

National Commission on Farmers

Serving Farmers And Saving Farming 2006 : YEAR OF AGRICULTURAL RENEWAL THIRD REPORT

Contents

	Page No.
Terms of Reference	
Composition of NCF	
Chapter I : 2006-07 : Year of Agricultural Renewal	1-24
Chapter II : Strengthening Agricultural Research: Towards Science Led Evergreen Revolution	25-127
Chapter III : Towards an Indian Single Market	128-171
Chapter IV : Technology Missions : Way Forward	172-227
Executive Summaries	228-257
Annexures :	
1) Field Visit to Punjab	258-263
2) Field Visit to Maharashtra	264-270
3) Recommendations on the Draft National Biotechnology Policy	271-274
4) Letter to Chief Ministers of States on implementation of Mission 2007: Every Village a Knowledge Centre	275-277
5) Press Release of the National Advisory Council	278-279
6) Gist of the Communication sent by the National Advisory Council	280
7) Constitution of Agriculture Coordination Committee	281-282
8) Summary of Consultations held	
a) Empowering of elected male and female members of Panchayats	283-287
b) Land Rights to Women in the light of Amendment to Hindu Succession Amendment Act, 2005	288-293
c) Women in Agriculture – What Next ?	294-306
9) Acknowledgement	307

TERMS OF REFERENCE FOR NATIONAL COMMISSION ON FARMERS

- ❖ Work out a comprehensive medium-term strategy for food and nutrition security in the country in order to move towards the goal of universal food security over time.
- ❖ Propose methods of enhancing the productivity, profitability, stability and sustainability of the major farming systems of the country based on an agro-ecological and agro-climatic approach and the harnessing of frontier technologies.
- ❖ Bring about synergy between technology and public policy and recommend measures for enhancing income and employment potential in rural areas through diversification, application of appropriate technology including IT for information on market, weather, credit facilities and e-commerce, training and market reforms.
- ❖ Suggest measures to attract and retain educated youth in farming and recommend for this purpose; methods of technological upgrading of crop husbandry, horticulture, animal husbandry, fisheries (inland and marine), agro-forestry and agro-processing and associated marketing infrastructure.
- ❖ Suggest comprehensive policy reforms designed to enhance investment in agri-research, substantially increase flow of rural credit to farmers including small and marginal, triggering agricultural growth led economic progress, which can lead to opportunities for a healthy and productive life to rural families.
- ❖ Formulate special programmes for dryland farming for farmers in the arid and semi-arid regions, as well as for farmers in hilly and coastal areas in order to link the livelihood security of the farming communities living in such areas with the ecological security of such regions. Review in this context, all ongoing Technology Missions like those relating to pulses, oilseeds, maize, cotton, watershed etc. and recommend methods of promoting horizontal integration of

vertically structured programmes. Also suggest credit-linked insurance schemes which can protect resource poor farm families from unbearable risks. Further, suggest methods of strengthening and streamlining the National Horticulture Development Board.

- ❖ Suggest measures for enhancing the quality and cost competitiveness of farm commodities so as to make them globally competitive through providing necessary facilities and application of frontier science and promote quality literacy for codex alimentarius standard, sanitary and phyto-sanitary measures among farmers through reorienting and retooling extension machinery. Also suggest methods of providing adequate protection to farmers from imports when international prices fall sharply.
- ❖ Recommend measures for the credit, knowledge, skill, technological and marketing empowerment of women, taking into consideration the increasing feminization of agriculture and the proposed conferment of right to land ownership.
- ❖ Suggest methods of empowering male and female members of elected local bodies to discharge effectively their role in conserving and improving the ecological foundations for sustainable agriculture like land, water, agro-biodiversity and the atmosphere with priority attention to irrigation water.
- ❖ Consider any other issue, which is relevant to the above or is specially referred to the Commission by Government.

The Commission is to submit a medium term policy for food and nutrition security in the country in order to move towards the goal of universal food security over time within the next three months and to submit its recommendations on other Terms of Reference as soon as practicable and in any case on or before 13th October, 2006. The Commission, however is permitted to submit interim reports on any of the Terms of Reference it deemed fit or expected of it.

[Ministry of Agriculture Resolution No.8-2/2003-Policy(ES) dated 18th November, 2004]

COMPOSITION OF THE NATIONAL COMMISSION ON FARMERS

The composition of the reconstituted National Commission on Farmers is as under:-

Chairman

Prof. M.S. Swaminathan

Full-time Members

Dr. Ram Badan Singh
Shri Y.C. Nanda

Part-time Members

Dr. R.L. Pitale
Shri Jagadish Pradhan
Ms. Chanda Nimbkar
Shri Atul Kumar Anjan

Member Secretary

Shri Atul Sinha

[Ministry of Agriculture Resolution No.8-2/2003-Policy (ES) dated 18th November, 2004]

CHAPTER I

2006 - 07: YEAR OF AGRICULTURAL RENEWAL

1. 1968 marked the beginning of the green revolution leading to quantum jumps in the productivity and production of wheat and rice. The last 10 years have witnessed a fatigue in the green revolution with the growth rate in foodgrain production falling below population growth. Thus, human numbers are increasing faster than our capacity to make the goal of food for all a reality. At the same time, consumption is not going up due to inadequate purchasing power at the household level. A famine of jobs/ livelihoods as a result of poor growth of opportunities for employment in the rural non-farm and off-farm sectors is leading to a famine of food at the household level. According to the Union Planning Commission, we are off-track in achieving the UN Millennium Development Goal of reducing the number of hungry persons by half by 2015. Also, we are off-track in reducing infant and maternal mortality rates and in achieving universal primary education.

2. Our Prime Minister has rightly emphasized the need to double annual foodgrain production from the present 210 million tonnes to 420 million tonnes within the next 10 years, i.e. by 2015, which is also a benchmark year for achieving the UN MDGs. This will call for producing at least 160 million tonnes of rice from 40 million ha and 100 million tonnes of wheat from 25 million ha. Pulses, oil seeds, maize and millets will have to contribute 160 million tonnes. In addition, the national goal is to raise the production of vegetables and fruits to over 300 million tonnes by 2015. Since land is a shrinking resource for agriculture, the pathway for achieving these goals has to be higher productivity per units of arable land and irrigation water. Factor productivity will have to be doubled, if the cost of production is to be reasonable and the prices of our farm products are to be globally competitive. The average farm size is going down and nearly 80% of the farm families belong to the marginal and small farmer categories. Fortunately, the ownership of livestock is more egalitarian. **Enhancing small farm productivity, and increasing small farm income through crop-livestock integrated production systems**

and multiple livelihood opportunities through agro-processing and biomass utilization, are essential both to meet food production targets and for reducing hunger, poverty and rural unemployment. Programmes designed to achieve these goals must be engendered, since there is increasing feminisation of agriculture, poverty and under-nutrition, as well as unfortunately HIV/ AIDS

3. 2005 has been a difficult year both for the nation and for farm and fisher families. Beginning with the titanic tsunami of 26 December 2004, and ending with the disastrous earthquake in Kashmir and floods in Tamil Nadu, our farm and fisher families have been subjected to the fury of nature in the form of drought, unseasonal and heavy rains (like the one which caused damage to the onion crop in Maharashtra) and floods. Institutional support to small farmers is weak. The same is true of post-harvest infrastructure. For example, even now paddy is being spread on the roads for drying in many places. The spoilage losses can be as high as 30% in the case of vegetables and fruits. Institutions, which are supposed to help farmers, such as research, extension, credit and input supply agencies, are by and large not pro-poor and pro-women. Mechanisms for risk mitigation are poor or absent. Hardly 10% of farmers are covered by crop insurance. Farm families are also not covered by health insurance. There is no Agricultural Risk Fund. Both risk mitigation and price stabilization are receiving inadequate policy support. The cost of production is invariably higher than the minimum support price, due to ever-increasing prices of diesel and other inputs. Investment in agriculture has suffered a decline over the past two decades. Capital formation in agriculture and allied sectors in relation to GDP started declining in the 1980s and is only now being reversed. This has adversely affected irrigation and rural infrastructure development. An unfortunate consequence of the constellation of hardships faced by small farm families is the growing number of suicides among farmers. The situation is particularly alarming in parts of Vidharba of Maharashtra State. **To our shame, the suicide hotspots include Wardha district, where Mahatma Gandhi spent a significant part of his life, fighting for freedom from colonial rule, so that the country can be rid of hunger, poverty and gender injustice.**

4. The cost-risk-return structure of farming is becoming adverse. Consequently, indebtedness is growing in rural areas. In Maharashtra over 55% of the State's farm households are in debt. Average household size of farmers is 5.5 at the All-India level. In the low-income groups, the average size goes up to 6.9. According to NSSO-59th round, the average monthly per capita consumption expenditure of farm households across India was Rs. 503 in 2003. Endemic hunger (i.e., chronic undernutrition), is high both in families without assets like land or livestock, as well as in families with small land holdings without access to irrigation. Policy reform in agriculture is thus overdue. Such policy reform should be pro-small farmer and pro-women and pro-landless agricultural labour. If we do not attend to the problems of small farm and landless agricultural labour families with a sense of urgency and commitment, the "Indian Enigma" of the co-existence of enormous technological capability and entrepreneurship on the one hand, and extensive under-nutrition, poverty and deprivation, on the other, will not only persist, but will lead to social disruption and violence and increasing human insecurity. Without peace and security, enduring economic progress will not be possible. NCF therefore recommends that the agricultural year 2006-07 be designated as the **Year of Agricultural Renewal**.

5. During this year, an integrated package of measures should be introduced in every part of the country to increase farm productivity and profitability in perpetuity without associated ecological harm. The programmes should cover all our major agro-ecological regions-arid, semi-arid (i.e. dry-farming) hill, coastal and wet (i.e. irrigated or high rainfall) zones. The present agricultural crisis can then be converted into an opportunity for not only reversing the decline, but for taking the agricultural revolution forward by helping farm families to bridge the gap between potential and actual yields in all major farming systems through mutually reinforcing packages of technology, services and public policies. The programmes initiated during the 2006-07: Year of Agricultural Renewal by Central and State Governments, Panchayati Raj institutions, Agricultural, Veterinary, Rural and Women's Universities and IITs, Private and Public Sector Industries, Civil Society Organisations and Mass Media should be designed to foster productivity, quality, sustainability, profitability and employment revolutions in the farm

sector in all the over 600,000 villages in the country. It should help to promote job-led economic growth in our villages.

6. The following should be the major components of the Action Plan for the Year of Agricultural Renewal. All of them require concurrent and integrated attention.

6.1.1 Soil Health Enhancement: Agricultural Universities, ICAR and CSIR Institutes, Krishi Vigyan Kendras, Fertilizer Companies, State Departments of Agriculture and Farmers' Associations and Panchayati Raj institutions should commemorate **2006-07 as the Year of Soil Health Enhancement**. The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) located at Hyderabad may be actively associated in this programme. ICRISAT has very valuable information on the soil health status in dry-farming areas, ICRISAT, CRIDA, CAZRI at Jodhpur and the National Bureau of Soil Survey and Land Use Planning of ICAR can provide technical support and assist in monitoring. For this purpose, the following steps need to be taken:

- i. Re-tool and re-equip all Soil Testing Laboratories in order to enable them to provide each farm household with a **Soil Health Card**, which contains integrated information on the physics (soil structure, occurrence of hard pan in the subsoil, etc.), chemistry (soil organic matter and macro- and micro-nutrient status), and microbiology (occurrence of earthworms, soil micro-organisms etc.,) of the soils. The Soil Health Cards should stimulate balanced fertilization, including the amelioration of micro-nutrient deficiencies.
- ii. Promote through campaigns and demonstrations, the introduction of fodder/ grain legumes in the crop rotations as also the cultivation of green and green-leaf manure crops.
- iii. Composting of all agricultural residues and wastes and the use of microbial fertilizers and farmyard manure should be promoted to the maximum extent possible.
- iv. Methods of improving soil health through integrated nutrient supply will have to be prescribed and farmers should be assisted to adopt the recommendations.

- v. All staff working in Soil Testing Laboratories should be retrained.
- vi. Integrated wasteland and biofuels programme should be promoted.
- vii. The Agri-clinics programme should be restructured and revitalized and farm graduates should be encouraged to take to a career of self-employment in the rural services sector.
- viii. Breeding soils for higher productivity may be undertaken in the case of problem soils and wastelands.
- ix. Wasteland development could be linked to the production of biofuel and industrial raw material (for the production of paper and board, rayon, packaging material etc) as well as fodder, firewood etc.
- x. Community Land Care movements may be launched by Panchayats

6.1.2 Soil Health Enhancement holds the key to improving the return from investment in other inputs like seeds and water. Dry-farming areas need particular attention from the point of view of overcoming micro-and macro-nutrient deficiencies. As stressed by the Prime Minister, the second green revolution has to begin in dry-farming areas

6.2. Irrigation Water: Supply Augmentation and Demand Management: Water is a public good and a social resource and not private property. The privatization of water supply distribution is fraught with dangers and could lead to water wars in local communities. **Increasing supply through rainwater harvesting and recharge of the aquifer should become mandatory.** In addition, a nationally debated and accepted strategy for bringing 10 million hectares of new area under irrigation under the Bharat Nirman programme should be developed. The Polavaram Project to be built across the Godavari in Andhra Pradesh is a case in point. Different viewpoints can be reconciled only by dialogue and consensus building. All existing wells and ponds should be renovated. Demand Management through improved irrigation practices, including sprinkler and drip irrigation, should receive priority attention. A Water Literacy movement should be launched and regulations should be developed for the sustainable use of ground water. Seawater farming should be promoted in coastal areas through the cultivation of mangroves, salicornia, casuarina and appropriate halophytic plants. The

conjunctive use of rain, river, ground, sea, and treated sewage water should become the principal method for the effective use of available water resources. In water scarce areas, the land use system should place emphasis on the cultivation of high value – low water requiring crops, such as pulses and oilseeds. Pulses and oilseed villages can be promoted where all farmers work together in harvesting rainwater and sharing the water equitably for growing pulses and oilseeds. Promotion of “**Hybrid arhar (pigeon pea) villages**” can be the starting point of a pulses revolution. In paddy and sugarcane, water saving methods of cultivation like those inherent in the “System of Rice Intensification” (SRI) methodology should be perfected and popularized. More crops per drop of water should not remain just a slogan. Land use decisions are also water use decisions. Hence, the choice of cropping systems should be based on irrigation water availability including rainfall pattern. Watershed management should be linked to the different Technology Missions as emphasized in our earlier reports, so that the concurrent availability of water and of the other inputs like seeds needed to optimize the benefit from irrigation water can be ensured. Low cost green houses can be promoted in areas where evaporation exceeds precipitation during many months in a year. Panchayats may be assisted in launching water literacy and water quality management programmes.

6.3. Credit and Insurance: Credit reform should consist of the following measures:

- i. **Interest rate on agricultural loans:** The spread between the deposit and lending interest rates in India is high by international standards. The need is to improve the efficiency in the financial intermediation by controlling both the transaction cost and the risk cost. On the part of the Government, crop insurance as well as the speed and manner in which the debt recovery and settlement process operates would need to be considerably improved. These improvements could be brought about in the medium to long term. A high interest rate means that a greater proportion of income has to be diverted to interest payment. **Keeping in view the decline in the profitability of agriculture, and increasing farmers’ distress and indebtedness, the government may consider providing support to the banking system for reducing the rate of interest for crop loans to 4% during the Year of Agricultural Renewal.**

- ii. **Compounding of interest on arrears:** The compounding of interest on arrears may be applied only in the case of recalcitrant borrowers who do not pay the dues inspite of having adequate repaying capacity. The farmers facing erosion in income and consequently their repaying capacity due to market failure should not be charged compound interest on arrears.
- iii. **Shift from micro finance to livelihood finance:** There is an urgent need for a paradigm shift from micro-finance to livelihood finance, as the access of the poor to micro-finance alone is not likely to alleviate their poverty. Livelihood finance is a comprehensive approach to promoting sustainable livelihoods for the poor, which includes financial services, [including insurance for life, health, crops and livestock: infrastructure finance for roads, power, market, telecom etc and investment in human development], agriculture and business development services [including productivity enhancement, local value addition, alternate market linkages etc] and institutional development services [forming and strengthening various producers' organisations, such as SHGs, water user associations, forest protection committees, credit & commodity cooperatives, empowering Panchayats through capacity building and knowledge centres etc.].
- iv. **Access to institutional credit in poverty stricken tribal areas:** Special efforts are required to improve the access to institutional credit in the poverty stricken tribal areas in the dry land agriculture regions like the Kalahandi belt of Orissa/ Palamau region of Jharkhand/ tribal areas of Chattisgarh/ Madhya Pradesh/ Andhra Pradesh and the Vidharba region of Maharashtra.
- v. **Agri-risk Fund:** There are areas in our country, which have recurrent and frequent drought/floods etc, which cripple the incomes of the farmers. These farmers become defaulters to the banks and thereby become "push-outs" of the credit system. Rescheduling and restructuring of their loans are not enough in the event of successive natural calamities. The government of India may step in to create an Agriculture-Risk Fund to provide relief [waiver in full/ part of loan and interest] to the farmers in the case of successive droughts, etc. and also waiver of interest on loans in areas hit by droughts, floods, heavy pest infestation etc. This

Fund should have contributions from the Central Government, State Governments and Banks in a predetermined fashion.

- vi. **Distress 'hot spots' – moratorium on debt recovery:** There is a need for moratorium on debt recovery including loans from non-institutional sources in distress hotspots, till reasonable profit margins in agriculture operations are restored. The debt recovery may be staggered in easy installments. For this purpose, liquidity support may have to be provided to the localised banks like the RRBs/Cooperative Banks etc.
- vii. **Credit for low cost/sustainable agriculture:** There is need for developing suitable project profiles for low input sustainable agriculture and aquaculture. Institutional credit should also be available for viable projects of sustainable farming practices including the upkeep of traditional breeds of cattle.
- viii. **Issue of Kisan Credit Card to women farmers:** The Kisan Credit Card (KCC) is a major innovation in agricultural credit. However, inspite of nearly 4.5 crore KCCs issued by the banks, very few cards have been issued to women farmers. As a matter of fact, no separate data are available in this regard. Keeping in view the fact that there are a very large number of women-headed farming families, particularly in the hills and NE Region, special effort is needed to issue KCC to these farmers. The banks may develop proper documentation systems to issue KCCs to women where the land is in the name of the menfolk who do not reside in the rural area [jobs in the cities/army etc] or face similar other situation and the land is cultivated by the wife.
- ix. **Distress sale - need for pledge loans:** Distress sale by small/ marginal farmers to square off their debts or for immediate consumption purposes soon after harvest is quite common. According to the Report of the Inter-Ministerial Task Force on Agricultural Marketing Reforms, micro-level studies reveal that about 50% of the marketable surplus of small/marginal farmers is disposed off in distress sale. It is normal for a farmer to get 10-15% discounted price for spot payment for his produce. **Pledge loans to farmers need to be liberalised and encouraged to help the farmers to overcome this problem.**

- x. **Credit business potential in marketing infrastructure:** The banking system needs to develop credit business potential of financing projects for improving/modernization of markets, storage including cold storage facilities, rural based transport operators, etc.
- xi. **Negotiable warehouse receipt:** There is a need to encourage instruments based on secondary markets of agriculture produce. The constraints in improving the negotiability of warehouse receipts need to be removed.
- xii. **Pariwar Bima Policy:** An integrated micro insurance policy providing floating cover for various risks i.e., hospitalisation of husband, wife and dependents, natural death, accidental death, permanent total or permanent partial disability and loss/ damage to dwelling unit etc., may be introduced with government support for the poor. The Panchayats and NGOs/ Self Help Groups could be the delivery arrangement for reaching a large number of clients. The government may meet a part of the premium cost as a life saving support towards a safety net for the poor.
- xiii. **Rural Insurance Development Fund:** A Rural Insurance Development Fund may be created to take up development work for spreading rural insurance.
- xiv. **Crop Insurance:** Crop insurance is covering about 14% of the farmers. The need is to expand the cover to all farmers and all crops in a time bound manner. The scheme needs to be made more farmer friendly and the premium reduced.
- xv. Establish **Credit Counseling Centres** where severely indebted farmers can be provided with a **debt rescue package** of information in order to get them out of the debt trap, and thereby save them from committing suicide.
- xvi. Establish in every block a **Self-help Group Capacity Building and Mentoring Centre** in order to equip members and managers of SHGs with the needed management, marketing and accounting expertise. The use of Kisan Call Centres needs to be popularized.
- xvii. Develop and introduce an integrated credit-cum-crop-livestock-human health insurance package.
- xviii. Promote credit and insurance literacy through the **Every Village a Knowledge Centre** movement. For this purpose, introduce policies for more extensive use of Community Radio linked to the internet/ cell phone.

6.4. Technology:

- i. Technology is the prime mover of change. Both technology fatigue and technology gap should be avoided. This will call for revitalization of research, education and extension systems. It is suggested that all ICAR institutions and Agricultural Universities may commemorate 2006–07 as the **Agricultural Technology Year**. The major aim of this year should be to strengthen participatory research and knowledge management with farming families and the organisation of about 60,000 Lab to Land programmes in the area of post-harvest technology and value addition to primary products. Farm schools should be established in the fields of farmer-achievers in order to foster farmer to farmer learning of new technologies.
- ii. Agricultural scientists should state the performance of new varieties and technologies in terms of **net income per hectare**, and not just in terms of yield per hectare. The aim of technological transformation of farming should be to enhance income per hectare on an environmentally sustainable basis.
- iii. There should be a proper match between production and post-harvest technologies and a post-harvest technology wing should be added to every Krishi Vigyan Kendra. Also, Lab to Land demonstrations should include post-harvest technology. **About 60,000 Lab to land demonstrations may be organized in the area of post-harvest handling, processing and value addition during 2006-07 to mark the 60th anniversary of our independence. Many of them should be organized in dry-farming areas, where millets, pulses, oilseeds and cotton are grown.** The help of CSIR and the Central Food Technology Research Institute (CFTRI), Mysore should be taken by ICAR while designing the Lab to Land programme. The demonstration should be so designed that they also serve as training ground.
- iv. For landless agricultural labour (both women and men), the aim should be to convert them into skilled workers, thereby adding economic value to their time and labour. The training should be in skills which can help in organizing market-

driven enterprises and the training methodology should be based on the principle of learning by doing.

- v. Management procedures which can confer the economy and power of scale to small and marginal farm families, such as **Small Holders' Cotton and Horticulture Estates** should be popularized. In such estates, production and biomass utilization can receive concurrent attention. Average farm size is going down steeply, and Farmers' SHGs in the form of joint management units like the Cotton, Horticulture, Aquaculture and other Estates are urgently needed. The SHG movement should cover both the production and post-harvest phases of farming.
- vi. Value addition to biomass will help to generate skilled jobs. Rice occupies the largest area in the country and the opportunities for generating more jobs and income by establishing Rice BioParks. Similarly, eco-boards can be produced from cotton stalks.
- vii. There should be a pro-nature, pro-poor and pro-woman orientation to technology development and dissemination. Organic Farming and Low External Input Sustainable Agriculture (LEISA) techniques should be promoted along with Integrated Natural Resource Management and Integrated Pest Management (IPM) techniques. The role of women, both as farmers and farm labour is critical for the success of eco-farming practices. Hence, all programmes designed to foster access to technologies must be gender sensitive.
- viii. Agricultural and Rural Universities, Home Science colleges and Research Institutes should foster participatory research and knowledge management systems with farm women and men. They should identify farm families from whom other farmers can learn (land to land transfer of technology). **Farm Schools** should be established in the fields of such farmer-achievers as recommended in the first report of NCF.
- ix. New technologies like biotechnology (BT) and Information, Communication Technology (ICT) should be demystified and a cadre of Rural **Farm Science Managers** should be developed by training a couple of women and men members of every Panchayat/ local body in the management of new technologies, such as

the establishment of refugia in Bt Cotton fields and the detection of spurious seeds by using the Bt detection kit developed by the Central Institute for Cotton Research, Nagpur. Under the 73rd Constitution Amendment, the responsibility of Panchayats includes agriculture and agriculture extension. **Therefore, a Scientist – Panchayat linkage is the need of the hour.** Genome Clubs may be organized in village schools and KVKs to spread genetic literacy. Illegal release of genetically engineered crop varieties like Bt Cotton should be stopped. Spurious seeds will ruin the spread of useful technologies.

- x. Inputs are needed for output. Hence, the right inputs should be available at the right time and place at affordable costs. Input supply systems should become farmer-friendly and also controlled by Farmer Self Help Groups to the extent possible. Quality standards should be enforced. The package of technology to be effective must be accompanied by an appropriate package of services in the areas of extension and input supply.
- xi. Energy is a key input. The energy sources needed by farm families, both electricity and diesel, should be available in a reliable manner and at affordable price. In addition, solar energy could be tapped where economical. There should be a Panchayat-led integrated energy generation and management movement.
- xii. ICT should be effectively harnessed to empower rural men and women through the Every Village a Knowledge Centre Movement with farming system and season specific information.

6.5.1 Market: Ultimately, it is only opportunities for assured and remunerative marketing that will determine the economic viability of farming both as a way of life and a means to livelihood. Market reform should begin with production planning, so that every link in the cultivation-consumption-commerce chain receives adequate and timely attention.

6.5.2 The existing State Land Use Boards are not equipped to provide proactive advice to farmers on land use planning. There is an urgent need for a **National Land Use Advisory Service, linked to State and Block Level Land Use Advisory Services** on a

hub and spokes model. These can be virtual organisations with the capacity to link land use decisions with ecological, meteorological and marketing factors on a location and season specific basis. The National Land Use Advisory Service can be linked to the proposed Indian Trade Organisation (ITO) as described later. It should have continuous contact with IMD, ISRO, Agricultural Universities and Departments, Commodity Exchanges and Futures Markets, APEDA, Commodity Boards and all credible national and international sources of information on domestic and international markets. The Land Use Advisory Service should cover crop and animal husbandry, horticulture, inland fisheries, forestry and agro-forestry, and have the capacity to proactively assess potential surpluses and shortages of essential commodities.

6.5.3 The State and Block level Land Use Advisory Service Organisations should have appropriate linkages to data providers at the State and local levels. The Block level Advisory Service can be located in the ISRO supported Village Resource Centres under the Mission 2007: Every Village a Knowledge Centre Movement.

6.5.4 Land use advice should be based on the quantity and quality of the available irrigation water and temperature. The National and State Level Land Use Advisory Services should also monitor the state of crops and issue timely warning on emergent surpluses and shortages. If this is done, situations like the recent onion shortage crisis can be avoided. **Without economically and ecologically sound and proactive advice on land and water use, farmers will have to fend for themselves in taking decisions on what to grow.** With the spread of agricultural globalisation, this can be disastrous to the economic health of farmers.

6.5.5 **Amendment to Acts/legal instruments:** The Essential Commodities Act and other legal instruments including the State Agriculture Produce Marketing Committee Acts [APMC Acts] relating to marketing, storage and processing of agriculture produce need to be reviewed in order to meet the requirements of modern agriculture and attracting private capital in this sector. We are glad that the Union Ministry of Agriculture has already taken action in this area.

6.5.6 **Periodic rural market:** There is a need for focused attention for improving the rural periodic markets, which are the first contact point for the farmers and also improving the infrastructural facilities at the regulated markets.

6.5.7 **Role of the APMCs/SAMBs:** The role of the APMCs/ State Agriculture Marketing Boards need to change from regulatory focus to promotion of grading, branding, packaging and development of distant and international markets for the local produce.

6.5.8 **Commodity-based farmers' organisations:** Commodity-based farmers' organisations should be promoted to facilitate direct farmer-consumer linkage.

6.5.9 **Long supply chain – farmers' organisations – Direct sales:** The supply chain is long and the intermediaries add their margin with very little/no value addition, leading to increase in the price paid by the ultimate consumer and low share of the producer. Farmers' organisations/ direct sale by farmers to consumers should be promoted.

6.5.10 **Post-harvest Operations:** The losses in harvesting, threshing, farm storage, packaging and transportation from farm to market are substantial resulting in huge loss to the farmer and the nation. The extension staff/PRI's could play an important role in educating the farmers in better post harvest management practices. As stressed earlier there is a need for introducing a Post Harvest Technology Wing in every Krishi Vigyan Kendra [KVK].

6.5.11 **MSP Implementation:** Implementation of MSP across the regions needs considerable improvement. Minimum Support Price arrangement needs to be put in place for many important crops other than paddy and wheat. These include for coarse cereals like millets. Without MSP support, advice to farmers on crop diversification could lead to disastrous results.

6.5.12 **MIS:** The price behaviour of sensitive commodities needs to be closely watched particularly during the glut periods for need-based intervention under the 'Market Intervention Scheme' [MIS] of the Government of India.

6.5.13 **Import Tariffs:** Import tariffs on farm products produced in resource poor regions deserve to be carefully monitored and maintained at such levels as to provide sufficient incentives to dryland farmers.

6.5.14 **Pre-production Agreements to sell:** Pre-production agreements for sale between the farmers and corporate houses/processing companies/others are being increasingly used in the case of certain vegetables/fruits/ medicinal plants etc. These agribusiness models are being loosely referred to as 'contract farming' though in many of these cases there is no formal contract between the farmers and the prospective buyer. The advantage of such arrangements could be biased in favour of the agribusiness organisation. However, there are beneficial effects of such arrangements to the farmers in the matter of access to adequate/timely credit, good quality inputs, new technology, employment generation, introduction to new crops, separation of production and marketing risks and better farm practices etc. **The need is to develop a comprehensive, clean, equitable and farmer centric model agreement, which cannot be abused against the farmers. Special care needs to be taken regarding clauses dealing with quality standards, withdrawal conditions, pricing standards, paying arrangements, acts of God clauses and arbitration mechanism.** Till such a code of conduct is introduced and the farmers are empowered by formation of groups/cooperatives to deal with the agribusiness unit on their behalf, one has to be rather cautious about these arrangements.

7. Thus, the National Agricultural Renewal Year Programme of 2006-07, should deal concurrently with soil health enhancement, augmentation of the area under irrigation coupled with efficiency and equity in water use, credit and insurance reform, technology upgradation and dissemination, and farmer-centred marketing. The aim of the Agricultural Renewal Programme will be enhanced productivity per units of arable land and irrigation water, higher profitability, increased on-farm and off-farm employment

opportunities and long-term environmental sustainability. Distress hot spots should receive priority attention.

8. In a globalised economy, we should develop appropriate institutional instruments and policies to safeguard the livelihood security of nearly 70% of our population who depend on crop and animal husbandry, inland and marine fisheries, forestry and agro-forestry and agro-processing for their work and income security. Risk Mitigation and Price Stabilization Funds will be needed. All Technology Missions and the Small Farmers' Agri-business Consortium (SFAC) should be restructured under competent professional management. Each Mission should have measurable time-bound goals. The Mission Director, an eminent professional, should be in position atleast for a period of 5 years.

9. Farmers need appropriate institutional support to enhance their agricultural competitiveness. Institutional support to confer on small farm families the power and economy of scale is vital to enhance the productivity and profitability of small farms. Multiple livelihood opportunities are essential for ensuring the income security of resource-poor farming families, particularly in rainfed semi-arid, arid and hill regions. Mixed farming and improved post-harvest technology leading to value addition to primary products can help to achieve this goal.

10. The Union Minister for Commerce and Industry and the Government of India have done a commendable job in safeguarding the interests of our farm women and men in the recent negotiations at Hong Kong. They have put together a broad-based coalition of the concerned. Postponement of agreement in agricultural negotiations will however prolong the unequal trade bargain entered into at Marrakesh in 1994. **As a national self-empowerment measure, we should consider establishing an Indian Trade Organisation (ITO) and our own boxes for domestic agricultural support on the model of WTO's Blue, Green and Amber Boxes.** The value of our annual agricultural production including livestock in 2002-03 was Rs. 5,60,516 crore¹. The value of our

¹ National Accounts Statistics of India, 1950-51 – 2002-03, EPW Research Foundation, Mumbai, 2004

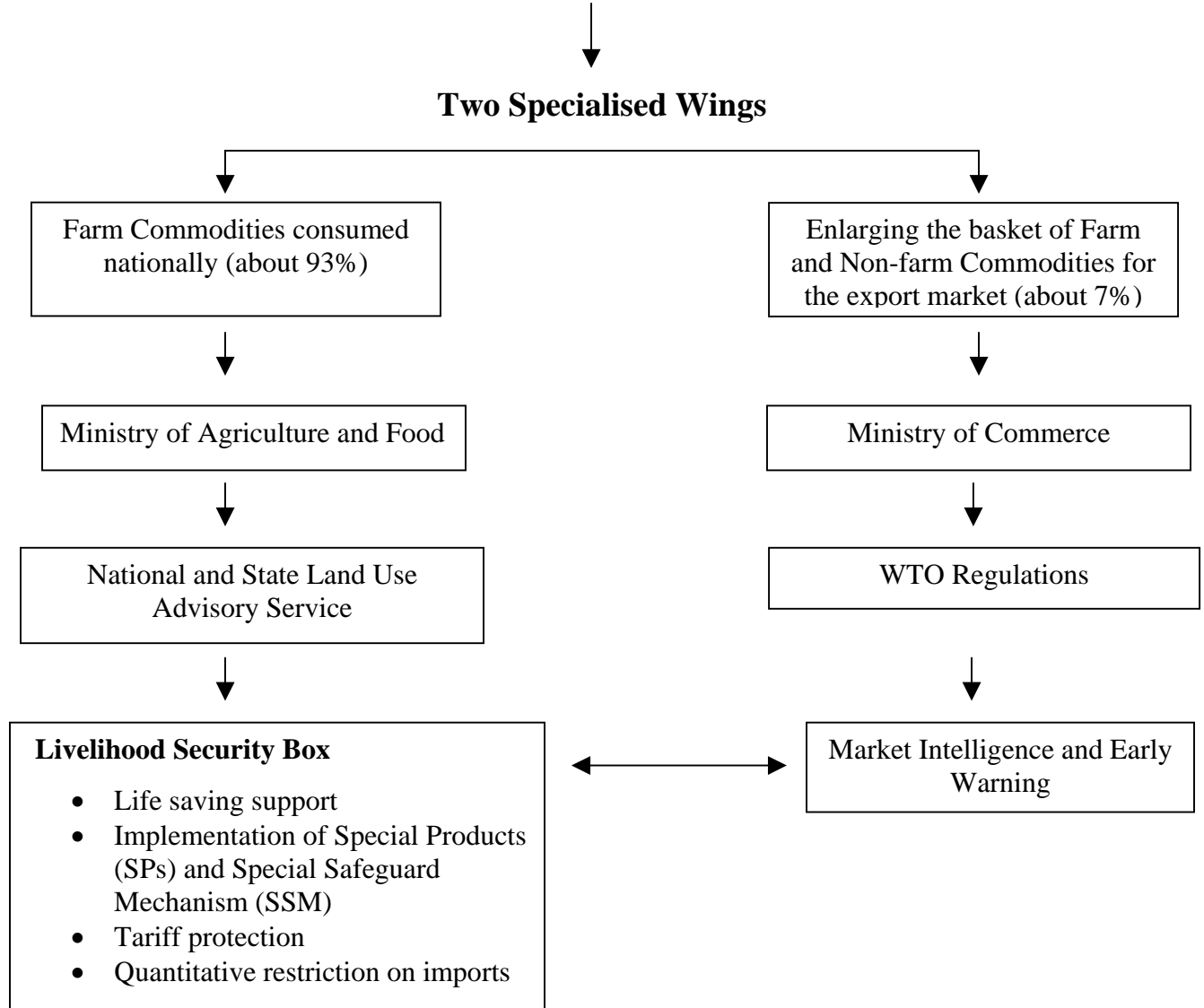
exports of farm commodities in 2002-03 was Rs. 34,654 crores (6.18 % of total agricultural production)². Thus only a small proportion of our agricultural commodities enter the global market, since with a population of over a billion, there is a large home market. **Hence, we must segregate the very modest support we extend to our farmers into two groups – those which are of the nature of life and livelihood saving support to small farm families, and those which could be considered as trade distorting in the global market.** The Indian Trade Organisation (ITO) can be a virtual organisation, specializing in WTO affairs. It can serve as a brain and information bank for enabling Government to take informed and proactive decisions. It can provide timely advice on potential surpluses and shortages in major agricultural commodities, by maintaining a trade watch. The Indian Trade Organisation should serve as a friend and guide to small farm families and should provide proactive advice on land use and crop planning. It should help to save resource poor farm families from the onslaught of the subsidy, technology and capital driven agri-business paradigm of OECD countries. **For this purpose, the proposed National Land Use Advisory Service can function as an arm of ITO.** In addition, ITO should help to impart trade and quality literacy through the national network of Village Knowledge Centres. It should monitor the arrangements for sanitary and phytosanitary measures and ensure that the codex alimentarius standards of food safety are maintained. The ITO will help to build a long-term memory system in relation to home and external trade and help checkmate adverse global trade trends by stimulating timely national action.

11. A schematic outline of the proposed institutional structures for safeguarding lives and livelihoods in rural India is given below:

² Agricultural Statistics at a Glance 2004, Ministry of Agriculture, Govt. of India

Indian Trade Organisation (ITO)

(Professionally-led, 21st Century Virtual Organisation established by the Ministry of Commerce & Ministry of Agriculture and Food)



12. Without the support of appropriate institutional structures, farm families will face increasing distress. It should be emphasized that the proposed ITO should accord priority to problems characteristic of the 'production by masses' category of farming. It should continuously emphasise the contrasting policy support needed by farm women and men engaged in subsistence farming, as compared to large agribusiness enterprises.

13. The proposed National and State level Land Use Advisory Services could be a part of ITO since this will help to ensure that the proactive advice on land and water use is based on the best available assessment of home and external trade opportunities

14. Launch of the Year of Agricultural Renewal Movement : This movement which will cover the crop year of 2006-07 should be launched with the support of State Governments, Farmers' Organisations, Business and Industry, Academia, Civil Society Organisations, Panchayati Raj Institutions and Mass Media. The year should end with the adoption by Parliament of a **National Policy for Farmers**, which will help to assure farm women and men that "Jai Kisan" is not an empty slogan. NCF will provide to the Ministry of Agriculture a draft National Policy for Farmers in April 2006, so that it can be widely discussed with farmers' organisations during May - December 2006 and finally adopted before the 60th anniversary of our independence. We must put faces before figures, if we are to understand the sad plight of farm families. To assure farmers that Government measures agricultural progress not merely on the basis of production targets, but also on the basis of real growth in farmers' income, figures on annual growth rate in farmers' income should be given. Such a change in mindset, which regards farm families as the custodians of food security and national sovereignty and not just as "beneficiaries" of small Government programmes, will become explicit by redesignating the Ministry of Agriculture as the "**Ministry of Agriculture and Farmers' Welfare**".

15. The various components of the Year of Agricultural Renewal can be discussed and finalized by the Agriculture Coordination Committee chaired by the Prime Minister and the NDC Committee on Agriculture chaired by the Union Minister for Agriculture and Food. State Governments and Panchayati Raj Institutions will have to play the principal role in developing the precise strategies for soil health enhancement, water conservation and equitable and efficient use, credit and insurance, technology choice and delivery, and home and external marketing. The Government of India will have to take urgent steps to protect the over 600 million strong Indian farming community from the onslaught of the highly subsidized agri-business paradigm. International prices of farm commodities often give the wrong impression that farmers in OECD countries are more

efficient. According to Oxfam, the United States provided to about 25000 cotton farmers nearly US Dollars 3.8 billion in subsidies during 2004. No wonder they captured 40% share of global trade in cotton. The MSP for cotton should be worked out on the basis of what an undistorted price of cotton per quintal would be. **The need to announce an advance bonus of Rs. 550 per quintal is urgent in the case of cotton.** It should be noted that cotton farmers constitute a large proportion of those who have committed suicide.

16. Indian Farmers and Bharat Nirman : Bharat Nirman will help to foster job-led economic growth in villages and bring about a shift from unskilled to skilled work in the case of women and men without assets like land, livestock or fish pond. Improved communication (roads and telephones) and provision of electricity will help to open up new opportunities in the rural manufacturing and trade sectors. Gandhiji's dictum that "Gram Swaraj is the pathway to Poorna Swaraj" should be the guiding spirit behind Bharat Nirman.

17. We offer the following suggestions to ensure that the new deal to rural India also results in a new deal to farm and fisher families.

17.1.1 Consultation and Consensus: Ten million ha of additional land are to be brought under irrigation by 2009. This will consist of the following steps:

- i. Completion of ongoing major and medium irrigation projects: 4.2 mha
- ii. Minor irrigation
- iii. Surface water: 1.00 mha
- iv. Ground water: 1.80 mha
- v. Enhancing utilization of completed projects 2.00 mha
- vi. Ground water development for small and marginal farmers, tribal and Dalits: 1.00 mha

17.1.2 As mentioned earlier, there are ongoing debates in all these areas from the environmental, political and social points of view. Frequently matters have to be settled by courts. Therefore the precise strategy for irrigation water security should be discussed in multi-stakeholder consultations at the State level as soon as possible so that continuous conflicts and litigation can be avoided.

17.2 Capacity Building: Atleast one woman and one male member of every one of the about 240,000 Panchayats/ local bodies should be trained to become Members of a **Bharat Nirman Corps. Bharat Nirman will then become everybody's business.** The training of the Members of the Bharat Nirman Corps can be done by Agricultural, Rural and Women's Universities, IITs and by appropriate NGOs, Farmers' Organisations, NABARD and Financial Institutions and Business and Industry.

17.3 Care and Management of the Infrastructure: Steps should be taken to ensure that there are adequate funds and institutional structures to maintain and improve the infrastructure created at enormous expenditure. The Gram Sabha should be involved in the process of providing oversight and advice.

17.4 Convergence and Synergy: At the local level, it is essential that there is convergence and synergy among other large social and human development programmes such as the National Rural Employment Guarantee Act and the National Rural Health Mission. Such measures would make the programme for Agricultural Renewal inclusive, ensuring attention to the livelihood security of agricultural labourers and landless families. Priority may be given to the integrated implementation of all these programmes in the **Farmers' distress hotspots** in every State. The 500,000 Members of the proposed Bharat Nirman Corps can become the grassroot voices for the Gram Swaraj and Jai Kisan Movements.

18. **Knowledge Connectivity :** NCF is grateful to the Government of India for accepting the recommendation made in its second report (August, 2005) that Knowledge Connectivity should become fundamental to physical connectivity under the Bharat

Nirman programme. We welcome the following statement in the revised Bharat Nirman document regarding Knowledge Connectivity:

“The Government is committed to expanding rural connectivity through a slew of measures so that rural users can access information of value and transact business. This will include connecting block headquarters with fiber optic network, using wireless technology to achieve last mile connectivity and operating information kiosks through a partnership of citizens, Panchayats, Civil Society Organisations, the Private sector and Government.”

19. The National Alliance for Mission 2007: Every Village a Knowledge Centre facilitated by NCF provides a platform for partnership for achieving the goal of knowledge connectivity under Bharat Nirman. NCF recommends that Government may review its policy towards **Community Radio**, since a combination of the Internet/ cell phone and community radio will help to take timely information to farmers even in the remotest parts of the country.

20. In 1995, the Supreme Court of India ruled, “**air waves or frequencies are public property**”. The principle is the same as for seawater enshrined in the immortal Dandi march of Mahatma Gandhi. A successful merger of tele-centre technologies and the radio will help to usher in an era of knowledge revolution in rural India. Efficient disaster management and mitigation will be greatly facilitated by such a step. We therefore recommend that Village Knowledge Centres (VKC) may be permitted to apply for a community radio license. The eligible organisations should also include Gram Sabhas, Cooperatives, ICT-Self Help Groups promoted by NABARD, NGOs and Educational Institutions.

21. As Community radio applicants generally represent rural, remote and deprived communities, with limited funds and access to Delhi, a single window clearance should be given for CR licenses. It is important to recognise that the applicant, being a small outfit in rural areas will not be able to access various departments in government for

clearance. NCF suggests, that the extension and provision of community radio licences to village knowledge centres is seen as a part of Bharat Nirman. In the light of the above, all clearances and documents, including the Wireless Operating License, should be granted within a period of three to four months from the date of receipt of the application. The Community Radio license should be valid for a period of five years from the date of operationalising the radio station, with the option to request an extension for another five years. No license fee should be levied on the CR license holder. The requirement of furnishing a bank guarantee at the time of applying should ideally be done away with, or should be a token amount of Rs 5,000. A community radio station may be permitted to cover an area of minimum of 10 kilometres radius, for which a minimum transmitter power of 100 watts is required. However, in case of hilly, isolated and sparsely populated terrain, a more powerful transmitter or a wider coverage area may be required to reach the target community. In such cases, the transmitter power may be fixed according to topographic and demographic requirements. Broadcasting using transmitters up to half a watt should be de-licensed. The number of frequencies to be allotted for community radio should ideally be fixed at three within a particular coverage area for optimisation.

22. In an era of *globalisation* and bottom-up approaches to development, Community Radio can act an important medium in strengthening grassroots and mainstream linkages; act as a true people's medium and contribute towards creating a vibrant, aware and informed community, the hallmark of a true democracy. As one of the signatories to the process of the World Summit on Information Society, India is committed to ensure a political atmosphere that enables the creation of a ***“people-centred, inclusive and development-oriented Information Society, where everyone can create, access, utilize and share information and knowledge.”*** Extending to the citizens of India, ***a right over airwaves*** would be an essential measure in both these regards.

23. A Community Radio Station attached to VKCs may be permitted to cover an area of approximately 10 kilometers radius. In the case of hilly areas as well as fishing zones in oceans, a wider coverage will be needed. Broadcasting using transmitters upto half a

watt should be delicensed. The Community Radio license should follow the programme and commercial codes of the All India Radio. **A forward-looking Community Radio Policy which will be in keeping with the spirit of the Right to Information Act is the need of the hour.** Knowledge and skill empowerment of farm families is essential for achieving the goals of the Year of Agricultural Renewal.

24. To sum up, we should not remain silent spectators to a steady agricultural decay. Both human security and national sovereignty are at stake. Overall economic growth rates have little meaning if we do not look after the economic health and survival of over 60% of our population. The Year of Agricultural Renewal programme, if implemented with speed and dedication, can help to launch the country on the path of an ever-green revolution in agriculture characterized by continuous improvements in productivity and profitability without associated social or ecological harm. Improving small farm productivity, as a single step, will make the largest contribution to the eradication of hunger and poverty. This, together with the generation of market driven non-farm livelihood opportunities through the proposed ICAR-CSIR 60,000 Lab to Land demonstrations in post-harvest technology and agro-processing will help the country to realize the full benefits of **Bharat Nirman**.

CHAPTER II

STRENGTHENING AGRICULTURAL RESEARCH: TOWARDS SCIENCE-LED EVERGREEN REVOLUTION

2.1.0 Introduction

“However efficient the organization which is built up for agricultural demonstration and extension, unless that organization is based on the solid foundations provided by research, it is merely a house built on sand”

(Royal Commission on Agriculture, 1925)

2.1.2 **Science and technology are the engines of agricultural growth and development.** This was amply demonstrated in the Green Revolution process in India triggered by the development and widespread adoption of high yielding varieties (HYVs) of rice and wheat and ushered in by the synergistic congruence of technological, political and socio-economic forces in 1968. Green Revolution technologies played a major role in increasing food supplies, in lowering and stabilizing food prices, in increasing farm incomes and in generating additional income and employment in the non-farm economy. Even poor producers were able to internalize their production and employment benefits to improve their incomes and food security. Poverty levels in rural areas declined and the country moved from food deficit to food surplus in two decades, thanks to high growth in total factor productivity.

2.1.3 Early projections expected these trends to continue though indications were there in the mid-1990s that a deceleration of the rate of technical change could erode these gains significantly. With respect to the vanguard crops - rice and wheat, and leading regions - northwestern India, there is indeed a deceleration. Wide yield gaps continue for all crops at various levels. New challenges have also emerged even as the traditional concern of sustained food security permits no room for complacency. Poverty and hunger, despite significant improvement are still at unacceptable levels as India is home

to nearly one-fourth of the World's hungry and poor. It is becoming obvious that **past paradigms and institutions will not serve either the cause of growth or of poverty alleviation**. No wonder, India is off track in achieving the UN Millennium Development Goals, particularly in the areas of hunger and poverty reduction.

2.1.4 Today, **Green Revolution has waned** and India's agricultural growth rate in recent years has slipped below the population growth rate. This has implications for economic growth, food security, equity and rural welfare. The mid-term review of the 10th Plan had also revealed that the progress is way off the track in meeting all the targets set for the Plan period and beyond. This trend must be reversed to help achieve the desired agricultural growth rate of about 4 percent per annum. This requires a multi-pronged strategy, developed around technology flow. We have analysed the nation's agricultural research and technology development system with a view to suggest as to how the R&D sector should be strengthened and reoriented to play the pivotal role in creating a **science-based and knowledge-led evergreen revolution**. We are convinced that science and technology will assume even greater role than in the past, but 'more of the same' will not serve the cause. Contemporary challenges and opportunities would demand a reorientation of agricultural R&D institutions, strategies, and a new paradigm to steer these.

2.2.0 The State and Trend of Food, Agriculture and Food Security

2.2.1 During the past over 40 years (between 1962-63 and 2003-04), spanning the Green Revolution era, foodgrains production increased from about 83 million tonnes to about 200 million tonnes, primarily due to increase in cereal production, particularly rice and wheat, from 70 million tonnes to nearly 187 million tonnes (**Table 1**). Oilseeds, sugarcane and cotton productions had also increased by 2 to 3 times. But, the production of pulses remained more or less stagnant, around 12 million tonnes, although in recent years there is some acceleration. As regards livestock production, from 1970 onwards, the growth has been phenomenal, multiplying from 23 million tonnes in the triennium ending (TE) 1972-73 to 88 million tonnes in the TE 2003-04. Today, with an annual

production of nearly 100 million tonnes, India is the largest milk producer in the world. Fish and eggs productions had also multiplied 5 to 6 times.

Table 1: Production Trend in Indian Agriculture

Commodity group	Unit	TE 1962/63	TE 1972/3	TE 1982/83	TE 1992/3	TE 2003/04
Foodgrains	Million tonnes	81.6	103.5	130.8	174.8	199.7
Cereals	Million tonnes	69.6	92.6	119.5	161.7	186.5
Pulses	Million tonnes	12.0	10.9	11.3	13.0	13.2
Oilseeds	Million tonnes	7.2	8.6	10.5	19.1	20.3
Sugarcane	Million tonnes	101.9	121.6	176.7	241.0	293.5
Cotton	Million bales	5.3	5.8	7.5	10.3	10.8
Potato	Million tonnes	2.9	4.7	9.9	15.6	24.2
Milk	Million tonnes	20.2	23.0	34.0	55.8	87.7
Eggs	billion nos	3.2	6.6	10.8	21.7	40.8
Fish	Lakh tonnes	12.2	18.3	24.1	41.2	61.8

Source: Agricultural Statistics at a Glance 2004

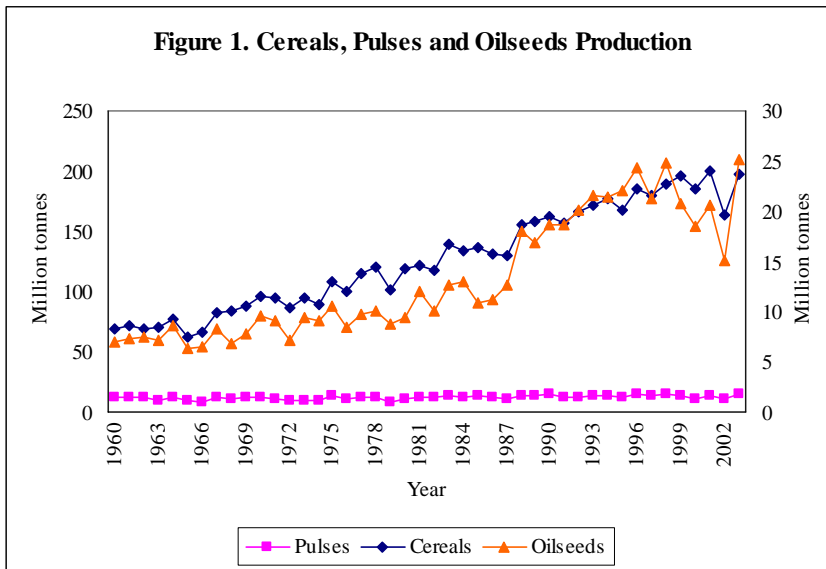
2.2.2 **The quantum jumps in the productions were realised through quantum jumps in yield.** For instance, cereals yield increased from 750 kg/ha in TE 1962-63 to 1915 kg/ha in TE 2003-04 (**Table 2**). It is heartening to note that about 70 to 75 per cent of the production increases in most of the commodities were through increases in yield per hectare. It may be further noted that while the Green Revolution had occurred essentially in wheat and rice, its spill- over effect was visible in other commodities and production systems.

Table 2: Productivity (kg/ha) Trend for Major Commodity Groups

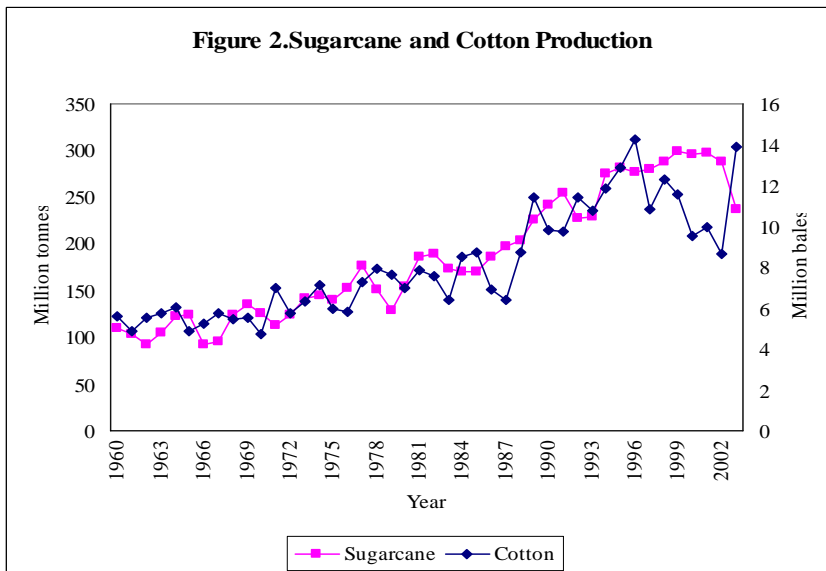
Commodity group	TE 1962/63	TE 1972/3	TE 1982/83	TE 1992/3	TE 2003/04
Foodgrains	698	848	1030	1406	1671
Cereals	750	924	1150	1599	1915
Pulses	499	500	492	562	598
Oilseeds	493	520	580	761	904
Sugarcane	42961	48902	56251	65129	66477
Cotton	686	756	944	1367	1330
Potato	7362	9520	13247	15507	18574

Source: Agricultural Statistics at a Glance 2004

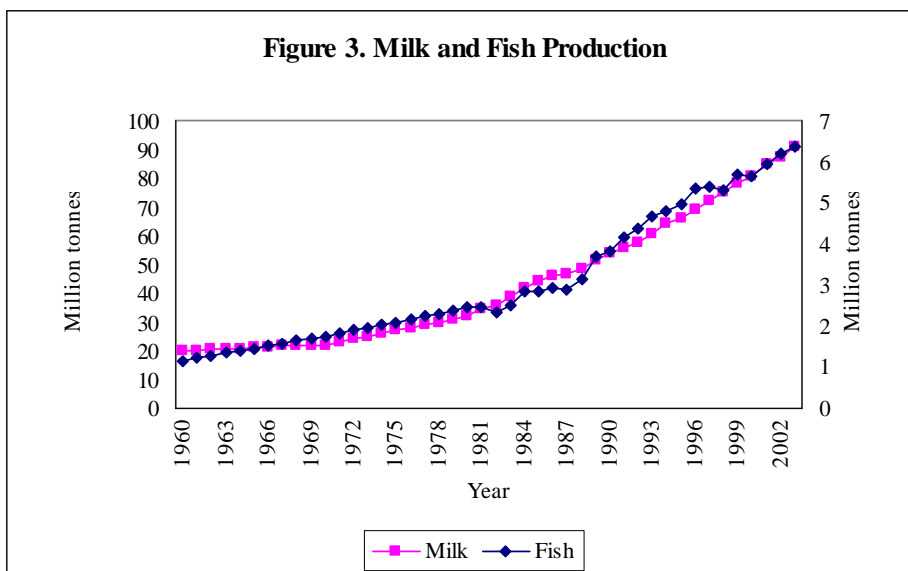
2.2.3 However, as seen in **Figures 1 and 2**, production of cereals, oilseeds, sugarcane and cotton from 1996 onwards has remained stagnant and at times even declined. Nonetheless, lately (during 2004-05), cotton production has shown remarkable progress and has increased to about 243 lakh bales in 2005 from about 138 lakh bales in 2003. During the same period, the cotton lint yield has increased from less than 300 kg/ha to over 500 kg/ha (partly attributed to the rapid adoption of Bt Hybrid cotton varieties). Fortunately, although slightly decelerated, livestock and fish productions continue to maintain steady growth (**Figure 3**).



Source: *Agricultural Statistics at a Glance 2004*



Source: *Agricultural Statistics at a Glance 2004*



Source: *Agricultural Statistics at a Glance 2004*

2.2.4 During the next 5 to 15 years (by the years 2010 and 2020), foodgrains production will need to be increased by about 45 and 90 million tonnes, respectively, from the current level (**Table 3**), requiring an annual growth rate of 1.96 percent, against 2.18 percent registered during 1995 to 2000. Human demand for high value food products, namely, fruits, vegetables, milk, meat, egg and fish, as evident from the past consumption trend (**Table 4**), and further propelled through income growth (GDP growing annually by 7 to 8 percent), is projected to increase by about three-fold towards the year 2020 at a high trend growth rate of about 4 to 5 percent (against a trend growth rate of about 1.96 percent for foodgrains) (**Table 5**).

Table 3. Domestic Demand for Foodgrains by Commodities

Foodgrains	Domestic demand (mt)			Demand growth (%)	
	1995	2010	2020	1995-2000	2000-2020
Rice	77.0	103.7	121.9	2.14	1.78
Wheat	61.7	84.2	100.3	2.17	1.91
Coarse grains	27.6	35.8	43.5	1.68	1.88
Pulses	14.2	23.0	30.9	3.42	3.09
Foodgrains	180.5	247.8	296.6	2.18	1.96

Source: Kumar, Praduman, 1998. *Food Demand and Supply Projections for India. Agricultural Economics Policy Paper 98-01. New Delhi: Indian Agricultural Research Institute*

Table 4. Food Consumption (g/person/day)

Food groups	1969-1971	1979-1981	1990-1992	1995-1997	2000-2002
Cereals & prod.	402	410	451	449	424
Eggs & products	1	2	3	4	4
Fish, seafood & prod.	8	8	11	12	13
Fruits & prod.	70	71	79	96	103
Meat (slaughtered) & prod.	10	10	13	13	14
Milk & products	90	107	148	164	174
Oil crops	15	12	20	20	18
Pulses & products	45	34	36	35	31
Starchy roots & products	47	54	55	61	67
Sweeteners	53	54	62	64	67
Vegetable oils & prod.	11	14	18	22	26
Vegetables & products	118	133	146	153	188

Source: FAO STAT

Table 5. Household Human Demand for High Value Commodities

Commodity group	Human demand (mt)			Demand growth (%)
	1995	2010	2020	1995-2020
Fruits	36.2	65.8	97.6	4.05
Vegetables	74.9	127.7	181.1	3.59
Milk	66.2	122.0	182.8	4.14
Meat & Egg	3.3	7.2	12.1	5.33
Fish	5.0	10.8	18.3	5.32

Source: Kumar, Praduman, 1998. *Food Demand and Supply Projections for India*. Agricultural Economics Policy Paper 98-01. New Delhi: Indian Agricultural Research Institute

2.2.5 Given that nearly 600 million Indian people (about 60% of the total population are directly dependent on agriculture, comprising about 120 million farm families, the country, of necessity, aims to meet its food and agricultural demand almost entirely from its domestic production. Thus, the demand projections closely match the production targets (**Table 6**). As seen in **Table 6**, area under foodgrains in 2010 will be only 121 million ha against 124 million ha in TE 1994-95. Therefore, **the projected additional production towards the years 2010 and 2020 must accrue entirely through yield increases of about 50 to 100 percent over the base year TE 1994-95 (Table 7).**

Table 6. Production Targets for the Years 2010 and 2020

Items	TE 1994/ 95		Area in years 2000 to 2010 (mha)	Production Target (mt)	
	Area (mha)	Prod (mt)		2010	2020
Crops					
Rice	42.19	78.1	42.18	103.6	122.1
Wheat	25.13	60.8	26.24	85.8	102.8
Coarse grains	33.25	32.6	30.69	34.9	40.9
Total cereals	101.57	171.5	99.11	224.3	265.8
Pulses	22.59	13.4	21.69	21.4	27.8
Foodgrains	124.16	184.9	120.8	245.7	293.6
Fruits	3.2	33	3.2	56.3	77
Vegetables	5.1	71	5.28	112.7	149.7
Livestock and poultry products					
Milk	-	60.5	-	103.7	142.7
Meat & eggs	-	3.2	-	5.4	7.8
Marine products	-	4.6	-	8.2	11.8

Source: Kumar, Praduman, 1998. *Food Demand and Supply Projections for India. Agricultural Economics Policy Paper 98-01. New Delhi: Indian Agricultural Research Institute*

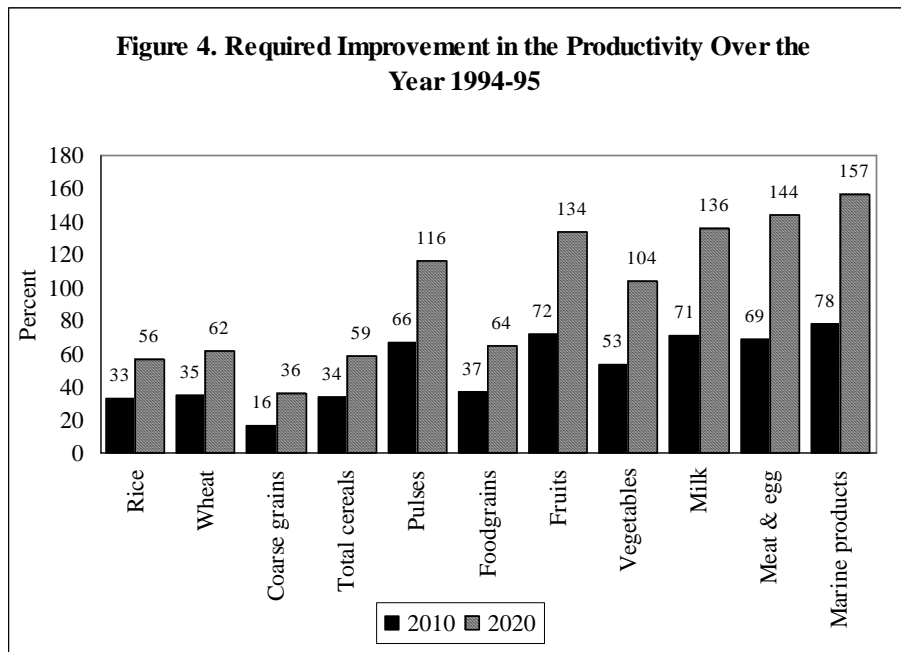
Table 7. Target Yield (kg/ha) Levels to Meet the Future Demand

Crop	Yield achieved in TE 1994/95	Required yield level	
		2010	2020
Rice	1851	2456	2895
Wheat	2420	3270	3918
Coarse grains	979	1137	1333
Total cereals	1688	2263	2682
Pulses	593	987	1282
Foodgrains	1489	2034	2447
Fruits	10281	17656	24063
Vegetables	13921	21345	28352

Source: Kumar, Praduman, 1998. *Food Demand and Supply Projections for India. Agricultural Economics Policy Paper 98-01. New Delhi: Indian Agricultural Research Institute*

2.2.6 As seen in **Figure 4**, the average yield at the national level is required to be improved by 33 per cent for rice, 35 per cent for wheat, 16 per cent for coarse cereals, 66 per cent for pulses, 37 per cent for vegetables and 72 per cent for fruits by 2010 over the base year 1994-95. **By 2020, the yield level over the base period yield is required to be improved by 56 per cent for rice, 62 per cent for wheat, 36 percent for coarse**

cereals, and 116 per cent for pulses. The production of livestock and poultry products must be improved by 70-80 per cent by the year 2010 and 136-157 per cent by the year 2020. This level of yield improvement requires serious efforts on the part of the National Agricultural Research System (NARS). The emphasis for achieving the required increments in yield levels must be placed on regions where the current yield levels are low.



Source: Kumar, Praduman, 1998. *Food Demand and Supply Projections for India. Agricultural Economics Policy Paper 98-01. New Delhi: Indian Agricultural Research Institute*

2.2.7 Annual total agricultural production is a function of extent of cultivated area, yield per hectare and cropping intensity. The cropping intensity (currently around 130 percent) and yield per ha largely depend on **water availability** (irrigation intensity), **plant nutrient application and availability** (fertiliser consumption) and on **extent of area coverage under quality seeds of modern varieties – the three pillars of the Green Revolution**, of course, duly supported by appropriate policies and services. As seen in **Table 8**, net cropped area increased from 135 million ha in 1961 to 142 million ha in 1981 and since then has stagnated and even marginally decreased. Area under irrigation has more than doubled from about 25 million ha in 1961 to 55 million ha in 2001. Quantum jump had occurred in fertiliser consumption which increased from 0.34 million tonnes in 1961 to over 16 million tonnes in 2001 (in elemental terms, the nutrient

supply increased from less than 10 kg NPK per ha to over 90 kg NPK per ha). The coverage under High Yielding Varieties (HYVs) of rice and wheat ranges from about 60 percent to almost 100 percent, varying from State to State and region to region within States, the adoption being much higher under irrigated conditions as compared to that in rainfed and other non-congenial settings.

Table 8. Input use in Agriculture

Particulars	Unit	1961	1971	1981	1991	2001
Net Cropped Area	Million ha	135.4	139.7	141.9	141.6	141.0
Irrigated Area	Million ha	24.9	31.6	40.5	49.9	54.7
Fertilizer Consumption	Thousand tonnes	338	2657	6064	12728	16094*

* Figures relate to 2002-03; Source: Agricultural Statistics at a Glance 2004

2.2.8 In recent years, however, **the three pillars of the Green Revolution have weakened**. The growth in fertiliser use has greatly decelerated. Non-availability of quality seed in adequate quantity, at desired time and at reasonable cost, is a major constraint. The irrigation growth has also decelerated and has often accentuated salinity and water logging problems. **The use efficiency of all the three factors has thus greatly deteriorated**. The rates of adoption of new technologies have also been far below its expected level (**Table 9**). These adverse trends of resource use and technology transfer are certainly responsible for the sluggishness of Indian Agriculture in recent years.

Table 9. Percentage Farmers Using Modern Inputs

Input	Kharif	Rabi
Fertilizer	75.7	54.2
Improved Seed	46.3	34.3
Pesticides	46.4	30.8
Veterinary Service	30.3	22.3

Source: Chand, Ramesh, 2005. WTO and Indian Agriculture: Issues and Experience

2.2.9 **Table 10** gives the composition of agricultural economy of different States as well as of the country as a whole. The contribution of crops sub-sector to the agricultural economy has decreased from 76% in 1981 to 66% in 2002 whereas the

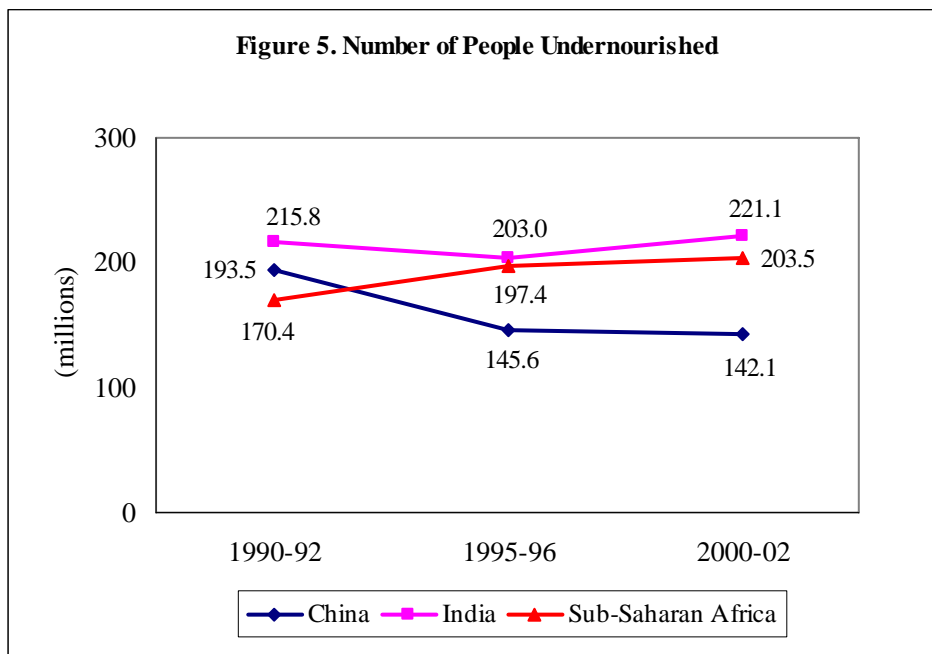
contribution of livestock sub-sector has increased from 18% to 25% and that of fisheries from 1.9% to 4.4%. Considerable differences amongst the States regarding magnitudes of contributions of the various sub-sectors have emerged over the years. As regards crops, in several States, such as Madhya Pradesh (where the contribution of crops has increased from 70% to 75%), Maharashtra, Orissa, Tamil Nadu, Uttar Pradesh and Assam, the contribution was over 70%. The livestock sub-sector contributed over 30% to the agricultural economy in Rajasthan, Punjab and Haryana and between 25% to 30% in the States of Andhra Pradesh and Himachal Pradesh. The fisheries sub-sector had relatively high importance in the States of Goa, Andhra Pradesh, Assam, Gujarat, Orissa and West Bengal. **These trends must be internalised while allocating resources and setting priorities for research and technology development programmes in different States and regions.**

Table 10. Composition of agricultural economy in India (%)

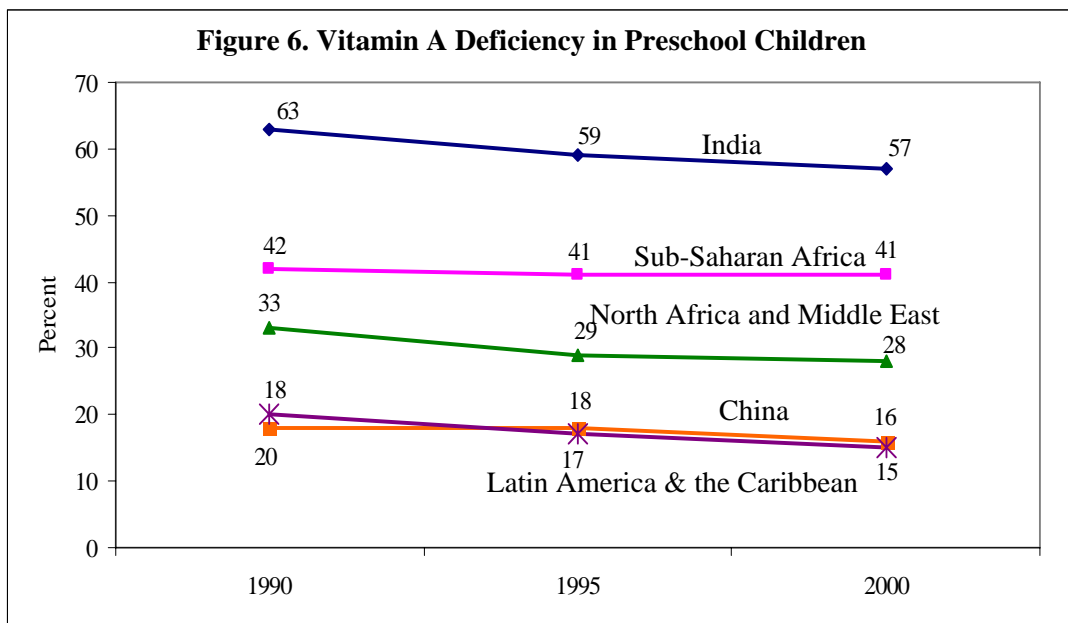
States	Crop sector			Livestock sector			Forestry			Fishing		
	1981	1991	2002	1981	1991	2002	1981	1991	2002	1981	1991	2002
Andhra Pradesh	82.2	79.8	62.7	14.2	18.1	26.6	1.6	1.0	2.4	2.0	1.1	8.3
Assam	79.4	79.3	73.6	12.8	16.4	13.8	4.1	1.8	4.1	3.7	2.4	8.5
Bihar	73.2	63.8	68.8	21.3	31.1	24.2	3.8	3.3	2.4	1.7	1.7	4.7
Goa	64.6	69.4	69.0	14.0	16.7	15.8	9.6	2.7	2.3	11.8	11.1	12.8
Gujarat	81.5	73.7	63.9	13.7	21.7	24.8	3.3	2.3	3.0	1.6	2.4	8.3
Haryana	69.4	70.6	66.8	30.0	28.7	32.5	0.5	0.3	0.4	0.1	0.3	0.3
Himachal Pradesh	58.6	59.2	58.4	21.1	30.5	27.9	20.0	9.9	12.8	0.3	0.4	0.8
Karnataka	80.7	81.7	72.5	15.2	16.2	20.9	3.1	1.4	4.3	1.0	0.7	2.4
Kerala	75.1	72.8	62.2	16.2	23.8	25.3	4.8	0.9	6.7	3.9	2.5	5.8
Madhya Pradesh	70.3	72.5	75.2	18.3	24.9	19.8	11.3	2.3	4.6	0.1	0.2	0.4
Maharashtra	73.9	71.3	71.8	18.3	22.6	22.0	6.4	5.0	4.3	1.5	1.1	1.9
Orissa	84.6	86.7	75.0	6.2	7.4	11.5	7.2	3.3	7.5	2.0	2.6	6.0
Punjab	73.2	73.2	68.1	25.6	26.1	30.8	1.2	0.6	0.3	0.1	0.1	0.9
Rajasthan	72.6	70.6	64.4	26.2	27.3	31.4	0.9	2.1	4.0	0.3	0.1	0.2
Tamil Nadu	79.2	76.2	72.7	18.2	21.1	21.4	0.8	1.8	2.4	1.8	0.9	3.4
Uttar Pradesh	78.9	75.8	73.1	18.3	23.3	22.5	2.5	0.5	3.2	0.3	0.4	1.3
West Bengal	72.7	67.1	67.3	16.7	25.8	20.5	3.0	1.1	2.0	7.6	5.9	10.2
All India	76.2	73.7	66.1	18.3	23.1	25.0	3.9	1.9	4.5	1.9	3.0	4.4

Source: National Account Statistics

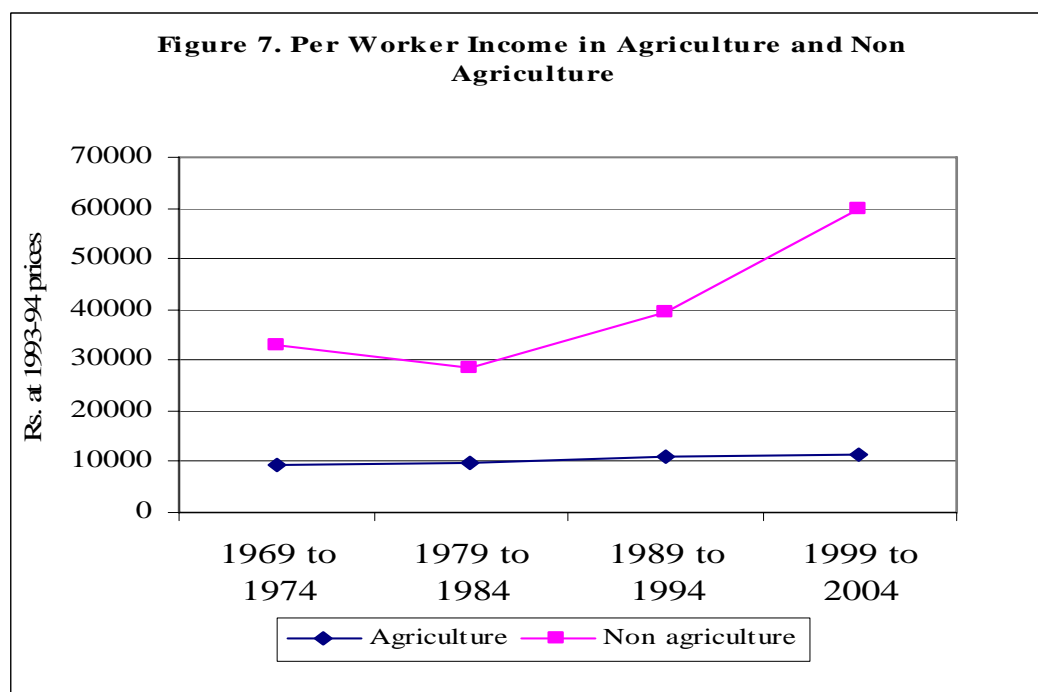
2.2.10 FAO estimates reveal that the number of undernourished people in India increased from 216 million in 1990-92 to 221 million in 2000-02, although the number had decreased to 203 million in 1995-96 (**Figure 5**). During the same period, in China, the number of undernourished decreased from 194 million in 1990-92 to 146 million in 1995-96 and to 142 million in 2000-02. **Micronutrient and vitamin A deficiencies posed greatest health problem in India.** As seen in **Figure 6**, in the year 2000, 57 percent of the pre-school children in India suffered from vitamin A deficiency against 41 percent in Sub-Saharan Africa and 16 percent in China. **This slow or even negative progress (in terms of absolute number of undernourished) in India's food security, to a large extent, was related to the slow growth in already low income of farming households,** increasing from Rs 9,049 during 1969/70-1973/74 to Rs 11,223 during the year 1999/00-2003/04. **The income disparity between agricultural workers and non-agricultural workers doubled from 1:3 during 1979-84 to 1:6 during 1999-2004 (Figure 7).**



Source: FAO 2005



Source: Micronutrient Initiative and UNICEF 2005



Source: Chand Ramesh, 2005. WTO and Indian Agriculture: Issues and Experience

2.2.11 Despite a deceleration in rate of growth of human population in recent years, India's projected total population in 2010 will be 1.19 billion, comprising 815 million rural people (68 percent of the total population). The agricultural population will

account for about fifty percent of the total population and 71 percent of the rural population. Poverty projection for 2006-07 suggests that of the 220 million of the people below poverty line, 171 million will be rural people, of which nearly 122 million will be farmers or their family members. **In other words, while poverty will continue to be essentially a rural phenomenon, the majority of the poor people will be from the farming community.** This is not difficult to understand as one sees the declining trend of the contribution of agricultural GDP to the total GDP. As seen in **Table 11**, during the past eight years, the post reforms era - 1995/96 to 2003/04, the agricultural GDP grew only by 1.86 percent per annum whereas during 1980/81 to 1994/95 it grew by 3.33 percent. The corresponding figures for the non-agricultural GDP were 6.95 and 6.56 percent, respectively. Further disaggregation shows that within agriculture the crops GDP had grown only by 1.18 percent whereas the livestock GDP grew by 3.7 percent.

Table 11. Growth Rate in GDP agri. and Non agri. in Different Periods, %/year

Period	Total	Non-agri.	Agri.	Fishery
I. Pre green revolution				
1950/51 to 1964/65	3.95	5.59	2.66	4.79
II Green revolution period				
1965/66 to 1979/80	3.62	4.4	2.76	3.47
III Wider technology dissemination				
1980/81 to 1994/95	5.37	6.56	3.33	6.29
IV Post reforms				
1995/96 to 2003/04	5.69	6.95	1.86	4.17

Source: Chand, Ramesh, 2005. WTO and Indian Agriculture: Issues and Experience

2.2.12 **There must be a paradigm shift from the concept of macro-level food security at the National level (i.e., the per capita availability of food) to nutrition security at the level of each individual child, woman and man.** Nutrition Security is best defined as "physical, economic, social and environmental access to balanced diet and clean drinking water". **The major cause of household and individual level food insecurity in our country is the lack of the minimum purchasing power essential for economic access to balanced diet. The famine of jobs/ livelihood opportunities leads to the famine of food at the household level, thus emphasizing the need for ensuring**

that our development strategies lead to job-led and not jobless economic growth. Farmers are also consumers and hence 70% of the consumers in India are also those who earn their livelihood in farming. Therefore, under our conditions enhancing agricultural productivity per units of land, water and labour is the speediest way of ending poverty-induced chronic undernutrition. Another problem of the Indian agricultural economy is that of the intensity (Table 12). It may be emphasized that **the smaller the farm, the greater is the need for marketable surplus**, so that the family has adequate cash income. With the increasing fragmentation of land and continuing decrease in average size of farm holdings, **part time off-farm employment of marginal and sub marginal farmers would become a necessity for livelihood security.** In this context, the newly enunciated National Rural Employment Guarantee Scheme, the Food for Work Programme and the National Food Guarantee Programme (proposed by NCF) could be extremely effective in enhancing livelihood security of the farmers and of other rural poor, particularly through strengthening skilled employment.

2.2.13 The intensity of small farms (<2 ha) in the country will further increase, reaching 83 percent in 2010/2011 (from 63 percent in 1960/61). About 45 percent of the total cultivated area will be operated by smallholders and the rest 55 percent will be operated by medium-and large holders, which together would constitute 17 percent of the total farming households (Table 12).

Table 12. Percentage Share of Operational Holding by Size Groups

Size group (ha)	1960-61	1970-71	1980-81	1990-91	2000-2001*	2010-2011*
A. Number of operational holding (%)						
Small (<2)	63	70	74	78	81	83
Medium (2-4)	19	15	14	13	12	12
Large(>4 ha)	18	15	12	9	7	5
B. Area of operational holding (%)						
Small (<2)	19	21	26	32	39	45
Medium (2-4)	20	19	21	23	25	27
Large(>4)	61	61	53	44	36	28

Source: Jha, Dayanatha, Presidential Address, 60th Annual Conference of Indian Society of Agricultural Economics

2.2.14 Agricultural Research must be refocused in a manner that science not only helps to enhance productivity, but also income through farming system diversification and value addition. Value-added employment involves a paradigm shift from unskilled to skilled work and from routine on-farm to value-added off-farm livelihoods. Over a third of the rural population is assetless, i.e., they do not possess land or livestock or fish pond. Concurrent attention to skilled on-farm and non-farm employment is essential for alleviating poverty and chronic undernutrition. **Unfortunately, agricultural research institutions are yet to work in an integrated manner to achieve the triple goals of ‘more food, more income and more jobs’, all in an environmentally sustainable and socially equitable manner.**

2.2.15 Our planning process over the past decades in the agricultural sector has been focused on increasing foodgrains production. All strategies have been addressed to the crop sector and rightly so, because focus was providing the foodgrains. But incidental to such planning process, the livestock sector got neglected and in its wake the landless and the marginal farmers, who constitute 58% of the rural population, never received due attention. Incidentally, this resource poor population sustains itself through 481 million livestock and 410 million poultry which serve as the most critical components of our rural production system.

2.3.0 Changing Contours of Indian Agriculture

2.3.1 Opening up of the economy and integration in global market implies dismantling of protective restrictions intended to safeguard national interests, and enhancing our competitiveness. **Food self-sufficiency, maintaining low food prices, raising agricultural exports, and investments for upgrading production potential in a cost-effective and sustainable mode were overriding concerns.** These generated a stream of protective and incentive instruments (all bunched in AMS) which need adjustments under the liberalized regime and imply massive restructuring of the price structure. Agriculture is responding to these forces as well as to changing IPR regimes.

2.3.2 The most profound shift pertains to **rapid privatization** in all domains - production, consumption, investment, technology, etc. and concomitant decline in State control. Alternative instruments and approaches are evolving to transform agriculture and a very important part of this 'learning' phase is a redefinition of the role of the State. Public goods, welfare imperatives, other regulatory needs, and other areas of market failure will continue to need government intervention. **A matter of concern globally is shrinking investment in international public goods.**

2.3.3 Policies and instruments which served well in yesteryears have either been overstretched or are untenable in the current scenario. There is consensus that the unfolding challenges of Indian agriculture can only be addressed through science and technology, and that a different R&D paradigm - a **national innovation system** integrating all facets of rural life and stakeholders would be necessary. **While Centrality of the efficiency mantra is essential for meeting the growth objectives, sustainability issues would also become critical.**

2.3.4 The agrarian structure is in a flux. There is inexorable downward pressure on farm size and increasing concentration in the lowest size-groups. Increasing migration and occupational restructuring are consequent responses discernible in the countryside particularly in hill and mountain and arid drylands. It is now realized that **smallholder farming must become viable and efficient.** This focus also underscores the importance of **employment and labour intensity of agriculture.**

2.3.5 Agricultural growth in recent years has thrown new sectors and regions into prominence. Livestock, fisheries, horticulture, specialty enterprises (spices, aromatic, organic) and value-added products illustrate this trend. **Market-driven diversification** in a global perspective has become the new paradigm driving future agricultural growth.

2.3.6 Rising capital intensity, particularly in the high-growth sectors of agriculture, has set in motion a new set of forces. Movement of industrial and foreign capital and entrepreneurial resources to agriculture, biased technical change, continuing infirmities in market and other infrastructure, varying knowledge- intensity of the sector

and other factors are ingredients of the evolving scenario which need to be monitored and regulated appropriately. **There is a real threat that left to the market, poor and small farmers will lag further behind.** The soaring imports of vegetable oils and pulses and depressing the domestic production of these commodities is a case in point. **Declining growth in public investments and eroding institutional infrastructure are other disturbing features of the current trend.**

2.3.7 World agriculture, particularly trade, places high premium on **quality. Public health and food safety concerns are central themes of global regulatory negotiations.** Indian agriculture has to respond to these. Equally important are sustainability of natural resources (particularly water) and other environmental externalities including global warming and climate change. These could cripple our productive capacity sooner than later. Market failure is widespread in these sectors and difficult regulatory measures confront us.

2.3.8 **The agricultural knowledge sector** will play a pivotal role in exploiting the new opportunities and containing the likely threats. A new philosophy, approach and strategy will be required even as we try to enthuse vigour and vitality in the existing R&D institutions.

2.4.0 Overview of Agricultural R&D Infrastructure

2.4.1 **Agricultural R&D owes its origin, growth, and sustainability to public support as more than 85 percent of aggregate R&D funding comes from public exchequer. With more than 20,000 scientists and Rs. 30601 million expenditure, it is one of the largest systems in the world.**

2.4.2 The public system has large and complex network of Central and State research/education institutions/universities, zonal research stations and co-ordinated research programmes (**Table 13**). The 'D' component has been with the States, under the control of State departments of agriculture. Its isolation has not been successful and there has been **a decline in the extension system across the board.** Consequently, the Centrally supported frontline extension system has grown covering frontline

demonstrations, KVKs (496 and by the year 2007 the Government aims to establish at least one KVK in each 527 district). Current thinking, however, appears to favour NGOs involvement.

Table 13: Institutions in ICAR and SAU's in India, 2004 - 05

Institution	Number
Central	
National institutes (Deemed Universities)	4
Other Institutes	43
National Bureaus	5
Project Directorates	12
National Research Centres	31
All Coordinated Research Projects	91
Central Agricultural University	1
Krishi Vigyan Kendras	496
Zonal Research Stations	8
State	
State Agricultural Universities*	40

* Include Horticulture and Veterinary Universities; Source: ICAR Annual Report, 2004-05

2.4.3 The institutional edifice of the State R&E system continues to grow. The number of SAUs has grown from a mere handful in early seventies to 40 now. Unfortunately, funding levels have not kept pace with this and operational as well as scientific resources have degenerated. These trends fly against persistent advice to reorient resources and focus toward local R&D institutions.

2.4.4 Perhaps the most significant trend has been the growing involvement of private sector. This is welcome. However, its exclusive preoccupation with profits restricts its area of interest. The whole subsistence farming sector, the substantial body of new knowledge in public goods domain, poor and fragile eco-systems are examples. **Public-private synergy is evolving as a new R&D ideology.**

2.5.0 Investment in Agricultural R&D

2.5.1 Current R&D spending is estimated at about Rs. 31 billion annually. It is backed by more than 20 thousand scientists in the research/education sector alone.

Private sector participation has risen rapidly over the last decade and it now accounts for about 14 percent of funding (**Table 14**). The uptrend in public R&E funding has been consistent, except in more recent years when it has flattened. Operational support however has not kept pace with overall trends. The problem has been serious in the State system whose share in the total R&E expenditure has consistently declined over the past four decades (**Table 15**).

Table 14. Growth of Private Research in Asia

Country	Expenditure (Million 1995 US\$)		Annual growth rate (%)	Private as % of total, 1995
	1985	1995		
India	26	56	7.7	13.9
China	0	16		3.2
Indonesia	3	6	6.9	6.9
Malaysia	14	17	1.9	21.0
Philippines	6	11	6.1	22.4
Thailand	11	17	4.4	11.8
Pakistan	2	6	11.0	Na
Total	62	128	7.2	10.1

Source: Pray (2002), The growing Role of Privatization in Agricultural Research: Agricultural Research Policy in an Era of Privatization, Edited by D. Barlee and R.G. Echeverria, CABI Publication, Walingford.

Table 15: Public Investment in Agricultural Research and Education: at 1999 prices

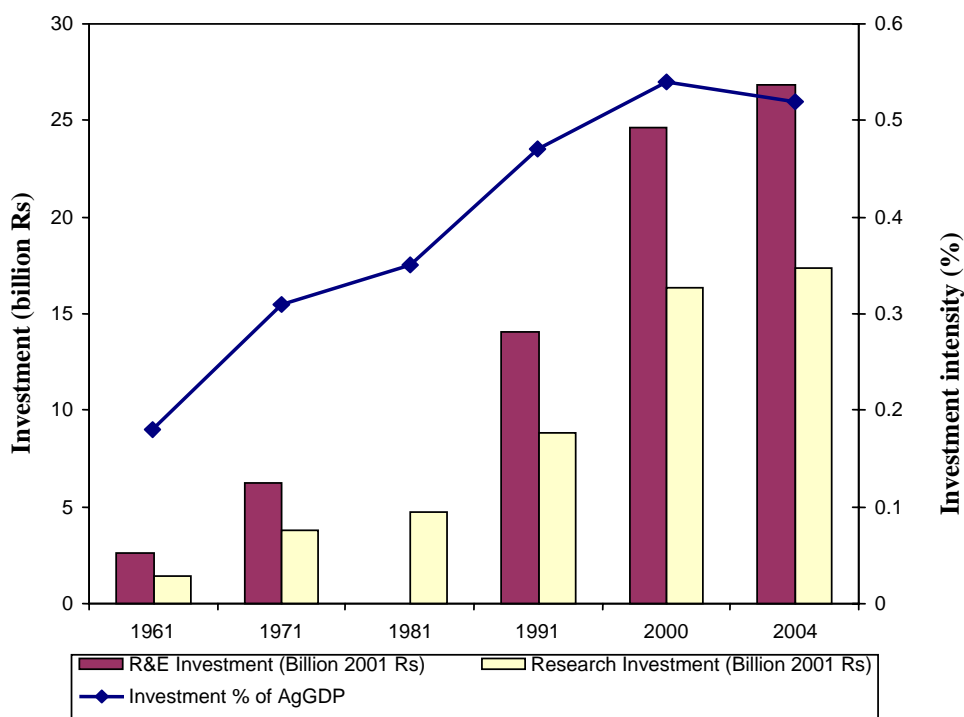
Year (TE)	Total R&E expenditure (Rs. Million)	Share of States, %	Expenditure as percent of Agric. GDP
1971	6073 (8.6)	69.2	0.32 (4.7)
1981	8007(1.9)*	52.5	0.40 (1.3)*
1991	13528(5.2)	56.6	0.45 (1.7)
2000	20773 (4.0)	50.5	0.50(0.6)*
CAGR	4.4	-	1.4

*Figures in parentheses are growth rates for the preceding decade. *Growth rates are not statistically significant; Source: Jha and Pal 2003(IFPRI), Agricultural Research & Technology Status, Impact and Contemporary Issues*

2.5.2 The edifice is large in nominal terms. In relation to the size of the agricultural sector, however, investment intensity is low. At 0.34 percent of agricultural GDP (**Figure 8**), research intensity is only half of the overall average for all developing

countries (0.6 percent) (Table 16). There is considerable inter-State variability in intensity of State funding (ranging from 0.08 in U.P. to 1.4 in H.P.) (Table 17). With the exception of a few States, commitment to R&E is not strong and in some States (UP, WB) the situation has deteriorated (Figure 9).

Figure 8. Trends in Government Funding to Agricultural Research and Education in India



Source: Pal, Suresh (2005), NCAP, New Delhi

Table 16. Public Agricultural Research Expenditure in India Relative to Other Regions 2000

Country/region	Total spending (Million international dollars)	Intensity (% of AgGDP)
India	1,858	0.34
China	3,150	0.40
Brazil	1,020	1.81
Japan	1,658	3.62
USA	3,828	2.65
All Developing Countries	12,819	0.53
All Developed Countries	10,191	2.36

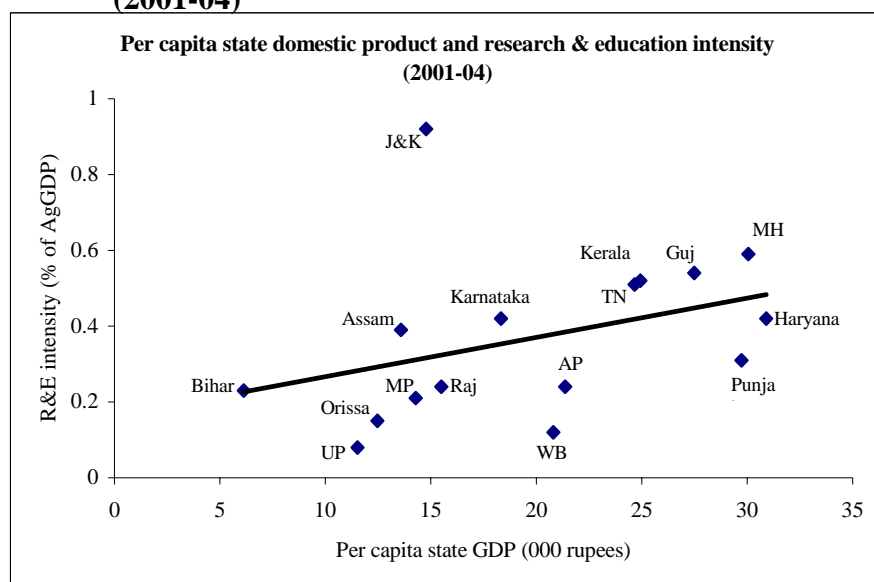
Source: Pray (2002), *The growing Role of Privatization in Agricultural Research: Agricultural Research Policy in an Era of Privatization*, Edited by D. Barlee and R.G. Echeverria, CABI Publication, Walingford.

Table 17. Growth and Intensity of Agricultural R&E Funding by State Governments

States	Annual compound growth rate (%)		Funding as share of AgGDP (%)		Funding per scientist, Rs Million	Share in funding by all States (%)
	1982-91	1992-04	1981-83	2002-04	2002-04	2002-04
Andhra Pradesh	6.47	5.48	0.16	0.24	1.00	7.69
Assam	5.51	4.08	0.28	0.39	0.79	3.41
Bihar*	8.55	4.25	0.13	0.23	1.36	4.50
Gujarat	9.71	6.4	0.19	0.54	1.21	7.29
Haryana	5.16	6.68	0.28	0.42	0.87	5.67
Himachal Pradesh	12.76		0.62	1.37	0.80	3.61
Jammu & Kashmir	10.97	12.19		0.92	0.99	2.79
Karnataka	7.54	6.27	0.19	0.42	0.71	7.27
Kerala	5.23	2.79	0.31	0.52	1.26	4.88
Madhya Pradesh*	13.29	8.8	0.07	0.21	0.76	4.80
Maharashtra	7.06	6.26	0.39	0.59	1.40	16.23
Orissa	6.50	2.17	0.10	0.15	0.80	1.59
Punjab	10.28	5.12	0.24	0.31	0.77	6.57
Rajasthan	10.95	5.22	0.12	0.24	0.74	4.16
Tamil Nadu	13.00	5.59	0.21	0.51	0.95	8.04
Uttar Pradesh*	5.74	-6.56	0.13	0.08	0.59	4.21
West Bengal	2.34	7.45	0.17	0.12	1.33	3.96
All States	8.23	5.64	0.19	0.28	0.84	100.00

* For undivided State, Source: Pardey & Beintema, 2006, Science for Agriculture: Growing Global Divide, IFPRI

Figure 9. Per Capita State Domestic Product and Research & Education Intensity (2001-04)



Source: Pal, Suresh, 2005. NCAP, New Delhi

2.5.3 **Dependence of State R&E on the Centre has grown.** For outreach programmes also, Central support has become more important. It has been argued that this has crowded out support for hardcore R&E. The conceptual dichotomy between basic/applied research/development and institutions (Central/local) has to be translated in a clear funding policy.

2.5.4 Priority accorded to agricultural R&D is revealed by the fact that **this large network was built mainly from domestic resources.** There has been a slowdown over the last decade or so and this is reflected in restraints on recruitment of scientists. This has been attributed to the overall policy thrust on downsizing public bureaucracy. Current assessments argue for a need-based approach on this so that priority sector investments remain on track in real sense.

2.5.5 Yet, very modest external assistance has played a useful role in R&D capacity development. In the wake of the evolving IPR regime, global technology markets are tightening. This reinforces the thrust on domestic capacity building and external assistance has a key role to play in this regard. Public good research requires adequate support from public funds.

2.5.6 R&D needs are growing exponentially and substantially enhanced domestic funding is essential to address these. There are pronouncements at the highest level endorsing this. On the other hand, there is also the view that we do not need more of the same. **Until the contours of a national policy on public R&D are redefined and clearly enunciated, managers of public finances will remain apathetic.**

2.6.0 Scientific Manpower Resources

2.6.1 Scientific manpower is the most critical resource for R&D. There are no official estimates but a recent study shows that there are about 22,000 scientists in the NARS (**Table 18**); **public sector institutions account for more than 95 percent of them.** Public extension system is much larger, and taken together, professional manpower in public agricultural R&D appears impressive.

Table 18. Scientific Manpower in ICAR/SAU System

Particulars	All ICAR institutes	All SAUs
<i>Period: 1992</i>		
Total number of scientists	4,092	17,678
Full-time researchers	2,999	8,132
Scientists with Ph.D. degree (%)	68.8	62.6
<i>Period: 2001/02</i>		
Total number of scientists	4,539	13,633
Full-time researchers	3,069	5,810
Scientists with Ph.D. degree (%)	75.7	69.6
Average of scientist (years)	43.8	45.7
Percent of scientists		
Assistant professor	43.3	45.4
Associate professor	39.3	34.9
Professor and above	17.4	19.7

Source: Jha and Pandey (2005), Research Resource Allocation and Pal and Byerlee (2003) The Funding and Organization of Agricultural Research in India: Evolution and Emerging Policy Issues. NCAP Policy Paper 16, NCAP, New Delhi.

2.6.2 Skill level of scientists in the research and education system is comparable to the best. **More than two-third of them hold Ph.D. degrees.** The extension system, on the other hand, faces the problem of low proficiency and this has remained a matter of concern from the very beginning. In addition to efforts to upgrade the skill level through intensive training, this has also forced entry of better trained research and non-government personnel in extension system. **A highly motivated and trained public extension system is essential to raise the knowledge intensity of Indian agriculture.** Dismantled and *ad hoc* responses are inefficient.

2.6.3 **The average age of scientists is growing** and this has long-term implications for scientific productivity. This has happened due to divergence between attrition and replacement rates in recent past. Restrictions on recruitments in public sector has affected human resources adversely both by discouraging creation of new positions and by bureaucratic hurdles on filling vacancies.

2.6.4 More than three-fourth of the scientific manpower resources are in States which account for half of the national R&E expenditure. With nearly uniform salary patterns, this reveals structural weakness—support per scientist is significantly lower in the State system (Rs. 0.84 Million against Rs. 1.72 Million). As attention shifts back to strengthening local R&D institutions, this dichotomy will need to be addressed. **There cannot be a ‘second rate’ psyche segregating scientists.** Institutional dispersion of scientists reveals another constraint. Several ICAR and SAU units are below the critical size. This implies that we create hard infrastructure but often fail to back these up with adequate human resources (humanwares).

2.6.5 Matching human and other resources has not received adequate attention. Finally, there are two serious issues which need reiterating. These relate to decline in scientific manpower in the State system and stagnation in the Central system. This has happened during the phase when the research agenda expanded and diversified. This had consequences like loss of critical mass in research units and programmes. Second, lower support per scientist in the State system does not auger well for the future, particularly since these scientists are expected to play a larger role in research outreach functions.

2.7.0 Institutional Base for Agricultural R&D

2.7.1 Institutional linkages and research coordination are unique strength of the public R&D structure. Private R&D achieves excellence by concentrating high quality resources. This is beyond the reach of public systems, but synergies and complementarities offer similar opportunities. This requires careful planning, an area which has not been given much attention. Consequently, these institutions try to emulate the private sector research institute/laboratory model. This is not tenable logically besides nurturing waste and duplication. Redesigning national R&D must begin from this premise. This requires ‘out of the box’ thinking.

2.7.2 Without professionalizing and modernizing the public extension system, the tripod of research, education and extension cannot be completed. The most important source of synergy breaks down. This has been recognized since long but the resource

implications have kept reforms at bay. The segmented (Centre-State, research/education-extension) and departmental models tried in the past have not been successful. The unique nature of agriculture makes agricultural R&D different from other sectors and makes extension vital. The context is different and other providers are emerging. **A new ball game has been set up and our response has remained outdated.**

2.7.3 **The Green Revolution model of R&D organization is proving inadequate** in the current context for several reasons. An alternative national innovation system paradigm has been proposed which places the farmer (rather than commodity/resource or region) at the Centre and then weaves in the farming system, technology, markets, and other stakeholders. In fact, elements of this concept are emerging in market-led transformation occurring in the countryside but public institutions, including R&D, remain rigidly tied to the past. This approach calls for massive changes in existing institutions.

2.7.4 Clear enunciation of the roles of the Centre, States, local bodies, Panchayati Raj Institutions, private sector, and NGOs in a client-Centred R&D structure is a critical task. Public resources are getting scarcer and its deployment has to focus on efficiency. **Critical scientific and resource mass and modern management must back the human resources. A very strong policy and planning capacity has to be created.**

2.7.5 The emerging IPR regime will have profound implications for public R&D systems. The changing incentive climate will drive resources away from public to private goods and from long-term to short term gains. Both of these detract from the basic rationale of public investment in R&D.

2.7.6 The Central point is that powerful forces have been unleashed by the free trade movement. In countries which have pursued the path of protection for long and have developed institutions accordingly, this change calls for new rules of the game and new institutional arrangements. We have not even begun thinking about how these will affect the existing R&D edifice. **Time is not on our side**, particularly keeping in mind that several of the bilateral and regional trade agreements that our country has signed will

be in force within three to five years. **Post-Hong Kong breathing time space on most global agreements is hardly 10 years.**

2.8.0 Research Resource Allocation

2.8.1 R&D became a critical element of agricultural development strategy since the fifties and it has been reasonably well supported. The Green Revolution created a favourable environment and provided a model strategy. As the foodgrains demand-supply balance became manageable, the same strategy was adopted to tackle new and emerging research issues like regional disparities, resource conservation and sustainability, high-growth and high-value commodities, frontier technology sectors, WTO-related research issues and so on. Such initiatives absorbed additional resources which were liberally provided for nearly three decades. There was not much concern regarding resource allocation in this expansion phase; additional resources to implement new schemes (plan) and on-going programmes (non-plan) was the critical issue which became the main monitoring indicator as well.

2.8.2 Public resources gradually became stringent and research priorities, relevance, research productivity and other efficiency-related issues came to occupy centrestage in the nineties. Research resource allocation is the main theme in this debate which strives to create a 'new look' national innovation system. The following issues of macro dimensions deserve priority attention and redressal:

- As mentioned earlier, new (**plan**) and on-going (**non-plan**) **dichotomy** has long been the only resource allocation calculus invoked every five years. Non-plan activities have claimed more and more resources over time and the flexibility to shift resources to new areas has gone down in recent years. This has been the impact of dwindling resources on the one hand and rigidities in non-plan expenditures on the other. **The share of research in total agricultural development expenditure has also gone down.**

- A related consequence has been **decline in operational cost per scientist**. This has hit the State system more and their capacity has been seriously undermined. Functional allocation of research funds emerged as a major issue in the nineties.
- Public R&D embraces research, education and extension. In the last 50 years, the relative emphasis has changed. In the initial post-independence years, the strategy emphasized extension. The assumption was that there was adequate slack in the knowledge system which could be exploited. Over the next three decades, focus shifted to research and capacity building covering research programmes, institutions and human resource development. There has been a noticeable shift in emphasis in recent years and outreach has again come to prominence.
- Research domain includes upstream (basic/strategic) and downstream (applied, on-farm) components and since the reorganization of research in the sixties there has been a division of labour between Central and State institutions along these lines. It has been shown earlier that the Central component has grown faster in terms of investments. It has also moved in downstream areas significantly. It is now realized that **critical weaknesses lie in the State component and this must be addressed, especially keeping in mind that agriculture is a State subject**.
- There are other macro policy issues which have a bearing on allocation of public resources for research. Growth in private research capacity, possible impact of research complementarity and spill-in, use of domestic and external resources, are examples which have all been invoked in research resource allocation debates. The problem all along has been that **the NARS has never articulated a Research Policy Statement**. Not surprisingly, very little analytical attention has been paid to resource allocation questions.

2.8.3 Current resource allocation profile reveals that there is greater **emphasis on R&D activities**. The integrated approach adopted by the public system implies that resources are allocated to research, education/training, and extension. **Table19 shows** that while almost everyone participates in research, more than 70 percent are involved in teaching/training and extension. Overall, 48 percent of all public R&E resources are

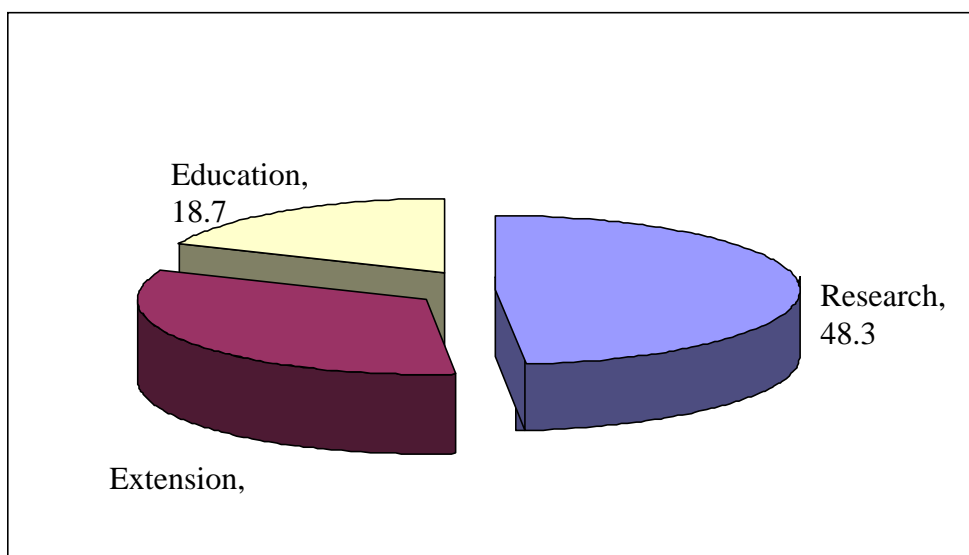
allocated to research, 19 and 33 percent are allocated to teaching and extension, respectively (**Figure 10**). Despite heavy back-up of support staff, nearly 11 percent of scientific resources are allocated to administrative chores. This amounts to more than a thousand full-time scientists - a waste no system can afford. As expected, Central research resources focus relatively more on research, but research resources allocated to administration is also higher. With little education responsibilities, the private system is able to dedicate more resources (60 percent) to research.

Table 19: Activity Profile of Agricultural Scientists (Percent).

Institution	<i>Participation</i>			
	Research	Teaching	Extension	Administration
ICAR	97.2	48.3	57.8	68.8
Deemed Univ.	99	89	56.7	66.9
Other Instt.	94.8	36.6	58.1	69.3
SAU	91.8	79.6	76.6	56.7
Other public	78.6	64.3	78.4	62.3
Total public	87.3	67.7	69.6	57.4

Source: Jha, Dayanatha and S. K. Pandey (2005), *Research Resource Allocation, NCAP, New Delhi*

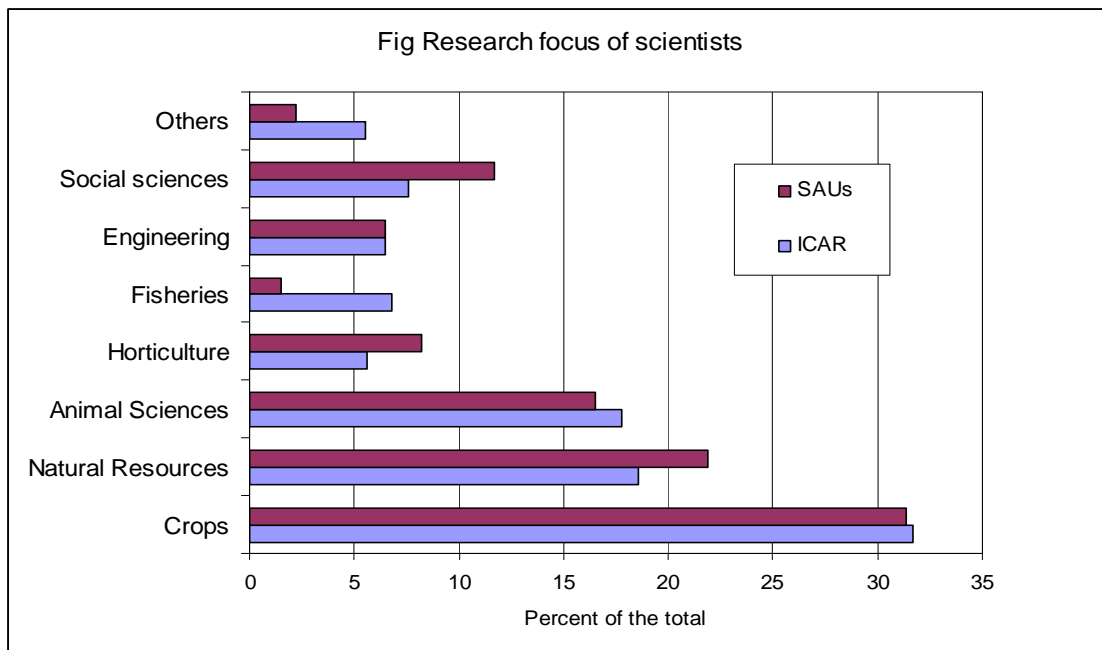
Figure 10. Percent Distribution of R&D Expenditure, 1999-2001



Source: Pal, S. and D. Byerlee. (2003), *The Funding and Organization of Agricultural Research in India: Evolution and Emerging Policy Issues. NCAP Policy Paper 16, NCAP, New Delhi.*

2.8.4 As regards commoditywise allocation, **Figure 11** shows that a major share of agricultural research is crop focused. Foodgrains and horticultural crops, the mainstay of the national food system, account for about 40 percent. The other major groups - livestock and fisheries receive (together about 22 percent) less attention than their importance in agricultural GDP. Food security still remains a strategic concern and claims very high priority. Figures for the Central research sector (ICAR) indicate a more growth-focused allocation with 25 percent resources going to livestock and fish, whereas SAUs allocate only about 19 percent to this sub-sector. The ICAR has a strategic forward-looking role and the allocation profile substantiates this. The table also shows that ground level institutions (SAUs) target their research resources more locally. The emerging private sector is still highly selective in its allocation. The broad pattern of allocation at different institutions is consistent; more rigorous analysis at programme/project level is needed for in-depth analysis of rationality.

Figure 11. Research Focus of Scientist

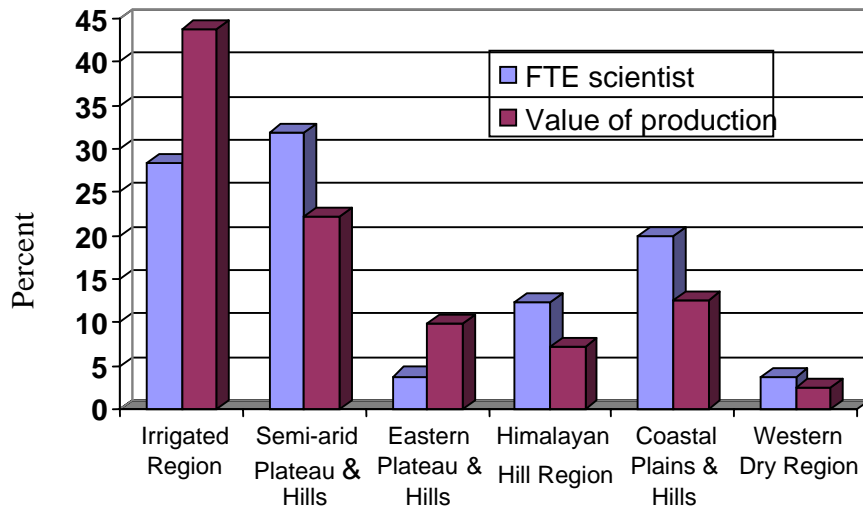


Source: Jha, Dayanatha and S. K. Pandey (2005), *Research Resource Allocation*, NCAP, New Delhi

2.8.5 Regional resource allocation analysis revealed that six agro-climatic zones — Trans-Gangetic, Central Plateau and Hills, Western Plateau and Hills, Southern

Plateau and Hills, East-coast Plains and Hills, and West-coast Plains and Hills accounted for more than 58 percent of all research resources. **Lower Gangetic Plains, Eastern Plateau and Hills, and Western Dry Region were relatively under-emphasized (Figure 12).** Strong State systems naturally contributed to regional capacity. ICAR followed a more balanced strategy and also factored in State capacity in its regional allocation. Congruence analysis indicated the need for higher marginal allocation to the zones neglected in the past.

Figure 12. Percent Distribution of FTE Scientists by Ecoregions



Source: Jha, Dayanatha and S. K. Pandey (2005), Research Resource Allocation

2.8.6 Considering rationality, simple congruence analysis revealed that research resources were broadly allocated in accordance with relative economic importance of commodities. This is what one expects in a mature public system. Knowledgeable scientists and consultative processes lead to this. High congruity index values were obtained with respect to individual commodity groups as well. Condiment and spices was the only group which recorded low index value. Institution-wise assessment VOP and FTE ranking revealed that ICAR and SAUs had high correlations implying that research resources were well aligned, but for ‘other’ public institutions and private R&D, the two were not in accord.

2.8.7 A scoring approach incorporating efficiency, equity, sustainability, and trade /value addition showed the need for marginal adjustments between commodities. It suggested marginal increase in resources allocated for cereals, vegetables, commercial crops, livestock, and condiments/spices groups and withdrawal from pulses, tubers, oilseeds, fibres, plantation crops, and medicinal/aromatic groups. We note that such readjustment proposals are naive and should not be accepted at face value. Research resources allocation decisions are complex and these data and analyses only help in improving the information base for decision making.

2.9.0 Scientific Productivity and Research Impacts

2.9.1 Creation of new knowledge and its application to enhance social welfare are basic measures of effectiveness of a research system. Several indicators are used by analyst to assess this effectiveness. These indicators assess the performance in terms of development of intermediate research products, usable technologies, and their spread and impacts. For agricultural research, which is applied in nature, scientific publications and technologies are the two main outputs. These research outputs also adequately capture other research contributions like development of research methodologies and intermediate products, which either get published in scientific journals, or facilitate technology development.¹ This section examines the trends in these main outputs of the ICAR-SAU system. Brief summary measures to quantify the socio-economic impacts are also discussed.

Research Publications

2.9.2 Research publications include journal articles, books and book chapters, monographs, research and teaching manuals, extension materials, etc. Since consistent time-series data are not available for all of these indicators, research articles indexed by three abstracting sources for agricultural and allied sciences are considered. These are the *Science Citation Index* (SCI), the *CAB Abstracts* (CABA), and the *Indian Science Abstracts* (ISA). Total number of research publications authored by the scientists working

¹ Patent is another indicator of research product, but this was not considered due to lack of information and emphasis in the system.

in ICAR institutes and SAUs were taken from these three sources. There is a drastic decline in the number of the SCI-indexed publications in 1990 over that in 1980. This decline is deeper for SAUs and it continued even in 2002. ICAR institutes however showed a moderate recovery in 2002. What is more worrisome is that even the institutes and universities with better publication record could not achieve the 1980 level in 2002 (Table 20). This clearly shows **depletion of upstream or strategic research in the ICAR and SAU system.**

Table 20. Trends in Annual Research Publications of ICAR-SAU System

	ICAR institutes		SAUs		Total (ICAR & SAUs)	Articles per FTE ^b scientist
	Top five ^a	All institutes	Top five ^a	All SAUs		
Number of articles indexed in <i>Science Citation Index</i>						
1980	446	696	496	758	1,454	0.14
1990	123	205	205	292	497	0.04
2002	143	299	154	231	530	0.05
Number of articles indexed in <i>CAB Abstracts</i>						
1980	690	1,090	951	1,924	3,014	0.29
1990	902	1,645	1,664	4,413	6,058	0.48
1998	934	2,027	1,672	4,637	6,664	0.51
Number of articles indexed in <i>Indian Science Abstracts</i>						
1990	651	1,170	1,547	4,308	5,478	0.43
2002	432	1,250	1,145	4,786	6,036	0.53

^a SCI data are triennium averages; ^b Full-time equivalent (e.g., a scientist spending 50% of his time on research was considered as 0.5 FTE). Source: Pal, Suresh, 2005, NCAP, New Delhi

2.9.3 A sharp decline in the SCI-indexed articles authored by the agricultural scientists echoes the broad trend observed for the Indian science. The total number of SCI-indexed research articles authored by Indian scientists in all fields of science decreased from 14,983 in 1980 to 10,103 in 1990, but rose back to 14,028 in 2002. However, part of the slow recovery of the articles of agricultural sciences during 1990s

could be attributed to a shift towards publication in Indian journals which increased in number over time. These Indian journals were also rated high by the national professional academies and assessment boards.

2.9.4 Trends in the total number of publications of agricultural science are quite encouraging. The number of CABA-indexed publications of the ICAR-SAU system increased from 3,014 in 1980 to 6,058 in 1990, which further rose moderately to 6,664 in 1998. A similar trend was also observed for the ISA-indexed publications. This increase in the number of publications during 1990s is important because the number of agricultural scientists has gone down during this period. The number of publications per scientist per year also increased from 0.48 in 1990 to 0.51 in 1998, registering an increase of about 6 percent (**Table 20**).² This clearly shows an upward trend in scientific productivity of the ICAR-SAU system. However, there are some noteworthy patterns. Nearly 80 percent of the papers were published in the non-SCI journals with zero impact factor³ and only a small proportion of the papers were published in the journals with an impact factor greater than zero but less than two. About half of the SCI-indexed and more than 70 percent of the total publications were authored by the scientists working in SAUs, which is expected because of their scientific strength and dominance of student research. However, the tendency to publish in the low rating journals is a matter of concern. The average impact factor even for the ICAR articles was 1.1 in 2002, as against 1.6 for CSIR articles, **underscoring the need for improving the quality of agricultural science publications in the country.**

2.9.5 Given the international norm of two papers per scientist in a year, **the current productivity level (0.5 paper) of agricultural research is too low in India.** The question now arises how can it be increased? Scientific productivity is directly related with the availability of research resources, both manpower and financial. It is found that an institute with higher budget per scientist is likely to be more productive than a poorly funded institute. At the same time, it is also important how the available resources are used. The institutes with higher proportion of operational expenses in the

² Increase in the ISA-indexed articles is sharper due to widening of its coverage of publication sources.

³ The impact factor is the frequency with which an average article from a journal is cited in a particular year.

total expenditure and greater scientific interactions and institutional linkages are likely to have better publication record. In addition, age of an institute capturing institutional factors like history and culture of an organization has a positive impact on the publication efficiency. This is because of the fact that the accumulating stock of tacit knowledge and tradition of “good practices” help in efficient use of research resources and attracting best brains. On the other hand, a high proportion of top cadre scientists are associated with lower scientific productivity. These results have strong implications for the ICAR-SAU system which is dominated by the top cadre scientists. Also, the share of operational expenses in some of the institutions was less than 20%. Thus, **balancing the cadre strength and factor-shares in research expenditure are essential for increasing scientific productivity of the system.**

Technology-led Enhanced Productivity, Profitability and Sustainability

2.9.6 The number of usable technologies developed is another indicator of scientific productivity, for which time-series data are not readily available. Studies in this area, however, provide useful insights; for example, there is an upward trend in the number of varieties developed for rice - an important crop receiving greater research attention. During the 1970s, 127 rice varieties were released, which rose to 223 in the 1980s — almost doubling the breeding productivity. Part of this jump in the productivity could be attributed to increase in the number of rice breeders. The number of officially released varieties increased to 257 during the 1990s. Besides increase in the number of varieties bred, rice breeding also witnessed some qualitative changes over time. The proportion of varieties with fine quality (long slender) grain increased from 29% in 1970s to 36% in 1990s. Also, there is significant increase in the number of varieties developed for marginal production environments, as well as those tolerant to biotic stresses. This development has contributed to a substantial reduction in yield variability even in the rainfed areas of eastern India. Development of hybrid rice in partnership with the International Rice Research Institute and private seed companies have established yield advantage of 15-20%. Thus, maintaining high and stable yields with improved grain quality is a major contribution of Indian plant breeding programmes. Also, there was focus on breeding short duration rice varieties, which constituted about half of the total

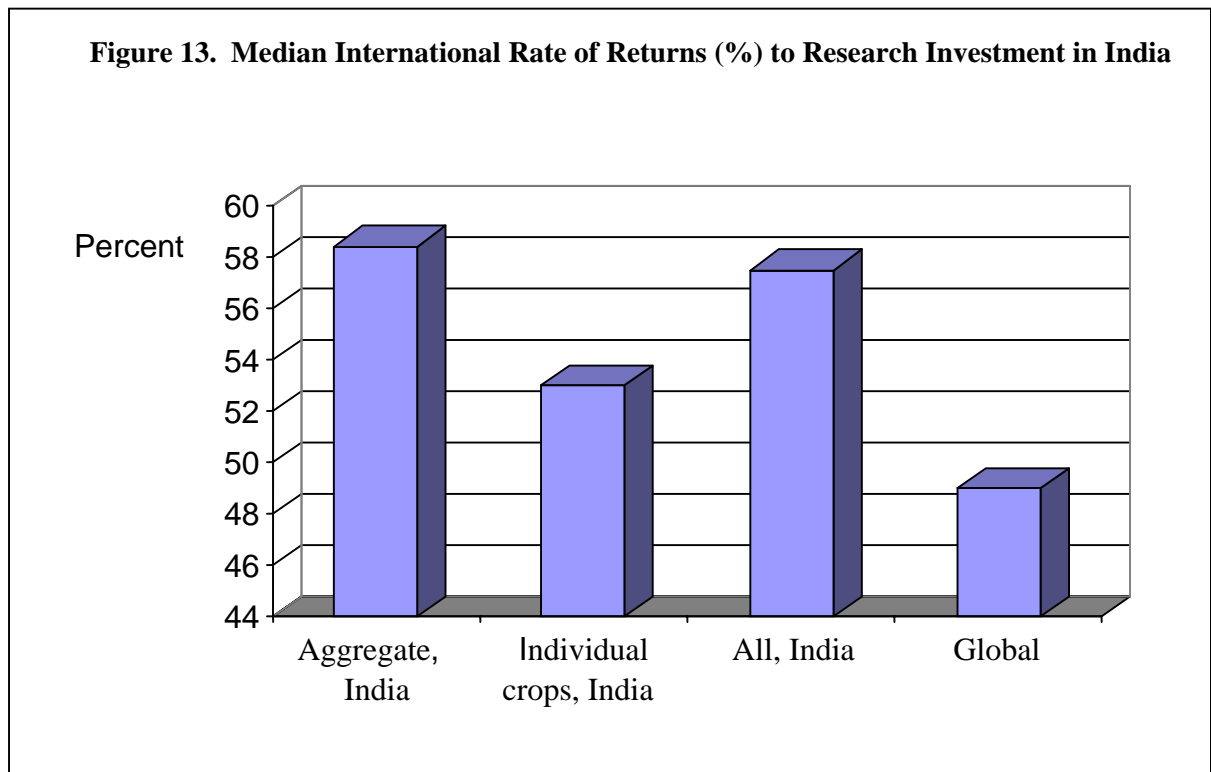
varieties released during 1980s and 1990s. Fast expanding rice trade, especially of Basmati aromatic rices, is triggered by the modern Basmatris which are high yielding, disease and pest tolerant and as good or even better in aroma and quality when compared with traditional varieties.

2.9.7 Similar trends are also observed in breeding programmes for other crops. For example, in maize, the number of varieties (50) developed during 1980-1993 was higher than those developed (45) during 1960-1980. Also, there was a shift in breeding focus from varieties to hybrids during the 1980s. Recently, high protein maize hybrids are developed to meet the rising demand for food and feed. In the case of wheat, so far more than 200 varieties have been released for cultivation in India, and yield potential has been increasing by one percent per year due to the persistent improvement in plant type. Improvement in grain quality (for *chapati* making) and development of rust resistant varieties are the other significant contributions of the wheat breeding programmes. After the mid-nineties, an additional yield potential of about 0.7 tonne/ha has been established on farmers' fields, which is likely to be enhanced further through exploitation of hybrid vigour in wheat breeding. **The success of crop breeding programmes, coupled with the policy of open access to public material, has contributed rather significantly to the growth of private seed industry in the country.**

Total Factor Productivity Growth and Rates of Return

2.9.8 Scientific contributions of the Indian agricultural research system are periodically reviewed by various expert committees and government bodies at different levels, and sustenance of the funding indicates that the Central and State governments are convinced of positive contributions of agricultural research. This is evident from a number of technological revolutions, often referred to as '**rainbow revolutions**,' ushered in different sectors of Indian agriculture. Socio-economic impacts of these revolutions have been assessed quantitatively by a number of studies done by the national and international organizations. It is shown that **investment in agricultural R&D is a 'win-win' option as it is the largest contributor to agricultural total factor productivity (TFP), which in turn reduces rural poverty significantly.** Although there are

considerable variations, **the average rate of return to investment in agricultural research was about 70 percent with a median value more than 50 percent.** These rates are very much comparable to those obtained internationally, covering both developed and developing countries (**Figure 13**). Furthermore, the marginal internal rate of return to research investment in India ranged from 57 to 59 percent since the green revolution era. This is against 35 percent rate of return realized for private agricultural R&D, and 45 percent for public agricultural extension.⁴



Source: Pal, Suresh, 2005, NCAP, NewDelhi

2.9.9 Concerns are expressed in some circles regarding the trend in the growth of TFP, which in a way reflects on effectiveness of NARS. **Table 21** provides a summary of important studies measuring TFP growth in Indian agriculture. The TFP growth was rather lower in the Eastern and West-Central India during 1977-87, but it picked up later, and most of the crops grown in these regions showed an appreciable growth in their

⁴ The marginal internal rate of return to investment in irrigation ranged from 4 to 6 percent during the corresponding period.

TFPs. The growth in agricultural TFP is estimated to be 1.4 to 2.1 percent since 1980, which is equal to that observed for the crop sector during the green revolution period. However, deceleration in the TFP growth for crops is observed in the Indo-Gangetic Plains during the mid-1990s. This is certainly an undesirable trend, but it would be premature to entertain the deceleration hypothesis based on the data for few years. Moreover, there is no clear indication whether this deceleration is because of slow improvement in the technical efficiency—an important factor for growth in TFP, or technological regression. Thus, there is no clear evidence of decline in the socio-economic impact of public agricultural research in the country. **In fact, deceleration in the agricultural growth since the mid-nineties underscores the need for acceleration of technology flow to farmers, requiring higher investment in research and extension.**

Table 21. Trends in Agricultural Total Factor Productivity Growth

Study and period	TFP growth (%)
Virmani (2004), All India, agriculture	
1980-81 to 1991-92	2.2
1992-93 to 2003-04	2.1
Coelli and Rao (2005), All India, agriculture	
1980-2000	1.4
Kumar et al. (2004), Indo-Gangetic Plains	
1981-90	2.02
1990-96	-0.02
Evenson and Rosegrant (1999), All India, crop sector	
1656-65	1.10
1966-76	1.39
1977-87	1.05
1956-87	1.13
TFP growth by region, 1977-87	
North	1.57
South	1.5
East	0.70
West-Central	0.39

Agricultural Diversification

2.9.10 In horticulture, forestry and medicinal and aromatic plants, rapid multiplication of disease-free planting material by tissue culture is contributing to rapid adoption of improved varieties and higher crop yields. Availability of improved varieties and hybrids and better crop and pest management techniques have enhanced vegetable yields significantly, and the country is now the second largest producer of vegetables in the world. In the case of livestock, cross breeding and nutrition and disease management research have increased milk and meat yields and reduced mortality rates. But, the success was confined to dairy, commercial poultry and fish sector only, and subsistence livestock sector suffered because of limited commercialization of technologies which are often capital intensive, causing a scale bias.

Sustainability of Production Systems

2.9.11 The Indian research programme has also focused its efforts on improving resource-use efficiency, conserving natural resources, particularly soil and water, and rehabilitating degraded soils. The management of degraded lands posed an important challenge. Land degradation in the form of soil erosion, salinity/alkalinity, and waterlogging are posing serious threats to sustainable agricultural development. Research efforts made by ICAR and IARCs like ICRISAT have continued to overcome these problems. Watershed programmes have shown several benefits in various target domains, documented in the form of higher incomes, crop diversification, increase in irrigated area and fodder availability, and soil and water conservation. Controlling soil erosion was found to benefit sustainable agricultural production in rainfed areas. Vertisol technology was developed to overcome the problem of rainfed area. The benefits of adopting Vertisol technology were documented as easy cultivation, effective pest management, higher production, less labour time and cost, higher income, increase in food and fodder security, lower cost of seed and nutrients, better soil and water conservation, prevention of soil erosion, and effective use of rain water.

2.9.12 Sustainability-enhancing impacts are, however, not as visible as the impacts in terms of increase in crop yields. There is substantial reduction in waste and

unculturable land and area subject to water and wind erosion, and large tracts of saline and alkaline lands are reclaimed and brought under cultivation. Soil & water conservation technologies have reduced water run-off by 15 to 42 percent, controlling soil loss by 2 to 12 tonnes per ha per year. In addition, the watershed programmes have increased cropping intensity, on an average by 41 percent and created more than one hundred mandays of employment per hectare in a year. It is expected that the resource-conservation technologies like watershed development would reduce the use of groundwater for irrigation by 5 to 30 percent in the rice-wheat system. The packages for integrated management of pests and plant nutrients, along with pest tolerant varieties are expected to reduce the use of pesticides to the extent of 50 percent. Although there are some success stories showing tangible impacts of these knowledge-intensive technologies, a number of factors limit their spread, especially to small farmers. These are mostly group-based interventions and the system is still struggling to address the question of appropriate methodology and institutional arrangement for their dissemination. **Lack of adequate information, services, inputs and credit further restrict exploitation of improved technology by small farmers.**

Benefits to Small Holders

2.9.13 Has agricultural research in India also benefited small holders and unfavourable production environments like dryland areas? **Since the green revolution technologies in long term were generally neutral to scale, the growth benefits were also shared by small producers, and the urban poor benefited through reduction in food prices.** The high-yielding varieties also spread rapidly to dry semi-arid regions of the Central and Peninsular India and covered more than 74 percent of area under sorghum and pearl millet, which is higher than that of paddy. Of late, there is rapid spread of modern varieties in the eastern India, contributing to most of the increase in the national foodgrain production during the 1990s. **There is a huge potential of untapped yield enhancement in Eastern India.** Several studies have shown that technological change has been pervasive even in the rainfed areas, and crops like coarse grains, pulses, oilseeds, fibres, and vegetables have registered a positive growth in the total factor productivity. However, the impact has been rather limited in a few States, viz. Bihar,

Madhya Pradesh, and Karnataka, partly because of incremental nature of technological advancements (unlike one-shot jump in irrigated areas), which are often eroded by erratic weather conditions. Barring these few limitations, the agricultural research system has been able to address the objective of sustainable agricultural development with social justice, and economic policy environment has helped in achieving this objective. Of course, international agricultural research community, mainly the CGIAR system, has been a useful ally in this endeavour and there have been many technology spillins. But, these technology spillovers from the CGIAR system would not have been realized in the absence of the strong national system.

2.9.14 Agricultural research leading to the adoption of improved technology may reduce rural poverty in many ways. We must get away from the too simplistic internal rates of return based on adoption of high yielding varieties. **New approaches could include:**

- **higher on-farm yields and productivity;**
- **higher net income of farmers;**
- **expansion of farm employment opportunities and higher wages;**
- **growth of non-farm activities;**
- **lower food prices;**
- **reduced vulnerability to crop and other risks; and**
- **empowerment of the poor and of their organizations.**

2.9.15 The last item, empowerment, has gained increasing attention in recent years. Unless the poor have the power to participate in deciding which technology to use, they are unlikely to benefit from it. In other words, better farm technology will most benefit the farmers who are active partners in setting priorities of R&D. An analytical framework for approaching the above issues should cover the following:

- What is the probability that applied research will be successful, and hence, what is a desirable measure of successful research in an R&D continuum?

- How soon will the results be available for adoption, how widely applicable will the results be, and when will they be adopted by various groups and for how long?
- Once adopted, what is their contribution to productivity and incomes of different groups of people, especially smallholders?

2.10.0 Major Challenges

2.10.1 Significant progress was made in the past 40 years and must continue to be made in the coming years in raising food consumption levels, improving nutrition, and reducing poverty through agricultural transformation. The efforts, however, need to be redoubled to meet WFS target and MDG to halve the number of hungry people by 2015. India is way off track in achieving the MDG goals. Hunger cannot wait. Further, resource-poor farmers are under acute distress and are finding it difficult to liberate themselves from the complex traps of multi-layer debts, poverty, poor access to institutional support, high production risks, market failures and declining returns. Average productivity of our crops and farm animals is low and wide yield gaps exist for almost all crops and commodities. **Why science and technology have failed to alleviate, if not completely eliminate, the distresses?**

2.10.2 As the world is experiencing revolutions in biotechnology, information and communication technology, nanotechnology, space technology and business management systems, veritable divides, such as technology divide, gene-divide, digital divide, gender-divide, rich-poor divide, rural-urban divide are dangerously widening, and threatening peace. **While the country harnesses the uncommon potential of the uncommon opportunities, it is challenged with the daunting task of bridging and narrowing the various divides.** The Challenge before us is to build research and technology development capacities and partnerships which will contribute to and capture the impact of Gene Revolution and other scientific revolutions. How can the national and international systems be strengthened to rationally manage biosecurity and TBT and minimize the adverse impacts of TRIPS and other WTO agreements on the small-scale farmers and fisherfolks and the poor and convert these provisions into an opportunity?

Bridges must be built across science, society and humanity so as to effectively share the global knowledge and technology pool for more equitable and inclusive development.

2.10.3 **The agriculture led broad-based economic growth must take place under the settings where the natural base of production resources, such as land, water and biodiversity, has shrunk, the biotic and abiotic stresses have intensified and there is widespread environmental and agro-ecological deterioration.** The degradation of breadbaskets, such as the fatigued rice-wheat lands, irresponsible fishing and aquaculture and industrialization of livestock production, stubbornly high post-harvest losses, and disconnects among production, processing and marketing are constraining the sustained accelerated economic growth that is needed to reduce poverty and enhance food security. Moreover, climatic change, variability and global warming and their impact on agriculture and vice versa emerge as new threats and management of these changes resulting in minimization of the damaging agricultural trends is a real challenge.

2.10.4 The precise causes of the agrarian crisis and waning of the Green Revolution process are many and varied, but **there are five basic factors which are central to the present crisis. These are: unfinished agenda in land reforms; quantity and quality of water; technology fatigue; access, adequacy and timeliness of institutional credit; and opportunities for assured and remunerative marketing.** The disconnect between science and public policy, the decline in quality of agricultural produce as well as no connectivity with the clients of farm research and adverse meteorological factors add to these problems. The worst affected are the majority of small and marginal farmers, tenants and share croppers, landless agricultural labour and tribal farmers, since their coping capacity is very limited. Women suffer more since they have little access to institutional credit or organized extension support.

2.11.0 The Road Ahead: Meeting the Challenges

2.11.1 Science and technology will be pivotal to the country's effort to meet the challenges enumerated above and to help our farm and fisher families to enhance the productivity, profitability, sustainability and equity. For this the Commission

recommends a three pronged approach: **Firstly, we must prioritise strategic research and technology development programmes**, including cutting-edge technologies, geared to meet the technological problems retarding and decelerating agriculture-led growth and development. **Secondly, we must realize that science and technologies should have a human face and cannot operate in a vacuum.** Therefore, it is absolutely necessary to formulate clear cut goals, policies, strategies and programmes and build partnerships for harnessing the (unlimited) power of science and synergizing technological and social revolutions. **Thirdly, the National Agricultural Research System, the technology assessment and transfer system, the knowledge system (skill development, re-tooling, indigenous knowledge , the humanware aspects, enabling mechanism (IPR, SPS) and services must be synergistically aligned, restructured and revitalized to dismantle the unholy alliance of hunger, poverty, unemployment, unsustainability and exclusion.** In this context, the following aspects must particularly be addressed.

- Evolve a **national innovation system**—align policy, incentives and institutions in this direction
- Balance the roles of the Centre, States, corporate and rural knowledge centres in provision of R&D services
- Use critical scientific and modern management tools essential for viability and efficiency of public R&D
- Align external assistance with the long-term capacity building — human resource development, particularly in frontier and strategic research
- Manage IPRs for technology transfer and resource generation by becoming dominant technology provider in the South

2.11. A. 0 Priority Research and Technology Development Areas

2.11. A.1 Science and technology must address (for crops, livestock, fisheries and forestry) the following four interrelated areas in order to attain higher productivity and sustainability and thereby help alleviate hunger and poverty:

- Enhancing yield ceilings, bridging yield gaps, protecting yield gains, minimizing post-harvest losses, augmenting value addition and improving productivity and promoting ecotechnologies rooted in the principles of ecology, economics, equity and employment;
- Exploiting the gene revolution (biotechnology), benefiting from information and communication technology revolution, space, nuclear and nanotechnologies and promoting knowledge-based farming systems, precision agriculture, intensification, diversification and value addition;
- Protecting and improving natural resources (land, water and biodiversity), addressing environmental concerns, and managing climate change and natural disasters; and
- Seeking congruence of productivity, profitability, sustainability and equity, addressing gender issues and problems of poor and the excluded, and managing liberalized trade in the globalised world by addressing issues related to global competitiveness in the context of the WTO AoA.

2.11. A.2 **In undertaking the above programmes, we must realise that basic (fundamental), strategic and applied researches constitute a continuum and are mutually reinforcing.** The Indian NARS has successfully been undertaking research in each of these categories. The modes of conducting researches have also evolved over the years. Lately, need for anticipatory and participatory researches have been felt to fill the gaps not covered by the usual modes of generating and transferring technologies. Given the persisting yield gaps and widening income inequity on one hand, and the fast changing global technological and socio-economic scenarios on the other hand, India needs to give high priority to strategic, participatory and anticipatory researches. Climate change, sea-level rise (the Tsunami 2004 is a cruel reminder to unforeseen destructions) and other such events call for national preparedness to meet these emergencies and new challenges by instituting and strengthening anticipatory researches. Strategic research, such as genomics and proteomics, which is geared to problem-solving, will particularly be helpful in removing the critical bottlenecks in technology. Participatory approaches of technology designing, verification and refinement will greatly ensure quick and

comprehensive adoption of technologies developed through inter-disciplinary and system-based programmes. **The Commission suggests the following strategic and anticipatory research areas for priority action:**

Breaking Yield Ceilings, Bridging Yield Gaps, and Protecting Yield Gains

2.11.A.3 It is encouraging that yields of major crops have continued to increase during the past 35 years; they are projected to increase towards 2030, albeit at a decelerating rate, but nonetheless implying a continued need for developing the technologies wherewith to achieve increased yields. For instance, rice, central to the nation's food security must maintain annual yield growth of about 2 percent towards the year 2020 to meet the demand. As cropping intensity becomes increasingly important, the features of crop duration and high per day productivity become preferred attributes.

2.11. A.4 As regards breaking yield ceilings, conventional breeding and management practices continue to offer great prospects of developing new super ideotypes, hybrids, and new life forms characterized by greatly enhanced new levels of yield, productivity, and adaptability, such as the **Super New Plant Type, Super Hybrid, aerobic and NERICA rices and extra-long-spike, and hybrid wheat cultivars**. These will be complemented by various genetically engineered products. Quality, consumer preferences, cost effectiveness, and environmental aspects of production, distribution, and consumption of these new types will need to be critically analyzed in order to assess efficiency and efficacy of their large scale popularization in the broader context of food security, poverty alleviation, sustainability, equity and biosecurity.

2.11. A.5 As regards bridging yield gaps, **50 to 100 percent transferable yield gaps are not uncommon**. There are several agro-ecological and socio-economic causes for the gap in bridging the exploitable yield gaps. With increasing emphasis on precision agriculture, there are greater chances for narrowing the yield gaps. The existing exploitable yield gaps should be seen as an opportunity for future growth that is consistent with agro-ecological, environmental, socio-economic, political and technological settings in the major production regimes. With newly-improved methodologies for systems analysis, and greater access to relevant data, reliable estimates

of potential yields in specific agro-ecological regimes are increasingly available. Such estimates will assist in estimating more reliably the gaps between actual and potential yields, and will assist also in charting strategies to bridge yield gaps.

2.11. A.6 As regards protecting the yield gains, under certain production regimes there are signs of decline in actual yields. A long term strategy and a site-specific and knowledge-intensive soil-fertility orientation are needed for the fertilizer-use technology transfer, adoption and monitoring by the extension advisory system and the farmers themselves. **Soil-test based fertilizer application**, particularly micro nutrients, real-time nitrogen management by leaf chlorophyll meter or leaf colour chart and soil nutrient budgeting, will be the elements of precision agriculture to sustain high yields and lessen the inputs-related deceleration of partial factor productivity. This approach calls for a paradigm shift in the technology transfer approach, based on intensive knowledge and higher capacity of extension agents of both public and private sectors. A **consortium approach** involving scientists, grassroot institutions, corporate sector, NGOs, financial institutions and farmers is urgently needed

Soils

2.11. A.7 Imbalanced agricultural intensification, excessive and unsustainable exploitation and consumerism-related industrialization under demographic pressure have over-drained our soils which have increasingly become both hungry and thirsty. Micro-nutrient deficiencies are spreading fast. These have caused **widespread decline in total and partial factor productivity growth rates** while demand for enhanced, sustained and pollution-free agricultural production is ever intensifying. **Enhancing input use efficiency and competitiveness must be our priority agenda.**

2.11. A.8 Classically, soil has so far been seen as a medium of plant growth to meet basic needs of humans and its other functions of regulating biosphere integrity and sustaining biodiversity have received scant attention. **“Soils don’t only serve for agriculture and forestry, but also for filtering, buffering and transformation activities between the atmosphere and the groundwater, protecting the food chain and drinking water against pollution and biodiversity. Regarding the latter, soil is**

the most important gene reserve, containing more biota in species diversity and quantity than all other aboveground biomass on the globe” (Blum, 2002, 17th World Soil Science Congress). Conceptual frameworks of development indicators generally ignore these vital functions of soil and need a re-look.

2.11. A.9 **Soil organic matter (SOM) is the mainstay of soil quality.** While balanced fertilization may meet crop productivity and maintain SOM, it is an urgent imperative to improve the sequestration of carbon in all the soils by all available means including recycling of crop residues, green manuring, composting, reduced tillage etc. We must realize that the **“grains belong to humans but the residues belong to the soil”**. So carbon sequestration should be an urgent priority, irrespective of its effect on climate change. Enhanced use of bio-fertilizers, soil microbes, bio-pesticides and bio-control of weeds may be given high priority.

2.11. A.10 Establish a **National Network of Advanced Soil Testing Laboratories** capable of testing large volumes of soil samples for 16 macro and micronutrients – 1000 laboratories in all parts of the country, to begin with. At least 500 of these should be located in dry farming areas where there is scope for doubling average yields immediately through addressing the deficiencies of micro-nutrients and the overall nutrient imbalance and deficiency in the soil. Revitalize and retool existing soil testing laboratories.

2.11. A.11 Provide each farm family with a **Soil Health Card** containing information on physical, chemical and microbiological profile and health of the soils. A dedicated cadre of soil technicians/scientists for the **National Movement on Soil Health Care** with defined targets and resources (functioning equipment and trained human resources at the soil testing laboratories) should be created.

2.11. A.12 Agri-clinics, Input Distribution Centres, Small Farmer Estates, Cooperatives, Block and District Level Science and Technology Consortia and Panchayat Raj Institutions must integrate their efforts for ensuring soil health in conjunction with integrated watershed development systems and the Technology Missions. Farmers must

be trained to follow the recommended practices. Special extension programmes based on large scale **participatory demonstrations** should be organized. KVKs, both for soil testing and training, must play a pivotal role in this work.

2.11. A.13 Fertilizer companies should be encouraged to produce, demonstrate and market new fertilizer combinations and mixes to promote balanced fertilization in a cost-effective and environment-friendly manner. **The revitalized Land Use Boards should be highly proactive in matching soils with most appropriate cropping and farming systems.**

2.11. A.14 Productivity of wastelands may be restored especially with inputs of social capital for removing poverty by enhancing self-employment, income generation and livelihood opportunities for small/marginal farmers and landless communities. The National Rural Employment Guarantee Scheme may particularly prove helpful in this resolve.

2.11. A.15 People must be made aware and sensitised of the shrinking capacity of soils to absorb any more abuse. A **National Soil Charter** structured on the “World Soil Charter of FAO” and “UN Soils Convention” should be created to ensure soil health security.

Water

2.11. A.16 Water, the life blood of agriculture, is under severe threat. Allocation of water to agriculture is facing a losing battle with the industrial, domestic, power and other sectors. There is also a compulsion to intensify agriculture under the constraints of declining per capita land and water availability. **The lack of water availability on the one hand and inefficient use of available water on the other have limited our agricultural production much below its potential.** Besides, there is a gradual deterioration in the quality of water. The adverse impact of expected climate change on precipitation, temperature and sea level rise as a consequence of global warming is no longer a theoretical conjecture and will further aggravate the precarious situation faced by Indian agriculture. It is therefore imperative that any technology and policy for enhancing

agricultural productivity must take into account the need for evolving programmes for efficient water management.

2.11. A.17 During this first year (2005) of the **UN Decade of Water for Life**, while India, under the Bharat Nirman Programme, has committed to add 10 million hectares over the next few years to its 56 million hectares already under irrigation (the highest in any one country of the world), top priority must be given to conserving every drop of water and rendering “**water as everyone’s business**” to ensure most judicious and efficient use of this most precious resource. Hydrological balance, water security and water-use policy, water users’ associations, storing water everywhere, recharging million wells, reviving dying wisdom for water conservation and use, energy and water pricing, integrated watershed management and convergence and synergy among missions comprise major water conservation and use initiatives.

2.11. A.18 **Precision agriculture** is a key to efficient water management. The concept of traditional agriculture is to be modernized to allow administering inputs and undertake farming operations precisely. This will need mutual collaboration among the scientists, the field functionaries and the farmers.

2.11. A.19 The much talked about **river linking programme** for inter-basin water transfer has taken a small step forward through the **Ken-Betwa** link canal. The consequent impact on productivity and more importantly the water and soil environment are only guessed at present. A systematic evaluation may be initiated to learn lessons from this programme and prepare us for undertaking similar and bigger endeavours in future.

2.11. A.20 Despite having a vast water management research database, **field-worthy information on certain important issues is yet to be generated**. These are on water management with mulches, on tuber crops, on system of rice intensification, its efficiency vis-à-vis land levelling index and sustainable methods of rainwater conservation and use.

2.11.A.21 Under monsoon climate, temporal and spatial deficits and excesses of water are common even in irrigated regions, as the source of water for the reservoirs is the

rainfall. This calls for supplementing the deterministic research results by considering the stochastic behaviour of rainfall, and hence, the water availability for agriculture.

2.11. A.22 A **travelling workshop** of experts from India and from the Nile, Jordan and Imperial Valleys should be organized to formulate new strategies for water management along the Rajasthan canal and other such existing and planned command areas. Water related tensions in rural areas are increasing. Timely and anticipatory actions must be taken to alleviate the conflicts.

2.11. A.23 Both the anthropogenic and natural causes of occurrence of poor quality water are known and their piece-meal solutions are also known. Looking into vast areas under such problems and their adverse impact on agricultural production, an '**Integrated Water Use and Management System**' is to be developed to address the problem in a sustainable and holistic manner.

2.11. A.24 **Bio-drainage** is suitable for partially salvaging non-remunerative wastelands that are saline, waterlogged and abandoned. With some ingenious planning, some normal cropping may be done along with plantation for bio-drainage in marginal lands. This will require evaluation of the environmental impact of bio-drainage and developing plantation geometry for selected tree species that are most suitable vis-à-vis the land and water quality. Despite successful demonstration of conventional land drainage technology, Indian farmers have not adopted or maintained them on their own. Like irrigation development, **drainage development should also be considered as a national objective and given adequate departmental support.**

2.11. A.25 **Pressurized irrigation** technology should be user-friendly, suitable also for small to marginal landholders and compatible with the available energy scenario in the countryside. The general awareness about the design criteria for pressurized irrigation system and its layout suiting to diverse field and horticultural crops and quality assurance are lacking among the manufacturers, suppliers field functionaries and farmers. Necessary steps, perhaps through a number of training programmes, should thus be taken to remove the aberration to benefit the users.

2.11. A.26 Remote sensing, simulation models, artificial neural network, GIS, geostatistical analysis etc., have great potential in **water resource assessment and on-farm water management**, and thus need to be applied for development and sustainable management of water resources. Application of modern tools to monitor ground and other water resources in relation to cropping pattern is required to diversify crops so as to prevent injudicious use of water resources.

2.11. A.27 **National Water Policy** should emphasise **Integrated Water Management encompassing water harvesting, conservation, rehabilitation of waterbodies and ground water recharge. Efficient utilization of water** must be considered as the core of a watershed development and management programme and such programmes are to be developed according to the agro-climatic environment of a region. Marketing facility is essential before going for diversification in agriculture using the harvested rainwater and such facilities need to be created simultaneously with the watershed development programme.

2.11. A.28 Mindset of all those who are associated with watershed programmes needs to be changed to consider water programmes not as merely departmental activities but as saviours of the rainfed agriculture and all who are dependent on it. This may be attempted through awareness generation programmes. **Participatory Irrigation Management (PIM)** is essential in irrigated regions to ensure sustainability of water use with high efficiency. Technology transfer procedures must find place at local levels and a mandatory mechanism needs to be developed involving farmers, administrators and the research institutions.

2.11. A.29 A **National Research Centre on Glacierology** should be established for collection, storage and dissemination of information on status of seasonal/perennial snow and ice. The Centre should undertake research on understanding the interaction amongst biological processes, physical environment and the climate change and develop early, medium and long-term warning systems and advise on trends of water availability and overall hydrological situation in the medium and long-term.

Biodiversity

2.11. A.30 Biodiversity, comprising genetic resources, is the building block of functions and forms of living organisms and will always be needed to produce new genotypes to meet the ever changing needs of humankind. New sciences of biotechnology and bioinformatics, coupled with conventional sciences, should be judiciously used for developing efficient and effective methods of conservation, utilization and exchange of genetic resources. Due to economic and population pressures the resources are eroding fast. Moreover, their availability is getting increasingly restricted due to their propriety protection under several systems. The Cartagena protocol for conservation, biosafety and sharing of genetic resources provides largely accepted and harmonized current practices and standards, and should be accepted by all countries. Along with Plant Breeders Rights, Farmers' Rights should be honoured and implemented for equitable and fair sharing of genetic resources. In this context, the indigenous rights over genetic knowledge and women's sphere of plant knowledge should be recognised under any intellectual property rights regime. The PVPFR Authority should ensure strengthening of national biodiversity management capacity implementation of the Farmers' Rights and execution of the TRIPS and SPS commitments.

Livestock

2.11. A.31 **Livestock, whose ownership is more egalitarian as compared to land, is emerging as a driving force in the growth of agricultural sector of India.** Contribution of livestock to Agricultural Gross Domestic Product (AgGDP) has increased from 14% in 1980-81 to 26% in 2000-02. Demand for livestock products is income elastic and sustained growth in per capita income of the population, rising urban population, change in food habit are going to fuel further growth of this sub-sector. More than equity and balance, the rural livestock provides sustainability to the total agricultural operations. In spite of poor infrastructure, low investments and low priority shown to this sub-sector, livestock has provided sustainability and stability to agricultural production. The greatest contribution from livestock in the current concept of global economy and the national agriculture resurgence is in terms of sustainability to the total rural development,

which the livestock only can provide, especially to the landless agricultural workers and marginal farmers.

2.11. A.32 But, research and technology development supports for the livestock subsector have been neglected. Besides low productivity, poor nutrition and fodder and feed availability, poor health and high incidence of diseases and highly disorganized breeding and germplasm conservation programmes have serious depressing effect on the industry. Bluetongue, Bird Flu and other highly contagious diseases must be contained and eradicated and not allowed to enter the country. Thanks to the NDDB that the dairy sector, due to production-processing-distribution linkage with an end-to-end approach, has rendered India as the foremost milk producing country in the world. Such an approach must be popularized widely.

2.11. A.33 For enhancing the role of livestock for livelihood security, the following actions are required:

- Set up a **Livestock Feed Corporation of India** to provide support to local level SHGs engaged in the production of fodder and feed and in organizing **Fodder and Feed Banks**. Strengthen applied research in different agro-ecological regions so that livestock owners can implement correct feeding regimes using locally available feedstuffs and roughages. Research on ‘rangeland management’ on private and govt.-owned wastelands and rangelands is needed to increase production and availability of grasses for small grazing ruminants such as sheep and goats. This research should aim to increase the productivity of these land resources using low input technology although initial establishment costs are likely to be comparatively high. There is need for research on economic feeding systems for increasing slaughter weights of lambs and kids.
- In the case of poultry production, Poultry Estates may be organized with the help from the **National Egg Coordination Committee** and the organized poultry industry to help SC/ST and other resource poor communities take to economically viable poultry farming. **Poultry Credit Card** (as also **Dairy Credit Card**) should be issued to promote entrepreneurships.

- Quarantine arrangements may be strengthened to **avoid the outbreak of epidemics caused by invasive alien species**. Poultry farming should be regarded as an agricultural enterprise and should be given special attention from the point of view of biosecurity.
- Promote institutions and establish mechanisms to ensure **quality consciousness in milk, meat, vaccine and other products of this sector**. Encourage research and innovation to enhance sector level efficiency in quality production, value addition, procurement, processing, storage and marketing of all livestock products, including those based on small ruminants.
- The government should encourage systematic area specific animal disease control programmes on the basis of a co-ordinated national plan under the overall guidance of the National Advisory Committee. The government should also structure, under a **National Animal Production and Health Information System (NAPHIS)** in the Central Department of AH&D, a dynamic disease information reporting and feedback arrangement. Special attention should be paid to Bluetongue and Avian Flu.
- A **national livestock breeding strategy** needs to be evolved to meet the requirements of milk, meat, egg and other livestock products and their distribution. Major thrust should be on genetic up-gradation of indigenous/native cattle and buffaloes using proven semen and high quality pedigreed bulls and by expanding artificial insemination network to provide services at the farmer's level.
- Research needs to be done on appropriate breeding objectives for indigenous breeds and appropriate methodology for implementing breeding programmes. This should especially include formulation of selection indices and accurate genetic evaluation to ensure steady genetic progress.
- **Conserving Genetic Heritage and Harnessing Unique Niches:** The national bureau of animal genetic resources should chronicle and digitise inventories of the livestock genetic resources and associated traditional knowledge, and launch gene literacy movements to sensitise all stakeholders. The Suratgarh Farm (Rajasthan)

and other such farms of the Government of India should be developed as an *ex situ* germplasm repository of livestock genetic resources.

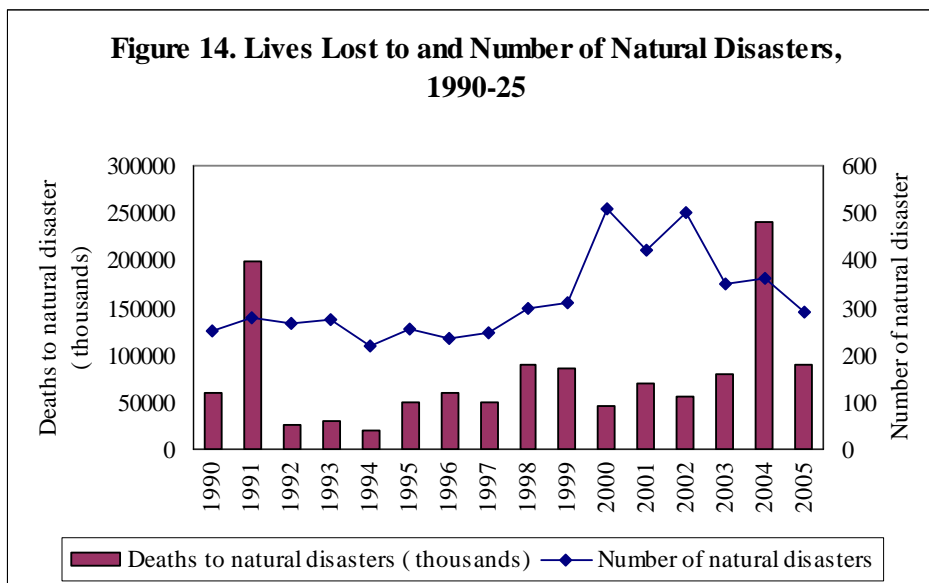
Climate Change, Risk Management, Disaster Mitigation and Environmental Protection

2.11. A.34 We have just past the first anniversary of the tragic Tsunami which on December 26, 2004 swept countries bordering the Indian Ocean that claimed the lives of more than 280,000 people and displaced 1.5 million people from their homes. Fisheries and coastal agriculture were severely damaged. In India, 300,000 fishers were made jobless. Furthermore, productive lands have been lost due to massive erosion and salinity infusion.

2.11. A.35 The Indian Ocean tsunami is one in a series of recent powerful natural disasters affecting developed and developing countries – from unexpected occurrences like earthquakes, floods, and cyclones to less immediate and evolving hazards like droughts and environmental degradation. The October 2005 South Asia Earthquake affecting Pakistan and India has resulted thus far in about 75,000 human casualties, and about \$330 million loss in livestock, crops and agricultural equipment as estimated by ADB/World Bank. The trend in the past two decades shows an increase in both the number of natural disasters and the number of people killed by them (**Figure 14**). In the past two years, the number of deaths from natural disasters has been far above the past decade's average.

2.11.A.36 In India, natural disasters such as floods, droughts, earthquakes, landslides and cyclones are of frequent occurrence and cause colossal loss of human lives, damage to properties and loss of crops. While most of the disasters are natural, some are aggravated by man-made activities. Need to develop strategies for disaster mitigation by agriculturists was never felt greater than today. To feed the ever increasing population it is essential to counter the adverse impacts of disasters in order to save and enhance the agricultural production. While doing so, care must be taken to prevent over exploitation and degradation of resources, which are to be maintained for the future generation. Natural resource management plays a key role not only in improving the land and water

degradation during crop production but also in protecting the environmental quality. Concerns for environmental pollution, especially from soil inputs to increase production have led the scientists to focus on the processes and procedures which can maintain land sustainability, arrest the processes of land and water quality deterioration and accelerate the rate of restoration of any natural resource. Approaches based on physical, chemical, biological and socio-economic principles can be most effective in providing solutions for mitigating disaster adversities, conserving resource base along with least detrimental influence on environment.



Source: EM-DAT 2005

2.11. A.37 Global warming and the resulting climate change are likely to have adverse impact on India’s water resources, agriculture, forests, industries, energy and transport, human health and coastal zones. **Rising temperatures are expected to result in the reduction of the country’s wheat and rice yields in the next two decades.** By affecting agriculture and forestry, global warming is likely to jeopardize livelihoods and food security by drying up river basins. The major impact of climate change is abnormal changes in weather patterns, which are already being felt. Erratic rainfall patterns are going to disrupt the management practices for crop production. Most countries in temperate and tropical Asia including India are experiencing occurrences of extreme weathers like droughts and floods. The global warming is threatening the melting of ice

and glaciers. This is going to cause rising of sea levels thereby exposing the low-lying coastal areas to severe environmental stresses.

2.11.A.38 About 30 per cent geographical area (32 m ha) in arid zone are prone to drought and famine. Rainfall deficit, delayed arrival of monsoon, early withdrawal, large gaps in between rainfall events in eastern India, Jharkhand, Chattisgarh, M.P. etc. are the main causes of agricultural droughts causing damage to crops and bringing miseries to farmers. On the other hand, the excess rainfall causing floods, damages the standing crops in fields, erodes the fertile soil from croplands and makes transportation of produce extremely difficult. Occurrences of earthquakes, cyclones, avalanche, landslides and tsunami create destruction in all forms whether houses, buildings, crops, properties or most importantly humans lives.

2.11.A.39 There is rapid advancement in the development of the modern tools like remote sensing (RS), geographic information system (GIS), global positioning system (GPS), simulation modeling and information technology. The combination of these technologies provide a cost effective means of acquiring high resolution real time data through RS, data management and analysis through GIS, georeferencing the ground truth data with GPS and utilization of data for specific purpose and management through simulation modelling. Thus, these can serve as very useful tools for precise assessment and sustainable development. The following areas deserve greater research attention:

- The isotopic ratio of Helium in ground water is a sensitive index for tectonic plate activity below earth's crust. Regular mapping of isotopic Helium concentrations in groundwater around the known tectonic fault lines and well-demarcated earthquake prone areas, can provide early forewarning signals for timely remedial action on the part of local administration. Further investigations on these aspects are recommended.
- Development of various kinds of early warning systems is required.
- To combat desertification, more research should be focused on non-nucleating theory of raindrop formation, which may explain cloud formation more scientifically than nucleating theory.

- The geophysical factors of an area, which are primarily responsible for desertification, need more attention and study than the climatic factors.
- Ozone is the most important air pollutant in terms of damage to crop plants and also injurious to human health.
- Studies should be initiated for monitoring of earth surface ozone levels in India.
- The effects of changing/increasing levels of ozone on crop growth and yield should be studied.
- Precision in climate change prediction must be higher for temporal and spatial scale resolution.
- The bio-physical and socio-economic aspects should be linked with climate change for realistic estimates of agricultural impacts.
- Bio-physical traits such as leaf membrane stability index, canopy temperature depression and spin lattice relaxation time may be explored to be used as selection criterion for adaptation to temperature stress in wheat.
- There is need for providing accurate advanced information on weather and its possible implications on the standing crops to farmers.
- Adequate precision is required in predicting the short term high temperature conditions or heat wave conditions which are likely to damage agricultural crops.
- Thermal time concept may be a useful tool in forewarning mustard aphid a month in advance.
- **Bilateral collaboration with selected institutes abroad, especially nanotechnology-based work in USA, will be extremely helpful in the above areas.**

Greening the Grey Areas: Accent on Rainfed Drylands

2.11.A.40 Rainfed and other less favoured areas have the highest concentration of poor and malnourished people; these highly risk prone areas are characterized by low agricultural productivity, high natural resource degradation, limited access to infrastructure and markets, and other socio-economic constraints. In the interests both of improving household food security and lessening socio-economic inequity, and also of

raising national agricultural production, **research and technology development must give greater attention to soil health, water conservation, livestock for livelihood security, horticulture and agroforestry in the rainfed areas, while maintaining and further increasing the gains made in irrigated areas. Genetic improvement for tolerance to water stresses (both scarce and excessive), salinity, acidity and other abiotic stresses as well as to biotic stresses, water harvesting and enhanced water and fertilizer use efficiency, management of soil erosion, crop-livestock integrated farming systems, participatory research, contingency farming and agro forestry should be high priority research agendas in rainfed areas. Technology transfer systems, including input and institutional supports should emphasize precision and pace, hence the need for greater skill alertness and commitment.**

2.11.A.41 Yield and productivity gaps are particularly large in rainfed areas. This is attributed mainly to large variability of soil features, negligible control on water, weak technology assessment, refinement and diffusion mechanisms and poor institutional supports. Nonetheless, there are several successful stories of bridging the gaps at various levels, which should be critically analysed for identifying the underlying drivers of change and their judicious scaling up and adoption for greening the grey areas. A recent IFPRI study had examined the prospects of replicating and sustaining sporadic and isolated instances of technology-triggered success stories of enhanced yields to achieve broad-based aggregate successful growth in rainfed agriculture and suggests that, **“where there is participation and individual motivation, where incentives are aligned with improved means to respond to incentives, and where technology plays a pivotal role, success may follow”**.

Managing the Gene Revolution

2.11.A.42 The global area planted with biotech (GMO) crops has steadily increased during the last nine years. Today, about 9 million farmers in 17 countries are growing such crops covering about 85 million ha. India, so far, grows only one biotech product, i.e., Bt Cotton, occupying nearly 0.5 million ha under legally-released Bt hybrid varieties and an additional about 0.5 million ha under “illegal” Bt hybrid varieties. A recent study

reveals that, on an average, 30 percent of the illegal seeds are non-Bt, only 27 percent are F₁, rest of 43 percent are only 10-75 percent positive for Bt, indicating F₂ and mixtures. Fake cartons of the legal seeds are increasing.

2.11. A.43 The parallel production of legal and illegal biotech varieties underscores the strengths as well as weaknesses of the technology. The strengths encompass higher resistance to bollworms (a serious cotton pest) – significantly reducing the number of pesticide spray and the amount of pesticides used, thus cutting down both cost and environmental pollution. Higher yield, superior quality and early maturity are other benefits of Bt cotton varieties. The weaknesses include greater chances of corruption of seed chain, high seed cost and greater chances of non-adherence to the biosafety measures, *viz.*, non-growing of *refugia*. Bt detection kits are available and should be used judiciously and transparently to confirm truthfulness of the seed and to build up quality control and faith of the farmer in the technology and the seed chain. The research and regulatory and extension systems must be effectively aligned to ensure smooth and cost-effective flow of quality seed.

2.11. A.44 The Gene Revolution is primarily propelled by the private sector. This paradigm shift has important implications for the kind of research performed, types of technologies developed and the way the technologies are disseminated. It raises concerns that the small farmers may not benefit. As per our needs, prospects and capacity, India should develop dynamic policy on biotechnology which must map out ways to benefit all stakeholders, especially small farmers, and minimize negative effects, if any.

2.11. A.45 The potential of biotechnology should be approached with a balanced perspective by integrating it within the national research technology and development framework and using it as an adjunct to and not as a substitute for conventional technologies in solving problems identified through national priority setting mechanisms. Priority setting should also take into account national development policies, private sector interests, market possibilities, potential for adoption by farmers, public perceptions of safety, and consumers' views. Accordingly, various stakeholders, public sector, private

sector, industries, NGOs and wider segment of civil societies should be involved in the formulation and implementation of national biotechnology policies, strategies, plans and programmes.

2.11. A.46 A panel chaired by M.S. Swaminathan, June 2004, had prepared a National Biotechnology Policy document and suggested the establishment of an autonomous **National Biotechnology Regulatory Authority** to oversee and harmonise biotechnological developments in fields of Agriculture and Food, Environment and Medicine and Pharmaceuticals. The Department of Biotechnology has also been preparing a document on national policy on biotechnology through a widespread consultative process. The National Commission on Farmers considered these two initiatives and widened the scope of the consultative process by organising a consultation with farmers and farmers' organisations, September 2005. The consultation suggested that **National Policy on Biotechnology** must address the following issues: (i) value, usefulness and appropriateness of biotechnologies, (ii) risk and biosafety aspects and their management, (iii) equity and ethical dimensions, overall awareness and promotion of pro-poor features of biotechnologies, gene literacy, (iv) control of and access to biotechnologies, the role of public and private sectors, harmonization of various regulatory provisions, and (v) investment in research and other institutional supports and partnerships for transparent and balanced harnessing of biotechnologies. It had emphasised that **Pro-poor features of biotechnology should be judiciously harnessed to attack directly the issues of food insecurity, malnutrition, and poverty.**

2.11. A.47 **The National Commission on Farmers' Consultation had endorsed the establishment of the above mentioned Authority** as also of a **National Biosecurity Institute** steered by an Advisory Committee comprising scientists, representatives of public and private sectors, industry, CSOs, NGOs and farmers. The consultation had recommended that the Authority should combine both regulatory and advisory responsibilities and coordinate and harmonise the various socio-economic and other development aspects, regulatory measures and bioethical and biosecurity norms towards harnessing biotechnologies for the good of the common man (*Aam Aadmi*).

Diversification

2.11. A.48 Science and technology development has been the main force in enlarging people's choice both by expanding human capacities to harness technologies and by providing menu of products to meet fast-changing needs and demands of humankind. There are several excellent examples of science and technology led diversifications such as the rice-wheat system, conservation farming, aquaculture and horticultural revolution. Diversification will be successful only if it:

- Responds to market changes, trade liberalization, shifts in food habits and food baskets and to other socio-economic developments and agro-ecological settings;
- Increases employment/income-generation opportunities and judicious use of land, water, labour, biodiversity and other resources;
- Reduces the incidence and damage caused by pests and diseases and risk diffusion leading to higher and more stable production and income; and
- Promotes resource conservation through the adoption of integrated farming systems (incorporating integrated pest management and integrated plant nutrient management), thereby exploiting synergism and lessening the requirements for and reducing the pressure on increasingly scarce water, land, and other resources.

2.11. A.49 To realize the fore-listed possibilities, policy guidance and institutional supports must be in place to induce appropriate technology development. Technologies suitable for integrated crop-livestock farming, especially for small-holders, should have priority for development and diffusion. Moreover, the production systems, including organic agriculture, should be linked to effective markets to increase farm income and poverty reduction.

Value Addition and Prevention of Post Harvest Losses

2.11.A.50 **Post harvest losses, on an average ranging from 10 to 30 percent depending on commodities, being high in horticulture, livestock and fisheries - all high value products, are colossal.** For instance, in horticulture, serious mismatch between production and consumption continues although there is no reliable data

available to estimate the success achieved during the last 10 years in reducing post harvest losses. The estimates of monetary losses being incurred in the country keep rising at regular intervals, as evident from the four reports brought out during the past decade:-1993-94 = Rs 8,000 crore (*Min. of Food Proc.*); 1996-97 = Rs. 25,000 crore (*Mckinsey Report*); 1999-00 = Rs. 50,000 crore (*Anon.*) and 2004-05 = Rs. 85,000 crore (*Directorate of Marketing, Maharashtra*). The huge investments made not only by the Department of Agriculture and Cooperation, but also by the APEDA, NCDC, NAFED, Ministry of Food Processing etc. have thus not succeeded much in reducing the staggering post harvest losses. **No authentic data are available on the reduction in losses**, if any, achieved due to the infrastructure created, improved PHM technologies promoted and several policy initiatives taken for streamlining the systems involved. All investments and efforts made for improving PHM have ended at the storage level of bulk quantities of a few commodities, with no care taken at the retail level. Consequently, the fresh produce continues to be sold in open stalls, roadside kiosks, carts, footpaths etc. causing serious loss in quality of the produce besides adding to the PH losses.

2.11. A.51 Further, liberalization has brought focus on technology as a major factor in competitive marketing, which should be duly reflected in new agriculture and science and technology policies. As trade shifts from primary products towards processed and manufactured products, greater emphasis will be needed for agroprocessing and post-harvest technologies that convert primary products into quality products and value-added products. Horizontal and vertical diversification can together proceed to expand options for quality products that meet fast-changing demands of local and foreign markets. **Trade - , biosafety - , gene - and legal-literacy should be ensured at all levels, from farmers to policy-makers. These moves will promote farmer-industry linkage, small and medium enterprises (SMEs), rural entrepreneurships, and off-farm rural employment.** It will be necessary to create marketing infrastructures that pay increased attention to food safety (as by cold chains) and to minimize post-harvest losses - particularly large for horticultural, livestock, and fish products. **Institutional innovations will have to be explored, e.g. Contract Farming, Nucleus-Estate linkage systems, Small Holders' Estates and Futures Markets. The group dynamics will promote**

decentralized mass production by masses and benefit from centralized services. Through ensuring backward-forward linkages under an end-to-end approach, the Small Holders' Estates will synergise production-processing-marketing linkage.

2.11. A.52 Efforts are underway in different countries to identify specialty commodities, such as off-season varieties and production systems, new crops, and novel varieties and breeds to capture new opportunities. With the increasing demand for herbal medicines and botanicals, and for organically produced food, aquaculture and other products, several countries have developed specific production and distribution patterns. Public and private sector support in supplying quality seed, planting materials, processing, procurement and marketing to promote these initiatives is a condition *sine qua non*. Individual countries have developed or are developing policies, strategies and programmes on such diversifications. As several of these initiatives are innovative and diverse, there is good scope for sharing such experiences through information system networks as well as through Technical Cooperation among Developing Countries (TCDC) arrangements promoted by FAO and other UN agencies and international organisations.

Aligning R&D to Manage WTO AoA

2.11. A.53 The share of agricultural trade in total agricultural GDP of the country had increased to nearly 10 percent during the TE 2004 from 6.3 percent during the TE 1995. The WTO AoA provides both opportunities and threats to agricultural families and agro-based industries. It was hoped that the trade liberalization will help accelerate the agricultural export leading to high net trade and will be instrumental in improving efficiency in allocation of resources. As seen from **Table 22**, in the post-WTO era, both export and import have increased substantially. However, the increase in imports was relatively higher than that in export, thus bringing down the proportion of surplus to GDP from 3.2 percent in TE 1995 to 2.7 percent in TE 2004, although there was a hump in the initial post-WTO years. **This trend has adversely affected our self-reliance in agriculture.** The value of export required to financing imports increased from 32 percent in the pre-WTO era to 57 percent in the post-WTO era.

Table 22. Indicators of Performance of Agricultural Trade, Unit: Million \$

Period	Imports	Export	Trade surplus	Surplus/GDP
1992/93-94/95 (Before WTO)	1190	3725	2534	3.2
1995/96-97/98 (Initial Years)	1996	6530	4534	4.6
1998/99-00/01 (Post WTO)	3272	6060	2788	2.7
2001/02-03/04 (Post WTO)	4087	7141	3055	2.7

Source: Chand , Ramesh,2005. WTO and Indian Agriculture: Issues and Experience

2.11.A.54 Export of marine, livestock and horticultural products maintained the tempo of growth continuing from pre-WTO period whereas there was a setback to the exports of oilmeal and the earnings from traditional groups consisting of tea, coffee, spices, etc. declined sharply. Primarily caused by declining international prices, imports of several commodities increased substantially, at times hurting domestic production of major crops and the country was not able to safeguard interest of the farmer-producer. Vegetable oils accounted for more than three-fourths of the total increment of agricultural import in post-WTO era. Imports of pulses, spices, cotton, wood and wood products have also increased significantly (**Table 23**). Noticeable increases in imports of fruits and nuts had also occurred (mostly due to increase in cashewnut import which is mainly for reexport as processed cashew). Huge imports of vegetable oils and pulses have depressed domestic prices of these commodities and adversely impacted their domestic production and the producers. India should develop policy to regulate trade of such commodities to balance interests of both producers and consumers. **Since farmers, who are both producers and consumers, comprise about 60 percent of our population, the exercise of balancing the import and export of strategic commodities must be undertaken keeping in mind overall income and savings and livelihood security of small farmers.** On the other hand, the country must be able to take full advantage of the bright prospects of increasing exports of high value commodities such as fruits, vegetables, fish and livestock products.

2.11. A.55 Cost competitiveness and product quality issues are critical to compete in World market. **Research and technology development should be geared and focused to increase the overall competitiveness of our major crops and commodities.** This

calls for enhanced and sustained efficiency of inputs use, thus cutting cost of production, improving quality and reducing post-harvest losses so that the input-output ratio is maximized (without sacrificing the ecological and environmental security). International quality and safety standards for agriculture products are very high. Meeting of their standards involves substantial costs for building technical and physical capability. There is a need for pooling talents and resources available in both public and private sectors to build this capacity. Finally, public research system should shoulder the responsibility to protect small farmers from ill-effects of trade reform process.

Table 23. Import Dependence for Food (Import/Domestic consumption %)

Item	1991-94	1995-98	1999-02
Vegetable	0	0	0.1
Milk	0.1	0	0.1
Rice	0.2	0.1	0.1
Cereal	0.4	0.7	0.3
Wheat	0.8	1.7	0.6
Fruits	0.4	0.6	0.7
Sugar & Sweeteners	2.3	1.6	1.4
Pulses	4.5	6.1	10.7
Veg. Oils	5.7	24.4	47.9
Total	0.89	2.02	3.76

Source: Chand , Ramesh,2005. WTO and Indian Agriculture: Issues and Experience

2.11. A.56 Along the production-processing-marketing chain, commodity-specific detailed action plan should be prepared with clearly defined goals. India's preparedness in the field of SPS measures is highly inadequate. As a result of which, several of our consignments get regularly rejected. The situation is likely to get still worse in the coming years as the Codex Alimentarius Safety Standards get more and more stringent, let alone the fast shifting of the goal posts. Thus, the urgency of the launching of quality and food literacy movement in the villages and strengthening of SPS infrastructure can hardly be overemphasized. **A Food Safety Council of India, chaired by the Union Minister of Agriculture, with the Union Commerce Minister as co-Chairman, should be established.**

2.11. A.57 We must urgently augment and create survey, surveillance and quality literacy programmes. The SPS infrastructure should be brought at par with International Standards and awareness should be generated abroad on steps taken by India to maintain high standards regarding food safety and biosafety. Keeping in mind high prospects of enhancing livestock export from India, the food safety concerns for livestock products will particularly be important since livestock economy is the backbone of a large number of marginal farmers and landless agricultural labourers. But today large parts of livestock product international trade are restricted because of animal diseases and threat of Avian Flu looms large. **ICAR's work on animal diseases and risk management assumes extremely high priority for addressing these concerns.**

2.11. B .0 Policy and Paradigm Shifts

“Ahead of us lie dangerous times. There are serious problems that derive from the realities of the external world, climate change, loss of biological diversity, new and re-emerging diseases, and more. Many of these threats are not immediate, yet their nonlinear character is such that we need to be acting today”

(Lord May of Oxford, 30 November 2005)

2.11. B.1 Future of our agriculture would depend upon the ability of farm families to raise agricultural productivity in perpetuity in an environmentally sustainable manner and enhance our global agricultural competitiveness through rapid progress in the areas of quality improvement cost reduction, diversification of farming systems and value addition to primary products. **Science is basic to sustainable intensification, diversification, value addition and quality improvement.** It is only science based and knowledge intensive agriculture that can help our farming families numbering over 115 million (25% of the global farm population) to enhance productivity without associated ecological harm. The Commission offers suggestions on methods of achieving a proper match between scientific research and the knowledge and technological requirements essential for launching an “ever-green revolution” or sustainable agriculture movement. Even at the outset, it must be stressed that an annual growth rate of 4% in agriculture will need a 8%

growth rate in horticulture, animal husbandry and fisheries, thus emphasizing the need for a farming system rather than a commodity centered approach to research.

2.11.B.2 National and international policy actions should ensure that science and technology must specifically address the needs and prospects of majority small and resource-poor farmers and help mainstream the gender concerns. Institutional, human capital and policy supports must capture the positive effects and minimize the negative effects of globalization and liberalization and of revolutions in biotechnology and information and communication technologies. **A meaningful interaction between science and policy and between scientists and policy makers is needed to promote knowledge economies and to bring the much-needed congruence among productivity, sustainability, profitability and equity.** Thus, it is not only biological and physical sciences, but also economics and social sciences, which must all interact dynamically to yield wholesome results.

2.11.B.3 Urbanization and globalization have fuelled dietary convergence and dietary adaptation. These present both an opportunity to reach lucrative new markets and a substantial risk of increased marginalization of smallholders and poor people leading to even deeper poverty. Smallholders must organize themselves in cooperatives or as Small Farmers' Estates to enhance their economies of scale and competitiveness and should be supported both by the public and private sectors for training and skill development and start-up funds.

2.11.B.4 The need to accelerate agricultural production can hardly be overemphasized. However, quick fixes and short term economic gains, particularly those with heavy social and ecological costs, must be avoided. For instance, the conversion of vast paddy fields into saline aquaculture in Southeast Asian countries which saw a short lived boom but busted soon, caused serious land degradation. **National policy priorities for preventing land degradation and managing degraded lands must be determined and judiciously implemented.**

2.11.B.5 There are pressures for diverting water from agriculture to other sectors. IFPRI has warned that re-allocation of water from agriculture can have a dramatic impact on global food markets. Policy reforms are needed from now to avoid negative developments in years to come. These reforms may include the establishment of secure water rights to users, the decentralization and privatization of water management functions to appropriate levels, the participatory and community involvement in regulatory and pricing reforms and markets in tradable property rights, and in the introduction of appropriate water-saving technologies. **Community land and water care movements** should be launched to ensure commitment of the masses towards conservation and judicious use of water and other natural resources.

2.11.B.6 Likewise, major policy and management changes are needed to realize full potential of fisheries consistent with cultural and social concerns of all stakeholder groups. The dark side to the new fish boom should be discouraged. As regards livestock, the high environmental cost of intensified industrial livestock production and the environment friendly widespread mixed farming systems of majority small and landless farmers should be judiciously balanced through appropriate policy and technological interventions. **“Lack of policy action will not stop the Livestock Revolution, but it will ensure that the form it takes is less favourable for growth, poverty alleviation, and sustainability in developing countries”.**

2.11. B.7 Conservation of forests is closely linked with the status of agriculture and livelihood security of people living in and around forests. Small and poor farmers account for 60 percent of rain forest destruction, converting forestland to agricultural land to meet their food needs and to earn a living. “In fact, when a farm household in the humid tropical forest margins slashes and burns as the initial step in an agricultural cycle, it starts clock ticking”. Integration of social status, physical infrastructure and agricultural productivity of forest margin areas with the overall national economy will greatly reduce the pressure on forests and forestlands.

2.11.B.8 Policy towards minimising the erosion of the treasure of biodiversity should be a high priority. The FAO-led International Treaty and Global Plans of Actions on Plant Genetic Resources for Food provide the mechanism for rationally conserving and

utilizing genetic resources. Dynamic national research systems should be in place to address the research, development and sharing issues of germplasm. Biotechnology should increasingly be used for characterization, conservation and utilization of genetic resources. On the pattern of UNESCO's Human Genome and Human Rights, FAO should adopt a universal declaration on the "**Plant Genome and Farmers' Rights**" to provide a balance between the rights of conservers of biodiversity and the researchers, developers, and users of modern biotechnological products. There is an urgent need to develop guidelines and procedures for the realization of Farmers' Rights to sustain on-farm *in-situ* community based conservation of biodiversity and associated traditional knowledge. A fair, gender sensitive, transparent and implementable reward and recognition system should be created for this purpose.

2.11.B.9 Science can greatly promote inclusive development by addressing the needs and opportunities of poor, less-favoured areas, neglected and excluded communities. Even biotechnology can be geared towards this cause. **As repeatedly emphasized by Nobel Laureate Amartya Sen, the lack of entitlement to basic resources is the main cause of hunger and poverty. Scientifically informed agrarian reforms to grant titles to land and water, and increased access to credit, knowledge and markets, will enhance productivity, sustainability (through better land and water care) and income, thereby resulting in appreciable reductions in hunger and poverty. Engendering these changes and technologies and socioeconomic safety nets designed for small-scale and marginal farmers are essential for supporting rural livelihoods, and this aspect should be explicitly highlighted in national policies.**

2.11.B.10 The existence of an enabling environment to judiciously exploit scientific and technological developments is as important, if not more, as the technology itself. Policy provisions must humanize technologies, and should emphasize : (i) enhancing capabilities for sustainable livelihood, and providing for new livelihood opportunities for the poor, (ii) improving the productivity, profitability and sustainability of communities' assets, and establishing effective linkages between community mobilization and the government and other service providers, (iii) ensuring the congruence and synergism among environmental, economic and social (gender and other equities) securities, and

(iv) empowering communities, especially the vulnerable ones, to harness new and appropriate technologies and enabling them to blend traditional local technologies with modern technologies.

2.11.B.11 **Science and technology development must continue to spearhead the productivity-enhancement process.** Sustained intensification through increased yield per unit land area, water, labour, and capital is the only recourse for achieving the production targets. In retrospect, the Green Revolution had its own strengths and weaknesses. The unprecedented production and yield increases and improvements in food supply and rural economy notwithstanding, it had the following shortcomings:

- Maximization of yield potential of only three cereal crops (rice, wheat and maize), albeit most important from the view point of food security, and that too only under irrigated or assured rainfall conditions, thus bypassing the vast rainfed and non-congenial areas and a large number of other important crops.
- In the initial years, it was suited generally to resource-rich farmers who could afford inputs, hence resource-poor farmers with little input capacity could not buy into the revolution, atleast in the early stages, thus enhancing inequality.
- It largely ignored the environmental costs.

2.11. B.12 The above shortcomings must be avoided as we launch the **Second Green Revolution as recently emphasised by our Hon'ble Prime Minister, Dr. Manmohan Singh.** In this context, the researchers must ask themselves the following questions in deciding their research and technology development priorities:

- Will the technology lead to higher productivity across all farms, water regimes (rainfed drylands), soil types and regions, not just well-endowed ones?
- How will the technology affect the seasonal and annual stability of production, especially the highly risk prone rainfed areas suffering from high instability?
- How will the technology affect the energy balance, eco-system and the sustainability of farming?
- Who will be the winners and losers from the technology – and how will it affect the majority small and marginal farmers, the poor and deprived ones?

2.11.B.13 Paradigm shifts will be needed to address the above and other related questions. The first paradigm shift relates to a shift in research approach from a single commodity based and monodisciplinary to a farming system based and multidisciplinary. The second shift demands a change from a top-down (training and visit system) extension approach to a participatory (effective research-extension- farmer-market interface) approach of technology assessment, refinement and transfer. The third shift seeks the integration of molecular biology, bio-technology and bio-information with conventional as well as traditional technologies (ecotechnology) for speedy, more precise and wholesome gains. The fourth shift seeks greater congruence between productivity sustainability and equity and creation of enabling mechanisms and inclusiveness for generation and adoption of new technologies. Cost-effectiveness of production, quality and safety in food and other products, and GMO biosafety and biosecurity, will assume high significance in the globalised and liberalized world. These paradigm shifts should be comprehensively internalized in national policies on agriculture and agricultural research and technology development.

Women in Science and Science for Women: Technological Empowerment of Women – Humanising Science and Technology

2.11. B.14 Countries with lower achievement in the Human Development Index and Gender Development Index have a larger percentage of their economically active population (both male and female) employed in the agriculture industry. Second, these same countries have a higher proportion of economically active women involved in agricultural activities relative to men. The disparities are likely to increase as rural to urban migration continues to change the composition of rural areas putting even greater responsibilities for the growth of the agricultural sector on women than they already have. In aggregate, women in rural areas in the poorer countries will be impacted most heavily as the feminization of agriculture intensifies further. **Agricultural technologies specifically designed to improve the efficiency and productivity of the female labour force will thus greatly improve overall agricultural productivity.**

2.11. B.15 There is lack of analytical understanding of the gender inequality. **Social research must provide disaggregated information on rural woman that can feed into**

policy formulation, and that can help articulate the strategic gender aspect of demographic transition. There is a lack of organized empirical evidence and of key information on the negative impact of the gender bias - as of unpaid work of rural women within the family, child labour, inadequate nutrition for mothers and children, inequitable access to credit and support services and to health and education facilities. This gap contributes to the continuing inability to influence those agricultural policies, programmes, and policy makers that affect rural women. Science must help gender mainstreaming to fully realize this huge human capital wherewith to combat hunger and poverty.

2.11. B.16 The National Commission on Farmers, in cooperation with the National Academy of Agricultural Sciences and the M.S. Swaminathan Research Foundation, organized a brainstorming session on the role of **Women in Science and Science for Women**, November 2005, to review the progress since the Fourth Women's Conference held in Beijing in 1995. Recognizing the increasing feminization of agriculture and further realizing that agriculture in the years ahead will be essentially science-led and knowledge-based, the meeting appreciated that

- (i) a people-centric sustainable development should ensure women's equal access to economic resources, land, credit, science and technology, vocational training, information communication and markets,
- (ii) S&T have to be developed, disseminated and harnessed in a gender sensitive manner with equal participation of women not only in S&T development but also by women who are the end users, and in strengthening the health, nutrition and livelihood security of women, and
- (iii) there is a greater need for self sensitization, confidence building and psychological management.

In order to ensure the above, the Commission strongly recommends to strengthen the following areas:

2.11. B.17 **Women in Science**

- Promote the full participation of women in all S&T activities and ensure their full and equal participation, by taking into account the multiple burden on their time and creating suitable support systems to reduce this strain.
- Enhance the retention of girls in the leaky pipe line especially at the tertiary level and the mid career women by bringing in flexibility in procedures and personnel policies to meet their special needs.
- Assess and draw up appropriate schemes to enhance their professional participation and increase the number of fellowships, opportunities for participation in conferences/workshops and increase their representation and participation in decision making and Professional Bodies as well as institute many recognitions and reward systems for their meritorious works.
- Prepare an electronic directory of women scientists and technical personnel as a reckoner for facilitating and enhancing their participation in scientific meetings and decision-making committees.
- Promote entrepreneurship among interested women by drawing up innovative schemes which help in the incubation and scaling up of innovative ideas which address the specific needs of women and establish special venture capital fund for enabling women entrepreneurs to take to a career of self-employment in converting new technologies into market driven products.

Science and Technology for Women

Skill Empowerment

2.11. B.18 Skill empowerment of women is fundamental for harnessing science and technology for livelihood security. In this context, the following actions are needed:

- Identify appropriate technologies for multiple livelihoods, enhance incomes and improve the way of life of poor and vulnerable women.

- Draw up well coordinated programmes to reach the rural women through well networked models for technology transfer, demonstration, dissemination and adoption.
- Establish training and mentoring centres for the rural women at households, SHGs, Farm women and Farm labourers. Capacity building centres on the model of KVKs should be established soon.
- Establish rural technology parks which will also help in adoption of appropriate technologies, to address local problems like reduction in drudgery and occupational hazards, appropriate tools, identify income generating activities – provide a platform to assess the real needs and feed to S&T institutions as agenda for research.
- Identify and promote micro enterprises based on assured and remunerative markets, low transaction cost and economic viability, preferably in horticulture, including medicinal and aromatic plants; village level agro-processing and value addition centres, organic farming, etc.
- Increase easy access to credit and markets to enhance multiple sustainable livelihoods; **develop micro-credit programmes into ‘Livelihood Finance’ systems which involve provision of credit together with appropriate services in the areas of technology, training and trade.**
- Induce financial institutions to address issues like flexibility, sensitivity of the needs and status of the poor women so that they have an easy access to credit.
- Promote ICT based information service like e-governance, e-agriculture, e-education, e-medicine, e-commerce etc. through the **Mission 2007 Every Village a Knowledge Centre which should have provision for appropriate contacts and follow up programmes to help those seeking special assistance.**

Generic Catalytic Interventions

2.11. B.19 The following steps and activities will further enhance the cause of science-led improved livelihood security of women:

- Engender the curriculum at the school level and technical education (Medicine/Engineering/Agriculture) level for gender sensitivity among future scientists and development personnel and strengthen S&T education and communication skills among community development workers.
- Engender all technology mission mode programmes and conduct periodic gender audit , the experience will help in preparing guidelines for the inclusion of women in other technology-based or technology-rich programme areas, especially the National Horticulture Mission, Bharat Nirman Programme, Capacity Building & Monitoring Centres for SHGs and revitalization of KVKs.
- Generate disaggregated gendered data on the impact of S & T on the livelihoods of rural women.
- Harmonize all activities and schemes coming under different Ministries/Departments so that women benefit optimally, ensure adequate resource allocation for women under various programmes and implement equal wages for equal work.
- Establish a **Network of Women Scientists and Institutions** interested in engendering the development through S&T based interventions to develop an end to end approach for the various agro-climatic zones. Such a national level action and policy research network should carry out longitudinal studies of women's roles in agriculture and rural livelihoods in the various agro-ecological regions of the country.
- Give greater focus to extension services in all areas of technology and build a strong cadre of extension workers, who may be given frequent exposure for sharing these ideas with the members in the group.
- S & T applications should foster job-led economic growth and not jobless growth. The opportunities for rural women to earn their daily livelihood through mini-enterprises and vending methods of marketing should be safeguarded by introducing engendered employment impact analysis.

Filling Critical Gaps to Enable Unreached Women to Benefit from Science and Technology

2.11. B.20 The critical gaps in taking the benefits of S&T to the unreached women should be filled in the areas of health, food and nutritional security, agriculture and entitlement. As regards health and nutrition, strategies should be enhanced to address anemia and hidden hunger caused by micronutrient deficiencies, particularly iron, iodine, zinc, vitamin A and B-complex vitamins and to promote conservation and revitalization of the traditional landraces and ethnic foods inclusive of wild edible foods to diversify the food basket. In Agriculture, the role of women should be promoted in the conservation-cultivation-consumption-commerce chain. Women's access to production, input and credit resources), and to Common Property Resources should be enhanced. Appropriate technologies and support services should be provided to enhance their use in a participatory and productive manner. Their capacity should be enhanced in water use/management and augmentation and in harnessing renewable energy like biomass, biogas, solar and wind. The various Acts, especially the BD, PVP&FR should be engendered and a literacy drive should be launched to understand them.

Participatory Research and Knowledge Management

2.11. B.21 Often the situation under which the scientific information is generated is unlikely to be same from those operated by the farmers. The scientific information is to be reviewed in terms of specific needs, opportunities and constraints faced by farmers in different production systems. The typical contrasts in physical conditions under which the farmers operate in terms of topography, soils, plot size, hazards, the facilities of irrigation, size of management unit, farming systems, nature of production stability, production sustainability, and priority for production need to be considered. The Small Farm Production Systems have some typical characteristics which include strong interaction between land and household economy, interlink of on and off farm activity, highly diverse, complex and risk prone activities even within systems, predominance of household inputs, prevalence of traditional practices, multiple enterprises primarily for domestic needs, production systems highly susceptible to stress and perturbations, and dependence on family labour and further sharing. **The assessment and refinement of**

technology thus need to be site specific, holistic, farmer participatory, and technical solutions to existing problems should be inter-disciplinary, interactive, iterative and gender sensitive.

2.11.B.22 Essentially the assessment and refinement of technology needs discipline to programme mode, piecemeal to system approach, open ended to focused technological intervention, “take it or leave” to demand-led approach, integration of biophysical and socio-economic factors, institute to inter-institute mode of technology assessment and refinement, and overall a strong research-extension to research-extension-farmer-market linkage and overall proper appreciation of distinction between science and technology. Different types of farmers’ participation are used for conducting on-farm trials for different purposes. In a truly participatory and collaborative, even collegiatic manner, the farmers must actively participate in on-farm trial process and be involved in regular meetings designed to clarify the logic, their current practices and their demand for new technology. The farmers must participate directly in the planning and execution of trials and analysis of the results and the knowledge should flow both ways.

2.11.B.23 A farming system is unique and reasonably stable through dynamic arrangement of farm enterprises that a household manages in response to the physical, biological and socio-economic environments in accordance with the household’s goals, preferences and resources. These factors combine to influence both the output and production methods. The farming system is a part of a larger system and can be divided into subsystems. On the regional level there are the non-agricultural systems, the market and credit systems as well as the farm systems. Within the farm subsystems there are the crop, animal, soil, weed, insect and other subsystems. Thus, the farmer must occupy the centre stage in refining, adopting and adapting the technologies. The approach should involve selecting target areas and farmers, identifying problems and opportunities, designing and executing on-farm research, and evaluating and implementing the results.

2.11.B.24 While identifying the solutions from on-farm trial, it must be seen that the technology will function and its profitability, compatibility with the farming system, contribution to reducing risk, need for institutional support and ease of testing by farmers

are duly considered. **The assessment of trials should be based on net income to the farmer assessed through economic analysis and ability to solve the problem diagnosed through.** The results of promising pilot activities should be extrapolated for defined groups of farmers in specific defined areas (clientele). The **Farm School** approach should be adopted for grassroot level training and technology diffusion, for which the R&D system must provide the needed financial and technical support.

2.11.B.25 In a real community situation, seeking participation and ensuring the same on a regular basis is essential to develop useful technologies. To ensure genuine participation is a crucial art. There is a need for attitude change on parts of the stakeholders, particularly the researchers and extensionists. The public sector researchers need to be proactive in participation especially in more difficult conditions. The following steps will prove helpful:

- The institutions in which they work have to be committed to produce results of use to an identified set of clients.
- Performance criteria, the means of assessing work against these criteria and the types of reward and incentives provided must all be geared to success in delivering technologies to meet clients' needs.
- Scientists will need specific training in participatory methods. Providing that due recognition is given to their potential shortcomings, training in PRA methods is a good first step. But the scientists must be given the resources for field work to pursue some of the research issues identified by PRA, and should go beyond mere diagnosis.

2.11.B.26 In the whole process of participatory research and technology development, researcher is most crucial person to ensure success. The local perception of research some times does not match with the participatory approaches. People also lack capacity to work together as there was no tradition of participation in India for a long time. This problem is still more pronounced when it comes to researcher and extensionists working together. This is an unfortunate legacy of the top-down research and extension. In the participatory mode, both the researchers and the extensionists need to develop positive

attitudes and empathy not only towards each other but also towards farmers. Since location specific research based on farmers' needs will be more relevant to the farmers, the research stations of the SAUs and the KVKs need to be strengthened with better quality staff who are dedicated, trained in need identification and are able to formulate projects accordingly and should have freedom to initiate their own research studies based on local problems. MANAGE and NAARM should emphasise this approach in their training programmes. The ongoing programmes on researcher-extensionist-farmer linkage, such as National Demonstrations, KVKs, ATMAs, Lab-to-Land and Land-to-Lab Programme and Integrated Watershed Programme (to enhance productivity of every drop of water) and others should be sensitised to this requirement and their staff at all levels should be trained in adopting the participatory approach. Some of these programmes, such as Lab-to-Land, need to be revitalized and strengthened. The SAU's Extension Departments should be reference centres, giving latest and credible information and advice.

2.11.B.27 Participatory (Farmer) breeding and knowledge sharing for development and diffusion of farmer-selected and scientist-assisted varieties combining proven adaptability to local agro-ecological, social and cultural milieu as well as possessing speciality traits (aroma, medicinal value and tolerance to local biotic and abiotic stresses) has emerged as an important strategy for harnessing treasures of our time-tested and ever-evolving indigenous knowledge and genetic resources. Several national and international programmes viz. the CGIAR Centres and the Indo-UK (DFID) programme have been promoting this approach. Some of these have been remarkably successful. For instance, the farmer participatory rice improvement programmes of the M.S. Swaminathan Research Foundation on *Kalajeera* (a high quality aromatic rice) in Orissa and *Navara* (a medicinal rice in Kerala) have tremendous potential of enhancing income and livelihood security of farmers in those areas. Such initiatives should be strengthened through additional research and technology dissemination efforts by mentoring and supporting dedicated SHGs and by linking the producers with markets and by creating and capturing niche markets.

2.11.B.28 **Participatory Research, Demonstration and Training (RDT) Centres** (see 2.11.D.11) should be farmer-centric and should concentrate on demonstrating how to increase the output and income of farmers with small holdings and artesanal fishermen. Precision farming, hi-tech horticulture, monsoon management and mixed farming will be important components of the training programmes. The proposed **National Board for Strategic Research in Agriculture** (see 2.11.D.10) can work out the modalities of establishing such Centres at locations where the work done will have a large extrapolation domain. Priority may be given to dry farming, where the work done at CRIDA and ICRISAT has shown that amelioration of micro-nutrient deficiencies in the soil can help to improve yield substantially. Also, we can initiate a revolution in pulses production by covering 100,000 ha under hybrid pigeon-pea (*arhar*) during 2005-06. The concerned State Governments could be requested to provide about 100 ha of land free of cost for establishing such RDT Centres. The Centres should be autonomous, and managed jointly by farm/ fisher families and scientists. **Panchayati Raj Institutions should be associated with the design and management of RDT Centres. These Centres should be designed to serve as windows into the new world of agrarian prosperity that awaits rural India.** They should have strong linkages with the relevant SAUs.

2.11.B.29 ICRISAT in partnership with CRIDA, National Remote Sensing Agency (NRSA), SAUs, Central and State Government Departments, NGOs and Farmers Associations/Organizations have developed and tested an innovative integrated watershed development model for enhancing the productivity of rainfed agriculture, minimizing land degradation and improving the livelihoods. The pilot model was developed and evaluated in Adarsha Watershed at Kothapally in Shankarpally Mandal in Ranga Reddy district of Andhra Pradesh. The main components of the participatory consortium approach for community watersheds are:

- Farmers collectively identify and prioritize the problems for possible technical interventions, participatory planning and implementation of watershed development involving all the stakeholders.

- A consortium of research and development organizations including NGOs provides technical backstopping to community watershed programmes.
- Increased individuals participation is ensured by providing tangible economic benefits through *in-situ* water conservation of rainwater which is translated into increased productivity and incomes through integrated genetic and natural resources management (IGNRM) approach. Holistic systems approach for watershed management for livelihood improvement was adopted in place of compartmental approach adopted earlier.
- Knowledge flow is facilitated by linking successful on-station watersheds and on-farm watersheds for strategic research.
- Islanding approach is used in which a strategic research watershed is established within the macro-watershed/district to serve as a site of learning.
- Cost effective and environment-friendly soil, water, nutrient, crop and pest management practices are promoted for wider adoption to raise the carrying capacity of the system.
- Empowerment of communities, individuals and the strengthening of the village institutions is achieved for sustainable development.
- Continuous monitoring and participatory evaluation by researchers and elimination of contractors for implementing the works has increased transparencies, overall performance and sustainability of the programme.

2.11.B.30 This holistic innovative model has changed the paradigms for watershed management in India where watersheds are used as an entry point for improving the livelihoods and protecting the environment. Main success of the model depends on implementation of participatory approach by the community, empowerment of the stakeholders, building the available institutions and community-based organizations and most importantly technical backstopping by the consortium. **The pilot model, covering 200 villages, has been highly successful in enhancing productivity, profitability and sustainability. The Consortium should be encouraged to replicate and upscale the model.**

2.11.B.31 During the past 20 years, many extension systems like the Training and Visit system (T&V) of the World Bank have been tried and later pronounced as failure. Recently, another World Bank loan supported system, termed “Agricultural Technology Management Association” (ATMA) was introduced. ATMA takes into account the deficiencies of the T&V system and adopts a farming systems approach to extension. If implemented in a manner that regards farm families as partners and innovators and not just beneficiaries, ATMA will represent an improvement over the earlier approaches to extension. **The mindset of extension personnel should change from patronage to genuine partnership (Lab to Land and Land to Lab).**

2.11. B.32 Ecologically-sound agriculture is knowledge intensive. An area rather than a single farm approach is needed to spread eco-technologies like Integrated Pest Management, Integrated Nutrient Supply and Integrated Natural Resources (Soil, Water) Management. Panchayati Raj Institutions should be involved in the social engineering aspects of group endeavour in eco-agriculture as stipulated in the Constitution 73rd Amendment Act.

2.11.B.33 As earlier recommended by the Commission, the KVKs, should be developed into **Krishi and Udyog Vigyan Kendras** in order to give concurrent attention to on-farm and off-farm livelihoods. **Establishment of 50,000 Farm Schools** in the fields of farmer-achievers were suggested in order to spread their impact through farmer to farmer learning. The economic credibility and viability of the technologies adopted by outstanding farmers will be a major advantage in the lateral transfer of technical know-how. Thus, Farm Schools can serve as the grassroot learning centres and they can lead to a learning revolution in farming, particularly in areas such as horticulture, green house cultivation, efficient systems of water conservation and use, organic farming, cultivation of GM Crops, cultivation of tissue culture propagated banana, spices and other crops, medicinal plants, plantation crops, dairy and goat farming, crop-livestock–fish integrated production system, aquaculture etc.

2.11.B.34 The SAUs/ ICAR Institute–KVK-Farm School system of technological and skill upgradation of farming needs continuous feed back and advice from farm men and

women. In order to provide a structured opportunity for sustained scientist–farmer dialogue, it is suggested that a **National Council of Innovative Farmers** (see 2.11.D.18) may be set up for providing on continuing basis guidance on the technology and public policy requirements for achieving productivity, quality and value-addition revolutions in the 115 million operational holdings in our country. This Council may be serviced by ICAR, with DDG (Extension) serving as the Convenor. Members of the Council of Innovative Farmers may be appointed by the President of ICAR in consultation with the National Commission on Farmers. A **National S&T Alliance (Consortium) for Rural Livelihood Security**, as suggested by the Commission, may be established to synergise inputs of various concerned Departments and Ministries at grassroot level.

Fostering Strategic Partnerships towards an Innovative System

2.11. B.35 The modern concept of an innovative system emphasizes a pluralistic system of research providers that recognizes the comparative advantages of different providers, and complementarity that can be achieved by forging close linkages between different actors. The leadership of ICAR has noted these requirements and has taken a number of initiatives to promote such linkages. However, effective implementation needs greater awareness down the line. In particular, the growing role of private research and the implications for public institutions are not widely appreciated. Where the private sector can efficiently provide near-market research services with scope for appropriation of benefits, the public sector should be prepared to withdraw and play a complementary role. Private research is stimulated by strategic research support from the public sector, and there are many areas where public-private linkages can enhance the effectiveness of both sectors. Enabling institutional mechanisms, especially IPR protection and capacity within the public sector to manage partnerships, can help develop and sustain these linkages.

2.11. B.36 The externally aided projects like NARP, AHRDP, NATP and proposed **National Agricultural Innovation Project** (NAIP) reflect government’s response to the changing needs in the national agriculture research system. There have been major paradigm shifts in the approach as well as in activities in these projects **to address**

concerns of system efficiency through O&M reforms, research infrastructure capacity building, human resource development, and programme efficiency through production system, mission mode, team of excellence and competitive and project-based modes of research funding involving different stakeholders including private sector. Policy, incentives and regulations should be aligned to foster innovations and entrepreneurship in agricultural science. In order to attract brilliant young scientists to agriculture, a Genius Award for young scientists should be established. The emphasis to address emerging market context through research on value chain in a consortium mode involving all the stakeholders is yet another move towards management of change. The concern on declining emphasis on basic and strategic research must be addressed through creation of national fund for basic and strategic research by ICAR as a separate plan programme. A significant component of the proposed NAIP should also strengthen basic and strategic research.

2.11. B.37 The proposed **India – US knowledge initiative on agricultural research and education** is a realization of the tremendous scope to complement the capabilities of the two countries being leaders in different fields of science and technology. The initiative is an effort towards addressing problems such as global warming, new pest-disease complexes, resource depletion and degradation, household nutritional security, slow growing farm profitability, and increased competition. Sharing of recent developments in cutting edge technologies, such as nanotechnology, should be high on the agenda. **It is recommended that the NAIP should internalize these initiatives alongwith the proposed strengthening of scientific talent, technology acquisition and public-private partnership.**

2.11. B.38 The IPR and other enabling regulatory measures should be harmonized nationally and internationally to reward the incentives as well as to protect the poor. The International Agricultural Research Centres (IARCs) of the CGIAR have long been interacting with the private sector, and mutually benefiting thereby. Some of the centres have formalized their collaborations through agreements. So far, the CGIAR system has been able to share its technologies and products as international public goods. **The CGIAR policy must carve out a system which will allow a continuation of the free**

flow of technologies to the poor, without jeopardizing their partnership with the private sector. Financial and other supports should be extended to the CGIAR system to enable it to pursue frontline research to generate highly competitive technologies and to leverage benefits from the spillover effects. Linkages should be established among IARCs to build complementary Centres of excellence and avoid duplication of efforts.

2.11. B.39 Private sector R&D institutions are growing in India, particularly in the areas of biotechnology and crop breeding. **It is high time that we develop Codes of Conduct for public-private sector partnerships based on respect for each other's obligations.** Not-for profit R&D institutions also exist in the NGO sector which can also adopt the same Codes of Conduct as public-funded institutions in their partnerships with the private sector, where IPR, Breeders' Rights and other forms of proprietary control over technologies and products of commercial significance are important. The Codes of Conduct should be developed through extensive consultation among all partners so that these could be used in the entire national scientific research system. The Commission recommends the following additional measures to further strengthen the partnership:

- Provide tax incentives, including tax holidays, so as to increase private sector's contribution to R & D from 14% to 33%;
- Strengthen national capacities in regulatory matters, especially IPR, SPS and quarantine facilities to promote technology acquisition as well as trade;
- Encourage testing of new varieties bred by private sector and their other technological products in the public sector supported national technology testing programmes; and
- Undertake joint research activities with clearly defined responsibility, accountability and profit sharing.

2.11. B.40 **Public private partnership in high value agriculture is a necessity and involvement of smallholders is crucial for achieving inclusive and equitable development.** The role of the corporate system in the overall food chain is becoming important, highlighting the need for greater and effective linkages between public and private sectors in the changing food situation of the country. This linkage must be

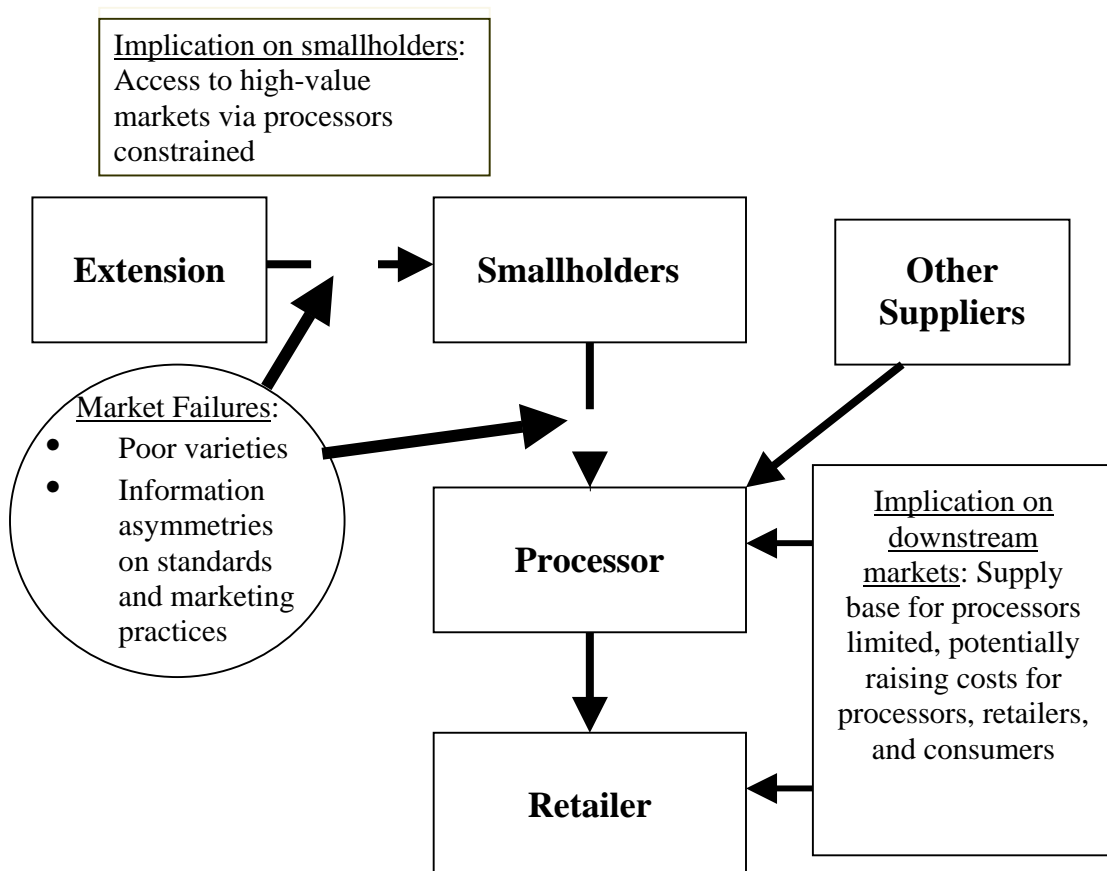
addressed by the country's innovation and research system. Indian supermarkets are increasingly retailing and distributing not only processed food but also fresh vegetables and fruits and other agricultural products and are playing an important role in the food chain. This has also put an increased pressure on food management and processing. In this transformed scenario, we must not forget the role of small and marginal farmers who are not only producers but also constitute the bulk of the poor consumers as customers. Small farmers thus must get a foothold in this changing food chain, but the major problem is their smallness causing higher unit transaction cost to participate in the system.

2.11.B.41 The rising consumer income, especially in the non-agricultural sector and urban areas and changing life-style, are creating bigger markets for high value agricultural products like fruits, vegetables, fish, eggs, milk and meat. The growing markets for these products present an opportunity for farmers to diversify their production out of foodgrains and raise their incomes. Annual growth rates of the order of about 4 to 6 percent in these commodities vis-a-vis 1 to 1.5 percent in case of cereals were registered during the last ten years and the trend is likely to continue in the years ahead. **The enhanced production of the high-value products will push up processing and marketing of these products creating a lot of employment in rural areas.**

2.11. B.42 In order to mainstream the small landholders into the high-value agricultural and supply chain, the strategic partnership between public and private sectors will be needed. Such an arrangement should be built to pool risk and resources to bring actors together to resolve market failures witnessed in developing countries. Supply chain plays important role in cooperation of the partners to specify high quality products to generate value and consumer demand. Such a win-win situation is particularly favourable for smallholders in terms of higher prices, knowledge, reduced losses and assured markets. However, smallholders are not able to make these demands due to market failures attributed to information asymmetries, organisational failure, high transaction cost and regulatory failures. The synergy of the public-private partnerships, especially involving the smallholder is bound to create mutual benefits and confidence

and can remedy market failures which cannot be undertaken separately by public and private sectors. If kept out of the chain, implications for smallholders are depicted in **Figure 15**.

Figure 15. Implications of Exclusion of Small Holders from Market Chain on their Economic Activities



Source: Karl M. Rich, IFPRI-MTID-New Delhi and Clare Narrod, IFPRI-MTID-Washington, DC. 2005. Perspectives on the Supply Chain Management of High-Value Agriculture: The Role of PPP's in Promoting Smallholder Access

2.11. B.43 **The market failures can be remedied through: creation of research contribution to deliver high quality varieties, particularly suitable for processing, development of third party certification organization and public-private-partnership-led (PPP-led) initiative to create producers' organisation to improve marketing and build linkages with processors, as suggested in earlier reports of the NCF in relation to the creation of Small Farmers Estates (SFEs) on the NDDB**

model. The PPPs must be at the chain-level to intervene in all major bottlenecks, as targeting one may not benefit the whole supply chain. Bulk vending should be promoted to cut cost and also to mainstream small producers in market chain. Establishment of effectively functioning rural warehouses and transport connectivity and facilities, especially in hills and mountains and dryland arid zones, will be essential for linking the smallholder with the market chain. The PPPs must also induce positive effects for all stakeholders, processors, retailers, etc. to ensure a positive feedback and benefit to the whole supply chain. For keeping the system dynamically responsive to new situations with optimum output for all the partners, it may be prudent to ponder as to how to identify appropriate partners and modalities to scale-up PPPs and as to how can PPPs regulate market failures.

2.11. C .0 Funding of NARS and Strategic Financial Strengthening

2.11. C.1 The complexity of development challenges, the urgency of meeting the challenges and the unprecedented technological revolution (including ICT revolution) provide uncommon opportunities to the national agricultural science, research, education and technological development system to appropriately and synergistically strengthen and position itself to meet national goals as well as international commitments, particularly the Millennium Development Goals - especially halving the number of hungry and poor people by 2015.

2.11. C.2 As discussed earlier, **investments in agricultural research, science and technology development are not only low (as compared to several developing and most developed countries) but also have been stagnating in the recent years.** Some of the new emerging challenges and opportunities, such as climate change, nanotechnology, value addition to biomass, integrated and precision farming systems, participatory breeding and scientific organic farming, have barely been addressed. Knowing that the rate of return on investment in research in India has been high and the country is faced with complexer problems seeking technological solutions, the need for increasing investment in agricultural research can hardly be overemphasized. Not only the level of funds but also the efficacy of allotment of resources and the various mechanisms for

maximising the return on investment in agricultural research in terms of economic gains, social equity, environmental sustainability and ecological security need to be improved.

2.11.C.3 **Our Prime Minister has repeatedly emphasized that agricultural revival and farmers' well-being are the top priorities of the Government. The Common Minimum Programme of the UPA Government states, "The UPA Government will give the highest investment, credit and technological priority to the continued growth of agriculture, horticulture, aquaculture, floriculture, afforestation, dairying and agro-processing that will significantly add to the creation of new jobs. ... will ensure that public investment in agricultural research and extension, rural infrastructure and irrigation is stepped up in a significant manner at the very earliest.will ensure that adequate protection is provided to all farmers from imports, particularly when international prices fall sharply. ...will follow policies and introduce programmes that strengthen India's vast science and technology infrastructure."**

2.11.C.4 To a certain extent, the above declarations are being backed up by fund allocations and other supports in varying measures. One of the major recent initiatives is the Bharat Nirman - a time-bound business plan for action in rural infrastructure for the next four years. "Under Bharat Nirman, action is proposed in the areas of irrigation, road, rural housing, rural water supply, rural electrification and rural telecommunication connectivity. **We have set specific targets to be achieved under each of these goals so that there is accountability in the progress of this initiative (Prime Minister).**

2.11.C.5 The Finance Minister in his Budget 2005-06 statement had observed "Agricultural Research has a vital role to play in the strategy for reviving and encouraging diversification. Our agricultural universities and research institutions have done good work in the past and now need to be strengthened and modernized. A Task Force headed by Dr. M.S. Swaminathan has recommended the creation of a National Fund for Strategic Agricultural Research. I am happy to announce an initial provision of Rs 50 Crore for operationalising this Fund."

2.11. C.6 It is most heartening that the Central Government has decided to establish a National Science Education and Research Foundation for frontline research in science and has approved Rs 1000 Crore for commencing two institutions, one in Kolkata and one in Pune. **The National Commission on Farmers applauds this move and wishes to emphasise that similar strengthening of selected flagship agricultural research institutions and strategic research and technology development programmes is essential to meet the formidable challenges and to capture the uncommon opportunities in agriculture.**

2.11. C.7 **In line with the above, the Commission recommends a provision of Rs. 1,000 Crore as a one-time grant to NARS to bridge the critical gaps in scientific infrastructure in frontier areas of technology, so as to enable the Nation to enhance its agricultural competitiveness and to benefit from science-led agricultural transformation.**

2.11. C.8 The suggested additional allocation will particularly strengthen the following areas: **conservation of livestock heritage of the Nation** by establishing field gene banks and undertaking systematic genetic improvement of local animal breeds, especially **in rainfed drylands and geared to the needs of small and resource-poor farmers**; strengthening of **genomics, bioinformatics** and other cutting edge **biotechnologies**; harnessing the **gene power of microorganisms**, including bioremediation; enhancing **use efficiency of plant nutrients and water**; and **value addition**, low-cost processing and **biomass utilization**.

2.11. C.9 **The additional investments in infrastructure and human resource development and technology incubation and dissemination will mobilize science also for ensuring the success of Bharat Nirman, National Rural Employment Guarantee Bill, Tribal Land Rights Bill and other such initiatives of the Government. This will auger well also with the Prime Minister's call to the scientists to bring about a Second Green Revolution which would have special focus on dryland agriculture and would address the needs of small and marginal farmers (PM's Inaugural Speech, 93rd Session, Indian Science Congress, 2006).**

2.11. C.10 Several recent committees and reviews have suggested revitalization of the NARS on the above lines. For instance, the **Swaminathan Task Group** as well as **Mashelkar Committee** have identified IARI, IVRI and other premier national institutes to be designated as **Institutions of National Importance** (see 2.11.D.10 and 2.11.D.22). The Commission recommends that such institutes should be given special funds and organizational and management supports to empower them to enrich the Indian agricultural knowledge system necessary for enhancing country's competitiveness at the global level on one hand and to serve the majority small and marginal farmers, often inhabiting vast rainfed drylands and other poorly endowed non-congenial agro-climatic regions, on the other hand.

2.11. C.11 As mentioned earlier, India has one of the largest NARS, covering the entire spectrum of crop, livestock, fishery, forestry, natural resources and agro processing and agri-business, but there are gaps in several areas awaiting redressal or are not receiving focussed attention. Some of such areas, as listed below, require more intensive and inter-disciplinary attention.

- Climate change and its implications;
- Harnessing space technologies, ICT, nanotechnology and other frontier technologies for precision farming;
- Organic recycling and value addition to biomass, biofuels and bioenergy production;
- Crop livestock-fish integrated production systems;
- Pre-breeding and participatory breeding; and
- Scientific organic farming.

2.11. C.12 **The Commission recommends setting up of new National Centres/Institutes in the above areas or mandate existing ones to address those areas specifically.** Such institutions could be set up in existing ICAR institutes or SAUs but should be functionally and financially autonomous with their own Governing Boards. The National Institute for Space Applications and Precision Farming could be set up jointly by ISRO and ICAR in the land available to ISRO at Hyderabad. The National

Institute for WTO concerns in Agriculture could be set up jointly by ICAR, the Ministry of Commerce, APEDA and MPEDA. It should have wings for capacity building in IPR and SPS (sanitary and phytosanitary measures). The National Institute for Biofuels could be set up by ICAR and MNES. In Commission's view, the institutions should be built around outstanding scientists and research leaders of proven capability in these fields. Such committed research leaders should be first identified and involved in the project design process.

2.11. C.13 Further, the 10th Plan Steering Committee for Agriculture, Chaired by Prof. M.S. Swaminathan, had identified **National Challenge Programmes** and priority areas to be led by Scientist-achievers in a time-bound manner, intended to harness the power of partnership among appropriate institutions and scientists. These will address issues related to climate change, WTO concerns, gender dimensions, productivity, profitability and sustainability of organic farming, dryland farming, pulses and oilseeds production systems, bio-fuels, energy plantations and biomass-based power generation, coastal farming systems, including sea water farming, medicinal plants and herbal biovalleys, abiotic stresses with particular reference to drought and salinity, new animal and fish feeds and new vaccines for establishing disease-free zones in livestock production. Adequate resources should be allocated to these challenge areas.

2.11. C.14 In addition, the need for additional support for prototype manufacture of new implements and their wide-spread testing, quality assurance and effective popularization, particularly for enhancing productivity and profitability of farmers, can hardly be overemphasized.

2.11. C.15 **The Commission recommends that the ICAR should position itself to effectively utilise the available and the funds requested above.** Unfortunately, some of the allocations are not being systematically and effectively used by the concerned organizations. For instance, the provisions under the National Fund for Strategic Agricultural Research (NFSAR) are yet to be operationalised. **A National Board for Strategic Research in Agriculture (NBSRA) may be set up to coordinate and harness advances in Basic Sciences for agricultural progress.** A couple of well-chosen

strategic research and technology development programmes (with high potential socio-economic and agro-ecological pay-off) should be launched by the ICAR without any further delay. Based on the preliminary outcomes, additional funds should be requested under the NFSAR. Obviously, prompt decision-making, project/programme formulation and effective governance are called for utilizing the resources for strengthening our research, especially strategic research.

2.11. C.16 **Besides intensity, sustainability of the funding is also important.** The current funding situation is not sustainable for a number of reasons. First, increased funding has not matched the continuing expansion of the number of R&E institutions, resulting in a steady increase in the share of salary and overhead expenditures at the expense of operating expenditures. In ICAR, the salary to operational expenses ratio has increased to 70:30 against a target of 60:40 and the situation is even more serious in the SAUs. New resource generation opportunities such as payments for services by farmers, growing high value crops (commercial livestock and fruit crops), income generation through commercialization of technology and services, and contract research with the private sector are emerging and should be tapped. This will require development of capacities in IPRs and business skills in public research organizations. However, resource generation will not fill the gap. **Public funding should be increased to 1% of AgGDP and priority should be given to Central and Eastern States.**

2.11. C.17 The share of competitive funding is still low and uncertain. Because competitive funding has the potential to enhance accountability, quality and efficiency of the system despite somewhat higher costs in terms of overheads and time of scientists, **a higher share of funds should be gradually shifted to competitive funding.** Of course, regular block grants must continue in order to maintain and upgrade research infrastructure and to strengthen basic and strategic research.

2.11. C.18 **The roles of Centre and States in supporting R&D should be balanced and harmonised.** The distinction between the roles of the Centre and the States in agricultural research has become blurred over time. In practice, SAUs should have primary responsibility for applied and adaptive research to meet local demands in their

respective States, and ICAR should take the lead in strategic research that is relevant to several States, and in those applied research areas where States will tend to under-invest due to spillovers. However, SAUs are generally starved of operating funds and now largely depend on ICAR. A shortage of funding in the SAUs has had adverse effects on human resources development, research infrastructure, and linkages with farmers. **There is an urgent need to sensitize policy makers at the State level to the payoffs to investing in research. At the same time, the Central Government might develop a funding formula that supports the weaker States, but provides incentives to stronger States to increase their funding (e.g., matching grants). A key role of Central research is to generate spillovers to enhance efficiency in State research programmes.** In some areas, especially crop breeding, spillovers are pervasive. The AICRPs provide a mechanism for facilitating such spillovers.

2.11. D. 0 Institutional Reforms and Revitalising the NARS

Addressing Multiple Research Objectives

2.11. D.1 The Indian NARS must find a balance among multiple objectives, ranging from traditional food security objectives, to emerging demands to serve a more market oriented economy, to meet the needs of more sophisticated consumers, and to preserve the environment. Striking a balance between these objectives has major implications for organization of research, prioritization of the research agenda, and management of intellectual property. Since there are increasing demands on the public sector to provide technologies with characteristics of ‘public good’ and that address market failures in addressing social and environmental concerns, public research investment in India needs to close the gap with the global average of one percent of agricultural GDP as mentioned earlier. Also, **public research institutions must work closely with key stakeholders to define priorities that address multiple objectives**, employing formal research prioritization approaches. This is extremely important when the system is large in size, objectives are conflicting and clients are poor in articulating their research needs.

Intellectual Property Rights and Public Research

2.11. D.2 **IPR regimes should be part of agricultural development pathways and consistent with our own priorities and capacities.** IPRs are important because they offer possible mechanisms for stimulating research, enabling access to technology, and promoting enterprise growth, all for the good of society. As such, they are merely one tool in a range of policies that may be applied in specific contexts to further agricultural development (e.g. for supporting public agricultural research, regulating seed production and marketing, providing an enabling environment for agribusiness development, and empowering smallholders). Because the incentives provided by any IPR regime usually interact with various other factors it is difficult to identify unambiguous conclusions regarding the possible contributions and concerns that IPR regimes might present for Indian Seed Industry. There are several priorities for monitoring. These include assessing the extent to which IPR regimes (and other policy changes) affect the structure and concentration of the domestic seed industry, and determine the options available to smallholders. This also includes analyzing if farmers have equitable access to an increasing diversity of crop varieties and if the structure of the commercial seed market provides confidence for participants while at the same time encouraging new entrants.

2.11. D.3 IPR regimes in plant breeding should provide incentives for diversifying and strengthening plant breeding and seed production. This implies that policymakers cannot consider IPR regimes in isolation from wider issues of national agricultural policy. The role of the public research system may be a subject of considerable debate in light of generally declining national budgets and the growth of the private sector. The system needs to distinguish between using IPRs in order to facilitate the use and delivery of their varieties, and seeing IPRs as a contributor to institute budgets through royalty income. This requires knowledge about the costs of obtaining and enforcing IPRs, and a realistic assessment of the public system's capacity to compete with the private sector in producing commercially viable products (or in rewarding and maintaining staff for this task).

2.11.D.4 The strategies that the public system adopt for using IPRs will depend on answers to fundamental questions about the role of public sector agricultural research.

For instance, different approaches to relations with the private sector must be taken into account. In addition, the way that public system manages IPRs has a significant bearing on the extent to which germplasm resources are shared more widely. There are still serious challenges with respect to delivering useful varieties, particularly of non-hybrids and so-called ‘orphan crops’, to smallholders. The combination of limited and isolated markets with widespread seed saving means that even fairly strong IPR regimes are unlikely to elicit commercial interest in the near future. **We must find ways of combining (largely) public plant breeding, appropriate formal seed delivery (most likely private or cooperative), and support to local seed diffusion mechanisms, to serve the farmers dependent on these crops. Public policies need to ensure that farmers are conversant with, and participate in debates regarding possible IPR regimes; that they are well-informed consumers who understand their rights in agricultural input markets; and that their interests and priorities are reflected in the work of public agricultural research.**

Efficiency of Public Research

2.11. D.5 The public sector in general in India suffers from centralization and bureaucratization that imposes high transaction costs at all levels. Despite having a certain level of autonomy, the research system is no exception. Although ICAR recognizes these problems and has initiated a number of organizational and management (O&M) reforms, there are still important gaps as well as problems in their implementation. **First, institutional rigidities imposed by commodity and disciplinary boundaries restrict the flow of information between hierarchies and organizations in a large system such as India’s.** The decision to review the functioning of the AICRPs—originally established to forge interdisciplinary and inter-institutional research—was an important step toward addressing these rigidities. But much remains to be done to **decentralize and devolve power before transaction costs can be reduced to acceptable levels for efficient research management.**

2.11. D.6 **Second, there is a growing problem in the quality of scientific human resources owing to inbreeding in the system, especially in the SAU system, and**

weakening of global scientific linkages. In the 1960s and 1970s, a significant proportion of scientists were educated abroad and Indian scientists were generally well integrated with regional and international networks. This situation has deteriorated significantly with scientists often working in the same institution in which they receive their PhD, and with professional isolation of many scientists. This trend must be arrested through assessment of human resource needs and use of foreign grants and loans for human resources development, and to support participation in international scientific networks and other initiatives. Advances in information and communication technologies also have much potential to foster such linkages and improve access to international literature and scientific data bases.

2.11. D.7 **Third, research institutions require much improved accountability through institutionalization of objective and transparent evaluation mechanisms for planning, monitoring and impact assessment of research.** Proliferation of research programmes has meant that many programmes serving small States and agro-ecological zones are inefficient. Much of the inefficiency is due to research programmes serving small ecologically- and politically-defined markets, so that even if they are productive in terms of technologies produced, they are only used in a small area. Resource allocation needs to be linked to research planning based on ‘bottom up’ approaches involving relevant stakeholders and feedback from monitoring and impact assessment. Implementation of such processes has been attempted several times, albeit with varying degrees of success. A prerequisite for its effectiveness is to **link planning, monitoring and evaluation with funding decision and with performance evaluation at various levels—the system, institute, project and scientist.**

2.11.D.8 **Finally, although successive review panels of ICAR have raised these various concerns and proposed recommended changes, past attempts at reform have failed due to the lack of financial flexibility and autonomy of ICAR.** A package of reforms aimed at enhancing autonomy, improving decentralization and devolution of power, and improved financial management through project-based budgeting is required. Both ICAR and SAUs should commit themselves to such reforms. Support of high level

policy makers at both the Central government and State government levels is needed to implement this far reaching reform agenda.

Revamping and Refocusing the NARS

2.11. D.9 The centrality of adequate financial resources for science-led growth notwithstanding, the allocation, deployment, outlay-outcome accountability as measured by accepted indicators is equally important, if not more. A **Task Group, chaired by Prof. M. S. Swaminathan, Chairman of the National Commission on Farmers, on Revamping and Refocusing of National Agricultural Research**, set up by the Planning Commission at the instance of the Prime Minister of India, submitted its Report to the Planning Commission in February, 2005. The Report has made recommendations for transforming the Indian NARS to meet current ecological, economic, technological and social challenges and to equip more than 115 million farm families to face the challenges in the areas of markets and climate. It has suggested ways of bringing about paradigm shift from unskilled to skilled work and from routine on-farm to value-added off-farm livelihoods. The recommendations of the Task Group are summarised below.

2.11. D.10 **Strengthening strategic, applied and anticipatory research:** Establish a **National Board for Strategic Research in Agriculture** to bring about convergence and synergy among the numerous ongoing efforts to enhance our agricultural efficiency and competitiveness and to enhance employment and livelihood opportunities in rural India and to help fill gaps in critical areas where the core competence of the country is inadequate. Declare the national institutions like IARI, IVRI, etc., as **Institutes of National Importance** by an Act of Parliament to provide them autonomy to become **Global Centres of Excellence** in research, education and capacity building and to function like the Indian Institutes of Technology. A **National Council for Global Leadership in Agricultural Sciences and Education** may be set up for providing overall guidance to these Centres.

2.11.D.11 In order to improve the productivity of specific ecosystems in an economically and environmentally sustainable manner, a **National Participatory Research, Demonstration and Training Centre** to bring together, in an integrated

manner, the available scientific institutes in relation to research, such as arid, semi arid, coastal, hill and mountain eco- systems, should be established. These should be designed on the line of the polyclinics of CSIR. A **North Eastern Cadre in the Agricultural Research of ICAR**, with an initial cadre strength of 300, to create a critical mass of women and men scientists, trained from the region as well as from the rest of India, should be created.

2.11.D.12 A **National Regulatory Policy and Structure** which can help to assess risks and benefits of agricultural biotechnology in an objective and transparent manner, based both on science and technology which is of paramount need to safeguard the environment and human health, should be developed. IPR issues alongwith SPS issues based on the principle of social inclusion, must be given due attention. Selected **National Challenge Programmes** in areas such as the impact of WTO agreement, potential change in climate, dryland farming, etc., should be initiated. Initiatives and efforts are needed in areas of value addition, non-farm employment and empowerment of Panchayati Raj Institutions to discharge the responsibilities. **Public-private partnership** should be strengthened and **Code of Conduct** to foster ethical and symbiotic partnerships between public-private structures is needed. A **National Patents Bank for Rural and Agricultural Prosperity** to enhance new technologies on the part of underprivileged sections of the rural societies should be set up.

2.11. D.13 **Professionalisation of R&D Management in Agriculture:** The ICAR headquarters should be rather a more compact technical body engaged in interdisciplinary synergistic development, implementation, monitoring and evaluation of research strategies and programmes. The research and administrative wings of the Council should be unified. About 10% of the budget of ICAR institutes should be reserved for human resource development and capacity-building through life-long opportunities for re-tooling and re-training.

2.11. D.14 The National Academy of Agricultural Research Management (NAARM) at Hyderabad should train in ICAR and SAU scientists in professional R&D management and sensitise the various functionaries in major national and international issues and

agreements such as WTO, global climate change, etc. NAARM should host a **National Virtual University for Science in Agriculture** to reach out the Panchayati Raj institutions and other unreached. A **Creativity Index** to measure the spirit of invention and innovation amongst scientists should be developed and the recruitment system should be rendered fully transparent, merit-based and assertive.

2.11. D.15 The ICAR should dynamically adopt a thorough self-introspection, participatory self-assessment and self-correcting process. In its urgently called for integration and consolidation exercise, the system may operate on a project-mode basis on the lines of **The Log Frame Options** used in the CGIAR which has built-in mechanisms for effective monitoring, evaluation and implementation accountability.

2.11. D.16 The fund management system of the ICAR should be improved with the help of modern technologies. **Block and competitive grants and project funds should be developed with defined links between authority and accountability at every level. There should be no artificial distinction between Plan and Non-Plan funds at the Institute level.** All research proposals undertaken should have sharp focus with well-defined and verifiable indicators.

2.11. D.17 **Integrating Research, Extension and Development:** Agricultural extension should be **holistic and inclusive**. Credit and knowledge flow should be synchronised in time and space. **Farm Schools, Kisan Credit Cards, Agri Clinics, Agri Business Centres**, etc. should be established and strengthened. An area-based rather than a single farm-based approach is needed to spread eco-farm practices particularly through the active involvement of Panchayati Raj Institutions.

2.11. D.18 All technical positions in agriculture, both at the Centre and States, should be manned by technical persons with a proven track record in agricultural transformation. A **National Council of Innovative Farmers** may be set up to provide a structured opportunity for **sustained scientist-farmer dialogue**. A National and local-level **Science and Technology Alliance for Rural Livelihood Security** may be formed for providing technical support for Food and Work for Employment Guarantee Programmes with

emphasis on developing skilled workforce, enhanced factor productivity, and livelihood security specially of the socio-economically-deprived people. A **National Institute for the Technological Empowerment of Women and Members of Panchayats** may be established. Partnership and strategic bilateral and multilateral cooperation in the research and development, especially with CGIAR system, should be strengthened.

2.11. D.19 The Swaminathan Task Group was asked to review the functioning and priorities of the NARS as a whole. Concurrently, the Hon'ble Minister of Agriculture had appointed a **Committee on Reorganization of ICAR under the Chairmanship of Dr R. A. Mashelkar**, Director General, CSIR to suggest the organizational and procedural changes in the ICAR with the aim to improving the research outputs of ICAR institutions and their further commercialization. The Committee submitted its report to the Hon'ble Minister in July, 2005. The Committee had the benefit of discussions with Dr. Swaminathan and Dr. V. L. Chopra (Member Planning Commission and Convener of the Swaminathan Task Group), and concentrated mostly on organizational restructuring and did not venture deep into policy and associated institutional aspects. The highlights of the recommendations of the Committee are summarised below.

2.11. D.20 The ICAR should seek to invoke its autonomous status in its true sense to enable and empower its Governing Body with greater powers in decision-making in matters of finance and human resources. Several changes were suggested in composition of the various Committees of the Council, **it was suggested to have the Prime Minister of India as the President of the ICAR Society.**

2.11.D.21 Several suggestions have been made for **abolishing multiple layers of command and controls** existing between the Institutes' Directors and the Director General, including abolition of the existing positions of DDGs and ADGs and regrouping the activities under a few Headquarters Directors and Heads of Departments.

2.11. D.22 **Institutes like IARI, IVRI, NDRI and CIFE should be granted greater autonomy while remaining an integral part of the Council.** Staff Research Councils should be renamed as "Institute Research Committee", which should play a leading role

in priority setting, monitoring and evaluation. ICAR should develop a scheme on the lines of “**CSIR Jewels**” scheme to provide suitable incentives to meritorious scientists as well as to encourage institutes to evolve a competitive grant system and generate income from external sources.

2.11. D.23 **Existing promotion policy of scientists, which is on the pattern of Career Advancement Scheme of UGC, may be done away with.** ICAR may revert back to a suitably designed promotion policy as per ARS rules, providing desired mobility of scientists between ICAR, SAU, Private Sector and International Organizations. A system for quick hire of scientists on the lines of the CSIR system may be evolved. **The scientific posts should be kept out of the purview of the existing instructions under which only 1/3rd vacancies arising in a year can be filled.** The Committee strongly supports further strengthening of the National Professors and National Fellows scheme.

2.11. D.24 **ICAR should develop procedures and in-house capacity for pricing of ICAR’s intellectual properties, its licensing and associated ownership rights, leading to establishment of business and market entities by ICAR institutes.** The Council should take initiative for linkages with industry and private sector and have a continuing mechanism for ICAR–Industry Interface to develop **Scientist–Entrepreneur Scheme**. The ICAR may consider the feasibility of establishing core shared facilities with appropriate industry partners and other stakeholders.

2.11. D.25 The recommendations of the Swaminathan Task Group and of the Mashelkar Committee are generally complementary and topical. These should be critically examined and, those accepted, should be implemented by the Government without further delay.

CHAPTER III

TOWARDS AN INDIAN SINGLE MARKET

3.1.0 Introduction

3.1.1 The Tenth Five-Year Plan document has observed that the major problems faced by the trading community in internal trade are the diversity of controls exercised by multiple authorities at different levels, restrictions of inter-State and inter-district movement of goods, lack of uniformity in standards laid down by different authorities and agencies and in taxes. Pricing strategies get affected by differential tax rates and become localised. **All this has led to breaking up the vast India Market into a large number of smaller regional markets. The paperwork involved in complying with the various controls, regulations and licenses, the costs involved in terms of time and resources and the inevitable corruption and malpractices that this leads to have served as a big drag on the efficiency of trading operations in the country.**

3.1.2 Trade is an important sector of the economy. The share of internal trade in the Indian economy in 2001-02 [advance estimates] stood at around 13.4% of the G.D.P and employed about 36 million people, a majority of whom were self-employed, engaged in the retail and wholesale trade. It is the most important sector in the tertiary/service sector with a share that is twice the share of 'finance and insurance'.

3.1.3 The European Community has overtime managed to bring about a Common Market for all products i.e., a market with no internal customs charges or quantitative restrictions and then a Single Market, where there are no fiscal charges at borders nor any technical barriers to trade. With a view to benefit from the international experiences, a study was undertaken by the FAO at the request of the National Commission on Farmers, through the Government of India, Ministry of Agriculture. The FAO studied the European Union Market integration experience and looked into the legislative, political and economic measures taken during the process. The European experience is documented in this study not as much to establish any direct applicability but to understand the political processes and the economic measures that led to the adoption of a common and eventually a single market in that

region. This chapter has drawn on the above report. Extracts of the above draft report from the Chapter ‘Common Market in The Federal Structure and Options for Considerations’ are annexed at Appendix–I. Since there are no internal customs duties but quantitative restrictions or prohibitions could be applied to restrict or prevent the goods from moving out of the State and movement from one State to another State could be checked at the borders and fiscal charges be applied, India could at present be considered, in European Union [EU] terminology, a Common Market. Several steps however, would have to be taken in removing the quantitative/fiscal/administrative barriers to reach what, in European Union terminology can be called a ‘Single Market’.

3.1.4 The FAO report states that one of the major impacts of removing the inter-State barriers would be the realisation of better prices by the Indian farmers as supply chain between the producer and the consumer would be reasonably streamlined. This would also benefit the consumers. The cost of agricultural products in the urban areas has a reflection of hidden costs/taxes involved in the inter-State transport. Reducing the transaction cost would help in reduction of the ultimate price paid by the consumer to some extent and improve competitiveness of Indian Agriculture.

Box-1

Liberlising Trade

“As restrictions on domestic trade are relaxed, prices stabilize across States and there are welfare gains to producers, consumers and wholesale traders at the national level. In a liberalized trade regime for both domestic and foreign trade, States make new trading partners domestically and may even prefer to trade abroad than domestically to make the best of price difference. The gains illustrated to accrue from liberalizing domestic and foreign trade are derived from small policy changes that reduce/ eliminate movement restrictions and also from reduced transportation cost.”

Source: Jha and Srinivasan

3.1.5 The Hon’ble Prime Minister of India, Dr. Manmohan Singh observed as under:¹

“An important commitment of our Government is to integrate the domestic market for all goods and services. The time has come for us to consider the entire country as a common or single market for agricultural products. We have to systematically remove internal controls and restrictions. We should enable direct marketing between farmers and NGOs, Cooperatives and Private Companies.”

¹ Agriculture Summit, 2005 [9th April 2005]

3.1.6 The internal barriers to trade come in the way of a large unified Single Indian Market. This deprives in great measure the advantages of trade, which leads to economies of scale and increasing returns in production. The need to remove the barriers to trade is unquestioned; the real issue however is as to how to go about in the federal system.

Box - 2

The Federal Structure

Although agriculture is a State subject, a number of major policy decisions impacting the sector are taken by the Central Government. This includes the budgetary allocations under the Five Year Plan and several Central Government programmes and policies including laying down of Minimum Support Price for selected agriculture products and input subsidies. However, State Governments retain the right to impose fiscal levies on agriculture products, which constitute a considerable source of income for them. They also have the power to fix the prices of certain major inputs like electricity and water, which are provided through public utilities. States also have considerable flexibility in providing support services to agriculture like extension services, research and development, although there are several central government programmes in these areas which are available throughout the country. Agricultural marketing is a State subject and most States have taken steps to organize and regulate the wholesale markets in agricultural products through the State enacted Agriculture Produce Marketing Committee [APMC] Acts.

Indian Constitution guarantees to every citizen freedom of trade, business or profession, but the State Legislatures are empowered to impose such a reasonable restriction on the freedom of trade, commerce and intercourse with or within the State as may be required in public interest. This implies that absolute ban on import or export of goods or quantitative restriction on movement cannot be imposed by any State Government in India. However, in practice this freedom guaranteed by the Constitution has been somewhat restricted by several regulatory and fiscal measures imposed by different State Governments. Unfortunately, whilst in Europe, custom duties or fiscal changes which have equivalent effect, are specifically banned by legislation adopted under Treaty of Rome, these restrictions cannot be done away by a legislative or administrative order of the Central Government. The States have to be persuaded or induced to remove these restrictions in order to derive the benefits of an Indian Common Market.

FAO Report [December 2005]: Towards an Indian Common Market

3.2.0 The Marketing Issues

3.2.1. The various issues connected with marketing of agricultural produce in India and the needed reforms for the sector have been discussed in detail in the Second Report of the National Commission on Farmers [Serving Farmers and Saving Farming- Crisis to Confidence]. The small size of operation of the farmers and the system of selling ungraded produce means that the farmer starts with a serious handicap. Further, the regulated marketing system as it operates virtually does not offer the farmers virtually any choices/options, the market charges have become high and certain cess [like education cess, infrastructure cess etc.] have been added to, the

farmers complain about lack of transparency in weighing and also in auctions and generally about lack of infrastructure and poor treatment given to them at the market yards, the distance from villages to regulated markets in most of the States is quite large and with small marketable surplus and poor infrastructure, many of the small farmers find it difficult/uneconomic to take their produce to the market yard. Inadequate storage facilities in the rural areas and non-availability of pledge finance leads to distress sale where spot payment means a discount of 15-20% on the price. Some of the other weaknesses of the marketing system for agricultural produce are listed below:

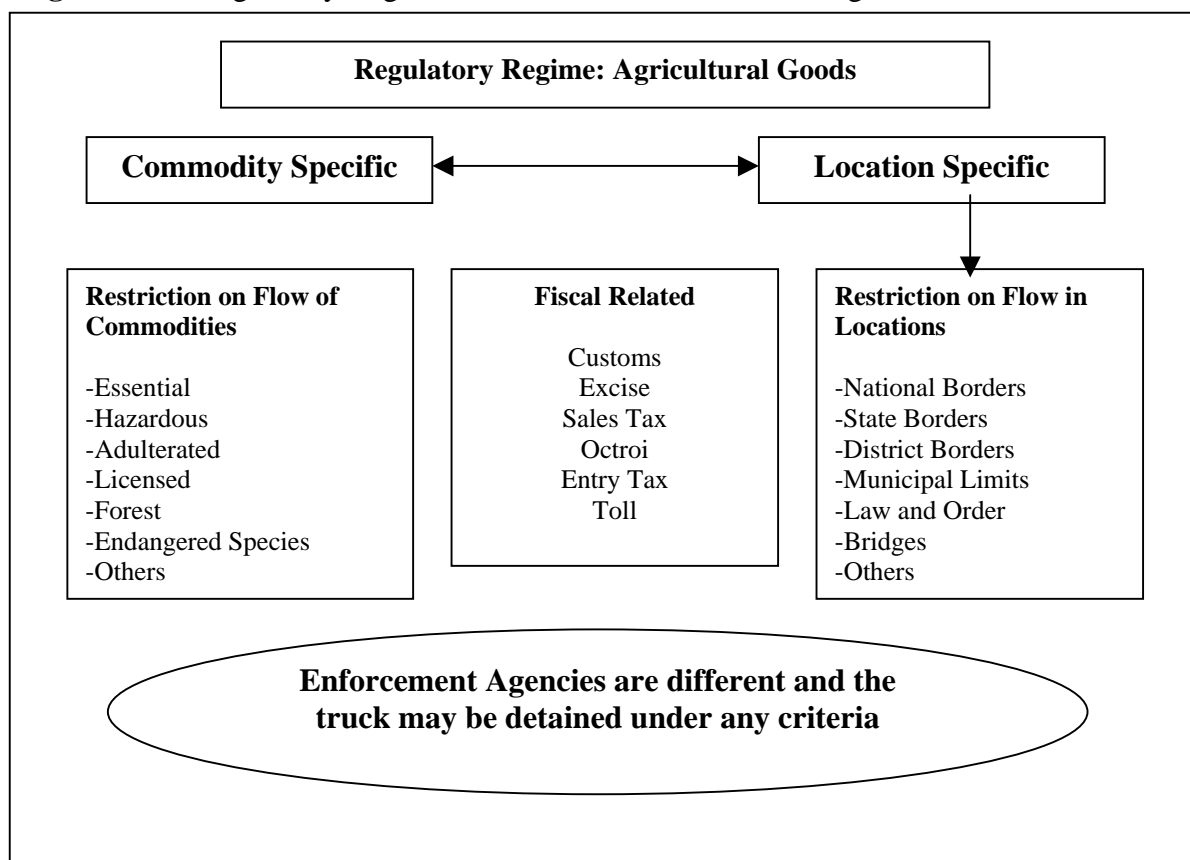
- ❑ Thin spread of regulated markets in many States and lack of development of the periodic village markets, which are the first contact for the farmers.
- ❑ Inadequate infrastructural facilities at the regulated markets.
- ❑ Large variations in market fee/ other charges in the different markets across the States.
- ❑ Variations in the entry tax/octroi/ sales tax etc.
- ❑ Inefficient working arrangement.
- ❑ Lack of grading at the farm gate.

3.2.2 Besides the above, the complex tax structure, multiplicity of State-level taxes, the permit system of the transport vehicles, the harassment to which the transport operators [the truck drivers etc.] are subjected to at various checkposts and random checking for various purposes leads to delays and increase in costs. All these and the various Acts like the Essential Commodities Act, 1955, and the plethora of control orders issued under it, the Prevention of Food Adulteration Act, 1954, Fruits Products Order, 1955, Standard of Weights and Measures [Packed Commodities] Rules, 1977, Export [Quality Control and Inspection] Act, 1963, etc make internal trade difficult and markets fragmented. The various barriers to internal trade, excessive paper work, various check points which the transport vehicles have to cross causing inordinate delays and payment of bribes etc. add to the transaction cost leading to increased price to the consumer and a lower share to the producer in the consumer price.

3.3.0 Barriers to Internal Trade–Problems, Causes and Suggestions

The barriers faced in the inter-State movement of goods is summarized in the diagram below:

Diagram: The Regulatory Regime for Inter-State Movement of Agricultural Goods



Source: Debroy and Kaushik [2001]

3.3.1. The causes leading to the above problems could be grouped under the following broad heads:

- [a] Restrictions imposed by the Essential Commodities Act [ECA] 1955/Prevention of Food Adulteration Act, 1954 etc.
- [b] Fiscal issues
- [c] Transport related
- [d] Agriculture trade related

3.3.1.0 **Essential Commodities Act, 1955 and other Acts/Orders**

3.3.1.1 The Essential Commodities Act [ECA] is a Central legislation to control the storage, movement and trade in a large number of commodities including food grains, edible oils, pulses and sugar. The Act was enacted with the objective of maintaining and increasing the supplies of any commodity declared as essential by the Central Government and securing equitable distribution and availability at fair prices. The Act provides the framework for rules, regulations, orders, regulating or prohibiting the production, supply and distribution, trade and commerce of the specified commodities to achieve the objective of the Act. The Act provides instruments like license, permit, price control, storage, transport, distribution, acquisition, prohibition on sale, compulsory sale [levy] to the Central/ State Governments, maintenance of records and supply of information, on which orders could be passed by the Government to achieve the objectives of the Act.

3.3.1.2 Using the powers under ECA 1955, the various Ministries/Departments have issued control orders for regulating production, sale and prices of different items. Similarly, utilizing the powers delegated by the Central Government under the Act *ibid*, the State Governments/UTs have issued a large number of control orders covering items such as paddy/rice, edible oils etc. As per data available with the Ministry of Consumer Affairs [2005], the number of control orders issued by various State Governments/Union Territories under food and non-food items was 182 and 55 respectively. It is understood that 41 of these were rescinded and 10 amended. The ECA 1955, and the Control Orders were relevant and issued in situation of demand exceeding the supply. **The demand-supply balance and the economic environment have changed in recent years but the restrictions and controls are continuing and coming in the way of efficient functioning of the marketing system. Many of the provisions under these control orders are now outdated and have to a certain extent adversely affected the potential of private sector initiatives and consequently agricultural development in the country.** Removing controls on the movement and stocking of agricultural commodities across the country could result in incentives for the private sector and cooperative sector to invest in modern storage and bulk handling facilities for a range of commodities. Private investment in these facilities is likely to increase market efficiency, reduce post harvest losses and reduce government deficits. In any case, the powers of the

Government to restrict the movement of goods out of their territory granted under the ECA, 1955, are incompatible with the principle of a single market.

Box - 3

Central Order

Despite the superficial absence of direct utilization of Control Orders, their mere presence creates uncertainty and thereby distortions. It further keeps certain powers with the food inspectors often liable to be misused.

FAO Report [December 2005]: Towards an Indian Common Market

Suggestions

3.3.1.3 Realizing the changing situation, the Government of India has already revised the lists of essential commodities from time to time. The number of essential commodities has come down from a high of 70 in 1989 to 15, at present. The need is to delete the remaining items also. It would be better if the ECA, 1955, was put under suspended animation for the present and revived by Government notification if any emergency situation develops, for a limited time for a specific commodity in a specified area. After watching for a few years and being satisfied that under the changed environment it is possible to tackle even emergency situations with market operations, it may be possible to scrap the Act all together. Scrapping the ECA, 1955, or placing it under suspended animation would also make various control orders issued under it redundant. However, to ensure that the States do not issue fresh control orders, the Central Government may consider the feasibility of making Central legislation to ban imposition of any restriction in the movement, stocking etc. of agricultural commodities.

3.3.1.4 Similarly the Prevention of Food Adulteration Act [PFA] 1954, Food Processing Order, Weights and Measures Act have become somewhat outdated and are misused by junior officers/inspectors etc. to cause considerable harassment to various units/establishments. It is expected that the new proposed *Food Safety and Standards Bill [2005]* could solve a major proportion of the current problems. The Bill would cover entire India and will supersede all State laws on food and food processing once it becomes a law ratified by the Parliament. The Bill clearly defines the food items and in line with the global concerns on food standards, incorporates the provisions of complete traceability on the label of the produce. However, interestingly the stress on the traceability up to the farm-level for agriculture and horticulture is

less as compared to the processed foodstuff. In addition, the Bill proposes the creation of an apex organization, Food Regulatory Authority of India [FRAI], which would be the supreme authority for standard setting and enforcement in the food sector as against the present position where different Ministries are involved in administering different Acts/Control Orders concerning food and food processing.. Furthermore, the proposed Bill, once enacted, would repeal all the concerned control orders issued by various departments, and create a streamlined framework. The specific enactments which would be repealed are listed in the Second Schedule of the proposed Bill and are as under:

- [i] The Prevention of Food Adulteration Act, 1954 [37 of 1954]
- [ii] The Fruit Products Order, 1955.
- [iii] The Meat Food Products Order, 1973.
- [iv] The Vegetable Oil Products [Control] Order, 1947.
- [v] The Edible Oil Packaging [Regulation] Order, 1998.
- [vi] The Solvent Extracted Oil, Deoiled Meal and Edible Flour [Control] Order, 1967.
- [vii] The Milk and Milk Products Order, 1992.
- [viii] Any other order issued under the Essential Commodities Act, 1955 [10 of 1955] relating to food.

Box – 4

The Prevention of Food Adulteration Act, 1954

The Act dates back to 1954 and is extremely restrictive in the category of permitted additives, which do not reflect technological options which are now available and widely used internationally. Although changes are possible, the procedure for making changes is extremely complicated and the authorities concerned have shown little flexibility in these matters. The Act is also rigidly administered in the sense that any deviation from what is prescribed, even in the matter of descriptive content of labels, is treated as an offence equivalent to adulteration, which can invite criminal prosecution. There have been instances where smudged labels have been treated as mislabeling and made a basis for criminal prosecution. In one case a label indicated the weight in “Kg.” Whereas the prescribed form under the rule was “Kg” and the mere addition of a dot at the end of “Kg” was regarded as a material deviation from the prescribed rules! Such provisions deter organise sector companies from expanding in this area while the unorganised sector, which is not policed at all, largely unaffected. We would recommend repeal of The Prevention of Food Adulteration Act.

Report on Task Force on Employment Opportunities, Government of India, Planning Commission

3.3.2.0 **Fiscal Issues**

3.3.2.1 Fiscal reforms are important in facilitating the growth of efficient trade. There exist various forms of charges/taxes on the traded commodities in India. There are considerable variations in the market charges and taxation rates across States. Sales tax is the major component of State collection, followed by State Excise and Motor Vehicles and Passengers and Goods Tax. There are differing tax rates applicable depending on the size of the vehicle. The Central Sales Tax increases the price of the goods in the consuming State in comparison to the producing State. The Entry tax by State Governments impedes the movement of goods across the State borders. Non-uniformity of laws and procedures related to taxes add to the problems of the traders.

3.3.2.2 Octroi is used as a tax levied on the products entering the territory of a city or Municipal Corporation. Whenever the agricultural products enter the area of another *mandi* jurisdiction, it can technically be stopped and detained for checking payment of market fee at the point of purchase any time. This acts as a major harassing force on the movement of primary commodities and inhibits free movement of goods within a State.

3.3.2.3 The multipoint sales tax system as prevailing in India has cascading affect on prices. Further, as already stated, the rates of tax are not uniform in different States and also inhibit trade on account of extensive checking of documents etc at the border check points. In November 1999, the Government of India appointed an Empowered Committee of State Finance Ministers to suggest sale tax reforms. Following the appointment of this Committee, it was decided to introduce uniform floor rates of sales tax on most of the items important for inter-State trade. However, a review of the revised sales tax rates announced by the States showed that there was no uniformity in the revised rates or categorisation of products. In some States, 'essential commodities' were clubbed with the 'prohibited' items categories for rate purposes and the highest rate of 20% was levied on items of mass consumption alongwith liquor and narcotics. It appeared that the decision to implement a minimum floor rate was used as an excuse to increase the sales tax rates without rationalisation of the tax structure. The above Committee also recommended the introduction of the

Value Added Tax [VAT] in place of the sales tax. The VAT has been introduced in some of the States from April 1, 2005.

3.3.2.4 The Value added tax [VAT] is a multi-point tax imposed on 'value addition' at each stage, which is calculated as the difference between the purchase price and the sale price allowing for the 'set off' on the tax paid earlier. The invoice of the inputs purchased earlier provides the claim for credit, which could be deducted from the tax liability on the sale price. Under VAT, the rate of tax is applicable at each stage. The general rate of VAT on different items as proposed by the Empowered Committee was 12.5%. 46 items have been identified as exempt items'. Gold, silver, precious and semi precious stones are to be taxed at 1% and agriculture, industrial inputs and certain essential items [a total of 270 items are to be taxed at 4%. Rate flexibility is provided for 10 local items [out of Empowered Committee's list]. Further, petrol, diesel, aviation turbine fuel, liquor and lottery tickets are out of the VAT provisions. The Central Sales Tax is proposed to be phased out in 3 years from the second year onwards.

Box - 5

Value Added Tax [VAT]

Since the current tax statutes are cluttered with ad-hoc and outdated rules and procedures, the ideal solution is to gradually move to uniform nation-wide Value Added Tax [VAT] is universally accepted as the most efficient form of indirect taxation. As each input going into the final product is taxed only once, this tax avoids cascading and multiple incidences and is easy to implement and monitor. A unified system of taxing domestic trade in the form of a national VAT levied and administered by the Union Government would, in one stroke, bring about harmonization and help in removing the tax on inter-State trade

Tenth Five Year Plan document 7.8.58 - 7.8.59

3.3.2.5 The introduction of the Value Added Tax initially raised several issues/problems to industry and trade. Some of these issues were the treatment relating to the pipeline stocks/documents, the long time taken by the States in release of VAT statutes and rules etc and the communication gap between the State Government and the taxpayers. All these led to uncertainty and confusion for the industry, trade and the public. The above issues were however, transitional in nature and the trade/industry and others are expected to get used to the change. It is also expected that this experience would be useful for other States when they introduce VAT. However, the continuation of the Central Sales Tax for few more years and the

impact of rate flexibility for 10 items in each State would continue to impact the possibilities of developing a Common Market.

3.3.2.6 The complex tax structure and multiplicity of State-level taxes distort the process of trade. Inter-State and Centre-State harmonisation of tax law and administrative procedures could facilitate the simplification of the tax system.

Suggestions

3.3.2.7 All possible efforts are required to introduce VAT at the earliest. Till, a comprehensive national VAT is introduced, all States should switchover to State VAT. The inconsistency in commodity classification also needs to be addressed to ensure uniformity in rates. For inter-State sales, there should be zero rate in the originating State and the destination VAT should be applied at the point of final sale. The State VAT with a harmonised rate structure should eventually replace sales taxes and other taxes like turnover tax, octroi and entry tax etc. The introduction of entry tax to compensate possible loss due to implementation of State VAT should not be encouraged. This would come in the way of a unified Common Market. **The State VAT may, in due course be replaced by National VAT, once there is an agreement between the Centre and the States regarding sharing of the tax.**

3.3.2.8 The octroi or any other local tax introduced by any State needs to be abolished. If however, for revenue reasons the octroi etc. cannot be abolished in all cases, at least the primary agriculture produce should be exempted from their coverage.

3.3.2.9 Another approach could be the abolition of all indirect taxes on agricultural products as a policy that would not only resolve the problem of border taxes but would also be more socially equitable. **A tax on agricultural products decreases the price received by farmers and increases the price paid by consumers. As farm incomes lag behind average Indian incomes and the poorest sectors of non-farm society spend the highest proportion of the income on food, indirect taxes applied to food products are doubly regressive. Furthermore, removing internal indirect taxes on agricultural products would tend to make Indian agricultural products more competitive on export markets.**

3.3.2.10 A possible measure for compensating the States for loss of revenue could be to increase the devolution of funds from the Centre to the States most affected by incomes foregone. Another suggestion particularly relevant for compensating the loss of revenue could be the increase in VAT rate on processed and semi-processed products by say 0.5% all over the country.

3.3.2.11 The FAO study has also suggested, raising the tax say on petrol, by 0.5% to generate additional incomes to compensate loss of revenue by abolition of octroi, Central Sales Tax etc. The above report has observed that the end result would benefit the financial position of the States, rather than hurting their interest, and Haryana could be mentioned as an example in this regard. The State has long discontinued the taxes and the movement restrictions on the primary commodities and has been one of the biggest beneficiaries of the new tax regime, as the tax collection rate in the State has increased appreciably.

3.3.2.12 **An important step could be to change the administration of taxes so that no border checks etc. are needed. Most of the physical barriers on primary agricultural commodities at the State borders are on account of collection of sales/purchase tax or APMC cess or Octroi. Furthermore, the verification of purchase tax returns etc is another function of these posts.** The introduction of uniform rates on VAT in all States and network connectivity between authorities where information regarding movement of goods from one VAT jurisdiction to another could be exchanged online may help to do away with the need of having physical barriers. It is understood that the European Union [EU] has dispensed with all border formalities without having reached the stage of full harmonization of indirect taxation. The minimum rates of such taxes have been decided at EU level, but member countries are free to set higher rates. However, to avoid trade distortion, the products for sale in another member country are sent across the border free of tax and tax is then applied for sale at the rate applicable in the member country for sale. Compensating the State Governments for loss of revenues due to removal of fiscal related barriers to trade would be a complicated issue in our federal system. This would require considerable work on the basis of data/projections etc. for a comprehensive review. It may be better if the Finance Commission addresses this issue so that the Single Market becomes a win – win situation for all.

3.3.3.0 **Transport related**

3.3.3.1 Commercial vehicles moving across borders face a multiplicity of checks from different authorities relating to road tax, license fee, payment of excise/VAT, Essential Commodities Act, forest conservation, pollution control, security etc. The transport vehicles are required to obtain 'fitness certificate' and pay road tax on an annual basis. These vehicles are allowed to ply only within the State covered in their 'permit'. For movement beyond the State, the transport vehicle owner has to apply for 'National Permit' covering at least four States. The permit holder is required to pay the road tax and permit fee for all the states concerned. The rate of road tax in different States is different.

3.3.3.2 Further, the variation in the collection procedures across entry points even within a State is another issue. Sometimes the goods carrying trucks from the bordering districts of the neighboring States even prefer to travel by a longer route so as to avoid the additional expenditure at that particular entry-point, and have to incur increased fuel cost and undergo longer travel time in that process.

3.3.3.3 As stated earlier, there are other taxes like entry tax, octroi, toll tax etc. In each of these cases the appropriate authority at the checkpoints reserves the right to stop and detain the vehicles, which significantly adds to the cost of transportation. The interruption of the trucks/transport vehicle could be on various grounds, and it is quite possible for a particular vehicle to face detentions on each of them, increasing the transaction cost substantially. The direct impact of these measures, coupled with the general inefficiencies in the infrastructural scenario creates a major uncertainty and hurts internal trade especially in perishable products.

Box- 6

Road Transport- Problems

The laws affecting the trucking industry like Motor Vehicles Act, the Motor Transport Workers Act, the Carriage of Goods Act, etc is another major problem. Smooth flow of goods carriage is hampered to a great extent by frequent stoppage of vehicles for a variety of reasons. For example, vehicle detention can be due to trucking operations or goods carried in the truck, or both. Trucking operations cover a wide range of areas, like inter or intra-State permits, road tax, load checks, local police check post, etc. But the more serious and time-consuming detention is on account of goods carried in the truck. Vehicles are frequently detained for checking essential documents, like sales tax, payment of market fee, octroi, entry permits, etc. Besides, there are numerous other reasons under different legal provisions that can detain a vehicle, like check on the movement of essential commodities, food adulteration and hazardous chemicals etc. These checks are generally conducted by respective agencies at separate points, resulting in more than one detention. There exist flying squads or surprise checking teams other than normal checkpoints, which are empowered to stop and check the vehicle at any point within their jurisdictional limits and detain the vehicle for any violation

FAO Report [December 2005]: Towards an Indian Common Market

3.3.3.4 The FAO report states that the cost of importing grains from Thailand to the bordering States is cheaper than transporting the same from another State of the country. Even the cost of importing from the US ports to India [select ports] is cheaper than the road transport of grains from Punjab to Andhra Pradesh. It establishes the abnormally high transport cost one has to incur in the country.

Box - 7

High Transport Cost			
The extent to which the inter-State barriers inflate cost further becomes obvious from the Table below. It is observed from the table that the cost of importing grains from Thailand to the bordering States is cheaper than transporting the same from another State of the country. Even the cost of importing from the US ports to India [select ports] is cheaper than the road transport of grains from Punjab to Andhra Pradesh. While the analysis is exploratory in nature, it clearly establishes the abnormally high transport cost one has to incur in the country			
Domestic Transport Cost of Grains with Oceanic Freight Charges [Rs./Tn]			
Mode [Year]	From	To	Rate
Truck Mid - 2000	Punjab	Mumbai	1915
	Punjab	Andhra Pradesh	2610
	Punjab	Tamil Nadu	2750
	Punjab	Kerala	2865
	Punjab	West Bengal	2470
	Delhi	Mumbai	1210
	Delhi	Andhra Pradesh	2278
	Delhi	West Bengal	1611
Ship 2000	Europe	India	1365
	US Ports	India	1886
	Australia	India	1000
	Bangkok	India	534

Ramesh Chand [2002]

3.3.3.5 In spite of the high cost of road transport [in absence of any suitable alternatives], about 65% of the goods haulage is by roads. The road length in India increased by over six times between 1951 and 1996-97, but the status of road connectivity is rather poor. Another issue is the cartelised nature of the road transport industry. New entrants in the business are not much welcomed. It is reported that there is no undercutting among the top 100 truck owners leaving virtually no room for competitive price negotiations. Medium and large truck operators [above six trucks] account for nearly 87% of the business. Most of the truck operators are running their business as 'family concerns'.

Suggestions

3.3.3.6 In order to ensure that reforms in removing the barriers lead to gains to the farmers, and are not largely appropriated by transport operators, the Government may closely look at the road transport operations and take suitable measures to curb cartelisation and make room for easy entry of farmers/farmers' groups and other individuals in this sector.

3.3.3.7 The removal of the inter-State barriers would facilitate the internal trade on one hand, while indirectly facilitating the foreign trade on the other. This would lead to welfare gains to all parties concerned including the farmers, processing and exporting firms as well as the final consumers.

3.3.3.8 **To simplify the arrangements, it may be suggested that a uniform amount may be charged for the National Permit and the permit holder may be allowed to ply the vehicle anywhere in the country. Similarly, the system of annual fitness certification and road charges may be replaced by a lifetime charge assuming around ten-years life for a transport vehicle. For plying the vehicle beyond the above limit, the vehicle may be subjected to an annual fitness certification and payment of fee etc.**

3.3.3.9 But for revenue consideration, the concept of 'National Permit' has no other value. The government could also consider doing away with it all together.

3.3.3.10 **All checks [other than those for security reasons] may be given up or at least integrated under one window. Use of computers may be encouraged to minimise the detention time at various checkpoints. This may also increase the revenue collections.**

3.3.4.0 **Agriculture Trade**

Agriculture Produce Marketing Committee [APMC] Act

3.3.4.1 The wholesaling of agricultural produce is governed by the Agricultural Produce Marketing Acts of various State governments. Once a commodity is notified, the APMC Act makes its transaction mandatory in the regulated market. Various Government Committees noted that this monopoly, introduced with the objective of benefiting farmers, is actually harming them. Although market committees may legally

be considered as a corporation [or Local Authority], they function virtually as a department of the State government. The market fees charged on value of produce sold [known as the Mandi tax] do not reflect the actual operation and maintenance cost of the wholesale market but seen as another tax on agricultural commodities. Apart from the *mandi* tax [usually two percent in most of the States], there are several other charges applied on the products entering the regulated market yard. The major charges among this category are usually rural development cess [2 percent], infrastructure cess [2 percent], education cess [0.5 per cent] etc. While the actual utilization of the collected funds for these purposes is somewhat questionable, it is the farmer who has to indirectly bear the entire burden, as the trader takes account of these transaction charges while making the bidding. The State governments usually find these mechanisms a major source of extra budgetary income, outside the purview of audit. Hence, very often, they tend to be used as discretionary funds by the political masters. The APMCs have also generally failed to provide adequate infrastructure at the *mandis*. The focus of the APMCs has been on regulation and not development of markets for the local products, introducing grading and encouraging local processing etc. The APMC have also not played any significant role in bringing better market information to the farmers.

3.3.4.2 Direct marketing could enable the farmers to sell their produce to the processors or bulk buyers at lower transaction costs and maybe at better prices than what they get from intermediaries or from the wholesale markets. However, the APMC Act in most of the States does not allow direct buying by processing industries, exporters or wholesalers. Although this requirement has been waived on a case-by-case basis in some States under pressure from the industry, the market fee still has to be paid even though the produce may not enter the APMC yard.

3.3.4.3 Multiple collections of *mandi* taxes is another problem, as Market Committees insist on collection of market fee again when the product comes from another Market Committee jurisdiction. If a product comes from outside the State, then the seller has to pay the market fee again, even if he has paid it in the State of origin. This procedure of double taxation needs to be removed.

3.3.4.4 The monopoly of APMCs has meant that the private sector including cooperatives have not been able to contribute in establishing and developing *mandis*. The provision of the APMC Acts in different States requires modification to create a

lawful role for the private sector in the marketing development. The inter-Ministerial Task Force on Agriculture Marketing Reforms, which gave its report in 2002, has observed as under: “High investment and entrepreneurial skills are required for creation and management of agriculture marketing infrastructure. The situation of control by the State has to be eased to facilitate greater participation of the private sector, particularly to engender massive investments required for the development of marketing infrastructure and other supporting services. Investment requirements for the development of marketing, storage, cold storage infrastructure in the country during the Five Year Plan period has been estimated to the order of Rs.12, 230 crore”.

Suggestions

Amendment of APMC Act

3.3.4.5 The regulatory marketing system introduced after independence was necessary at that stage to ensure transparency in trade in agricultural commodities and to ensure fair price to the farmer. But the working of the marketing committees has been questioned at times on various grounds including lack of transparency in operations. Farmers often express that the regulated markets are not friendly to them and the traders/petty officials exploit them. **In order to improve the transparency in the operation of the APMCs, it should be made obligatory for them to publish the daily arrivals, maximum and minimum prices and the balance of stock available. Availability of this information on the Internet for all APMCs on a day-to-day basis could be the first step to develop an all India market.** The monopoly of the APMCs in establishing and managing agriculture produce markets has meant that the private sector including cooperatives have not been able to contribute towards developing and building up marketing infrastructure in the country.

Box – 8

Amendment of APMC Act

The operation in APMC creates monopolies of the State Marketing Board/Market Committees in regulation the wholesale market by not allowing direct marketing, often leading to cartelization of a few brokers or arthiyas and non-transparency in price setting to the disadvantage of the farmers. The monopolistic operation of the market committee also acts as a disincentive to private sector in setting up processing units for value addition, as they do not have direct linkage with the farmers, which would otherwise help them in getting raw materials of assured quality and quantity. The policy framework should give farmers the liberty to freely market their produce anywhere including direct marketing to processors or other buyers without paying any market fees. However, in case they want the facilities of the market yard, they have to pay a service charge, which should be sufficient to cover the operation costs of the market committee.

FAO Report [December 2005]: Towards an Indian Common Market

3.3.4.6 The need for amendment of the APMC Act has already been discussed in the National Commission on Farmers second Report 'Crises to Confidence' released in August 2005. It may be repeated that the Ministry of Agriculture, Government of India have already formulated a Model Act on Agricultural Marketing incorporating the necessary reforms and circulated it among the States for suitable amendments in their respective APMC, Acts. The model Act basically follows the framework of the existing APMC Act with some modification and additions to facilitate direct marketing, entry of private sector including cooperatives in developing markets and contract farming etc. As per the Model Act, the waiving of market fees would only apply to specified produce sold under contract farming; direct sale would still be subject to market fee; direct buying from a farmer's premises would require a license from the State Government etc. **It appears that the Model Act would require a relook if all barriers to internal trade were to be removed.**

3.3.4.7 With the increasing quantum of market arrivals, the need is to promote alternative and mega markets especially near the big cities and metropolitan towns outside the purview of the APMC Act.

3.3.4.8 If however, the taxation on primary products is discontinued, the APMC Act and marketing committee checkpoints at the State borders would become redundant. **The Government needs to abolish market fee on primary agricultural commodities altogether and levying of charges for various services like loading, unloading, weighing etc. in the APMC yard and replace it, by one consolidated service charge for use of the market infrastructure.** This would bring in greater efficiency. In case the government finds the removal of market tax not possible immediately, it may be phased out over a period of two to three years, but the **additional taxes like 'Rural Development cess', Infrastructure cess, and 'Education cess' have to be discontinued at the earliest.** Furthermore, allowing private players including cooperatives to establish private *mandis* will be a major step in providing an alternative to the farmers and could lead to higher return to the farmers. The private players in most of the cases are selling processed agricultural products to the final consumers and therefore prefer to have assured supply of primary products. The coming up of pre production sale agreements loosely referred to as 'contract farming' is a significant development for Indian agriculture as it is expected

to enhance the level of investment in primary sector and boost productivity. Amendment/suitable restructuring of APMC Act would facilitate this trend further.

3.4.0 **Supporting Measures**

3.4.1 A host of supporting measures would be needed to ensure that the benefits of the Indian Common Market reach the farmers and the consumers [farmers and their families in India also form a very large percentage of the total population] and are not appropriated largely by the traders/truckers etc. Some of the supporting measures are discussed in the following paragraphs.

3.4.1.0 **Standardization and Harmonization of the Quality Standards**

3.4.1.1 The technical standards prevailing across the States are quite divergent and confusing at times. The prevailing scenario is in a way responsible for the current level of lower internal trade. In addition, the regional confinement due to diversity of standards often does not allow the players to enjoy the economies of scale. Furthermore, in coming years organized retail trade is going to be important in the country, and therefore there is need to ensure harmonization of the various prevailing standards across Indian States. Given the wide difference in the use of standards as well as selection of units prevailing in the country, the harmonization need to be introduced at every stage [e.g. – grading, packaging] to facilitate quick transaction. *Apple* is a fair example in this regard, where the level of standardization in the country is quite comprehensive, explaining the intensity of inter-State trade in it all over the country.

Box - 9

Horticulture

Horticulture products being high value have chance of increasing farmers' income and generally improving the nutrition contents of the food basket. The Government of India have launched the National Horticulture Mission [NHM] to double horticulture production to 300 million ton by the end of 2011 from the level of 152 million ton in 2000. To get the optimum benefits from the NHM, it would be essential to ensure that the farmer gets a fair return in the form of increased income by increased productivity, reduction in post harvest losses, generation of value addition and shortening the supply chain in the marketing system. A national 'common or single' market would require countrywide cold chains and improvement in processing and transportation facilities. The barriers to internal trade, particularly in the transport sector due to poor/inadequate road connectivity, slow movement of goods, and delays at check posts etc. need to be removed specially for the perishable commodities. There is also a need to harmonise various laws/regulations for the food-processing sector to encourage increased private sector investment and improved quality of products. The Task Force on Employment Opportunities, Government of India, Planning Commission had stated that there were six Ministries in the Government of India [the Ministry of Agriculture, Rural Development, Health and Family welfare, Food Processing Industries, Commerce and Civil Supplies, Consumer Affairs and Public Distribution], which were administering various Acts/control orders concerning food processing. The large number of Acts/Control Orders, their interpretation etc. and the fact that different ministries handle these, make the compliance extremely difficult. Direct marketing by the producers to the consumers and development of specialized markets for fruits near the bigger towns/cities could help in improving farmer's share in the ultimate price paid by the consumers.

3.4.2.0 Policy Support in Creation of Farmer Communities

3.4.2.1 While the removal of fiscal and procedural barriers would facilitate the movement of primary products with greater ease, there is a need to analyze its consequences on the return to the farmers. **While the streamlined movement, absence of taxes and presence of private sector is likely to enhance the return to them, the major proportion of the lower transaction cost could however, still be appropriated by other players [traders, private players etc.]. Furthermore, the dominance of the truck union over road-route makes the possibility of large gain by individual farmers unrealistic.** It seems prudent that the government should encourage the formation of producer enterprises in various forms all over the country so that a section of the farmers can themselves reap the benefit of the lowered transaction cost by sending the products to various parts of the country. The need is to give the power of scale to the small farmers both in production and post harvest operations to enhance their incomes. In the first report of the National Commission on Farmers 'Serving Farmers and Saving Farming' need for organisation of small farmers horticulture, cotton, poultry, aquaculture and other 'Estates' to facilitate delivery of inputs and confer power of scale to the small growers in production, post harvest and marketing was emphasized to increase their productivity and incomes.

3.4.2.2 There is also need for forming larger groups of farmers engaged in the production of higher quality products for specific markets within specific agro-climatic zones. There is not much evidence that agro processing and marketing enterprises have interest in procuring raw materials from small farmers unless the crops are highly intensive or belong to niche groups and certain labor intensive vegetable crops that need frequent harvesting [e.g. - baby corn, gherkins, mangetout and sugar-snap peas].

3.4.2.3 The realization of economies of scale in procurement, technology adoption and marketing is better performed by producer groups. From the supply side it is not easy for value addition enterprises to work with a large number of small farmers, which involve problems of product uniformity, product traceability and variation in cropping programs leading to a greater management input and raw material procurement cost. In a number of countries, governments encourage small farmer involvement in agro-enterprises. The motivation for the enterprises could come from government offering tax breaks and concessions, a supporting bureaucracy or relaxing zoning laws when companies are establishing new processing units or retail outlets, Government support services related to strategic crop production, specialization etc. Consequently, the small farmer gains access to the market, the consumer welfare increases substantially, and the processors and packing houses have a focal point, for example, a producer group or association to work with.

3.4.2.4 The farmer group operation would facilitate requirements for quality and traceability for exports, which is currently not always possible with numerous small holdings. In farmer communities, due diligence will occur through proper record keeping and monitoring on the farm during the production process and with strong linkages within the supply chain.

3.4.2.5 The formation of farmers' collectives would further facilitate crop specialization in clusters. Farmers in specific agro-climatic zones with comparative advantage for certain crops or products could obtain comparative and competitive advantage by crop specialization in conjunction with other farmers in the location. The three main reasons for specialization could be [i] the limited and finite resources in the area could be channeled to work with the farmer groups on those crops or products; [ii] processors and industry would become concentrated and established in

the production zone, if the region could provide sufficient volumes of product and continuity of supply to make a processing enterprise viable; and [iii] farmers could better manage a particular crop or a group of crops in order to achieve specialization.

3.4.2.6 Producer groups and associations organized as agribusiness enterprises could exercise either of the following product management system – [i] the growers or farmers become an integral part of the supply chain; [ii] producers who earlier were competitors, work together, with that particular product passing through a farmer marketing group that has the responsibility for the category; [iii] any marketing group has to commit to supply two to three outlets and form a working relationship based on the principles of partnership; [iv] the decision regarding type of product variety to grow will be determined by the farmer enterprise group on the basis of agro-climate, resources available, consumer and market studies; and [v] the growers and producers in charge of the programme take all the risks in the management of that product.

3.4.2.7 The proposed enterprises could take various forms, e.g. agricultural cooperatives, commodity-based collectives etc. The agricultural cooperatives in India have so far suffered from various institutional drawbacks [poor management quality, excessive government control etc.] and are not a universal success. The government may provide start-up capital to these producer enterprises through institutional support policy [credit in easy terms] as well as technical support [opening training centres to provide management skills to the village-level select representatives from the cooperatives] to avoid the potential problems, National Dairy Development Board being the best example of the success story.

3.4.3.0 **Credit Policy**

3.4.3.1 There is also a need for development of suitable credit policy framework for ensuring benefits to the farmers from a nationwide common agricultural market. The main motive for creation of the Common Market is to increase the internal trade in agriculture, improvement in productivity and move to high value agriculture. Given the resource-constraint of the average Indian farmer, it is unlikely that they would be able to increase investment in land or productivity on their own. In that case, the gains from the creation of the Common Market could bypass a major segment of the farming community, and the purpose would be defeated. The government may formulate a much stronger credit policy, and implement it effectively. The National

Bank for Agriculture and Rural Development [NABARD] as the development financial institution for agriculture will be required to play an important role in this regard particularly in financing the farmer associations/groups/organisations. Financing of new agri-business opportunities would require development approach and a sound knowledge of agri-enterprises. The linkages between credit and marketing will require to be strengthened and need based new credit products developed.

3.4.3.2 With increase in trade, the development of instrument based secondary market of negotiable warehouse receipt system would become important to provide liquidity in the marketing system. The banks are presently reluctant to provide loans against the warehouse receipts issued by the Central Warehouse Corporation when the holder is not the person in whose favour the receipt was originally issued. Transferability of the warehouse receipt is limited but for the fact that the original owner cannot transfer it to another person without clearing the bank's dues. While the State warehouse Act provides that a warehouse receipt is transferable by endorsement and shall entitle the holder to receive the goods specified therein on same terms and conditions on which the person who originally deposited the goods would have been entitled to receive. Due to the above shortcoming the usage of the warehouse receipt, as a financial instrument has not picked up.

Box - 10

Lending Against Commodities

Banks do have a facility for lending against commodities. However, this potential has never really been realised in the Indian context as lending against commodities is considered to be a high-risk area as this sector is considered to be one of the defined 'Sensitive Sector' in the economy and put on par with capital markets and real estate lending. The bank is firstly not sure of the creditability of the warehouse owner and its managerial ability. Instances are cited where the warehouse owner has disappeared or misappropriated the commodities stored in the warehouse. Cases of fraud have been experienced in the past, which has made banks distrustful of the same. Secondly, the bank is not internally equipped to evaluate the goods stored in the warehouse and is uncertain of the quantity and quality of the goods lodged therein. Thirdly, there is doubt regarding the longevity of the goods. Agricultural commodities largely are prone to deterioration in quality as they are stored for longer periods. Hence, even though the goods are pledged to the bank, in case of default the bank may not be able to realise the value due to the deterioration in quality of the farm produce. Lastly, authenticity of the warehouse receipt, which has been pledged by the farmers, is sometimes in doubt. Therefore, given the high risk attached to this kind of lending, banks have preferred to keep away from such credit and have also tended to charge high rates of interest on such loans. This has become an even more serious issue in light of the stringent capital adequacy norms that are to be implemented under the Basle II Accord where risk weights are to be adduced having regard to the level of risk in each lending structure as reflected by its credit rating.

Source: P.H. Ravikumar, Trading in Dematerialized Warehouse Receipts: Opportunities for Banks and Other Financiers

3.4.3.3 **The need is to establish a more secure system. If there were prescribed norms for accrediting the warehouses and they could provide certification about the quality and quantity of goods, the receipt would have better transferability. However, this presupposes availability of acceptable grading norms and standards of goods kept in the warehouse across the country and the reliability of the certification system. The goods have also to be stored according to grades and standards so as to create market segmentation. Further, the warehouses must meet the financial standards so that the banks could trust these.**

3.4.3.4 The crucial issues are evolving of commercially acceptable quality standards in respect of different commodities, the accrediting agencies working efficiently to improve confidence, having arrangements for gathering appropriate market intelligence about pricing and analyzing it for linkage with quality standards of the commodities accepted for storage.

3.4.4.0 **Food Security Related Concerns**

3.4.4.1 The argument in favour of retaining the barriers on inter-State trade in agriculture is sometimes based on ensuring food security. The idea is that, whatever be amount of foodgrain production by a particular region [State], it has to ensure a control on its movement so that it does not experience a shortage in case of bad harvest. Deficient regions could be particular about this argument. However, the argument is based on a wrong premise. Free and smooth movement of goods could ensure better food security. India's poorest regions are districts characterized with poor infrastructural facility and irrigation networks.

3.4.4.2 The viability of this ideology seems quite untenable, as seen from the findings of various committees. Most of Indian States are deficit in foodgrains, and therefore there is all the more need to ensure free flow of primary products. Stating the growing cereal deficit in the country, the Committee of Long Term Grain Policy [2002] has rightly cautioned against the potential problem in the backdrop of which ensuring free movement of primary products is all the more necessary.

3.4.4.3 Local controls usually put a downward pressure on the prices received by the farmers, and the higher price, in such situations, is entirely appropriated by the

traders. Given this scenario, there is all the more reason to believe that removal of the movements on agricultural products will enhance food security and definitely not reduce it.

3.4.4.4 Certain aspects related to food and nutrition security were discussed in the Second Report of the National Commission on Farmers – Serving Farmers and Saving Farming - Crises to Confidence. **Access to food grains is related to the purchasing power of the population and the nature of public distribution system that is prevalent. The focus has therefore to be increasing the incomes of poor and improving the implementation of the public distribution system. However, in areas, which are difficult to access, in addition to the above, the Government may also support the establishment of Community Food Banks/Grain Banks to improve food security of the poor.**

3.4.5.0 **Commodity Forward Trading**

3.4.5.1 While India has a long history of futures markets in agricultural commodities, during the mid sixties to 2002; forward trading was banned for many commodities. The Government of India have since permitted futures trading in many commodities including wheat, gram, coarse cereals, Kharif pulses, peas, rice, paddy, sugar, khandseri, gur, coffee, potato, turmeric, cotton, raw jute, major edible oils, oilseeds and their cakes, rice barn, chillies, cloves, ginger, rubber, pepper, silk etc. Three national level exchanges and 21 regional exchanges are providing commodity forward trading facilities.

3.4.5.2 Forward and futures markets enable sellers and buyers to reduce uncertainty and consequent risks through price discovery ahead of actual production. It helps in price stabilization by damping the peaks and moderating the lows, leads to an integrated price structure through out the country and ensures balance in supply and demand throughout the year. By aligning their functioning with spot markets, the forward/futures markets can work as a tool to handle complex situation arising from good and bad harvest through stabilising supplies prices. For the processors the facility helps to hedge price risks, avoid storing of goods and minimise the carrying costs is critical. **An orderly functioning forward market is essential for an efficient working of the markets and providing liquidity.**

3.4.5.3 At present the Forward Market Commission [FMC] regulates the forward markets in commodities. The FMC, which for decades was entrusted with the objective to curb forward traders, now has the job to develop and regulate the Commodity futures market. The Hon'ble Union Agriculture Minister has recently [while inaugurating the Fifth National Conference of Commodity Exchanges at Mumbai on 17 December, 2005] talked about strengthening and restructuring the Forward Market Commission and making it autonomous and independent regulator. It is reported that the proposed amendments to the Forward Contract Regulation Act also provide for setting up a Forward Markets Appellate Tribunal on the lines of Securities Appellate Tribunal [SAT] set up under Securities and Exchange Board of India [SEBI]. The steps for improvement in transparency in the operations of the Commodity Forward Markets are welcome particularly in view of the fact that commodity futures market was discouraged [near total ban] for many years and should now be developed to function in a very orderly and transparent manner. The Government may also consider permitting 'options contracts' under the forward trading in commodities for risk containment. However, option trading could also be used for purely speculative purposes.

3.4.6.0 **Market Information**

3.4.6.1 One of the major problems in India agriculture is the lack of timely and correct information to the farmer. The farmers and their groups/association/structure not only require information about the prices but also about the arrivals during harvest and pre-harvest period, stocks, exports/imports, trend in production, forecasts of production/prices etc. to take full advantage of price variations. Such information is essential for commercial operations. The Ministry of Agriculture website provides the data on price trends for major commodities, but at the village level such information is not always readily accessible. The above website would require to enlarge their functions. The farmers and their groups would also require information about the prices, availability, and qualitative aspects of various inputs for modern agriculture. The APMCs/ State Agriculture Market Boards could have played an important role in this area. However, it has not happened so far. These structures should see a business opportunity in providing these information to the farmers.

3.4.7.0 **Infrastructure Needs**

3.4.7.1 The infrastructure constraints could be a major issue in realizing the full benefits of a large all India market. The inadequate spread of regulated markets in many States, lack of basic facilities like electronic weighing machines, price display boards, public address system, electric lights, banks, security posts in many markets, inadequate connecting roads, storage facilities including cold storages etc are serious bottlenecks in developing a farmer centric marketing system. It is hoped that the amendments to the APMC Act would attract private sector participation and would facilitate creation of much needed infrastructure.

3.5.0 **Conclusion**

3.5.1 The Indian economy has moved away from shortages and scarcities. The agriculture sector has the potential for creating greater job opportunities and generation of incomes. However, the need is to first unchain the sector. Various Acts/orders etc., which were enacted to regulate stocking/marketing/ movement of agricultural produce and generally to safeguard, the interests of the farmers and the consumers [check against dishonest business practices] appear to have outlived their utility. The APMC Acts, the Essential Commodities Act and various orders/enactments issued there under, the prevention of Food Adulteration Act, the highly complex tax structure, different rates and procedures under the Central Sales Tax, Octroi, Entry Tax in different States has made the compliances of these laws difficult and has led to development of fragmented markets. Further, the taxes at State and local level are on a cascading basis. The transport of goods across the district/State boundaries is slow and time consuming. The goods carriers could be detained at border posts for any number of reasons and for any length of time. The junior officials and others manning these checks are not too reluctant to accept 'bribes'. All these lead to higher costs and inefficiency in trade.

3.5.2 The Government of India have already initiated various steps in the right direction. As regards the regulatory framework, the number of Essential Commodities under the Essential Commodities Act have been reduced from 70 in 1989 to 15 at present, the Government of India have circulated a draft model APMC Act to the State Governments with a view to facilitate necessary amendments to the APMC Act. The draft model APMC Act provides for enabling private/cooperative sector to

establish and operate agricultural marketing infrastructure and supporting services, direct marketing of agricultural commodities by farmers etc, permitting contract farming, introducing single point levy of market fee etc. However, the draft model Act would require a relook to be more effective in the context of removing the barriers to trade. The Government have also taken important steps in introduction of Value Added Tax [VAT] etc.

Box-11

European Experience

Looking at the European Union [EU] experience in developing a Single Market, it would appear that the task accomplished was quite difficult as compared to the task ahead in India. The European Community [EC] is a Union of independent nations with no central government or common currency. These countries also had different agricultural policies, different tax rates, different price support systems and level of support prices. The level of support prices was the most contentious issue with the countries having high support prices insisting that the price level should be near their support price while the EC wanted it to be near the level, which could be remunerative to the efficient producers. The other aspect is that all countries did not come together at the same time; rather the countries have joined slowly and mostly in batches. Six countries signed the Rome Treaty in 1957 and the latest to join was a batch of 10 countries [8 from Central and Eastern Europe, Cyprus and Malta] in 2004 taking the number of members to 25. Since the EC had decided in 1985 to become a Single Market by 2002, the late entrants [after 2002] did not get even the transition time to harmonise their technical and health standards.

FAO Report [December 2005]: Towards an Indian Common Market

3.5.3 Much work is still required to be done to remove the bottleneck in the transport sector, due to the multiplicity of commodity specific restrictions [essential, hazardous, adulterate, licenced, endangered species, forests] the goods carrier could be stopped at many points [State borders, district borders, municipal limits, bridges etc] and also regarding verification of payments regarding the Central and State Sales Tax, Entry Tax, Octroi etc. causing long delays and considerable harassment. As stated earlier, if this aspect of tax administration could be changed some of the harassment of the transport operators would be eliminated. The aspects regarding fitness certificate of the vehicle, issue of national permit, payment of road tax etc. also need simplification. The issue here is not so much of revenue losses but of the mindset and the vested interests of a large number of inspectors/junior officers and others who thrive in such situations. The need is to build a national consensus and move forward. A road map to build over the developments so far made is required. As stated earlier the transport barriers/bottlenecks have not so far attracted adequate attention of the Government for corrective measures. The implementation of the

reforms/changes, which do not have revenue implications or the impact is likely to be only marginal, need to be taken up first. The legal reforms i.e., changes in the APMC Acts, relook at the Essential Commodity Act and other related Control Orders and the Acts etc. are already under consideration and need to be expedited. **The need is for deepening and broadening of the general consensus and a strong political and administrative will to move on.**

3.5.4 Loss of revenues to the States is not an easy issue to tackle particularly in a federal set up. However, the progress being made in introduction of the Value Added Tax [VAT] is indicative that consensus could be arrived at in the larger national interest though it takes time. **The Government of India may consider requesting the Finance Commission to address this issue for the common benefit of all.**

Extracts from Chapter 5 of the FAO Report [December 2005]:

Towards an Indian Common Market

Common Market in a Federal Structure and Options for Consideration

1. A common market for agricultural products means a market within which there are no institutional or legal barriers to the free circulation of such products, so that producers or traders can sell with the same freedom across state borders as he can within his own state. The analogous concept in the EU is a single market (because the EU used the term “common market” to refer to the stage in its development when there were no longer any customs duties or quantities restrictions in its internal trade but there were still fiscal charges and non-tariff barriers). In India at present there are no internal customs duties but certain fiscal levies and administrative orders are sometimes applied to restrict or prevent movement of agricultural products from one state to another, which have led to erection of check posts at borders. So India is close to being what, in European terminology, would be called a common market but has several steps to take to reach what, in EU terminology, would be called a Single Market.

2. In a common market that applied to all goods there would be no need or justification for the existence of customs officers at state borders and all such customs posts would be closed down, as has happened in the EU. The mandate for this study was limited to the establishment of a common market for agricultural products and we have not, therefore, examined the case for, and means of establishing, a common market in India encompassing all goods. Nevertheless, we observed that a comprehensive common market for good would have advantages compared with a common market confined to agricultural products both for the Indian economy as a whole and agriculture. For the economy as a whole, it would improve efficiency by encouraging the optimum allocation of resources, thereby raising GNP. For agriculture, it would allow the easier “import” of agricultural inputs into states that are in deficit. And the closure of customs posts would ensure that the objective of a common market for agricultural products was not circumvented by ingenious devices like taxes on non-agricultural products that are used in transport of agricultural products, like the tax on bags used in the transport of apples referred earlier.

Furthermore some of the accompanying measures that can be taken to make a common market work more effectively, in particular road construction and improvement are better justified as part of a comprehensive common market than of a common market confined to agriculture.

3. Analogies between the EU and India have to be interpreted with caution as the two are very different entities. India is a single nation, albeit with a form of federal constitution that provides separate powers for the Centre and the States and India is a developing country, and like most other developing countries, has a very large proportion of its population engaged in agriculture. The EU is a union of independent developed countries that have agreed to pool their sovereignty in certain areas. However, there are certain similarities. In the EU some matters are dealt with collectively at the EU level and others remain at the competence of the member states or regions within the member states. In India, the Constitution prescribes sharing of power between States and Centre in certain subjects in the Concurrent List but allows exclusive jurisdiction to each in the other subjects, which are well demarcated.

4. The original 6 members of the EU came together for both political and economic reasons. Politically they wished to move towards greater unity, in order to bind up the wounds of the war and to remove the risk of a new one. Economically they hoped that by trading freely between each other they could create wealth. It was recognized from the outset that a common market was not consistent with the retention of separate agricultural policies and that these should therefore be replaced by a single common policy. For some (e.g. Germany) this was seen as the “price” to be paid for having a common market in other products. For others (e.g. France) it was an advantage to be gained in return for providing free access to their markets for other products. The various countries that have joined the EU since its original foundation have similarly felt drawn to do so for a mixture of political and economic reasons. And, as was the case with the original Six, some see the CAP and the support it provided for farmers as an additional incentive to join, whilst for others it is a cost to be paid in return for the other advantages, political or economic, of being a member. For example, of the countries that joined in 1973, it was seen as an advantage by Ireland and Denmark and a cost by the UK. And the fear that the CAP would provide a lower level of support than their national policy was one of the factors in the

decisions of Norway and Switzerland to not to join the EU. Although, however, different EU members see the CAP as a cost or a benefit, up to now, all have accepted that a common market does imply the need for most powers relating to agricultural support to be exercised at EU and not national level. However, member states can still take their own decisions in relation, for example, to agricultural extension services or research, (although there are also some common research projects) and they have some discretion on the precise way in which some EU wide measures are applied.

5. As for the impact of the market integration on farmers in the EU the setting up of the common market in the 1960s necessitated the removal of national price support policies and the establishment of a Common Agricultural Policy [CAP] with common support prices. The same is true of subsidies. The move from a Common Market to a Single Market in 1993 did not, of itself, necessitate any change in the level of common support prices or of subsidies but it happened to coincide with major changes in both that were being introduced, for other reasons, at the same time and whose impact on farm incomes was clearly positive. This makes it impossible to identify the impact on incomes of the reduction of transaction costs that arose from the ending of border formalities. At a theoretical level, the reduction of transaction costs in international trade can be compared with the reduction of a tariff. In both cases the impact will be to facilitate the flow of goods from a surplus to a deficit countries, which will tend to increase prices in exporting countries and reduce them in the importing countries. So the reduction in transaction costs will have had this kind of impact on market prices (which can differ significantly from the support prices fixed under the CAP) within the EU. The fact that prices for some farmers will have been increased and those of others will have been reduced does not mean that the benefits for some farmers were exactly offset by the losses for others. Trade is not a zero sum game and can be mutually beneficial. For example, Spain frequently has a deficit of feed grains, which is made up by imports from other EU member states, in particular France and the UK. A reduction in transaction costs on this trade will have been of direct benefit to French and UK cereals farmers but it will also have benefited Spanish livestock producers for whom feed grains constitute an input cost."

6. More generally, the common and then single markets should have created wealth through their impact on the non-agricultural parts of the economy where, with

no common support price system, the principle of comparative advantage has applied more freely. To the extent that this has improved the overall economy by comparison what would otherwise have been the case, it will have boosted the employment prospects of people who have left the agricultural sector (or chosen not to enter it) and this will have had a favourable impact on the incomes of those who remained in the farming sector.

Regulatory Concerns

Essential Commodity Act

7. The *ECA* was introduced during a period when India was not self-sufficient in agriculture and controlling the movement and storage practices acted as an efficient check against dishonest business practices. However, given the fact that India has now created a respectable buffer stock of food grains against any disaster, thanks to the operation of the FCI, there is scope for re-looking at the actual utility of the provision. Several government committees (e.g. – Mid-term review of Tenth Plan, Planning Commission) as well as key policymakers have at times expressed concerns over the provision. There is reason to believe that the law has outlived its utility and is only contributing to the rising transaction costs. Although in the last few years both the State and the Central Governments have taken number of steps to reduce the rigors of the *ECA* and the number of commodities covered by it has been drastically cut down, the government still retains the right to bring any commodity under its purview, if need be. Out of the 15 commodities still kept in the list, 11 are related to agricultural products. The mere threat of potential Government action keeps the private sector participation in storage, transport and processing at a low level. It also bears consequences on verifications made at the inter-state borders on movement of goods.

8. The powers for states to restrict the movement of agricultural products out of their territory granted by the *ECA* are incompatible with the principle of a single market. They may have served a purpose in helping to preserve local food security but at the cost of reducing food security for India as a whole. For these reasons the provision should gradually be phased out.

Amendment of APMC Act

9. As regards the collection of market fees through the APMC Act, it still continues to be a major hurdle on the free movement of primary agriculture products from not only between States but also even within the States from one market area to another. As already stated, it sometimes results in double taxation of the same products. Moreover, its operation creates monopolies of the State Marketing Board/Market Committees in regulating the wholesale market by not allowing direct marketing, often leading to cartelization of a few brokers or arthiyas and non-transparency in price setting to the disadvantage of the farmers. The monopolistic operation of the market committee also acts as a disincentive to private sector in setting up processing units for value addition, as they do not have direct linkage with the farmers, which would otherwise help them in getting raw materials of assured quality and quantity. The policy framework should give farmers the liberty to freely market their produce anywhere including direct marketing to processors or other buyers without paying any market fees. However, in case they want the facilities of the market yard, they have to pay a service charge, which should be sufficient to cover the operation costs of the market committee. It is therefore recommended that farmers, processor companies or other private operators may be allowed to operate their own wholesale market and charged a suitable fee for the service. This would encourage more investment in setting up infrastructures and create opportunities for providing better and more cost-effective services.

10. The reform of APMC would facilitate free movement of agriculture products between different States and from jurisdiction of one market committee to another. However, as market fee is a major source of income for a number of States, it may result in loss of revenue to some of them. It is felt that in the major cereal producing States like Punjab, Haryana, Western UP and Andhra Pradesh where bulk of food grains are procured by the FCI for the central pool, the loss of market fee may not be significant as the FCI and the State Government agencies are expected to continue their procurement through the existing Mandi structure. However, the mechanism of collection of market fees is widely being used to collect a number of add-on taxes, education cess, infrastructure cess, R & D cess etc., and alternate source of finance need to be formulated. Collection of all additional fees and cess in the market should be withdrawn and alternative sources of revenue should be found for

the same. In case the State Government feel that the abolition of market fees would lead to a loss of revenue, the rate of VAT on processors or semi-processors of agriculture produce can be increased suitable to compensate the loss of revenue for (e.g. by 0.5%). As of now, most of the horticultural products are already exempt from VAT.

Budgetary Issues

Purchase Tax and VAT

11. To create single market requires inter alia that there should be no customs barriers or measures having an equivalent effect at state borders or at borders within states. There are in principle two ways to fulfill this objective. One is to exempt agricultural products from indirect taxes. The other, which would be analogous to the one the EC has used, would be to change the administration of taxes so that no border measures would be needed.

12. Most of the physical barriers on primary agricultural commodities at State borders are on account of collection of sales/purchase tax or APMC cess or Octroi. Furthermore, verification of purchase tax return etc. is also another major function of these posts. The introduction of uniform rates of VAT in all the States and network connectivity between authorities where information regarding movement of goods from one VAT jurisdiction to another can be exchanged online may do it away with need for having physical barriers. The Government of India has stressed a lot on introduction of uniform VAT rate throughout the country and most States are agreeable. On processed and semi-processed agriculture products, it is recommended that a uniform rate of VAT should be applicable in all the States and that it should be collected at the first point of sale and retained by the State in which it is sold. If the product undergoes further value addition in the same State or on different State, VAT should be charged on the enhanced value and the VAT collected earlier would be rebated. This process could be facilitated by electronic exchange of information.

13. The limited experience of the States where VAT has been introduced has indeed been very positive as it resulted in a more transparent and efficient system of collection. Moreover tax collection itself has improved greatly in the States, which have introduced VAT. It is therefore likely that other States will follow suit and uniform Vat rate will prevail throughout the country before too long and the

government need to expedite the process. Most of the fiscal barriers on agricultural commodities would go in case the APMC be removed, and the check-posts of the market committees would also be redundant. Further removal of the documentation requirement would be extremely important for ensuring free flow of trade at the borders. It is recommended that the establishment of an electronic network for VAT may be expedited so that electronic exchange of information may substitute physical checking at the borders and would cut down a lot of documentation requirements. By VAT-ing taxes on the semi-processed products, there will be no need to check the produce at the borders.

14. The EU currently has dispensed with all border formalities without having reached the stage of full harmonization of indirect taxation. Instead of full harmonization, minimum rates of such taxes have been decided at EU level (e.g. for VAT the minimum rate is currently 15%) but member states remain free to set higher rates. In order to avoid trade distortions arising from these tax differences the principle has been established that products for sale in another member state are sent across the border free of tax and tax is then applied on sale at the rate applicable in the member state of sale. The one exception to this rule is that individuals are free to purchase products that are for their own use in another member state and bring them across the border without having any further tax to pay. The EU Commission regards this system as less than ideal, in particular because of the control problems arising from product being moved without have been taxed and has proposed fuller harmonizing but this proposal has not yet been adopted.

15. Abolishing indirect taxes on agricultural products is a policy that would not only resolve the problem of border taxes but would also be more socially equitable. As farm incomes lag behind average Indian incomes and the poorest sectors of non farm society spend the highest proportion of the income on food, indirect taxes applied to food products are doubly regressive. Furthermore, removing internal indirect taxes on agricultural products would tend to make Indian agricultural products more competitive on export markets. It is therefore recommended that Purchase tax or VAT should be exempted on primary agriculture products. It may be noted that a number of States are not collecting any purchase tax on primary

agriculture products. Moreover, State Governments have recently been empowered to exempt cereals and pulses from VAT.

16. The alternative would be to retain indirect taxes on agricultural products but not permit them to be collected or controlled at state borders. Purchase tax, for example, would be paid on first sale wherever first sale took place. Within this option, there is a choice between elaborate systems under which, if first sale took place outside the state of production, the collecting state would remit the proceeds to the State of production. Or the principle that the collecting states would retain the tax, which is the one that applies in the EC could be chosen. In either case, it would be desirable to unify the rate of tax, to avoid distortions under which operators would seek to make the first sale in the State with the lowest tax or, as a second best, to follow current EC practice and establish minimum tax rates that all States would agree to apply.

Octroi

17. As regards Octroi, it is well recognized that it is an onerous tax and the cost of collection is huge. More and more States have gradually abolished Octroi. However, it is an important source of revenue for the local bodies like Municipal corporations, which are often fund starved. Therefore it is suggested that if Octroi has to be continued as a revenue source, at least primary agriculture produce should be exempted from its coverage so that the farmers can be benefited.

Other Local Taxes

18. Some states have introduced certain other taxation measures, which impact agricultural products by impeding their movement and thereby adversely affect farmers' income. It is recommended that they should be abolished. The measures like Himachal Pradesh Taxation (On Certain Goods Carried by Road) Act, 1999 are put in place in order to build up infrastructure by exploiting the frequently traded primary products. The same objective could be met by introducing indirect taxation policies (e.g. – by introducing an equivalent amount of cess on petrol so as to compensate the loss in revenue) in Himachal and other willing states. The indirect taxation introduced like this at least would create minimum distortion on the price received by the farmers.

Transport related issues

19. It has been observed that the reduction of the inter-state barriers might not lead to any direct benefit received by the farmers, given the prevailing cartelized nature of the transport industry. In order to translate the regulatory reforms undertaken into material gains received by the farmers (individuals as well as farmer cooperatives), the government must enact a definitive law against cartelization of the road transport industry.

20. In the EU the construction and maintenance of transport infrastructure is a national not a EU responsibility. But the contribution that transport links can make to regional development and the need to improve certain key intra Community transport links in order to create a Trans European transport network in the interests of improving the Single Market has been recognized. Therefore, member states may use some of the EU funds that are allocated to them under the EU's regional policy, to part finance the construction of roads. And, as a means of improving the internal market, the Council and Parliament adopted in 1996 Community Guidelines covering roads, railways, waterways and traffic management systems in order to improve certain key connections. Under this, Directives have been addressed to member states in respect of key projects within this overall project and EU funding to cover part of the cost is being made available under a variety of legal instruments. India would do well to emulate the EU example in this respect.

Standardization and Harmonization of the Quality Standards

21. It has been mentioned earlier that the technical standards prevailing across the states are quite divergent and confusing at times. The prevailing scenario is also in a way responsible for the current level of lower internal trade. In addition, the regional confinement due to diversity of standards often does not allow the players to enjoy the economies of scale. Furthermore, in coming years organized retail is going to be very important in the country, and therefore there is an urgent need to ensure harmonization of the various prevailing standards across Indian states. Given the wide difference in the use of standards as well as selection of units prevailing in the country, the harmonization need to be introduced in every stage (e.g. – grading, packaging) to facilitate quick transaction. *Apple* is a fair example in this regard, where the level of standardization in the country is quite comprehensive, explaining the

intensity of inter-state trade in it all over the country. The Food Safety and Standards Bill (2005) is a welcome step by the Government, which will ensure the desired harmonisation as it would supersede the State laws, once enacted.

22. Harmonization of standards removed many non-tariff barriers in the EU. If, when the Food Safety and Standards Bill in India have been enacted, it emerges that there remain some state standards that differ from national standards then the principle of mutual recognition that applies in the EU in areas where there is no EU wide standard could be applied. Under this principle, whilst member states can establish their own standards in cases where there is no EU wide standard, they are not permitted to prevent the sale on their market of products that meet the standards applied in another member state.

23. The absence of common grading standards can also act as a form of non tariff barrier even if it is not compulsory to use the standards applicable in the state of sale, because the absence of standards inhibits direct sales from producers to distant markets, because as such standards are needed to allow contracts to be entered into without prior sight of the products. Again the Food Safety and Standards Bill should help to address this issue.

24. In India the Bureau of Indian Standards (BIS) and AGMARK are there but the level of enforceability varies widely across states. Indian standards are formulated through participation from various stakeholders, including representatives from the government, consumers and industry. The standards are laid for various categories like vegetable and fruit products, spices and condiments, animal products and processed foods etc., and product quality is checked through either ISI laboratories at Delhi, Bombay, Calcutta, Madras, Chandigarh and Patna or in a number of public and private laboratories recognized by them. On the other hand, the AGMARK 'seal' provided by AGMARK standard, set up by the Directorate of Marketing and Inspection of the Government of India in 1937, ensures quality and purity of a product. The government should utilize both these provisions for ensuring harmonization across the country, apart from the provisions of Food Safety and Standards Bill (2005). While ISI certification is purely voluntary, AGMARK seal has been made mandatory for only a few products. As a result, a large number of products are brought to market without standardization. Moreover, there is no compulsory

standard packaging requirement except for edible oils and vanaspati. More products should be brought under the ambit of AGMARK and that even packaging should be standardized. The fluidity and transparency of a Single market would be further enhanced if grading standard for food process, particularly horticultural products, were established on an India wide basis.

Non-Regulatory Issues

Policy Support for Creation of Farmer-Centric Environment

25. The gain from removing indirect taxes or savings in transaction costs as described earlier would initially benefit traders and the transport industry. Both are areas where competition is limited, by the accreditation system that limits free entry into the trading sector and by the agreement that exists between truck owners. It is difficult to ascertain whether these limitations on competition in fact raise the charges they make above the cost of providing their services but, to ensure that the savings arising from the removal of border checks were transmitted back to growers and on to consumers, it would be desirable to increase competition, by freeing up access to the trading sector and forbidding restrictive agreements in the transport sector. The realization of the benefits of market integration to benefit small farmers depends on the measures to address supply side constraints, which prevent this category of farmers to take advantage of the opportunities opened up by greater market access, and help them to increase competitiveness or diversify. Some of these issues are examined below.

Formation of Producer Organizations

26. The economies of scale in procurement, technology adoption and marketing are better attained if small farmers combine together as producers groups. From the supply side it is not easy for value addition enterprises to work with a large number of small farmers, which involve problems of product uniformity, product traceability and variation in cropping programs leading to a greater management input and raw material procurement cost. In a number of countries Governments also encourage small farmer involvement in agro-enterprises. The motivation for the enterprises comes from government offering tax breaks and concessions, a supporting bureaucracy or relaxing zoning laws when companies are establishing new processing units or retail outlets, Government support services related to strategic crop

production, specialization etc. Consequently, the small farmer gains access to the market, the consumer welfare increases substantially, and the processors and pack houses have a focal point, for example, a producer group or association to work with.

27. The farmers group operation would facilitate export requirements for quality and traceability, which is currently not always possible with numerous smallholdings. In farmer communities, due diligence will be accorded through proper record keeping and monitoring on the farm during the production process and with strong linkages within the supply chain.

28. The formation of farmers' organizations would further facilitate crop specialization in clusters. Farmers in specific agro-climatic zones with comparative advantage for certain crops or products can obtain a comparative and competitive advantage by crop specialization in conjunction with other farmers in the location. Already there are areas in the country that have a reputation for growing certain types of horticulture crops - Nasik for grapes and onions, Nagpur for mandarins, Nawasari for chikoos, Durg for papaya, Kullu for apples, the Kashmir Valley for saffron and Hoshiarpur for kinnow. The three main reasons for specialization are; (i) the limited and finite resources in the area can be channeled to work with the farmer groups on those crops or products; (ii) processors and industry will become concentrated and established in the production zone, if the region can provide sufficient volumes of product and continuity of supply to make a processing enterprise viable; and (iii) farmers can manage a particular crop or a group of crops in order to achieve specialization.

29. The proposed producer companies' enterprises could take various forms, e.g. - agricultural cooperatives etc. The agricultural cooperatives in India have so far suffered from various institutional drawbacks (poor management quality, absence of the right decision-making capability, excessive government control etc.) and are moderately successful. The government should provide start-up capital to these producer enterprises through institutional support policy (credit in easy terms) as well as technical support (opening training centres to provide management skills to the village-level select representatives from the cooperatives) to avoid the potential problems. National Dairy Development Board being the best example of the success story. The Company Law has been recently amended to permit formation of producer

companies, which have certain tax and other advantages. This form could be well suited to form strong farmer enterprises.

Credit Policy

30. One of the major goals of the study is to recommend suitable policy frameworks towards creation of a common agricultural market. While the need for extending the credit net for enhancing agricultural growth has been well known, its necessity for creation of the common market is also quite obvious. The driving motive behind the creation of the common market is to increase the return to the farmers through enhanced internal trade in agriculture and increase in agricultural production as well as the productivity is a pre-requisite for that. Given the resource-constraint of the average Indian farmers, it is unlikely that they would be able to increase investment in land or productivity on their own. In that case, the gains from the creation of the common market would bypass a major segment of the farming community, and the whole purpose would be defeated. Therefore, the government needs to formulate a much stronger and wider credit policy, working in the interest of the small and the marginal farmers.

31. While the current government credit policy is already focusing on extending the facilities to the small farmers, there is an urgent need to the broad base it further. It will not be possible for the government to help the formation of producer enterprises all over the country in one go. While the formation of producer enterprises could be encouraged in some select areas (where specialization is readily possible) initially through financial and technical support, access to credit could be extended to the uncovered regions both directly as well as indirectly. A significant proportion of the farmers is not covered by the official credit net, and has to go to the moneylenders or *arthiyas* for credit. The regional rural banks need to be energized to solve this problem. Secondly, having a vibrant private sector would indirectly contribute in this regard as they have already started providing credit to the farmers selling their product to them in the form of quality farm inputs. Removing the remaining barriers for private sector operation would facilitate this trend further.

Provision of Market Information

32. It has been noted earlier that absence of market information (both on prices and appropriate post-harvest measures) acts as a major negative force on Indian farmers. It is the responsibility of the Government to provide the timely information especially to the small and medium farmers. The current level of Government effort remains mostly inaccessible by these groups at large. The Private sector initiatives like the e-choupal model of the ITC and the innovative marketing strategies of several other private players are successfully supplementing the Government initiatives and appropriate policy measures must be undertaken in order to encourage these types of arrangements. The proposed reform of the AMPC Act would be a major step in facilitating the entry of more private players in this sector. The optimality of the operation of private players have already been reflected through higher price to the farmers and increased productivity.

Creation of Rural Infrastructure

33. In order to create a common market, creating a minimum level of infrastructure connectivity is necessary. Infrastructure services such as roads, electricity supply and telecommunication and others are limited in rural areas. Warehouses, cold storages and post-harvest practices are awfully inadequate. As private investors are generally shy in investing in such infrastructure which is more in the nature of public good, government must continue to be the major investor in creating rural infrastructure. A recent study undertaken on behalf of IFPRI on “Linkages between Government Spending, Growth and Poverty in Rural India” found that for each Rs. 10 Lakh spend on roads, 165 people will be lifted above the poverty line. Rs. 10,000 crores are spent on roads will increase productivity growth by more than 3 percent as well as increase in non-agricultural employment.

34. Ongoing projects like “Bharat Nirman” will certainly help in achieving the objectives. Apart from enhancing the government support to the agricultural sector, the private sector has to be encouraged to invest more in the infrastructure building, as the state participation is clearly less than satisfactory. There is a need to adopt various innovative projects to enhance public-private partnership to build adequate infrastructure, both marketing as well as physical, for the primary sector.

“To attract promoting agencies to take up infrastructure projects, the Central / State Governments need to additionally extend support in the allocation of suitable land to set up the market, provisions of village land for farmers’ association and collection centres, deregulation of area from the APMC Act where new markets were to set up, ensure first approval of foreign technical assistance, import of equipment and services like electricity, service, sewage, telephones etc.”

35. The disguised unemployment in Indian agriculture is a major problem, and transfer of the surplus labours to other economic activities is a major challenge to the government. Although extension of labour intensive horticulture is capable of absorbing a proportion of the excess labour employed in traditional agriculture, there are limits to diversification and promoting off farm opportunities is quite important. Apart from focusing on ‘*Bharat Nirman*’, the government needs to concentrate on ‘PURA’, which plan to enhance physical, electronic and knowledge connectivity of the villages, with significant positive externality on agriculture sector.

36. Apart from strengthening the road network, attention also needs to be paid to the mode of transportation of agricultural produce. Railways are an efficient means of transport of goods over long distances, but most railway wagons in India are not designed to carry agricultural and food products in bulk. Products have to be generally transported in gunny bags in open or closed wagons, which do not have any facility for mechanical loading or unloading. Silo storage or bulk handling and movement is rarely undertaken. Cost of transportation could be greatly reduced if suitable steps are taken for bulk handling for agricultural produce by trains. There is also a need to increase availability of refrigerated vans for carriage of fresh farm produce, which are highly perishable, this would minimize travel and transit losses and be time and cost efficient.

37. Another cost-effective means of transport would be to encourage internal trade in agriculture through inland waterways. There is an extensive network of rivers and canals in the country and most of the productive regions are adjacent to them. However, unlike in Europe, China and many other countries in the world, inland waterways are rarely used in India to transport bulk commodities. In fact, over time most of the waterways have gone into disuse. They need to be revamped by regular ridging, if necessary. One additional benefit of introducing this would be a favourable impact on environmental pollution.

CHAPTER IV

TECHNOLOGY MISSIONS: WAY FORWARD

4.1 Historical Backdrop

4.1.1 Technology Mission as a technique or a method to achieve specific development goals was initiated in 1986 by the former Prime Minister late Shri Rajiv Gandhi. Five Technology Missions were initiated, out of which Technology Mission on Oilseeds was one. In his Convocation Address at the IARI, New Delhi in February, 1986. Late Shri Gandhi said - “One of our biggest problems today in the agricultural sector is the oilseeds. We are setting a thrust Mission for oilseed production. When we talk of a Mission we mean an exercise starting from engineering of the seeds and, finishing with the finished products of the vegetable oil, which could be delivered to consumer. We would like to put of one person in-charge of such a mission with full funding with no restriction on him whether bureaucratic or otherwise. The only limits will be certain achievements, which must come within a certain time frame. This will cut across a number of Ministries where you find a lot of hassles and we find our projects getting stalled because the interaction is not smooth enough. We have already decided on this particular Mission.....”.

4.1.2 Till the 1980s, programmes for enhancing the production and productivity of various agricultural crops was sought to be achieved through investment in inputs and provisions of subsidies to farmers through specific programmes along with investment in infrastructure like major and minor irrigation etc. However, with the ascent of Shri Rajiv Gandhi as Prime Minister of India, it was felt that new approaches and methodologies were necessary to give the required fillip to various crops, particularly those which were items of mass consumption and whose shortage led to large import bills. Fortunately, this was the stage when the importance of technology driven growth in agriculture was realized more clearly. It was also the time when the problems of coordination in meeting the felt needs of the farmers and the need for an end to end approach towards growth of production and productivity was also realized. The 80s also saw the arrival of Dr. Sam Pitroda with his reputation in the field of science and technology and his known capacity to cut through the traditional methods of governance, for leading the Technology Missions.

4.1.3 These developments at the Centre were matched by substantial enthusiasm in the States because of the enthusiasm and vision of Shri Rajiv Gandhi in the context of his very large political mandate and the zeal of Dr. Sam Pitroda in converting the States into new thinking for rejuvenating agriculture.

4.1.4 The 80s therefore saw the congruence of several positive factors when the Technology Missions were born. The Centre had formulated a new methodology to ensure significant technology inputs and more efficient delivery mechanism for optimising yields of crops and the States were equally enthusiastic in implementing the ideas in order to gain political mileage and also benefit farmers in drylands.

4.1.5 The following key elements of the Technology Mission approach emerged:

- (i) Effective transmission of available technology even while encouraging research on newer technologies.
- (ii) An end-to-end approach in order to meet all the requirements of the farmers in an integrated way.
- (iii) An effective integration of the activities of various Stakeholder Departments so that the needs of the farmers could be understood comprehensively rather than through segmented lenses.
- (iv) Crops where there was a significant gap between the actual and possible productivity mainly due to insufficient/ inappropriate transmission of technology to the fields.

4.1.6 Briefly, the Technology Missions were designed to be technology rich and to comprehensively transfer the available technology enhance profitability and incomes of farmers through appropriate attention to both production and post-harvest and processing issues. This was expected to be achieved through full collaboration between the Centre and the States and collaboration amongst various departments involved.

4.1.7 These Missions were also supposed to be driven by dynamic and knowledgeable missions Directors who had the capacity to comprehend the technology as well as the delivery systems and who had the vision to deliver results in

a time bound manner. Last but not the least the Technology Missions were expected to be backed by appropriate policy support in order to protect the incomes of farmers.

With this historical background, the formulation and implementation of the discontinued as well as ongoing Technology Missions in the Agriculture Sector are being analysed.

4.2 Technology Mission on Oil-Seeds and Pulses (TMOP)

4.2.1 Between 1981-85, the area under oilseeds was fluctuating between 18-20 million hectares. production between 9-12.9 million tonnes and productivity between 563-684 kgs per hectares. The percentage of area under oilseeds, which received irrigation, was less than 14-17%. The soils in which oilseed crops were cultivated were mostly hungry and thirsty because the resource poor farmers particularly under dryland conditions were not able to provide the needed inputs of fertilizers, water or plant protection. The erratic monsoons further put the oilseed production at risk. There was no well-developed technology and high yielding varieties like in wheat and rice to push up the oil-seed production. Most of the oilseed crop varieties were susceptible to a large number of pests and diseases and they were also affected by abiotic stresses like drought, salinity, alkalinity etc., Devious market forces also dampened the enthusiasm of the farmers to go for oilseed cultivation. The efforts that had been made earlier through research and development activities had not increased production to any appreciable extent while the growing population and industrial needs of the vegetable oils, both edible, and non-edible had been steadily going up. To meet the growing demands India had to resort to import of edible oil which reached 1.6 million tonnes costing Rs.1319 crores in 1983-84 and 1.4 million tonnes costing Rs.1122 crores in 1984-85. This was a huge drain on foreign exchange resources of the country and if it was not controlled through proper strategies to step up the production of domestic vegetable oilseeds import of oils could reach an estimated Rs.3000 crores by 2000 AD. The major edible field oilseed crops of the country were groundnut, rapeseed-mustard, sesamum, safflower and niger and among the non-edible castor and linseed. Area under soybean and sunflower was limited and coconut oil consumption was localized. In this background, the Technology Mission on Oilseeds was expected to achieve the goal of self-sufficiency in a stipulated time frame.

4.2.2 A SWOT analysis revealed that we had the strength of soils, climate, research and developmental infrastructure to grow horizontally and vertically by encouraging oilseed crop cultivation and also by use of need-based necessary inputs. Since the soil and climatic conditions of the country were very diverse, a number of oilseed crops could be grown which was not the case in most of the countries around the globe. The yield gap was a great opportunity to exploit. The well laid out demonstrations by the scientists on farmers' fields by use of available knowledge and technology had brought out clearly the possibility to raise the yield significantly. Besides, this opportunity there was a well-developed developmental infrastructure of Departments of Agriculture, Forestry, Scientific Institutions, input agencies and industry in the country. The major threat was the import of cheap vegetable oil from abroad without proper checks and balances that dampened the initiatives of the local farmers.

4.2.3 The target to raise the present oil seed production from 12.4 to 26.0 million tonnes and vegetable oil production from 3.6 to 8.0 million tonnes by 2000 A.D. was fixed as the goal of the Mission.

4.2.4 **Strategy Development:** To bring a new vigour into the vegetable oil scenario, several steps were taken. Intensive discussions between scientists of ICAR and administrators of Department of Agriculture and Cooperation (DAC) Government of India were taken up to take stock of the existing scenario and explore opportunities to step up oilseed production. This was followed up with interactions with the officials of the Commerce and Civil supplies Departments on supply-demand scenario, with the scientists of Council of Scientific and Industrial Research, on technological options on improving the efficiency of oil extraction and organizations and departments that fix the prices of the different oilseed crops.

Based on these deliberations at the Central level, similar interactions were organized at the level of different important oilseed crop growing States of the country.

4.2.5 Based on all these intensive discussions and keeping the critical role of the farmers who grew the oilseed crops for bettering their income, four MMs (MM) covering all the activities of the oilseed scenario in totality were started both at the

Central and State level and to impart momentum to the Mission. These four MMs were:

MM I – Dealing with crop technology

MM II – Farmer support system

MM III – Price support, processing, storage and marketing

MM IV – Post harvest and processing technology.

MMs I and IV where technology is involved, were to be operated by DARE and CSIR respectively and Missions II and III were to be looked after by DAC.

4.2.6 The leaders for these MMs were identified both at the Central and State levels. Seventeen different agencies were involved in the various activities dealing with vegetable oil scenario. To coordinate, facilitate and execute the different activities and programmes, a full time Mission Director was appointed. The Technology Mission on Oilseeds recognized at the very outset the critical role of technology in production and processing and coordinated and integrated action, with follow up. The participatory role of all the agencies and farmers was also fully realized and a bottom up rather than a top-down approach was followed. Incentive prices for each of the oilseed crops were announced from time to time to enthuse the farmers. The National Agricultural Research System involving ICAR, State Agricultural Universities, Central Commodity Boards, private industry, Oilseed Federations, CGIAR, CSIR, ICMR and other scientific institutions, development departments/ministries/agencies were all brought together and all of them identified themselves as partners in achieving the objectives of the Mission. **This cooperative, coordinated approach with a sense of ownership and commitment by all partners was one of the reasons for the success of the Technology Mission on oilseeds.**

4.2.7 The Technology Mission on Oilseeds launched in May 1986, drew up the following strategic plans after due deliberations:

1. Identification of crops/States/areas, which have the highest potential for increasing production.
2. Development of short term and long term plans.
3. Identification of institutions and leaders at every level who will implement the plans and programmes.

4. Organisation of field demonstrations on a massive scale with available technologies and sensitise farmers and extension workers.
5. Documentation of all the strategies with cooperation of scientists/administrators/policy makers at the Central and State levels.
6. Development of activity milestones, time frame and implementation and review methodologies.
7. Constant and frequent reviews by the Mission Director and mid term course corrections where and whenever needed.
8. Mission activities to be reviewed once in three months by the high powered Steering Committee headed by the Secretary, Agriculture and Cooperation and Secretary, DARE with all the MM leaders and the Mission Director. Reporting to the PMO on a regular basis about the progress.
9. Organisation of national seminars and States level seminars, regional workshops involving scientists, industry, policy makers etc., and organizing training programmes.
10. Balancing between producer-market-industry-consumer imports and exports.
11. A very objective and result giving strategy laid out and followed which gave good results was:
 - a. Identifying crops, technologies and areas that could be exploited for increasing production, productivity and extractability of oil at the shortest possible time
 - b. Identification of non-traditional areas of the country where the crops could be introduced and exploited
 - c. Introducing non-traditional crops on a large scale
 - d. Improving the oil extraction technologies in different mills
 - e. Exploitation of rice bran and cotton seed as a source of oil and
 - f. Exploitation of tree species of forest origin.
12. In the strategy, high importance was given to –
 - a. Rabi groundnut production
 - b. Promoting rapeseed-mustard in a big way in Rajasthan and non-traditional areas like Central, South and East India
 - c. Extending area of cultivation and intensifying production and processing technologies of soybean

- d. Import of seed of high yielding varieties/hybrids of sunflower and popularising it
- e. Introduction of high yielding tenera hybrid plant material of oil palm
- f. Import of rice bran technologies from USA/North Korea
- g. Improving solvent and other rice bran technologies
- h. Announcing remunerative prices
- i. Extension of existing knowledge and development of new knowledge
- j. Extraction of oil from cotton seed and maize
- k. Blending, package and storage technologies
- l. Strong support of DAC by developing National Oilseed Development Programme (NODP)
- m. Gradually reducing the import of oils

The above strategies based on scientific analysis gave significant boost to oilseed production and reduced the import bill. An attempt was also made to look at alternate crops like *Simarouba glauca*, *Pongamia*, *Sal*, *Mahua* and other tree species for meeting the needs of both edible and non-edible oils.

4.2.8 As a result of the thrust given by the Government of India, the Technology Mission on Oilseeds (TMOP) achieved the goals of increasing domestic production and reducing the dependence on imported oil.

- (i) Between 1985-86 and 1998-99 the production of oilseeds increased from 10.83 to 24.75 million tonnes, yield per hectare increased from 570 to 944 kgs. and the area under oilseed crops increased from 19.02 to 26.23 million hectares.
- (ii) The strategy of non-traditional areas and non-traditional crops paid rich dividends.
- (iii) The thrust given to rabi groundnut, soybean, rapeseed-mustard, sunflower, oil palm paid well.
- (iv) The solvent extraction technologies, the conversion of hullers to shellers and rice bran extraction technologies gave good results.
- (v) By 1992-93, the import bill on vegetable oils came down very significantly.

4.2.9 Addition of Pulses

Buoyed by the initial success of the Technology Mission, pulses were also brought into the ambit in 1990. The objective of the Mission was expanded to increase the production and productivity of oilseeds and pulses and to make the country self reliant in these vital sectors. The total outlay of Ninth Plan for Oilseeds (OPP) and Pulses (NPDP) production programmes was Rs. 498 crore and Rs. 181 crore respectively. This went upto Rs. 540 crore and Rs. 215 crore for the Tenth Plan.

4.2.10 The pattern of assistance under Centrally Sponsored Integrated Scheme of Oilseeds, Pulses, Oil Palm and Maize (ISOPOM) is on 75:25 sharing basis between Govt. of India and State Govts. in all components except infrastructure development and publicity. Under infrastructure development, the pattern of assistance is 50:50 sharing basis whereas for publicity, 100% assistance is provided by GOI on lump sum basis (Rs. 2.00 lakhs for each State)

Table 4.1 : Area, production and yield of oilseeds and pulses from 1986-87 to 2004-05

Year	Oilseeds			Pulses		
	Area (Lakh ha.)	Production (Lakh tonnes)	Yield (kgs./ha.)	Area (Lakh ha.)	Production (Lakh tonnes)	Yield (kgs/ha)
1985-86	190.20	108.30	569	244.20	133.60	547
1986-87	186.30	112.70	605	231.60	117.10	506
1987-88	201.30	126.50	628	212.70	109.60	515
1988-89	219.00	180.30	823	231.50	138.50	598
1989-90	228.00	169.20	742	234.10	128.60	549
1990-91	241.50	186.10	771	246.60	142.60	578
1991-92	258.90	186.00	718	225.40	120.20	533
1992-93	252.40	201.10	797	223.60	128.20	573
1993-94	269.00	215.00	799	222.50	133.00	598
1994-95	253.00	213.40	843	230.30	140.40	610
1995-96	259.60	221.10	852	222.80	123.10	552
1996-97	263.40	243.80	926	224.50	142.40	635
1997-98	261.20	213.20	816	228.70	129.80	567
1998-99	262.30	247.50	944	235.00	149.10	634
1999-2000	242.80	207.10	853	211.16	134.18	635
2000-2001	227.70	184.40	810	203.48	110.76	544
2001-2002	227.80	206.60	913	220.08	133.68	607
2002-2003	215.00	148.40	691	204.96	111.25	543
2003-2004	237.40	252.90	1067	234.43	149.40	637

4.2.11 Following production constraints were noted in oilseeds and pulses

4.2.11.1 Oilseeds

- (i) Low productivity primarily due to their cultivation in un-irrigated drought prone areas.
- (ii) Highly risky crop affected by vagaries of nature like floods and drought in Kharif and frost in Rabi.
- (iii) Susceptibility to a number of pests and diseases, which lower productivity.
- (iv) Use of poor quality seeds by the farmers and their reluctance to provide cash inputs as growing of oilseeds was risky.
- (v) Distress sale of oilseeds during the harvest period where marketing channel was weak.
- (vi) Lack of high-yielding varieties suitable to the local agro-climatic regions.
- (vii) Non-availability of hybrids in Mustard, Groundnut, Sesamum, Soybean, Niger and pests and disease resistant varieties.

4.2.11.2 Pulses

- (i) Cultivation of pulses was less remunerative than that of cereals such as rice, wheat, and oilseeds or of other commercial crops. The farmers, therefore, diverted the better lands and resources for the cultivation of other crops.
- (ii) Pulses were raised under rainfed condition on marginal and sub-marginal lands, which were poor in fertility with minimal input application.
- (iii) The varieties available were susceptible to a number of diseases like yellow mosaic virus and powdery mildew in moong, urd and cowpea, sterility mosaic in arhar, wilt and blight in gram, reducing the yield; they were also vulnerable to termites and susceptible to pests.
- (iv) No major break-through had been achieved in pulses production technology and improvement of high yielding germ plasm. The varieties evolved in pulses had narrow adaptability and, therefore, the farmer had to manage within the limited range of varieties for different seasons and agro-climatic situations.
- (v) The production of pulses especially in summer/kharif season was affected by stray cattle and Blue Bull, which damaged pulse crops such as arhar, moong and urd more than any other crops.

- (vi) Lack of proper marketing infrastructure and highly fluctuating prices led to uncertainty in economic returns.
- (vii) Inadequate seed availability (about 2-5% seed replacement rates)
- (viii) Inadequate transfer of technology programmes.
- (ix) Poor storage facilities

4.2.12 The following suggestions for improving the relationship between financial outlay and output in terms of production, productivity and quality of produce can be made

- (i) Timely administrative approval for implementation of the schemes.
- (ii) Funds should be released directly to implementing agencies;
- (iii) Timely issue of State Level Sanctions/release of funds by the State Govts. for the programme
- (iv) Arrangements of inputs, well in time by the implementing agencies under the programme.
- (v) Close monitoring of the implementation of the programme activities;
- (vi) Review of programme on quarterly basis;
- (vii) Advance planning for inputs, particularly for seed. 5-6 years rolling plan for seed, variety/hybrids, season-wise and year-wise, agro-climatic zone wise, should be prepared by the State;
- (viii) More involvement of good private sector in input supply and extension activities as provision has been made in ISOPOM guidelines;
- (ix) Use of maize for production of ethanol for its further use as fuel
- (x) Encouraging primary processing facilities, rural godowns, marketing infrastructure etc. in rural areas.
- (xi) Involvement of farmers associations/groups/societies in implementation of the programmes/activities;
- (xii) Hiring of locally available, agriculture graduates/post graduates/doctorates at various levels, viz; grass root level, district level, States level, and national level, on contract basis.
- (xiii) Setting up of maize processing industries used on dry maize processing at district level;
- (xiv) Encouraging the production of speciality maize like QPM, Baby Corn, Sweet Corn, Pop Corn etc.;

4.2.13 Analysis

4.2.13.1 The substantial achievements of the TMOP were made possible not only by the political commitment and zeal at all levels but by a very favourable minimum support prices regime till 1994. The tide however, started turning in 1994-95 due to the changes in the Government. The sharp monitoring petered off after the departure of Shri Sam Pitroda. At the same time, voice of urban consumers for cheap edible oil became vociferous and international edible oil prices also registered a fall. The Government liberalized of import and put edible oil under Open General License (OGL). Even more importantly, and unfortunately, the bound rate for crude and refined soybean came down to 45 per cent whereas the bound rate for mustard and all other oils came to 75 per cent and 300 per cent. This was a death knell for the concept of self-sufficiency in edible oils. It also discouraged the oilseeds farmers within the country so much so that the production and area have tapered off ever since in sharp contrast to the impressive gains in the first ten years of the Mission. Briefly, therefore, the demands of the urban consumers and the interest of oilseeds producing farmers worked at cross-purpose and the trade policy negated the benefits of the Technology Mission on Oilseeds. While it can be argued that the policy move towards imports of edible oilseeds under Open General License was a component of the trade liberalization set in motion in 1991 for commodities across the board and that it was perhaps not possible to resist international pressure on reduction of bound rate for imports, it must be said that if the trade policy had to be adopted as a component of the country's foreign and economic policy, the Technology Mission should have been wound up at that stage itself without having to be continued till 2002 and be blamed for failing to achieve its objective, in the last years.

4.2.13.2 India is now amongst the largest importers of edible oils in the world today. There is a significant co-relation between the trade policy, minimum support price and self-sufficiency in oilseeds. The reduction in import duty to 50 per cent in 2002-03 led to one of the lowest level of production of 155.7 lakh tonnes, thereby negating the gains of the Technology Mission since its inception. The percentage of self-sufficiency of around 95 percent during 1990-91 and 1992-93 came down to only 50 percent during 2002-03. While per-capita availability of edible oils has increased because of increased availability of imported oil, it has very severely affected the

production of oilseeds and edible oil within the country and correspondingly it has meant substantial decrease in the income of farmers through production of oilseeds.

4.2.13.3 After the initial success, several other problems also cropped up. Even though several posts were specifically created for the Mission, many of these remained unfilled. The posts were filled on the basis of administrative convenience rather than on specific suitability of the concerned officials. The situation was replicated in the States where the reduced priority/ fervour for the Technology Mission in the Centre was felt. Consequently the Technology Mission became another division of the DAC with its own problems of vacant posts and inappropriate staff.

4.2.13.4 Compounding the problems further, the various officers in the Technology Mission were burdened with responsibilities for many other crops also in view of overall constraints on the staff of the department. This also led to a reduced focus on the activities of the Mission and oilseeds became one of the several crops in the overall umbrella of the Crops Division of the DAC. The Mission became a conduit for passage of subsidy for oilseeds crops with substantially reduced focus on technology generation and dissemination. An era of technology poor and subsidy rich Technology Mission thus began in mid 90s due to a combination of political, economic and administrative reasons. It would be very wrong therefore to place the blame on the Technology Mission as a concept and as an institution.

4.2.13.5 The picture would not be complete without commenting on the linkages amongst the MMs, since back to back approach was a critical component of the concept of Mission. In the first ten years of the Mission, CSIR played a very important role in providing the valuable component of post harvest technology and generated some viable research particularly for extraction units, which enhanced income opportunities for farmers and led to value addition. Fillip was also provided to establishment of oilseeds processing and extraction units and technologies for refining oil particularly soybean oil that led to very substantial growth of soybean oil consumption within the country with its well known benefits as a source of rich vegetable protein and simultaneous production of deoiled cake which commanded a premium price in international market for cattle feed production. This led to substantial growth in the incomes of the oil processing units and led to proliferation of

such units. The credit for the generation of this technology and the expansion of the skill of oilseeds processing industry must be given to CSIR which was an important stakeholder in the Technology Mission and whose representative was included in the regular staff of the Technology Mission.

4.2.13.6 The pulses component, however, failed to achieve the success achieved in the early years by the TMO, primarily because the new varieties with potential for quantum jump in yield could not be supplied by MM-I. For pulses, such major technological inputs were not available in 1990 and not much happened for generation and adoption of revolutionary packages of technologies. Moreover, necessary policy supports (inputs, pricing, marketing etc) were also not extended to pulses. Consequently, the productivity and profitability levels in pulses have remained stagnant in spite of its inclusion in the Technology Mission. Consequently, the farmers diverted better lands for other crops and only the marginal soils with little potential for quantum jump in productivity and profits were reserved for pulses. Obviously a Technology Mission could not achieve much in such cases especially when there was a lack of proper marketing infrastructure and price fluctuated in a wide range. Similarly, unlike oilseeds where processing and oil extraction held great opportunities for profit through domestic and international sales, pulses did not offer this incentive because of limited export market and inadequate technology for processing. Thus, even MM III & IV for pulses did not deliver the same results for pulses as they did for oilseeds.

4.2.13.7 In 1995-96, the then Union Agriculture Minister ordered the creation of a separate Technology Mission on Maize since maize offered good opportunities for quantum jumps in production and productivity, had a good export market particularly as cattle feed and also enjoyed a good market domestically as an industrial raw-material for starch. It therefore offered incentive for the farmers to increase production since the demand was growing. This was one crop, which was amenable to the Mission Mode. Unfortunately, since the Technology Mission on Oilseeds and Pulses had meanwhile started floundering due to indifference and adverse trade policies, the Planning Commission did not approve the setting up of Technology Mission on Maize. Strictly speaking therefore the Technology Mission Mode for Maize never really took off. It remained only a route to implement the existing

Accelerated Maize Development Programme of the DAC. Administratively-, however the Mission Director for the Technology Mission on Oilseeds and Pulses was also entrusted with the responsibilities for Technology Mission on Maize and maize was therefore taken off from the overall umbrella of crops under Agriculture Commissioner. Mission Mode for Maize was only a cosmetic appellation without the benefits associated with a true Mission.

4.2.14 The Mid Term Appraisal of Tenth Five Year Plan for the Agriculture and Food Security sector has also commented on the Technology Mission on Oilseeds and Pulses as under:

4.2.14.1 “Pulses yields continued to stagnate although these crops have been under a Technology Mission since early 1990s, and the area under cultivation has also shrunk. Despite some promising new varieties and proven benefits from micronutrients and sprinkler irrigation, there is as yet no breakthrough at the farm level. Although the MSP of pulses has been increased recently to encourage technology adoption, it is the view of the Commission for Agricultural Costs and Prices (CACP) that a sharp increase in imports has blunted this effort. Oilseeds have been under a Technology Mission since 1986 and there was substantial expansion of area, yield and production till the mid 1990s. But in the absence of technological breakthrough and because of pressure from cheaper imports, the Ninth Plan period saw stagnation in yield and decline in area. There was a rebound to a record 25.1 million tonnes in 2003-04, but growth continues to be negligible. In the current year, 2004-05, there has again been a marginal fall in output. Imports of edible oils are now at par with domestic production. Rising domestic demand, trade liberalization and a sharp fall in world edible oils prices in the late 1990s contributed to this rise in imports. Domestic prices of edible oils/ oilseeds remained low and were disincentives to domestic producers. Productivity improvements are required for domestic oilseeds production to remain competitive. This calls for a fresh look at the working of the Technology Mission on Oilseeds and Pulses (TMOP), which appears to be falling in its objectives”.

4.2.14.2 Technology Mission on Oilseeds and Pulses and the Technology Mission on Maize were discontinued in the Tenth Plan (2002-07). It was felt that the

Technology Mission on Pulses had not led to any appreciable increase in the productivity of pulses. While Mission Mode approach in the Technology Mission for Oilseeds has led to a significant increase in production and productivity, yet further increase in the production of oilseeds would be increasingly dependent on the market and price signal and the Technology Mission cannot *per se* address these issues. It was, therefore, felt that the extension of the Technology Mission on Oilseeds and Pulses may not serve any effective purpose.

It was realised at highest level that Technology Mission had to address major issues regarding price procurement and custom duty and closely integrate research with development and Technology Mission with its present structure would not be able to achieve this objective. It was also noted that the DAC had not been able to suggest some alternate structure for this.

4.2.14.3 However, the importance of oilseeds crops for the farmers and for the country was recognized and the concerned departments were asked to continue various programmes and schemes for development of oilseeds, pulses and maize. There was, ample justification for giving special thrust to the oilseeds, pulses and maize not only from the point of view of reducing imports but also from the point of view of livelihood of farmers involved in their cultivation.

4.2.14.4 In this context it has however to be noted that DAC had prepared an alternative structure for the Technology Missions on Oilseeds and Pulses which could not be debated and meanwhile the Tenth Plan came into operation without the Technology Mission on Oilseed, Pulses and Maize.

4.2.14.5 However, TMOP was replaced by a comprehensive and integrated scheme of oilseeds, pulses, oil palm and maize with substantial outlays and with reasonably differentiated approach and restructuring of the erstwhile Oilseeds Production Programme, National Pulses Development Project / Accelerated Maize Development Programme and Oil palm. A greater flexibility was also provided to the States for inter-component diversion of funds and provision for innovations, participation of private sector in the implementation of the programme etc. Briefly, therefore, the stress on oilseeds, pulses, maize and oil palm was continued without the structure of the Technology Mission, which in any case had become fairly weak over the years

due to several internal and external reasons mentioned earlier. It must also be said that it is doubtful whether the achievements of the Technology Mission on Oilseeds in the early years in a protectionist environment could be replicated in a far more open economic environment, both nationally and internationally, prevalent today.

4.3 Technology Mission on Cotton

4.3.1 Cotton is an extremely important commercial crop providing raw-material for 1500 mills, 4 million handloom and 7 million power looms providing livelihood to 60 million people who depend on cotton cultivation, processing and textile trade. On the economic front, India contributes around 15 per cent of the global cotton production and textiles including cotton contribute more than 20 per cent (2003-04) of total Indian export.

4.3.2 In view of lower yields and poorer lint quality of cotton as compared to many other countries, the Government of India launched Technology Mission on Cotton (TMC) in February 2000. The TMC is being implemented in 13 States viz. Andhra Pradesh, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal and Tripura.

4.3.3 The Technology Mission on Cotton consists of four Mini-Missions (MMs), MM-I on research is being implemented by Indian Council of Agricultural Research (ICAR), MM-II for enhancing production and productivity is run by DAC and MM-III on the development of market infrastructure and MM-IV on modernisation of ginning / pressing factories are being dealt by the Ministry of Textiles.

4.3.4 The MM-I and MM-IV are 100% funded by Government of India, while the expenditure for MM-II and MM-III are shared by Government of India & States on 75:25 basis and 60:40 basis respectively. The concerned Ministries are providing funds for implementation of their Mini-Missions.

4.3.5 The approved outlay for Tenth Plan is Rs. 568 crores, Rs. 355 crores, Rs. 108 cores and Rs. 85 crores respectively for the four MMs.

4.3.6 Achievements under various Mini Missions are as under:

4.3.6.1 MM I

The output under MM-I is primarily related to handling of biological population and basic research on cotton, hence, the output is composite by including quantitative and biological indicators.

- About 15 diploid and tetraploid cotton cultivars with high fibre quality have been identified for different zones of cotton cultivation for fast track release by All-India Coordinated Cotton Improvement Programme
- In germplasm screening, genotype resistant to cotton leaf curl virus and jassids have been selected. Some entries have additionally been identified for drought tolerance.
- Evaluation of promising cultures for cottonseed oil provided seed oil content up to 27%.
- Morphological markers have been developed and documented to characterize the varieties and hybrids (including the parents) on the basis of easily identifiable characters. Bio-chemical and molecular finger printing of cultivars is also progressing fast.
- Evaluation of soil suitability for cotton based cropping systems was undertaken in 9 States and database developed for soil suitability has been processed for its depiction on soil resource map.
- Newer strains of bio-inoculants have been developed for their mass multiplication to result in sustainable and cost effective production of high quality fibre.
- In integrated Pest Management, almost 50% reduction in insecticide sprays was possible in IPM blocks as compared to farmers' practice.
- In bio- control studies, fermented culture methodology was found suitable for mass production of *Tricoderma*.

4.3.6.2 MM II : Assistance has been provided during the Tenth Plan for distribution of certified seeds (37398 quintals), field demonstrations (60175), training of extension workers (883), Farmers' training (4978), seed delinting plants (2), sprinklers (12339) and drip sets (2514) pest surveillance IPM demonstrations (5548) etc.

4.3.6.3 MM III: Improvement is undertaken in marketing infrastructure through setting up of new market yards, improvement of existing market yard and activation of dormant yards. 60 per cent of the cost of development being borne by GOI and the balance by APMC/State Governments. Central assistance is limited to Rs. 1.50 crores for new yards, Rs. 0.09 crores for improvement of existing yards and Rs. 0.25 crores for activation of dormant market yard, although this last category is no longer prevalent in the Tenth Plan. Grant in aid is provided to Agricultural Produce Market Committees. A total of 161 market yards have been sanctioned of which 93 have since been completed.

4.3.6.4 MM IV: Takes care of modernisation of ginning and pressing factories for which a capital subsidy @ 25% of the cost limited to Rs. 20 lakh per unit is provided. A total of 616 ginning and pressing factories have been sanctioned of which 322 factories have been completed. To achieve the enhanced targets, the Ministry of Textiles increased the number of consultants and the programmes have been placed at the disposal of the Cotton Corporation of India (CCI) in order to make the facility of manpower and infrastructure available in CCI for the project. CCI has a TMC cell headed by the ex-CMD of CCI which has been spear heading MM-III & IV. This strategy of earmarking a professional exclusively, with technical and administrative backup available from a professional body, can be cited as one major reason for the comparative success of MM-III&IV vis-à-vis other MMs.

4.3.7 Constraints impeding progress

- (i) Nearly 65 percent cotton area is rainfed mainly in the Central and Southern zones.
- (ii) Cotton crop is particularly prone to pests and diseases
- (iii) The excessive use of pesticides and the synthetic pyrethroids have also led to development of immunity in insects against the pesticides.
- (iv) Large scale use of linted seed by farmers causing poor plant stands resulting in loss of yields and build up of disease and pests.
- (v) Wide fluctuation in cotton prices and inadequate market infrastructure.
- (vi) High incidence of contamination in cotton due lack of proper marketing infrastructure and modernized ginning / pressing facilities.

4.3.8 Technology Mission on Cotton has its four constituents MM under different administrative Department / Ministries. The DAC had entrusted impact evaluation study of MM-II of TMC to Agricultural Finance Corporation Ltd., (AFCL). The main recommendations / findings made by AFCL, were as under: -

- (i) Non-availability of certified seeds of new varieties / hybrids as a result of poor seed requirement planning by States.
- (ii) The field demonstrations may be organized on five hectare size for more effective dissemination of technology.
- (iii) Training courses for upgrading the knowledge and skills of farmers, extension officials are needed.
- (iv) The establishment and production of bio-agents and their sale may be entrusted to private sector.
- (v) Pheromone traps are not available in required number.
- (vi) Adopting seed village concept would be appropriate for production of certified seeds.
- (vii) The results of Insecticide Resistance Management (IRM) reported so far are encouraging and may usher in a new era in pest management in cotton.
- (viii) All individual components of IPM need to be implemented as a package in the interest of cotton growing farmers.

4.3.9 The Ministry of Textiles have also taken up the impact assessment of the implementation of MM-III and IV by Textile Research Associations (TRAs) and Central Institute for Research on Cotton Technology (CIRCOT). Indian Cotton Mills' Federation (ICMR) and East India Cotton Association (EICA) have also been associated with the impact assessment. Preliminary report of impact assessment suggests that the development of market yards and modernization of G&P units will help textile industry in getting good quality of cotton. The trash percentage in cotton processed by the modernized ginneries has also come down from 6-8% to less than 2%.

4.3.10 The Technology Mission on Cotton has helped to achieve the target of production of cotton. The production target under TMC was set at 215 lakh bales by the terminal year of the Tenth Plan. The cotton production during 2005 has however touched a peak record at 232 lakh bales and record productivity of 440 Kg per hectare

as per the estimates of Cotton Advisory Board (CAB) in the Ministry of Textiles. Besides, pesticide consumption has decreased in cotton resulting in decrease in cost of cultivation and thereby raising income of farmers. However, the productivity of cotton in India needs to be increased further. To improve the production, productivity and quality, following points are suggested: -

- (i) To bring more area under irrigated / semi-irrigated conditions particularly in central and southern zones.
- (ii) Providing matching share by State Governments under MM-II and MM-III of TMC and timely release of funds by them.
- (iii) Immediate modernization of more ginning & pressing factories to improve the cotton quality.
- (iv) In situ conservation of rainwater by dovetailing watershed and other such schemes.
- (v) States to involve industries, cooperatives as stakeholders in the implementation of TMC particularly through contract farming.
- (vi) All cotton growers to be covered under Crop Insurance.
- (vii) Cotton Corporation of India, NAFED etc. needs to be strengthened so that no cotton is sold by farmers below MSP.
- (viii) More efforts for educating farmers and others to reduce cotton contamination.
- (ix) Stringed punishment for spurious sale of seeds included Bt-cotton as well as pesticides / bio-agents etc.

4.3.11 The Mid Term Appraisal of Tenth Five Year Plan for the Agriculture and Food Security sector has however commented on the Technology Mission on Cotton as under:

“Cotton production had also fared poorly during the Ninth Plan. Yields decline due to a combination of lower prices and increased pests incidence following rapid price-induced area expansion in the previous decade. India’s cotton economy continues to suffer from well-known problems causing low yield and poor quality. It is also well known that, if these problems are addressed, very large gains are possible with end of the Multi-Fibre Agreement. In view of this, a Technology Mission on Cotton (TMC) was launched in February 2000 and approval given for cultivation of Bt varieties. With limited results from these efforts thus far, mills are importing larger quantities of

quality cotton. There is an urgent need to re-look the TMC and in particular, to involve the textile industry more closely on cotton technology”.

4.3.12 Analysis

4.3.12.1 The Technology Mission on Cotton (TMC) has been analysed in the First Report of the NCF (Serving Farmers and Saving Farming, December 2004) in Chapter VI on “Enhancing Cotton Productivity, Quality and Global Competitiveness”. It has already being commented that the performance of the Technology Mission as a whole has been mixed. While MMs III & IV appear to be working satisfactorily towards achievement of physical targets for establishment and renovation of market yards and renovation and modernization of ginning units respectively, the achievement of MMs I & II do not appear to be on track. Mere increase in yield and production during 2003-04 and 2004-05 cannot go to prove the efficacy of the MMs I & II since good prices in increased areas of Bt hybrids as well as increased involvement of cotton mills and private sector for technology transfer have been equally responsible for the higher yields. The core activity of MM-II would have involved a quantum jump of supply of seeds of open-pollinated varieties and the adoption of INM, IRM & IPM technologies beyond the project areas; this does not seem to have happened.

4.3.12.2 Another major shortcoming in the TMC appears to be the operation of the four MMs in seclusion without observable linkages and integrations. This has resulted in sub-optimal performance of the TMC. Some of the States also have not contributed their share of the budget and have consequently under-utilized the central resources particularly in MM–II. Consequently, the TMC is reduced to a routine departmental programme, individually implemented by the concerned departments. Unless the various MMs work together cutting across departmental lines and receive inputs and provide feedback to the other partner MMs and to the State governments, the benefits of the Mission approach would be difficult to achieve. Indeed, some growth in production and productivity would in any case come about in the normal course as has been happening with many other crops which do not have the benefit of a Mission for them. Even though cotton is an extremely important crop with wide ramification for the income of farmers and export earnings for the country, the Technology Mission on Cotton has not performed comprehensively to its full potential.

4.3.12.3 It may be useful to analysis some of the reasons for the varying success of the various MMs under TMC.

4.3.12.3.1 Mini-Mission I

As regards MM-I, the progress had been slow because the process of research and development of new varieties of seeds is a time consuming job. This research job is undertaken either by the Government Department or by the Government Institutions where they have to follow all the procedures, which further take time.

4.3.12.3.2 Mini-Mission II

In MM-II again the transfer of technology is undertaken by the Ministry of Agriculture, Govt. of India through the State Governments. If the attitude of the State Government is indifferent naturally the progress becomes slow. It is felt that the results and the extent of success of MM-I and MM-II may become more clear after the passage of few years.

4.3.12.3.3 Mini-Mission III

As against MM-IV, the MM-III i.e. modernization of existing Market Yards or setting up of new modern Market Yard had been some what slow.

- In the initial years, the cash rich Market Yards came forward and modernized the Yards by taking TMC share, as they did not need any money from the State Government.
- However, Market Yards with shortage of funds had to depend on the State Governments for their share for modernizing and hence the progress of modernization of Market Yards has now become slower.
- The Market Yards undertaking modernization have to follow the prescribed procedure of the Government for sanction, tendering etc. which require lot of time.
- The participants in the modernization i.e. Market Yards, State Governments do not feel any direct economic benefit as in the case of Ginning & Pressing factories where direct economic benefit goes to the owners.

4.3.12.3.4 Mini-Mission IV

The reasons for the better success of MM-IV can be brought out as under:-

- The first and foremost reason for the success had been the **single window** system between the Government through Technology Mission on Cotton and the entrepreneurs i.e. Ginning & Pressing Factory owners or prospective entrepreneurs.
- Due to **expected increase in the productivity and production of cotton**, the Ginning & Pressing factory owners were eager to modernize their factories to compete both domestically as well as globally for sale of their cotton and to have larger turnover and profits.
- Due to increased **demand for cleaner cotton** as well as for contamination free cotton and the willingness of the spinners (textile mills) to pay a **premium** on cleaner cotton, entrepreneurs came forward both for modernization of their existing factories as well as for setting up of new factories.
- The Cotton Corporation of India Ltd. (CCI), which was the implementing agency for TMC under the Ministry of Textiles, Govt. of India, started giving preference **to the modernized units for processing its stocks**. This also motivated many of the Ginning & Pressing factories to modernize.
- The technology i.e. machinery and equipment proposed for the modernization of the Ginning & Pressing factories was available indigenously from multiple manufacturers and hence the same was **available on short notice and at competitive rates**.
- **Direct economic benefit** to the Ginning & Pressing factories due to larger turnover, reduced complaints and better client relationship with the spinning mills motivated the Ginning & Pressing factories for modernization.
- The cost benefit analysis indicated **larger profit margin** in processing and packing of cotton to the Ginning & Pressing factories due to savings in electricity, repairs and labour as compared to conventional factories.
- The results were **assured and guaranteed benefits** in terms of productivity; quality of processing and reduction in contaminants and **risk factor was limited** one for the production of cotton in the catchments areas.
- The Ministry of Textiles, Govt. of India and CCI with the help of other institutions like Office of the Textile Commissioner, Textile Committee,

CIRCOT, ATIRA etc. held **awareness meetings** by involving all sectors like Ginning & Pressing factory owners, Spinning mills, farmers etc. to motivate for modernization.

4.3.13 Remedial Measures

4.3.13.1 Looking to the importance of cotton as a crop for a very large number of farmers, particularly in the dry lands and its downstream contribution, to a very large numbers of weavers and high end industrial products in textile which have vast foreign and domestic markets and considering the opportunities expected to arise due to the demise of the Multi-fibre Arrangement in 2005, it was only appropriate that the Mission approach for cotton was adopted in 2000, itself in order to achieve growth in production and productivity of cotton and expansion of facilities for marketing and processing of cotton into textiles. It was also conceptually in order to work through the four MMs since the goals of the Mission could not be achieved by a single department. Concerned departments like Agricultural Research, Agriculture and Textiles had to come together for coordination and implementation to achieve the prescribed goals within the shortest possible time. However, certain congenital problems need to be highlighted at this stage, which constrained the TMC from the very beginning. The Technology Mission must be a self-contained entity with its own full time professional Mission Director who could tap on the expertise of experts in research, extension, marketing and processing for value addition. As it were, the Agriculture Commissioner with his multifarious duties relating to various crops was designated as Mission Director. Notwithstanding his expertise seniority and position in the Government, he could not be expected to devote single minded attention to the activities of the Mission. Even the lower levels of the administrative hierarchy were burdened with other responsibilities for many other crops and this too acted adversely on the focus needed for cotton in the Mission Mode. Cotton, therefore, became just another crop in the portfolio of the Agriculture Commissioner thereby whittling down the very concept of Technology Mission.

4.3.13.2 It is further noted that no separate staff has been provided for the TMC and the work is being handled through deployment from amongst the existing departmental staff. Once again the degree of single-minded devotion to the goals of the Technology Mission seems to be missing. The staff also has not been selected on the basis of any specific suitability but on the basis of administrative convenience. A

specialized vehicle like a Mission cannot run to its full potential with such a diffused human resource.

4.3.13.3 Even, the Committee system of directing, controlling and monitoring, although well designed had its problems in practice because senior officers were not attending the various meetings due to their pre-occupation and adequate steps do not seem to have been taken to ensure their attendance. Consequently, the effectiveness of the meetings in sorting out coordination issues suffered. It would be necessary for instructions to be issued that only officers above certain levels should attend the meeting on these departmental committees for the various MMs.

4.3.13.4 Presently, the Cabinet Secretary is the Chairperson of the Empowered Committee and this is ample evidence of the importance attached by the Government to TMC. It is, however, seen that the meetings of the Empowered Committees are not frequent enough in view of the pre-occupation of the Cabinet Secretary who cannot be expected to devote enough time to the deliberations of the Committee on a continuing basis. It may perhaps be desirable to consider naming Secretary (Coordination) to be the Chairperson for the Empowered Committee on behalf of Cabinet Secretary.

4.3.13.5 In view of importance of cotton both for the farmers and India's domestic and international trade, the TMC is a thrust area under the Prime Minister. While, this is very welcome, it has added to the volume of reporting by the TMC in respect of progress of the Mission. While monitoring is extremely important, a lot of time gets devoted to compilation of data, which become repetitive. There appears need to rationalize reporting of the TMC in order to ensure more time for the officers to devote to the actual work of the Mission. Particularly touring. Perhaps reporting only to the Empowered Committee and to the Planning Commission may suffice.

4.3.13.6 The Mission guidelines also provide for National Level Monitoring Team (NALMOT) consisting of officers from the Mission and knowledgeable retired officials who tour in the field in order to provide ground level information about the quality of implementation in stead of mere statistics. While this is a very welcome initiative it may be useful to make these monitoring teams a little more broad based with involvement of farmers/NGOs also. It is however learnt that the State Level Monitoring Team (SALMOT) have not functioned with equal efficacy. It may be

useful for the Empowered Committee to specially review the functioning of monitoring at the State level and give suitable directions to the defaulting States.

Box- 1

Insecticide Resistance Management in Cotton

1. Cotton pest management has become complicated over the past one decade. The incidence and damage caused by American boll worm (*Helicoverpa*) during the 1997-98 seasons was the most severe in recent times. It is estimated that yield losses up to 25-50% were caused, primarily due to *Helicoverpa armigera* coupled with bad weather and farmers were forced to use more insecticide applications of up to 20-30 rounds. Based on studies at Central Institute of Cotton Research (CICR), evidence indicates that excessive use of insecticides also led to problems of insecticide resistance in *Helicoverpa* and *Spodoptera*, which further necessitated the repeated application of insecticide. Scientists have focused on the management of resistant pests through the use of the insecticide resistance monitoring data generated over many years and a simple strategy based on ecological principles was designed to conserve beneficial organisms to assist pest management.
2. Area wide farmer participatory 'Insecticide Resistance Management' (IRM), field demonstrations were carried out by scientists in nine villages in Maharashtra, three villages in Andhra Pradesh, eleven villages in Punjab and one village in Tamil Nadu. These were just the beginning of a planned effort to help the Indian farmer appreciate the value of making good pest management decisions.
3. In an excellent case study in Wardha district in Maharashtra, about 650 farmers of nine villages have harvested an average of 800 to 1600 kg. of seed cotton (kapas) per hectare with just two third of the normal production cost due to saving accrued from reduction in insecticide use. The IRM strategy was implemented in about 1200 hectares. Ninety per cent of the farmers sprayed 0-1 times at Economic threshold limit (ETL) of *Helicoverpa armigera* (American Bollworm) mostly with Endosulfan at a time when resistance of bollworm to this chemical was the least. This resulted in 70-80 per cent reduction in pest population.
4. Based upon the experience gained by scientists, Central Institute for Cotton Research (CICR) of Indian Council of Agricultural Research (ICAR), proposed to the DAC, Ministry of Agriculture to adopt this technology and provide funds as the institute will carry out the project.
5. Accordingly, the DAC provided funds to CICR for this purpose under MM-II of Technology Mission on Cotton. 26 districts in the country were selected where maximum pesticide consumption takes place. In each district 20 villages were selected. A Project Officer having sufficient knowledge in IRM was meant for each district while 20 skilled field worker (one for each village) was also assisted under the scheme for their salary etc. The Project Officer with a two-wheeler moves around 20 villages to guide continuously the field workers who will in turn guide farmers throughout the cotton season for the pest management particularly in the use of insecticides so that besides pest management, the resistant in pests does not evolve quickly with the results the number of sprays decreased and accordingly the pesticide use was reduced substantially. Furthermore, assistance was also provided under IRM project towards farmers' field days, farmers' exchange programme, training of project officers, field workers, publication of training manuals, booklets etc.
6. The IRM project made tremendous impact in pest control in the selected villages and improved productivity and economic conditions of the cotton growers substantially. This can be judged from the progress of IRM during 2004-05. As per report of CICR for the year 2004-05, the IRM project was implemented in 11 major cotton-growing states in the country covering 444 villages in 27 districts. 21617 farmers adopted these strategies on 61732 ha area under cotton crop. The average number of cotton sprays was reduced from 8.93 in case of non-adopting farmers to 4.8 in case of adopting farmers resulting in 46% reduction in number of sprays. Rs.2890/ha were saved in case of IRM farmers on account of the cost of plant protection and also 11% increase in the yield resulted in to Rs.6900 additional profit over the non-adopting farmers besides less environmental pollution.

Box- 2

Contract Farming in Cotton

1. The cotton produced by the farmers is used by the mills for the manufacture of textile goods. The value of textiles and garments depends upon the quality of cotton i.e. various characteristics of cotton fiber and contaminants therein.. Therefore, the mills require a specific type of cotton to meet their specific requirement. In this process, it is very important that farmers should produce the type of cotton and the quantity required for use by the mills. In this respect, it will give more dividend if farmers i.e. the producer and the mills i.e. the user, are brought face- to- face for the type of cotton and quantity of the cotton required by the mills through a kind of contract farming. This will provide linkage between farmers and mills.
2. The necessary contract farming rules can be framed by both producer and user themselves. In fact, such contract farming has already started in India for cotton .The contract farming started by Appachi Indian Company, Pollachi and others as well as Cotton Corporation of India (CCI) in the Ministry of Textiles in some states during 2002-03, are the examples of such endeavours. CCI organized first such national level Seminar in Hyderabad during 2002 and started such contract farming in cotton during 2002-03 itself.
3. Besides initiatives by private sector and CCI, the Tamil Nadu Government, with the active involvement of CCI, has also started contract farming in cotton with the mills in Tamil Nadu during 2005-06.
4. The benefit of contract farming is:

For the Industry:

Assured supply of good quality, unmixed and uncontaminated cotton, thus no more hassles of importing cotton.

For the Growers:

No dilemma about choice of seed / variety and buying inputs. Easy availability of loans for buying inputs. Higher yields with reduced expenditure leading to more profit from cotton cultivation. Easy and assured sale of cotton. Mills often facilitating supply of inputs / services for the success of contract

- 5 CCI is actively facilitating / catalyzing the contract farming in the country since 2002-05. Since 2005-06, CCI has also been involved for the implementation of MM-II of Technology Mission on Cotton, which will help CCI to accelerate bringing farmers and mills in contract mode of cotton production and procurement. The mills and others involved in contract farming are as under:
 - Many mills come forward to collaborate contract-farming programme in cotton with CCI. Some of them are (i) Nahar Group of Mills, Ludhiana (ii) Gokak Group of Mills in Karnataka (iii) Pratibha Sintex, Indore (iv) Super Spinning Mills, Coimbatore (v) Sanghi Spinners India Ltd. Hyderabad.
 - Royal Classic Mills (Tamil Nadu) has also come forward for contract in collaboration with State Government and CCI.
 - Private organizations like Appachi Cotton Co., Pollachi that have followed contract programme since 2002-03, have also joined CCI for implementation of the project during 2005-06.
6. The coverage in cotton contract, which is still at initial stage, has shown very encouraging results. The coverage of the cotton contract since 2002-03 particularly by CCI is as under:
 - CCI has taken up programme project during 2002-03 for first time in four states, viz. Gujarat, Madhya Pradesh, Andhra Pradesh & Orissa covering an area of 2996 hectares in 92 villages involving 3157 farmers.
 - During the same year programme was also taken up by three other organizations viz. Super Spinning, Coimbatore, Appachi Cotton – Pollachi, and Amit Traders in Andhra Pradesh, on an area of 11500 hectares. Thus, during 2002-03 contract farming in cotton was taken up on an area of 14496 hectares in the country.
 - During 2003-04 CCI had taken up the programme on an area of 1250 hectares in the states of Haryana and Andhra Pradesh involving 713 farmers. Other organizations in the state of Maharashtra (4), Karnataka (2), Punjab (1), Haryana (1), Gujarat (1), Andhra Pradesh (1) & Tamil Nadu (1) have taken up the programme on an area of 4196 hectares.
 - During 2004-05 CCI has taken up the programme in collaboration with other companies on an area of more than 6000 hectares. Others have also undertaken on area of 2648 hectares on their own.
7. The past results obtained by CCI in such contract farming programme, are briefly as under:-
 - Productivity was increased. Productivity increase from 80 kg to 240 kg. was observed in different locations.
 - Cost of cultivation was lower.
 - The quality of cotton was superior in case of contract farming fields as compared to other fields, as mixing of variety was not there.

4.3.13.7 A major problem identified for the TMC is the financial release procedure for assistance. It must be remembered that Technology Missions must be treated as a special purpose vehicle for achieving specified goals in the shortest possible time. Obviously, therefore, the rules and procedures for Technology Missions must be different from those, which govern the normal programmes of the Ministries. Specifically speaking, it is well known that in spite of improvements, the procedures for release of funds from the Central Government to State governments take time and are in many cases not in tune with the requirements in the field, because of the time schedule of the budgetary exercise. There is a substantial delay in the release of funds received from the Central Government to the field, especially when the State share has to be provided. Such procedural bottlenecks are lethal for work in the field since crop cycle particularly for cotton demands availability of funds at the beginning of the crop season in April itself. This too is a issue which should be addressed on priority by the Empowered Committee. It may be worthwhile to follow the pattern whereby funds from the Ministry of Rural Development pass directly to the District Rural Development Agency. It may also be worthwhile to see whether the procedure followed in the Technology Mission for Horticulture in the North-Eastern region of routing funds through Central and States level Small Farmers Agri-Business Consortium (SFAC) could be followed.

4.3.13.8 In general, while it can be said that Technology Mission on Cotton has benefited due to the multi stakeholders' involvement, it must also be commented that certain key areas still require greater and time bound attention for MM-I. It would be very necessary to develop extra long/long staple cotton varieties, which not only have the requisite length but also have the strength. This would help in generation of higher incomes for farmers undertaking production of extra long/long staple varieties of cotton and would also reduce and hopefully ultimately eliminate large imports of Egyptian cotton. Another area where ICAR would have to work harder in MM-I relates to research for Bt. Cotton hybrid in the public domain, in order to provide competition to the private sector, which rules this segment, and also to protect farmers from the high prices being charged by the private sector. Bt cotton has grown in terms of area coverage in most States, even though the varieties in the private sector were not formally released by the ICAR system for quite sometime simply because of its known high productivity and in spite of its high price. It is, therefore, clear that more

and more farmers would go in for Bt varieties if only they could get the quality assurance and reasonable price of seed.

4.3.13.9 While MMs III & IV have been doing well it must be recognised that the consumption of cotton in the mills is not rising, commensurate with the rising production in the wake of increase under Bt cotton and the work done by the MM-II for increasing the production and productivity of cotton. If this situation is allowed to continue, the higher supply and stagnant demand would lead to a fall in prices of cotton, causing substantial distress to cotton farmers and adverse effect on their desire to grow cotton as also their willingness to invest in the requisite quantities of inputs. While the Technology Upgradation Fund of the Ministry of Textile has benefited the mills substantially, a lot can still to be done beyond the stage of ginning. It is unfortunate that yarn is being exported to China and its conversion to textile through expansion of capacity and modernisation has not been up to the mark. It must be recognised that increase in area, production and productivity of cotton by itself may be desirable at the macro level but it is the income of the farmers which should be the major concern and this can be achieved only if the marketing arrangements and demands improve substantially. The real challenge lies in enhancing the quality awareness amongst farmers and ensuring transparent and scientific marketing and finally modernisation of the through the various stages. This can be and has to be achieved through more frequent interactions between the farmers and NGOs, scientists, and mills. TMC is the ideal instrument to facilitate this interaction on a continuing basis in order to positively assure incomes of cotton farmers.

4.3.13.10 Considering the priorities and potential of the TMC and taking in to account the operational problems which are making the Mission prone to business as usual approach and making it a clone of the normal Intensive Cotton Development Programme, it would be timely to set up a **National Cotton Council** with participation from farmers, Textile industry, NGOs, public sector and other major stakeholders under the chairmanship of Union Agriculture Minister and with Union Ministers of Textile and Commerce serving as Co-Chair persons. The establishment of the National Cotton Council on the lines of International Cotton Council has already been recommended in the First Report of the NCF. (Para 20 of Chapter VI)

4.4 Technology Mission for Integrated Development of Horticulture in North Eastern States, J&K, Himachal Pradesh and Uttarakhand

4.4.1 The Technology Mission for Integrated Development of Horticulture in North Eastern States, J&K, Himachal Pradesh and Uttarakhand Scheme was launched in the eight North-Eastern States namely Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and Sikkim w.e.f. 29th February 2001. During the Tenth Plan, the scheme was extended for implementation in other three contiguous hill States namely Jammu & Kashmir, Himachal Pradesh and Uttarakhand w.e.f. 23rd August 2003.

The objectives of the Mission, now running in its fourth year, are as under:

- To establish Convergence and Synergy among numerous ongoing governmental programmes, achieve horizontal and vertical integration of these programmes
- To ensure adequate, appropriate, timely and concurrent attention to all links in the production, post harvest and consumption chain
- To maximize economic, ecological and social benefits from the existing investment and infrastructure created for Horticulture development and
- To promote ecologically sustainable intensification, economically desirable diversification and skilled employment.

4.4.2 The Mission is being implemented in a mission mode with an end-to-end approach which includes development and introduction of high yielding varieties and technologies, expansion of area, post harvest handling and management, marketing, value addition and processing of horticultural produce with the following four MMs.

4.4.2.1 MM I: Research – coordinated and implemented by Indian Council of Agriculture Research. This MM concentrates on technology generation appropriate to the region. Major components under MM-I are supply of basic seed and planting material, technology standardizations, refinement, on farm demonstration and training.

4.4.2.2 MM II: Production and Productivity – coordinated by DAC and implemented by State Departments of Horticulture/Agriculture. This MM aims at increasing production and productivity of Horticulture crops by adoption of improved production Technologies.

4.4.2.3 MM III: Post-harvest management and Marketing-coordinated by DAC and implemented by Directorate of Marketing & Inspection/ National Horticulture Board. This MM aims for efficient post-harvest management techniques, which include development of cold storage facilities, efficient transport and marketing facilities etc.

4.4.2.4 MM IV: Processing-coordinated and implemented by Ministry of Food Processing Industries, Government of India. This MM aims at promoting processing industry for value addition to Horticulture produce by promoting new processing units, up gradation of existing units.

4.4.3 A total of Rs.453.36 crores were allocated for the Mission since inception. By far, MM II accounted for the highest share of Rs. 368 crores followed by MM III with a share of Rs. 56 crores. MM I & IV lagged at Rs.18 crores and Rs. 9 crores, respectively. Together, MM II and III accounted for more than 90% of the funds allocated. The proportion of subsidy as a percentage of total outlay was as high as 95%. During the Tenth Plan a total of Rs. 386.11 crores were allocated out of which more than 90% was allocated for MM II and MM III. In fact, the allocation under MM II is nearly 20 times that under MM I.

4.4.4 Under MM I, the coordinating research institutes have identified suitable crops for developing technologies and for production of planting material in the region.

4.4.5 Under MM II, assistance was provided for promotion of potential horticulture crops in these States besides creation of infrastructure facilities for improving the productivity of the crops such as irrigation sources, integrated pest management, protected cultivation, organic farming, on-farm handling and other related activities. In addition, assistance was provided for training of farmers within

and outside the States, training of trainers as well as women entrepreneurs involved in horticulture programmes for large-scale adoption of scientific technologies in these States. Besides some of the major achievements reported under MM II include bringing an additional area of 55,087 hectares under various horticultural crops, which includes fruits (24887 ha), vegetables (9336 ha), spices (13445 ha), plantation crops (3713 ha), medicinal plants (1125 ha), aromatic plants (1683 ha, flowers (793 ha). This amounted to an increase of nearly 8%. Among the 8 NE States Sikkim, Mizoram recorded a maximum percentage increase in area of 38.11% and 34.83% followed by Arunachal Pradesh (17.45 %) and Nagaland (13.8%). Among the perennial fruits expansion of area under citrus fruits, which includes orange, lime, lemon is 7286 ha followed by banana, (4503 ha) passion fruit (3885 ha) pine apple (3214 ha) and apple (1113 ha) & litchi (1109 ha). Besides, Kiwi was introduced in an area of 65 hectares. Among spices, ginger cultivation has increased by 3356 ha followed by large cardamom 3775 ha, black pepper and turmeric. An additional area 1125 ha of medicinal plants, 1683 ha of aromatic plants and 818 ha of flower crops have increased the opportunities for tapping the potential of high value crops over the pre-mission period (2000-01). A few States like Mizoram and Manipur have made impressive progress in vegetables, promoting cultivation of second crop in a year after paddy, adopting cluster approach, thus helping the growers to earn better returns from same unit area of land. Major success has been achieved in promoting Anthurium in Mizoram using planting material imported from abroad through a private company based in Bangalore. Besides, grapes (Bangalore Blue variety) are being promoted in and around Champai. Passion fruits of Kaveri variety of Bangalore are being popularised on a large scale in Mizoram, Manipur and Nagaland. A total of 295 nurseries have been set up. A successful mushroom unit has come up near Mao in Manipur cultivating 'shitake' and button mushrooms involving 200 farmwomen. Success was reported in creation of water bodies and on-farm water management. Under the component of organic farming, 535 earthworms /vermi compost units were reported to have been developed. Training of farmer/extension officers has also been taken up. The tissue culture laboratories have been mostly set up by the State Directorates of Agriculture.

4.4.6 Under MM III, assistance was provided for development of 29 wholesale markets, 199 rural primary markets, 26 Apni Mandis and 15 State grading laboratories.

4.4.7 Under MM IV, assistance has been provided for establishment of 9 processing units.

4.4.8 Analysis of the constraints affecting the Mission :

4.4.8.1 Unlike the other Missions, the TM for NE & Himalayan States is not restricted to a single crop. Keeping in view the diverse climate and favourable soil conditions conducive for their commercial exploitation in the Himalayan hill States, the Mission focuses on horticultural crops. The entire Himalayan region is a favourable agro-ecosystem for growing a wide range of fruits, vegetables, medicinal and aromatic plants and other cash crops. The holistic development of horticulture in the region with backward and forward linkage is expected to result in horticulture led transformation in terms of increased productivity, nutritional security, enhanced income and well being of the local farmers.

4.4.8.2 However, review of the Mission activities shows a large gap between the original concept and actual implementation in the field. This was brought out clearly in the First Report of NCF. A Committee was set up by Ministry of Agriculture to carry out the Technical Evaluation of this Technology Mission. This Committee submitted its Report in 2005, which highlights the problems observed in the implementation of the MMs.

4.4.8.3 A total of Rs. 18.8 crores was allocated under MM I. Five ICAR institutes/centre based in the North East region are involved in implementing the R&D programmes of MM I. R&D activities taken up under MM I do not provide need-based technological support for the crops and activities identified for development by the States. It was found that the States had not consulted the ICAR for the varieties/hybrids recommended for particular State/region of the crops identified for area expansion under MM II.

4.4.8.4 No evaluation of suitability and quality of varieties/hybrids marketed by the private companies and freely used by the farmers was undertaken by the ICAR Institutes.

4.4.8.5 Similarly, experimental trials had not been carried out for all the States to evolve package of practices appropriate to the agro climate condition for guidance to the departmental staff and the farmers. The State departments also did not place any requisition for specific information/technical advice before implementing the area expansion programme.

4.4.8.6 The ICAR Regional stations have also not taken up any systematic studies for developing packages of practices including vegetative propagation techniques. It was observed that the farmers were applying inputs in an arbitrary manner.

The ICAR units are also not involved in the working of different laboratories allotted to each State.

4.4.8.7 Under MM II, a total of Rs. 368 crores were allocated since inception. Every State has been allotted financial support for all crops and all the components, irrespective of the commercial potential and need, suggesting a lack of an agro-ecological and comparative advantage approach in priority setting.

4.4.8.8 It was also observed that each district had been allotted all the crops with small area fixed as target for each crop. Such an approach is not conducive to long-term impact of the investment being made in area expansion, nor is conducive for proper planning of infrastructure for storage, marketing or processing of the produce expected from each district.

4.4.8.9 Varieties / hybrids promoted are chosen arbitrarily mostly out of those available in the market, irrespective of the adaptability and superiority. In fruits, selection of some crops was done in an arbitrary manner without any established experience of the crops performance in the States; for example, Meghalaya was found promoting cultivation of peach and apricot in high altitude, which is not congenial for temperate fruits. A high mortality was observed in tree crops. The beneficiary farmers selected for area expansion in tree crops did not have any knowledge or training,

methods of planting, nursery plant in the open field and their after- care. No authentic records were maintained on the survival of the plant supplied, nor was any formal mechanism in operation in the district to monitor the performance. It can therefore be presumed that the area planted a few years back would have no surviving plants, and the same area could even be earmarked for area expansion programme in the coming years.

4.4.8.10 Production of planting material is yet to take off within the States and hence procurement is done from outside the State from untested sources. A permanent damage thus likely to be inflicted because of the perennial nature of the fruit species.

4.4.8.11 Procurement procedures for seed and planting material adopted leave considerable doubt about the quality of the planting material being used. In some States, procurement is done through authorised dealers who do not necessarily have knowledge of handling agricultural material. In a few other States, the farmers are asked to buy the planting material themselves, again leading to inferior material being used.

4.4.8.12 The subsidy per hectare for area expansion under MM-II is Rs. 13,000 per hectare wherever the seeds/planting material was supplied to the farmers by the Department. The cost of planting material was deducted from the total subsidy allowed and balance paid to the beneficiary for input purchase. Except in one or two States, no inputs seem to have been applied nor any instruction to the effect given by the staff. Consequently the objective of granting subsidy for input application as a component of improved technology was not achieved.

4.4.8.13 A total of 295 nurseries were set up but there was a shortage of planting material. The nurseries in the public sector suffer from acute shortage of funds and there is no verification of genuineness of mother plants being used for further multiplications in the private or public sector. Unless mother plants are developed from genetically superior clones of a particular variety, the nursery programme is bound to suffer from serious technical deficiency contributing to proliferation of inferior types through area expansion programme.

4.4.8.14 The design of organic farming structure varied from State to State despite the fact that the guidelines for the TMHNER had provided all the details and drawings. This clearly points to lack/absence of monitoring by technical staff of the State departments.

4.4.8.15 Assistance for highly technical units such as plant tissue analysis lab, disease forecasting lab, tissue culture units, plant health clinic etc has been provided to all States irrespective of the needs, competence of the staff and availability of appropriate technology for using the facilities for the farmers. Each State has been allotted more than one tissue culture unit for multiplying banana, Anthurium, orchid etc. This type of investment would be justified only when the demand for planting material is not less than one or two lakh plants for each unit to make these units economically viable. It will be difficult to sustain operations of these laboratories without trained manpower and recurring expenditure.

4.4.8.16 Under MM III a total of Rs 5600 lakhs were allocated since inception and 29 wholesale markets, 199 rural primary markets and 26 Apni Mandis were established, besides 15 State grading laboratories were reported to have been established as per the progress report of each State. However, Tripura and Nagaland have not set up any market. The structure created in Mizoram for collection and storage was found to be technically deficient in design, as it does not provide for any improved method of cleaning, grading, packing and storing. This could lead to post harvest loss. Infrastructure for Post Harvest Management (PHM) including marketing and processing is planned without any relation to the total production targeted at a given point of time.

4.4.8.17 The funds under MMIV were allocated for setting up new units as well as upgrading some existing units. In total 9 units have been set up out of which two are upgradation ventures. No established private sector firm has taken the advantage of MOFPI facilities under MM IV to set up units in the North Eastern Region. These were set up by NGOs or State/regional undertakings. Under MM IV a total of Rs. 9.66 crores was allocated since the start of the Mission. In the first two years Rs. 4.25 crores were released in the North-Eastern States for setting up processing units mostly in Manipur, Meghalaya and Mizoram. Out of this Rs. 2.15 crores or nearly 50% was

sanctioned to one unit in Mao, Senapati district Manipur, which is processing passion fruit. It was found that the plant was negotiating with the producers in three States for the supply of raw material. The plant should operate in two shifts each day for at least 200 working days in a year to make it a viable venture. During 2003–04, no funds were sanctioned for North-Eastern States. A total of Rs. 5.41 crores were sanctioned during 2003-04 & 2004-05 for the Himalayan States out of which Rs. 2.2 crores were released.

4.4.8.18 The Food Processing sector in the North-Eastern States has been in existence for more than 40 years on a very small scale. Performance of the existing units is far from satisfactory. Most of the units have become economically unviable resulting in closure. The common reasons for poor performance are:

- Lack of stable links between the grower and the processing units on the one hand and the processing units and markets on the other.
- Dependence of units on a single fruit rendering the plant un-operational for a major part of the year.
- Absence of adequate post-harvest management structure
- Absence of tetra / aseptic packaging
- Inadequate credit including working capital from banks and other financial institutions.
- Inadequate power supply
- High cost of transportation due to difficult terrain, frequent bandhs etc.
- Inability to take advantage of opportunities offered by border trade
- Lack of quality testing facilities
- Lack of good manufacturing practices
- Problems related to entrepreneurial ability and intent
- Problems of collateral security for raising bank finance given customary land tenure system

4.4.8.19 With the host of problems mentioned above, it is not surprising that private sector is reluctant to invest in this part of country in spite of incentives under the North-East industrial policy and departmental promotional programmes. For food processing units, heavy equipments are purchased including imported ones, which if

not utilized, would be deprived of the cover available for any defect under the warranty clause of each supply contract. The machines especially calibrated ones may lose their accuracy if kept idle for a long time. Therefore, without adequate supply of raw material and proper planning, investment on expensive equipments purchased in the beginning will go down the drain. With troubled history and failure of processing units to take off under the Technology Mission a serious mismatch may occur between MM II and MM IV.

4.4.8.20 The issues highlighted above clearly show that each MM is working independent of the other under the control of their respective administrative agencies. Linkages among the four MMs are weak.

4.4.8.21 With subsidies under MM II eating up the largest share and without any credible linkage established with MM I, the Mission has turned out to be subsidy rich and technology poor.

4.4.8.22 Consequently, the basic objective of the TMHNER of promoting integrated development of Horticulture in the region for improving production with the induction of improved technologies has not been achieved so far.

4.4.8.23 The research carried so far has remained stand alone without much responsive, corrective, participatory or prescriptive role. In general the coordination among ICAR Research Complex, State Agriculture University, Officers/Departments handling MM-II, III & IV was found weak resulting in communication gap among the four MMs both at the planning and implementation stages.

4.4.8.24 The State governments in the North Eastern Region are besotted with the problems of resource constraint to provide matching shares for centrally sponsored programmes and lack of technically skilled and dedicated staff for field level co-ordination and monitoring.

4.4.8.25 The Mission is headed by the Horticulture Commissioner, DAC and its progress is annually monitored by the Central Steering Committee headed by Secretary, DAC. The focus and leadership required to run the Technology Mission as

a special purpose vehicle may get compromised by treating the Mission Director's post as a routine post, without special staff and proximity to field required for running the Mission. A Directorate of Technology Mission was envisaged and till it comes to force, Small Farmers' Agri Business Consortium (SFAC) is performing its role of monitoring & reporting progress. In fact, funds under MM II, III, IV are routed through Central SFAC/ State SFAC. This was required due to typical lag in the release of funds in the region and funding the required administrative staff within the government machinery. SFAC has hired technical and managerial staff at the State level to monitor MM II, III & IV. This gives flexibility to its operations.

4.4.8.26 While the Technology Mission may not be flawed in conception, a substantial coordination and backward and forward linkages amongst participating Departments and various stakeholders in the public and private sector is needed to achieve Mission objectives. This has not happened adequately with the existing set up

4.4.9 Remedial Measures

- Development of appropriate technologies, which bring about a strategic jump in production / productivity with full involvement of research agencies has to take place to make horticulture a commercially viable occupation for the stakeholders and improve their income and profitability.
- MM I needs to focus on creating adequate mother plant resources for supply to the nursery; Practices for production and post-harvest handling of passion fruits; evaluation of vegetable hybrids promoted by the private sector for their yield and resistance to the major diseases of the region; evaluation of variety / hybrids release by the public sector for their adaptability etc.
- Based on the various agro climatic zones in States, crops should be selected for specialization and promotional activities should be in tune with this.
- A ban should be in place on import of planting material from outside the region and the nurseries both in private and public sector should be regulated.
- All the States have low capacity of absorption of new technology and therefore required to be exposed to basics of crop production and management before getting into higher levels of technologies.

- The beneficiaries identified for area expansion should get thorough training in improved methods of planting and other recommended packages of practices before distribution of seeds/planting materials. The guidelines should be published in local languages. Proper record should be maintained of the beneficiary, status of the crop, yield per unit area, return obtained etc. These are essential for analysing the impact of the investment and technology.
- Instead of providing cash subsidy, coupons should be provided for acquiring inputs from authorised dealers.
- Processing capacity should be projected given the availability of raw material and expected demand. The processing unit should be sanctioned based on this broad calculation.
- Marketing is one of the biggest lacuna and for the disposal of the surpluses. The Second Report of NCF had recommended that a campaign can be launched for development of Rural Periodic Markets (RPMs), Seasonal Markets, Daily markets and PRIs controlled markets preferably through Mission. Specialized marketing Self Help Groups (SHGs), Small Farmers Enterprises (SFEs) and marketing cooperatives should be promoted to undertake Group Marketing, linking the produce directly with the consumer/buyer. The NER could be integrated with South and South East Asian economy for converting this remote and isolated Region into the main route for trade and economic linkage of mainland India with South and S-E Asia. Steps should be undertaken to formalize the huge informal border trade in the region. Progressively, value addition should take place in India, so that farmers could benefit more.

4.5 Technology Mission on Coconut

4.5.1 Traditionally, coconut was grown for edible oil. It served as an ingredient for various industrial applications too. The changed food habits and availability of other cheaper edible oils both in the edible and industrial sectors, however, have brought out a drastic decline in the use of coconut oil in these areas. During the last few years, on account of heavy imports of cheaper vegetable oil, especially of the Palmolein, the price of coconut oil has been depressed despite the large-scale price support operations undertaken. The Price Support Scheme could not make much impact in pushing up the price level and was not beneficial to the farmers as expected.

In this context, it was realized that only diversification of coconut derived products and value addition could help the coconut growers in getting remunerative prices. The coconut crop has also been affected by severe pests and debilitating diseases. It was realized that a major initiative should be started towards controlling the pests and diseases in coconut to improve its productivity and promote product diversification and better value realization from various coconut products, thereby helping the marginal farmers to optimize their income from coconut.

4.5.2 Technology Mission on Coconut was formally launched on 30.1.2002 and it is being implemented as a part of the Coconut Development Board's ongoing programmes with the following objectives:

- To establish convergence and synergy among numerous ongoing governmental programmes in the field of coconut development in order to bring in horizontal and vertical integration of these programmes.
- To ensure adequate, appropriate, timely and concurrent attention to all the links in the production, post harvest and consumption chain.
- To maximise economic, ecological and social benefits from the existing investment and infrastructure created for coconut development.
- To promote economically desirable diversification and value addition to generate skilled employment.
- To disseminate technologies using participatory approach through demonstration and promotion to address the gaps in a mission mode.

4.5.3 Mission Components & Programmes

The Technology Mission covers four major components / programmes:

- Development and adoption of technologies for management of insect pests and disease affected coconut gardens.
- Development and adoption of technologies for processing and product diversification.
- Market research and promotion.
- Technical support, external evaluation and Emergent requirement.

4.5.4 Total Outlay for the Mission since 2001-2002 upto 31st March, 2005 amounted to Rs. 39.50 crores

4.5.5 Subsidy ranging from 25% to 100% of the total cost is extended to government /private institutions for Development and adoption of technologies for i) management of insect pest and disease affected coconut gardens ii) processing and product diversification and iii) market research and promotion.

4.5.6 Some of the major programmes initiated under this programme and achievements made so far are as follows:

- Establishment of 16 integrated Coconut Processing Units with infrastructure facilities worth Rs. 11.92 crores with a capacity to process 90 million nuts per year with financial assistance of Rs. 2.08 crores for value addition and by product utilisation.
- Establishment of 4 Tender coconut Preserving and Packaging unit with a capacity to process 10 Million nuts per year.
- Popularisation of use of Packed Tender Nut water and other convenience foods.
- Establishment of a processing unit for Activated Carbon with an installed capacity of 5 metric tonnes per day.
- Creation of awareness on the health aspects of coconut products.
- Creation of awareness on eco-friendly and sustainable production system.
- Extension of opportunities for diversification of coconut products.
- Containment of Root Wilt disease with in the endemic area by preventing the spread by removal of 6.94 Lakh Root Wilt diseased trees from the border districts of Kerala and replanting with quality planting material and adoption of better management practices.
- Enhancement of market potential for coconut products both in domestic and international markets.
- Management of pests and diseases.
- Setting up of three nos. of Bio-control laboratories for the control of leaf eating caterpillar.
- Action initiation for establishing Quality Control Lab for coconut and coconut products for the first time in the country at Bangalore and Kochi.

- Creation of infrastructure facilities for farm level primary processing of coconut by installing 1500 copra dryers with a capacity to process 50 million nuts per year.

4.5.7 Constraints

- (i) Difficulties faced by the State Governments in providing matching shares.
- (ii) Reluctance of financial institutions for extending loan facility for setting up coconut processing units.
- (iii) Violent fluctuations in the price of raw material viz. coconuts.
- (iv) Apprehension about influx of coconut products at a much lesser price from Sri Lanka and other major coconut growing countries.
- (v) Lack of price competitiveness of coconut products owing to high domestic price of raw material.
- (vi) Lack of access to superior packaging technology act as bottleneck for coconut processing industries in the country.
- (vii) Import substitute with cheaper products of similar nature for domestic use, greater competition for export and market share, inadequate market promotional activities, increased cost of production, improper labelling, non-uniformity of standards and improper packaging, not matching with consumers' choice in price and package, inadequate shipping and shipyard facilities for storage, high freight charges and other related problems and the like will continue to pose threats and challenges.

4.5.8 Analysis

It appears that significant departures have been made from the original concept of a Technology Mission in the case of Coconut. The Technology Missions in other commodities have envisaged an end- to- end approach, which includes development and introduction of high yielding varieties and technologies, expansion of area, marketing and processing. Here, the entire focus is on disease control and product diversification. These issues may be having merit of their own in the context of coconut but whether Technology Mission is the most desirable way of achieving it is debatable. The functions of Coconut Development Board and Technology Mission also seem to be common and overlapping. This further dilutes

the essence of the Mission and renders it indistinguishable from the several ongoing Departmental programmes.

4.5.9 Recommendations

4.5.9.1 Technology transfer, motivation and capacity building at farmer's level can be effectively done through Farmers Participatory Approach, Farmers Field Schools, forming coconut growers groups and exchange of ideas and technologies. Further, these farmers' groups can be linked to market information so that they know the prices for their produce. This linkage should be available to all the villages and people should be trained to access such information. This automatically motivates the farmers to produce more if the prices are better.

4.5.9.2 These groups of farmers with adequate training and seed money coupled with micro credit facilities can go for farm level processing of primary products which in turn provide raw material for large scale production of coconut products. For example if the farm level processing as a group is producing husk, shell, coconut water and coconut meat, the bulk of raw material for further use are available at one place, it is easy to collect and transport to the big processing units. This can be a linked programme, which could be pro coconut grower and ensure public-private partnership for making coconut industry competitive. This programme could enable the coconut farmers or their groups to be shareholders in the large-scale process.

4.5.9.3 Coconut, a versatile crop, which yields innumerable products right from root to the tip of the palms, is known as "tree of life". The prospects for coconut in the years to come are bright. Coconut can be processed as a food, drink, infant foods, pharmaceuticals, nutraceuticals etc.. As a green fuel, coco biodiesel, bio lubricants are also gaining momentum in various other countries. R&D will be required to identify and standardize the diversified products. Processing component will require lot of attention. Briefly, The Technology Mission would need to be redesigned with an end-to-end approach, if it is to be continued in view of its potential.

4.6 National Horticulture Mission

4.6.1 The National Horticulture Mission has been launched in the country during the current financial year (2005-06) for implementation with an outlay of Rs. 2300

crores for remaining period of Tenth Plan which will address the issues of production, post harvest management and marketing. With a budgetary outlay of Rs 13,300 crores (Rs. 11,000 cr. For Eleventh Plan) for the next seven years (remaining 2 years of the Tenth Plan and 5 years of the Eleventh Plan), the National Horticulture Mission (NHM) aims to double the national horticulture production to 300 million tonnes by the year 2011-2012. The focus area of the Mission is an under:

- Capacity building for production and supply of adequate quality planting material including setting up of scion banks of high yielding mother plants
- Increased coverage of crops under improved/high yielding cultivars.
- Enhanced production and productivity of horticulture crops.
- Strengthening of infrastructure facilities such as soil and leaf analysis laboratories , survey and surveillance of pest and diseases, green house, poly houses, micro irrigation, plant health clinics, vermin compost etc.
- Build adequate infrastructure for on farm and post harvest handling.
- Enhanced production of high value low volume horticulture products for exports.
- Strengthening infrastructure facilities for marketing and export.
- Enhanced production of high value processed products.
- Build a strong base to enhance efficiency in adoption of technologies.

4.6.2 Sanction for Rs. 314 crores for 12 States has been issued during current financial year (2005-06).

4.6.3 The Mid Term Appraisal of Tenth Five Year Plan for the Agriculture and Food Security sector has also commented on the National Horticulture Mission as under:

4.6.3.1 “Given climatic diversity, India has long run comparative advantage in horticulture. But despite appreciable production growth through area expansion, yields and produce quality remain unsatisfactory on international comparison. The National Horticulture Board and the Technology Mission for the North East run a number of schemes but major constraints remain, namely, senility of many existing orchards, non-availability of quality planting material, lack of strong extension machinery and inadequate marketing, cold-storage and processing infrastructure. The

Tenth Plan had proposed to double horticulture production by 2011-12 through a National Horticulture Mission (NHM) linking,, ICAR, DAC, Ministry of Food Processing Industries (MFPI) and the private sector. With area under horticulture already growing and responding to demand, no special effort (e.g. subsidy) is necessary to shift areas from existing crops. Rather the priority must be on technology to improve yield and quality and on post-harvest management, infrastructure and processing.”

4.6.3.2 It must, however, be said at this stage that even though Mid Term Review clearly speaks of priority on technology and in any case the Mission Mode is ideally suited for development and dissemination of technology in these times of knowledge based agriculture, the National Horticulture Mission somehow misses out the term “Technology” in its name. This gives the impression that unlike the Technology Mission on Oilseeds and Pulses and the Technology Mission on Cotton, the National Horticulture Mission is somewhat insipid on technology. This must not be allowed to happen.

4.6.4 Analysis

4.6.4.1 The National Horticulture Mission has taken off only recently and it would be premature to comment on its working. However, in a communication sent to the Planning Commission in January 2005, on the draft NHM, NCF had urged that the following facts and issues must be considered while firming up the design and implementation of the Mission;

- During the past 10 years, increase in horticulture production had occurred essentially through area expansion, whereas the overall productivity had remained low and even declined.
- The progress under the “Horticulture Revolution” has been skewed, both geographically and socially.
- The estimated post harvest losses in horticultural commodities continue to be at the level of 25% to 30%, valued at Rs. 20,000 crores to Rs. 80,000 crores, raising questions regarding the effectiveness of the huge investments made through the DAC, APEDA, NCDC, NAFED, MFPI etc. during the past 10 years or so for remedying this malady.

- Hardly 2% of the total horticultural produce is processed, and India’s share in the global market of horticultural products remains extremely low, about one percent.

4.6.4.2 A “business as usual approach” will not help to realize the goal of the Mission, especially the desired improvement in productivity and economic and ecological security. Our strategies and priorities would, therefore, need to be adjusted.

4.6.5 The key issues highlighted are as under

4.6.5.1 End-to-end Approach: The Mission should pay greater attention to “social engineering”, “inclusiveness” and “group dynamics”. In order to enhance the economies of scale for majority of small farmers, and to ensure end-to-end approach by integrating production – post harvest management – processing – marketing, Small Holders’ Horticulture Estates to institutionalise decentralized mass production by masses coupled with centralized services should receive high priority. Rural institutions such as PRIs, cooperatives, NABARAD and other banks (for credit flow), SHGs, KVKs and ATMAs must play a crucial role in production, processing, marketing, income generation, skill development and technology transfer and adoption. Appropriate mechanisms should be in place to ensure effective participation and contribution of these institutions. Highest priority should be given to the prevention of post harvest losses, processing, value addition, quality and marketing. From the very beginning, synergistic and holistic approach should be adopted to integrate production, quality, post-harvest management, processing, value addition, pricing, marketing, sustainability, profitability and equity. The worldwide concept of “Packing House” – a self-contained unit for cleaning, grading, sorting, packing, pre-cooling, storage, etc. of the fresh produce owned by the Small Farmers’ Horticulture Estate/Farmers’ Groups/Cooperatives should be adopted to link production with market. These “Houses” could also house agriclinics and soil and nutrient testing laboratories operated by Graduates (thus also promoting employment).

4.6.5.2 Capacity-building for Productivity Enhancement: Since our productivity is low and there are wide yield gaps, high attention should be paid to

increase per hectare yield and productivity through transfer and adoption of proven technologies. Farm schools should be established and supported to promote farmer-to-farmer learning. Demonstrations of high-density orchards, high-tech greenhouse horticulture as well as low-cost greenhouse horticulture should be supported for enhancing productivity and quality. There are serious research and technology gaps, not only in production and quality but also in PHM, processing and marketing. These gaps should be clearly identified for different settings and concerted effort should be made to address them in a Mission mode. A strong information and database system should support this venture.

Allocation of funds for establishment and renovation of tissue culture and leaf analysis laboratories must be based on analysis of the existing facilities and location specific needs. The past experience shows that adoption of drip/sprinkler irrigation/fertigation has generally been subsidy driven, without arrangements for certification and quality control which has brought bad name to this otherwise highly acclaimed and proven technology. Appropriate monitoring and certification of production and distribution of quality hardware components of micro irrigation should assume high priority.

4.6.5.3 Critical Linkage: The Food for Work and Employment Guarantee Programmes, should be used for area expansion of horticulture (e.g. in Maharashtra), particularly in degraded and wastelands under integrated watershed development programmes – a kind of asset creation. The funds thus saved should be redeployed for further strengthening of the “humanware”, i.e. skilled human resources who could move up in their employability and income and thus lessening the number in the Below Poverty Line category.

4.6.5.4 Providing Services and Seeds: Greater support should be given to the strengthening of services. Subsidy-driven horizontal expansion of horticultural area should be a lower priority. It is unrealistic to expect diversion of sizable cultivable area year after for new plantings/sowings of horticultural crops, as this will derail production of staple food grains and commercial crops, thus jeopardizing food security. A scientifically proven strategy would be required for adoption by each State on priority basis for rejuvenating old plantations and replanting senile and unproductive plantations.

Poor supply of quality planting materials is the key constraint and its redressal should receive the highest attention. Specialized women SHGs should be provided land in State Farms to produce seed and planting material of high value crops to obviate the constraint.

4.6.5.5 Accent on arid and semi-arid horticulture: Horticulture must play a pivotal role in enhancing and sustaining livelihood security in rainfed dry and semi-arid regions. In this context, rather than reinventing the wheel, the successful experience of horticultural revolution in Maharashtra, coupled with detailed analysis of national and international markets and trade, may be replicated in other parts of the country, with due adjustments based on location-specificity and avoiding the pitfalls encountered and other lessons learnt in Maharashtra.

4.6.5.6 Focused priorities: Given the multiplicity of horticultural species and the production, consumption and distribution settings, only a few high priority and wide-impacting programmes should be identified and implemented in each State through participatory approaches also involving private sector, NGOs farmers, rural institutions such as Panchayats, cooperatives and SHGs. Thrust should be on those areas and commodities, which already have a commercial base or have the potential to become commercial. Public-private partnership will be crucial for creation of cluster-based production, processing and marketing through Nucleus-Estate and contract farming systems. These aspects should be covered in the planning process itself.

4.6.5.7 Increase domestic consumption: In order to achieve the nutritional goal and also for price stability, domestic consumption of horticultural products should be increased. Social marketing, such as bulk vending of fruit juices in Mother Dairy depots and involving Home Science Graduates in establishing Health Food Markets, should be actively promoted.

4.6.5.8 A separate Mission on medicinal and aromatic plants: Considering the vast gaps and opportunities along the production-processing-marketing chain of fruits, vegetables and flowers, the National Horticulture Mission may concentrate only on selected species of these commodities, and even promote precision and protected horticulture. Recognizing the treasure of rich biodiversity, indigenous knowledge and

fast-expanding global market of botanicals, a separate National Mission on Medicinal Plants in association with the National Medicinal Plants Board will prove more effective. China, with no greater treasures on biodiversity than that of India, annually exports medicinal and aromatic plants valued at over US \$ 50 billion against India's export of less than US\$2 billion, let alone the vast potential of employment generation and realization of Farmers' Rights.

4.6.5.9 Mission management: The National Horticulture Mission is designed and planned to be implemented on the pattern of the on-going Technology Mission for the Integrated Development of Horticulture in the North eastern Region. The structure proposed in the Mission does not inspire confidence. The progress of the Mission in the North eastern Region has so far not been commensurate with the volume of investments. Therefore, it will not be prudent to follow the pattern of the NER Mission. There should be a stronger built-in mechanism for monitoring, evaluation and adjustments and a greater sense of accountability at all levels.

In order to achieve convergence and synergy, the Mission capacity to comprehend technical issues and the ability to coordinate and implement through sufficient experience in the field and in the States should be managed by a full time Director, who should be a professional with a proven record of achievements, particularly in the commercial aspect of horticulture. He/She should be on contract for 5 years in the post and should have both authority and accountability. The Director of the Mission should be the Member Secretary of the proposed National Horticulture Council and the National Executive Committee. Treating the Mission Director's post as a routine administrative posting will be a disaster.

4.6.5.10 State Governments: Horticulture being a State subject, the State Governments should agree to the Mission being operated on the model of a specific Mission, where all the links in the production, storage, processing, marketing and consumption chain function in an integrated manner.

4.6.5.11 National Horticulture Board (NHB): The National Horticulture Board was set up in 1984 on the recommendations of the 'Group on Perishable Agricultural Commodities' headed by Dr. M. S. Swaminathan. The Group had observed that different aspects of Horticulture Industry

were looked after by the various Departments/Organizations at the Central and State level. To coordinate the activities of these departments, and develop horticulture industry in an integrated manner with an end-to-end approach, it was felt necessary that a national organization should be set up. Under NHM NHB is setting up cold storages in selected clusters in the States. They also provide technical support for NHM schemes. The structure of National Horticulture Board (NHB) needs to be redesigned on the NDDB pattern.

4.7 Recommendations

4.7.1 Summing up, it is observed that there is a need for revival of the concept of Technology Mission and its potential for achieving productivity gains and higher incomes for farmers. NCF has also recommended the setting up of a Technology Mission on Sugarcane to bring the benefits similar to that reaped by oilseeds farmers in the early years of TMOP and for achieving end-to-end approach through infusion of technology and achievement of coordination amongst the stakeholders. However it is reiterated there is no use in having a faith in the concept of Technology Mission without bothering about its operational design. **Technology Mission should be one, which is technology rich, and which is characterised by well defined outcome indicators and monitoring tools.** It is also characterised by an end-to-end approach covering all subjects in the cultivation-consumption-commerce chain. Unfortunately, the Farm Technology Missions are tending to become subsidy rich and technology poor. Accountability has also been lacking and in the wake of inappropriate policy environment, the domestic production has stagnated and imports have increased. This has led to expansion in the distress of farmers particularly in the dry farming areas. The following ingredients therefore can be suggested as touchstone in the review of the existing Technology Mission and for the design of future Technology Missions:-

- (i) The target crop should have available technology with inadequate dissemination.
- (ii) It should have the potential for generation of technology, particularly new seed varieties capable of providing quantum jump in productivity and practices for adoption in the field.
- (iii) The Technology Mission created for the target crop should be a stand-alone entity with its own full time Mission Director who should have a fixed five

years tenure and who should be having substantial technical and administrative abilities not only to comprehend issues relating to technology but also to get them implemented in the field through coordination amongst departments and coordination with the States. Above all, he should be accountable for the success of the Mission. The Mission should have a Core Group of multi disciplinary posts which should be filled on contract for a period of five years from amongst participating departments / public / private sector/NGOs. Incumbents to posts must not be on routine deputation or should not be holding additional charge.

- (iv) The work of the Mission should be divided into MM for research, dissemination of technology, marketing, post-harvest technology and trade policies. The research components must not only cater to technologies for production of the crops but should also tap technologies for post-harvest technology. Department of Biotechnology and CSIR therefore could be successfully utilised for inputs in addition to ICAR.
- (v) In consonance with the observations in the Mid Term Review of the Tenth Plan (2002-07), it must be stressed that Research and Development of technology under a MM must focus on the need to enhance the income of the resource poor farmers. Further, the research must take into account the cost return factor. If the cost risk factors are low and returns are high, the technology would be easily adopted by the farmers even with minimal extension efforts. Further, agriculture research/technology should be gender sensitive by devising agriculture equipments, which are women friendly and which result in reduction of drudgery.
- (vi) Above all, with the experiences of TMOP where trade policies adversely affected the outcomes, a MM on Trade Strategy would be necessary since external environment is as important for production and income of farmers as dissemination of technology.
- (vii) The Mission should place greater stress on marketing efficiency and price signals in addition to infusion of technology and not so much on mere passage of subsidy, which have been the hallmark of normal departmental programmes.

- (viii) Decision-making at the Central level should be in the hands of an Empowered Committee headed by Secretary, Coordination in the Cabinet Secretariat. The Mission Director should be the Member Secretary of the Empowered Committee and should report the progress every quarter to the Prime Minister's Office and to Deputy-Chairman of the Planning Commission. Excessive reporting which may cut into the time available for work in the field / touring should be curtailed.
- (ix) The MMs could be headed by Additional Secretaries in the concerned Ministries since the Secretaries may not have the requisite time to devote.
- (x) Planning Commission should ensure active collaboration from the States through its powers to approve the Plan outlays of the States.
- (xi) Frequent inspection of the fields to check the adequacy and timeliness of the Mission inputs for the farmers should be ensured to supplement the efforts of the regular staff of the Mission. Small multi disciplinary teams consisting of retired officials, scientists, farmers, NGOs and representatives of the industry should be constituted to broad base the monitoring efforts.
- (xii) Concurrent evaluation for mid course correction would also be critical and should be done through independent institutions like AFC / NABARD / State Institutes of Administration / Industry Associations etc.
- (xiii) Internal financial / release procedures should be specially designed for the Mission. It should also be necessary to ensure that Central assistance is not blocked up in the States in view of their ways and means problems. This can be achieved if the funds in the Mission are made available to it and are routed through organisations like SFAC etc and channelised through similar State level societies directly to the field level implementing agencies. Mission activities would have a propensity to degenerate into normal programmes if these special instruments are not made available to it from the beginning.
- (xiv) Mission should have a term of ten years in order to ensure that they maintain their vitality as well as a time bound focus.
- (xv) Farmers should be associated at all levels in the decision making and monitoring activities of the Mission since they are central to the existence of the

Mission. The key indicators in the work of the Mission should include priority to the growth of income of farmers.

- (xvi) In the States, activities of the Mission should be reviewed in the State Planning Board, in order to ensure that the Technology Mission is not seen as a departmental programme of a single department but as a priority of the Government as a whole. The State Planning Board would be in the unique position to ensure participation of all the concerned departments through its control over their Plan proposal.
- (xvii) Another key ingredient for the success of Technology Mission would be **to make the watershed or the irrigation command area the point of convergence and integration of all relevant Technology Missions like those relevant to oilseeds, pulses, maize, cotton, horticulture, milk etc.** Convergence and synergy among the numerous technology missions now in progress will improve their utility and impact and also help to reduce overall transactions costs. All the Missions could be integrated under an umbrella set up which could be called **“National Federation of Farm Technology Missions”**. Pulses and Oilseeds are important nutrition and income providing crops in rainfed areas and farmers in dry farming areas would continue to suffer in poverty and deprivation unless the proposed National Federation of Farm Technology Mission extends to them the necessary help at the right time and place. Such a National Federation of Farm Technology Missions should be chaired by a practicing farmer who has a proven record of unleashing the power of creativity in small farmers management. Its major aim should be to enhance farming productivity and agrarian and rural prosperity. Recommendations in this regard have already been made in the First Report of the NCF Chapter 1 Para 9 (d).
- (xviii) It is important for on going and future Technology Missions to realize that it is not merely the increase in area production and productivity of target crops which should be the key objective. **It is far more important to focus on increase in the income level of farmers since it is the face behind the production statistics, which should never be forgotten.** There have been

examples where increase in production and productivity without adequate price support and insufficient demand has led to decline in the farmers' income from the crops. This is a very undesirable way of rewarding the farmers for their increased expenses for use of inputs whose cost have risen and his increased efforts in the field for achieving productivity. It is perhaps due to insufficient attention to the income of farmers that around 40 percent of the Indian farmers are willing to move out of Agriculture if they have an alternative. It has been noted in the Mid Term Review of Tenth Plan also that agriculture is becoming uneconomic as a profession and technologies are needed which can enhance the farmers' income, particularly for the resource poor farmers.

- (xix) Since technology is at the core of technology mission, it is necessary that Technology Missions, both ongoing and future ones, effectively use technology driven communication methodologies for speedier and more cost effective dissemination of know-how for the farmers to enable them to cope with demands of knowledge based agriculture. Technology Mission thus can benefit all the farmers through use of **Village Knowledge Centres** to be set up at the village level. The concept of Village Knowledge Centres has been extensively elaborated and recommended in Chapter VIII of the First Report of the NCF. President A.P.J. Abdul Kalam has also opined recently that Village Knowledge Centres would act as a front line delivery system
- (xx) Last but not the least, it should be realised that agriculture is an extremely important subject, allocated to the Panchayati Raj Institutions in the wake of the 73rd amendment of the Constitution. **The centrality of the Panchayati Raj Institutions must be built in while formulating the Technology Mission.** At the same time, it should be realised that this would be feasible only if and when the technical staff at the grass root level is placed at the disposal of the Panchayati Raj Institutions, which has unfortunately not happened uniformly in the country.

4.8 Technology Missions: Way Forward

4.8.1 To sum up, the Technology Mission is an efficient tool for programme design and implementation for achieving well defined production goals on a time bound and cost effective basis. The Mission mode method of programme design helps

to facilitate concurrent and adequate attention to all links in the production-processing-consumption-marketing chain. It has built in methods of continuous monitoring and evaluation, so that mid-course corrections can be introduced in operational strategies when needed. For its success, the following important ingredient identified by late Shri Rajiv Gandhi is fundamental – “We would like to put one person in charge of such a Mission with full funding and with no restriction on him whether bureaucratic or otherwise. **The only limits will be certain achievements, which must come within a certain timeframe.**”

4.8.2 NCF recommends that the existing organizational and managerial structures, in the case of the Technology Missions in Cotton and Horticulture be reviewed in the above context. During the early years of planned development in India, Jawaharlal Nehru said, “I do not want reasons for failure; I want to know how to succeed”. A Technology Mission has a national vision and need behind it. To achieve success, the Mission will need a dynamic Mission Director who is known to be an achiever. He/she should be in position for a minimum five-year period, so that there is adequate time to achieve results. **Authority, Accountability, and Achievement**, should be the basic management principles underpinning Technology Missions.

The Chapter is based on written material received from various sources, followed by individual discussions and a Consultation.

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EXECUTIVE SUMMARY

CHAPTER I – 2006-07: YEAR OF AGRICULTURAL RENEWAL

1. The inadequate progress in achieving the Tenth Plan targets in agriculture is well documented in the mid-term appraisal of Plan achievements by the Union Planning Commission. This has serious implications for not only food security, but also for rural livelihood security and for reducing hunger and poverty. In its first two reports submitted to the Union Minister for Agriculture and Food in December 2004 and August 2005, NCF has analysed the reasons responsible both for agricultural decline and farmers' distress leading occasionally to suicides. Several suggestions have already been made to reverse this decline.

2. During the last one year, the Government of India has taken several significant steps to take the country once again on the path of rural prosperity and farmers' wellbeing. These include the National Rural Employment Guarantee Act, Bharat Nirman, National Horticulture Mission and National Rural Health Mission. Several other important steps have been taken in the areas of credit and market reform. The time is therefore opportune for initiating during the Agricultural Year of 2006-07, an integrated programme for agricultural renewal. This programme designated **“2006-07: Year of Agricultural Renewal”** should consist of the following five mutually interactive and reinforcing action plans:

- a. Soil Health Enhancement: Government Departments, ICAR institutes, Agricultural and Rural Universities, Fertilizer Companies, NGOs, Farmers' Associations, Krishi Vigyan Kendras and Panchayati Raj institutions can undertake during the agricultural year 2006-07, a concerted soil health awareness and improvement programme. The programme should give concurrent attention to the physics, chemistry and microbiology of the soils. Both macro- and micro-nutrient deficiencies in the soil, as well as special problems like the occurrence of a hard pan in the subsoil and low soil organic matter content need attention. Every

farm family may be issued with a Soil Health Card to enable the family to monitor the biological productivity of their soils. Breeding soils for higher productivity may be initiated in the case of problem soils and waste lands. Community Land Care movement may be launched by Panchayats and training programmes may be organized for this purpose.

- b. Irrigation Water Supply Augmentation and Demand Management: In addition to the steps proposed under Bharat Nirman, rainwater harvesting and aquifer recharge should be made mandatory. The conjunctive use of river, rain, ground, sea and treated sewage water should become a national habit. The cultivation of low water requiring but high value crops should be promoted in areas where water is a constraint. Low cost green houses for the cultivation of vegetables and flowers and for seed production may be promoted under conditions where evaporation exceeds precipitation. Efficient irrigation techniques like micro- and drip irrigation should be widely popularized. Watershed management should be linked to appropriate Technology Missions, so that the benefits of water can be maximized. Seawater farming involving coastal forestry and aquaculture could be promoted along the coast and in Andaman and Nicobar and Lakshwadeep islands. Water conservation and sustainable and equitable use should become everybody's business. Water literacy and water quality management should receive attention from Panchayats.
- c. Credit and Insurance: Credit reform holds the key to ensure the economic survival of small and marginal farmer families. Keeping in view the decline in the profitability of agriculture, and the farmers' distress, the Government of India may consider providing support to the banking system for reducing the rate of interest for crop loans to 4 percent during the Year of Agricultural Renewal. Micro-finance should become livelihood finance by linking credit to essential support services so that credit becomes the pathway to sustainable livelihoods. An Agricultural Risk Fund should be established to provide farmers relief in the case of successive droughts or other natural calamities including disease outbreaks.

Kisan Credit Cards should be issued to woman farmers, even if the title to land is not in their names. Negotiable warehouse receipt is another urgent need. A Rural Insurance Development Fund and Credit Counseling Centres are needed. The Self Help Group movement can be strengthened by setting up at the Block or District level Self Help Group Capacity Building and Mentoring Centres. The Crop Insurance scheme needs to become farmer-friendly and the premium should be reduced. Crop insurance through SHGs can be promoted.

- d. **Technology:** Technology is the prime mover of change. Both technology fatigue and technology gap should be avoided. This will call for revitalization of research, education and extension systems. It is suggested that all ICAR institutions and Agricultural Universities may commemorate 2006–07 as the **Agricultural Technology Year**. The major aim of this year should be to strengthen participatory research and knowledge management with farming families and the organization of about 60,000 Lab to Land programmes in the area of post-harvest technology and value addition to primary products. Biomass utilization and the creation of skilled jobs in the non-farm sector should receive high priority. Management procedures should be developed such as the organization of Small Holders' Cotton and Horticulture Estates for the purpose of providing the power and economy of scale to small producers both at the production and post-harvest phases of farming. There should be income orientation to farming by promoting crop-livestock integrated production systems and improved post-harvest technology. New technologies like biotechnology and Information, Communication Technology (ICT) should be demystified and a cadre of Rural Farm Science Managers should be developed by training a couple of women and men members of every Panchayat/ local body in the management of new technologies, such as the establishment of refugia in Bt Cotton fields. ICT should be effectively harnessed to empower rural women and men through the Every Village a Knowledge Centre Movement.

- e. Market: Market reform should begin with production planning so that every link in the cultivation-consumption-commerce chain receives adequate and timely attention. Farmers need proactive advice on land and water use based on potential meteorological and marketing factors. A National Land Use Advisory Service linked to State and Block Level Land Use Advisory Services may be established for this purpose. These can be virtual organizations with the capacity to provide land use advice on a location and season specific basis. The National Land Use Advisory Service should have continuous contact with IMD, ISRO, Agricultural Universities and Departments, Commodity Exchanges and Futures Market, APEDA, Commodity Boards and all credible national and international sources of information on domestic and international markets. The Land Use Advisory Service should cover crop and animal husbandry, horticulture, inland fisheries, forestry and agro-forestry and have the capacity to proactively assess potential surpluses and shortages of essential commodities. Attention is also needed to farmer-friendly contract cultivation practices.
3. To sum up, the National Agricultural Renewal Year programme of 2006-07, should deal concurrently with soil health enhancement, augmentation of the area under irrigation coupled with efficiency and equity in water use, credit and insurance reform, technology upgradation and dissemination, and farmer-centred marketing. The aim of the Agricultural Renewal Programme will be enhanced productivity per units of arable land and irrigation water, higher profitability, increased on-farm and off-farm employment opportunities and long-term environmental sustainability. Distress hot spots should receive priority attention.
4. Establishment of an Indian Trade Organisation (ITO): **As a national self-empowerment measure, we should consider establishing an Indian Trade Organisation (ITO) and our own boxes for domestic agricultural support on the model of WTO's Blue, Green and Amber Boxes.** The value of our annual agricultural

production including livestock in 2002-03 was Rs. 5,60,516 crore¹. The value of our exports of farm commodities in 2002-03 was Rs. 34,654 crores (6.18 % of total agricultural production)². Thus only a small proportion of our agricultural commodities enter the global market, since with a population of over a billion, there is a large home market. **Hence, we must segregate the very modest support we extend to our farmers into two groups – those which are of the nature of life and livelihood saving support to small farm families, and those which could be considered as trade distorting in the global market.** The ITO can be a virtual organisation and should help to build a long term memory system in relation to home and external trade and help checkmate adverse global trade trends by stimulating timely action.

5. Launch of the Year of Agricultural Renewal Movement: This movement which will cover the crop year of 2006-07 should be launched on Baisaki day (13 April 2006) with the support of State Governments, Farmers' Organisations, Business and Industry, Academia, Civil Society Organisations, Panchayati Raj Institutions and Mass Media. The year should end with the adoption by Parliament of a **National Policy for Farmers**, which will help to assure farm women and men that "Jai Kisan" is not an empty slogan. NCF will provide to the Ministry of Agriculture a draft National Policy for Farmers in April 2006, so that it can be widely discussed with farmers' organisations during May-December 2006 and finally adopted before the 60th anniversary of our independence.

6. The active involvement of State Governments and Union Territories is essential for accomplishing the goals of the Year of Agricultural Renewal programme. It is suggested that the programme may be discussed at meetings of the Agriculture Coordination Committee chaired by the Prime Minister, and the NDC Committee on Agriculture chaired by the Union Minister for Agriculture and Food. The programme should be initiated after careful planning from the 2006 Khariff season onwards.

¹ National Accounts Statistics of India, 1950-51 – 2002-03, EPW Research Foundation, Mumbai, 2004

² Agricultural Statistics at a Glance 2004, Ministry of Agriculture, Govt. of India

7. Indian Farmers and Bharat Nirman: To ensure the success of this massive rural infrastructure development programme the following four steps will be needed:

- i) **Consultation and Consensus** - this is essential in the case of bringing 10 million hectares of additional land under irrigation.
- ii) **Capacity Building** - At least one woman and one male member of every one of the about 240,000 Panchayats/ local bodies should be trained to become Members of a Bharat Nirman Corps. The training of the Members of the Bharat Nirman Corps can be done by Agricultural, Rural and Women's Universities, IITs and by appropriate NGOs, Farmers' Organisations, NABARD and Financial Institutions and Business and Industry.
- iii) **Care and Management** - Gram Sabhas should be involved in providing oversight and advice in the area of maintaining and managing the costly infrastructure developed.
- iv) **Convergence and Synergy** - Steps should be taken to bring about convergence and synergy among other major social and human development programmes such as the National Rural Employment Guarantee Act, National Horticulture Mission and the National Rural Health Mission.

8. Knowledge Connectivity: Inclusion of knowledge connectivity as an integral component of Bharat Nirman, as recommended by NCF, is a welcome step. There is need for a forward looking policy with reference to community radio, since the community radio – internet/ cell phone combination can help us to travel the last mile in knowledge connectivity and reached the unreached. A far-sighted community radio policy which will be in keeping with the spirit of the Right to Information Act is the need of the hour.

EXECUTIVE SUMMARY

CHAPTER II

STRENGTHENING AGRICULTURAL RESEARCH: TOWARDS SCIENCE-LED EVERGREEN REVOLUTION

1. **Science and technology are the engines of agricultural growth and development.** Green Revolution, built through synergy of technology, policy, services and farmers, ushered in 1968, resulted in tripling of foodgrains production (80% through yield enhancement), which more than halved percentages of hungry and poor people, enhanced employment and farmers' income, and increased food self-sufficiency and national confidence. Today, however, India's agricultural growth rate has slipped below the population growth rate. This has serious implications for economic growth, food security, equity and rural welfare.

2. Stubbornly high incidence of hunger and poverty, technological fatigue, serious yield gaps, huge post-harvest losses, decreasing net trade intensity, low and stagnant farmers' income, declining holding size and widening rural-urban divides are matters of serious concerns. **There is consensus that the unfolding challenges of Indian agriculture can only be addressed through science and technology, and that a different R&D paradigm - a national innovation system integrating all facets of rural life and stakeholders would be necessary.**

3. Agricultural growth in recent years has thrown new sectors and regions into prominence. Livestock, fisheries, horticulture, specialty enterprises (spices, medicinal, aromatic, organic) and value-added products illustrate this trend. Market-driven diversification in a global perspective has become the new paradigm driving future agricultural growth. Rising capital intensity, particularly in the high-growth sectors of agriculture, has set in motion a new set of forces. Declining growth in public investments and eroding institutional infrastructure are other disturbing features of the current trend. World agriculture, particularly trade, places high premium on quality. Public health and food safety concerns are central themes of global regulatory negotiations. Indian

agriculture has to respond to these. Equally important are sustainability of natural resources (particularly water) and other environmental externalities including global warming and climate change.

4. Recent policy announcements have stressed the importance of investment in agricultural research as revealed by the following:

- The Common Minimum Programme of the UPA Government states, “The UPA Government.....will ensure that **public investment in agricultural research and extension, rural infrastructure and irrigation is stepped up in a significant manner at the very earliest.**” “**will follow policies and introduce programmes that strengthen India’s vast science and technology infrastructure.**”....
- **The Finance Minister in his Budget for 2005-06, announced an initial provision of Rs. 50 Crore for operationalising a National Fund for Strategic Agricultural Research arising from Swaminathan Task Group.**

Overview of Agricultural R&D Infrastructure in India

5. The National Agricultural Research System (NARS) comprises a network of Central (90), State (40) R&D organizations and coordinated research programmes (91). Agricultural R&D in the country owes its origin, growth, and sustainability to public support as **more than 85 percent of aggregate R&D funding comes from public exchequer. With more than 20,000 scientists and expenditure of Rs.31 billion, it is one of the largest systems in the world.** The ‘D’ component has been with the States, under the control of State departments of agriculture. Its isolation has not been successful and there has been a decline in the extension system across the board. Consequently, the centrally supported frontline extension system has grown covering frontline demonstrations and KVKs. The institutional edifice of the State R&E system continues to grow. The number of SAUs has grown from a mere handful in early seventies to 40 now. Unfortunately, funding levels have not kept pace with this and operational as well as scientific resources have degenerated.

6. **The rate of return on investment in agricultural research has averaged as high as 50 to 60 percent – one of the highest in the world.** Although there has been an increasing trend in R & D investment, it has flattened in recent years. Operational support, however, has not kept pace with overall trends. The problem has been serious in the State system whose share in the total R&E expenditure has consistently declined over the past four decades. The edifice is large in nominal terms. In relation to the size of the agricultural sector, however, investment intensity is low. **At 0.34 percent of agricultural GDP, research intensity is only half of the overall average for all developing countries (0.6 percent) and about one-sixth of the average for developed countries.** There is considerable inter-State variability in intensity of State funding (ranging from 0.08 in U.P. to 1.4 in H.P.). **With the exception of a few States, commitment to R&E is not strong and in some States the situation has deteriorated. Dependence of State R&E on the Centre has grown.**

7. For outreach programmes also, Central support has become more important. Priority accorded to agricultural R&D is revealed by the fact that this large network was built mainly from domestic resources. There has been a slowdown over the last decade or so and this is reflected in restraints on recruitment of scientists. This has been attributed to the overall policy thrust on downsizing public bureaucracy. Until the contours of a national policy on public R&D are redefined and clearly enunciated, managers of public finances will remain apathetic.

8. More than three-fourth of the scientific manpower resources are in States which account for half of the national R&E expenditure. With nearly uniform salary patterns, this reveals structural weaknesses - support per scientist is significantly lower in the State system (Rs. 0.84 Million against Rs. 1.72 Million). As attention shifts back to strengthening local R&D institutions, this dichotomy needs to be addressed. Matching human and other resources has not received adequate attention. **Two serious issues are decline in scientific manpower in the State system and stagnation in the Central system,** both of which have happened during the phase when the research agenda expanded and diversified. **This had consequences like loss of critical mass in research units and programmes resulting in decreasing scientific productivity and research**

impacts. Second, lower support per scientist in the State system does not auger well for the future, particularly since these scientists are expected to play a larger role in research outreach functions.

Major Challenges and Policy Directions

9. The challenge before us therefore is to build research and technology development capacities and partnerships which will contribute to and capture the impact of Gene Revolution and other scientific revolutions. **For this the Commission recommends a three pronged approach:**

- **Prioritise strategic research and technology development programmes**, including cutting-edge technologies, geared to meet the technological problems retarding and decelerating agriculture-led growth and development.
- **Realize that science and technologies must have a human face and cannot operate in a vacuum.** Therefore, it is absolutely necessary to formulate clear cut goals, policies, strategies and programmes and build partnerships for harnessing the (unlimited) power of science and synergizing technological and social resolutions.
- **The National Agricultural Research System, the Technology Assessment and Transfer System, the Knowledge System (skill development, re-tooling, indigenous knowledge), the Humanware aspects, Enabling Mechanism (IPR, SPS) and Services must be synergistically aligned, restructured and revitalized.**

10. Science and technology for crops, livestock, fish and forests, must address the following four interrelated areas in order to attain higher productivity and sustainability and thereby help alleviate hunger and poverty:

- Enhancing yield ceilings, bridging yield gaps, protecting yield gains, minimizing post-harvest losses, augmenting value addition and improving productivity and promoting **eco-technologies** rooted in the principles of ecology, economics, equity and employment;

- Exploiting the gene revolution (biotechnology), benefiting from information and communication technology revolution, space, nuclear and nanotechnologies and promoting **knowledge-based precision farming systems**, intensification, diversification and value additions;
- **Protecting and improving natural resources** (land, water and biodiversity), addressing environmental concerns, and managing climate change and natural disasters; and
- **Seeking congruence of productivity, profitability, sustainability and equity**, addressing gender issues and problems of the poor and the excluded, and managing liberalized trade in the globalized world by addressing issues related to global competitiveness in the context of the WTO AoA.

11. International quality and safety standards for agriculture products, including GMO related biosafety and biosecurity are very high. Meeting of their standards involves substantial costs for building technical and physical capability. There is a need for pooling talents and resources available in both public and private sectors to build this capacity. Finally **public research system should shoulder the responsibility to protect small farmers from ill-effects of trade reform process.**

12. With a view to bring special focus on women in agriculture, a **National Network of Women Scientists and Institutions** interested in engendering the development through S&T based interventions to develop an end-to-end approach, for the various agro-climatic zones, should be started. Such a national level action and policy research network should carry out longitudinal studies of women's roles in agriculture and rural livelihoods in the various agro-ecological regions of the country.

13. **Participatory research and knowledge management** is the key to promote relevance and effective adoption of technologies and new information by pursuing holistic and system-based approach for converging "global" knowledge to tackle local problems. The unique nature of agriculture makes agricultural R&D different from other sectors and makes extension vital. The context is different and other providers are emerging. A new ball game has been set up and our response has remained outdated.

Clear enunciation of the roles of the Centre, States, local bodies, Panchayati Raj Institutions, private sector, and NGOs in a client-centred R&D structure is a critical task. Critical scientific and resource mass and modern management must back the human resources and research – extension – farmer – market – consumer linkage.

Recommendations

14. In line with the Central Government's decision to establish a National Science Education and Research Foundation and allocation of Rs 1000 Crore for commencing two institutions to serve as flagship institutions of science to render India as a strong knowledge society, **the National Commission on Farmers recommends a provision of Rs. 1000 Crore as a one-time grant to NARS to bridge the critical gaps in scientific infrastructure in frontier areas of technologies, so as to enable the Nation to enhance its agricultural competitiveness and to benefit from science-led Second Green Revolution. This additional allocation will particularly strengthen work on conservation and improvement of livestock heritage of the Nation, genomics, bioinformatics, bioremediation and harnessing gene-richness of microorganisms, biomass utilization, value addition and use efficiency of plant nutrients and water. A National Board for Strategic Research in Agriculture may be set up to coordinate and harness advances in basic science for agricultural progress.** The ICAR should position itself to effectively utilise the available funds and additional funds allocated to the NARS.

15. The NARS covers the entire spectrum of crop, fishery, forestry, natural resources and agro processing and agri-business. However, there are gaps in several areas awaiting redressal or are not receiving focused attention. Some of such areas, as listed below, require more intensive and inter-disciplinary attention.

- Climate Change and its implications
- Harnessing space, ICT, nanotechnology and other frontier technologies for precision farming
- Organic recycling and value addition to biomass, biofuels and bioenergy
- Crop livestock-fish integrated production systems
- Pre-breeding and participatory breeding
- Scientific organic farming.

16. The Commission recommends setting up of new National Centres / Institutes in the above areas or mandate existing ones to address those areas specifically. Such institutions could be set up in existing ICAR institutes or SAUs or institutes of other relevant Ministries but should be functionally and financially autonomous with their own Governing Boards. In the Commission's view, the institutions should be built around outstanding scientists and research leaders of proven capability in these fields. Such committed research leaders should be first identified and involved in the project design process. The **National Challenge Programmes** (identified by the Task Group and other committees) should likewise be led by scientist-achievers.

17. The premier research institutes, such as IARI, IVRI, should be designated as **Institutions of National Importance**. The Commission recommends that such institutes should be given special funds and organizational and management supports to empower them to enrich the Indian agricultural knowledge system necessary for enhancing country's competitiveness at the global level on one hand and to serve the majority small and marginal farmers, often inhabiting vast rainfed drylands and other poorly endowed non-congenial agro-climatic regions, on the other hand. **A National Council for Global Leadership in Agricultural Science and Education should be set up under the chairmanship of the Minister for Agriculture to give guidance to these new initiatives and to position India as a leading player in international agricultural R&E system.**

18. **It is strongly recommended to increase the R&E intensity to 1.0 percent (from current level to 0.34 percent) of AgGDP. The existing serious imbalances in funds allocations to different agro-ecological regimes and commodities should be corrected by allocating larger proportions to eastern region to harness the high untapped agricultural growth potential, as also to rainfed arid and semiarid drylands and to livestock and fisheries subsectors.** The resources recently allocated to the National Horticulture Mission need to be aligned to priority areas for technology development for prevention of post-harvest losses, processing, value addition,

development of specialty varieties (*viz.* for processing) and production and distribution of quality planting materials.

19. **A package of reforms aimed at enhancing autonomy, improving decentralization and devolution of power, and improved financial management through built-in monitoring and evaluation is required.** Both ICAR and SAUs should commit themselves to such reforms. Support of high level policy makers at both the Central government and State government levels is needed to implement this far reaching reform agenda.

20. The following additional policy reforms by Central and State Governments are recommended:

- Balance expenditure per scientist in SAUs at par with ICAR.
- Maintain critical levels of scientific and resource mass in different ICAR Institutes and SAUs.
- Enhance share of operational expenses of scientists.
- Dedicate adequate public funds to promote basic and strategic research as well as to develop human capital.
- Promote **competitive funding** for networking, institutional reforms, addressing R&D challenges.
- Strengthen **project-based** funding with clearly defined outlay-outcome matrix on the lines of **The Log Frame Options**.
- Evolve **National Innovation System** aligning policy, incentives and regulations to foster innovation and entrepreneurship.
- Establish **Genius Awards** for young scientists to attract talented youth to agricultural research, technology development and education.
- Strengthen IPR regime for technology transfer, resource generation and evolving competitive market with due provision for social inclusion in access to new technologies.

21. **Codes of Conduct** should be introduced for public-private sector partnerships based on respect for each other's obligations, where IPR, breeders' rights and other forms of proprietary control over technologies and products of commercial significance, are important. The code of conduct should be developed through extensive consultation among all partners and can be used in the entire national scientific research system.

22. In order to promote investment in agricultural research by private sector, the following suggestions may be considered:

- **Provide tax concessions and tax holidays** to promote private sector's contribution to R&D from 14 percent to 33 percent.
- **Strengthen regulatory mechanisms**, especially IPR, SPS and quarantine facilities, to promote technology acquisition.
- Encourage testing of private sector's new varieties and other technological products by public sector regional and national testing programmes.
- **Undertake joint research activities** with clearly defined responsibility and accountability of and profit sharing by various partners.

23. SAUs are generally starved of operating funds and now largely depend on ICAR. The shortage of funding in the SAUs has had adverse effects on human resources development, research infrastructure, and linkages with farmers. There is an urgent need to sensitize policy makers at the State level to the payoffs to investing in research. At the same time, **the Central Government might develop a funding formula that supports the weaker States, but provides incentives to stronger States to increase their funding** (e.g., matching grants). A key role of Central research is to generate spillovers to enhance efficiency in State research programmes.

24. In order to enhance effective technology transfer and to bridge the yield and other performance gaps at various levels, the Commission recommends the following:

- Convert the Krishi Vigyan Kendras into **Krishi and Udyog Vigyan Kendras** in order to give concurrent attention to on-farm and off-farm livelihood and to

promote end-to-end approach and to link production with marketing and consumption.

- Establish 50,000 **Farm Schools** in the fields of farmers-achievers to spread proven technologies through farmer-to-farmer learning.
- Integrate the activities of KVKs, ATMAs (Agricultural Technology Management Associations), Lab-to Land and Land-to Lab programmes, Self Help Groups, agricultural cooperatives and other grassroot institutions.
- Establish **National Participatory Research, Demonstration and Training Centres** to integrate available scientific institutions, extension programmes and grass-root institutions related with agricultural development including the proposed initiatives, namely, Farm Schools, Soil Health Cards, Kisan Credit Cards, Agriclincs and Agribusiness centres.
- Establish a **National Council of Innovative Farmers** to provide a structured opportunity for sustained scientist-farmer dialogue.
- Establish National and local level **Science and Technology Alliances (Consortia)** for rural livelihood security.
- **Increase the involvement of small holders in public-private partnership in high-value agriculture** by integrating the small-holders with the high-value agricultural and supply chain and making necessary provisions for remedying market failures and **structuring the SFEs on the NDDB model.**

25. The recommendations of the **Swaminathan Task Group on Revamping and Refocusing of National Agricultural Research** to meet current challenges and those of the **Mashelkar Committee on Reorganization of ICAR** should be examined and the accepted ones should be implemented without further delay.

Executive Summary

CHAPTER III - TOWARDS AN INDIAN SINGLE MARKET

1. Trade is an important sector of the economy. The share of internal trade in the Indian economy in 2001-02 [advance estimates] stood at around 13.4% of the GDP. It employed about 36 million people, a majority of whom were self-employed, engaged in retail and wholesale trade. It is the most important sector in the tertiary/service sector. However, internal trade faces many problems due to the diversity of controls exercised by multiple authorities at different levels, restrictions of inter-State and inter-district movement of goods, lack of uniformity in standards laid down by different authorities and agencies and in taxes. As a result, the price strategies get affected by differential tax rates and become localised. **All this has led to breaking up the vast India Market into a large number of smaller regional markets. The paperwork involved in complying with the various controls, regulations and licenses, the costs involved in terms of time and resources and the inevitable corruption and malpractices that this leads to, have served as a big drag on the efficiency of trading operations in the country.**

2. The Hon'ble Prime Minister of India, Dr. Manmohan Singh has recently observed as under:³

“The time has come for us to consider the entire country as a common or single market for agricultural products. We have to systematically remove internal controls and restrictions.”

3. With a view to benefit from the international experiences, the FAO at the request of the National Commission on Farmers, through the Government of India, Ministry of Agriculture, studied the European Union Market integration experience and looked into the legislative, political and economic measures taken during the process. The European experience is documented in the study mainly to understand the political processes and the economic measures that led to the adoption of a common and eventually a single market in that region. The Report has since been received.

³ Agriculture Summit, 2005

4. The barriers to internal trade in India could be grouped under the following broad heads:

[a] Restrictions imposed by the Essential Commodities Act [ECA], 1955/Prevention of Food Adulteration Act, 1954, etc.

[b] Fiscal issues

[c] Transport related

[d] Agriculture trade related

Essential Commodities Act, 1955 and other Acts/Orders

5. Using the powers under ECA, 1955, the various Ministries/Departments and the State Governments/UTs have issued a large number of control orders covering items such as paddy/rice, edible oils etc. The ECA, 1955, and the Control Orders were relevant and issued in situation of demand exceeding the supply. The demand-supply balance and the economic environment have changed in recent years but the restrictions and controls are continuing and coming in the way of efficient functioning of the marketing system and also the agricultural development in the country.

Suggestions

6. The number of essential commodities has been reduced from a high of seventy in 1989 to only fifteen. It would be useful if the remaining agricultural products are also removed from the list of essential commodities. Alternatively, the ECA, 1955, may be put under suspended animation for the present and revived by Government notification if any emergency situation develops, for a limited time, for a specific commodity and in a specified area. After watching for a few years and being satisfied that under the changed environment it is possible to tackle even emergency situations with market operations, it may be possible to scrap the Act all together. Further, to ensure that the States do not issue fresh control orders, the Central Government may consider the feasibility of making Central legislation to ban imposition of any restriction in the movement, stocking etc. of agricultural commodities. In any case, the powers of the Government to restrict the movement of goods out of their territory are incompatible with the principle of a single market.

7. The proposed *Food Safety and Standards Bill [2005]* would repeal the outdated Prevention of Food Adulteration Act, 1954 and the concerned control orders issued by various departments, and create a streamlined framework. The Food Regulatory

Authority of India [FRAI] envisaged under the proposed Bill, would be the supreme authority for standard setting and enforcement in food sector against the present situation where a number of Ministries are involved in matters concerning food and food processing.

Fiscal Issues

8. Fiscal reforms are important in facilitating the growth of efficient trade. There exist various forms of charges/taxes on the traded commodities in India. There are considerable variations in the market charges and taxation rates across the States. The complex tax structure and multiplicity of State-level taxes distort the process of trade. Inter-State and Centre-State harmonization of tax law and administrative procedures could facilitate the simplification of the tax system. Further the multi-point tax system in India has cascading effect on prices.

Suggestions

9. Efforts have for be made to introduce the Value Added Tax (VAT) in all the States. The State VAT may, in due course be replaced by National VAT, once there is an agreement between the Centre and the States regarding sharing of the tax. The octroi or any other local tax introduced by any State needs to be abolished. If however, for revenue reasons the octroi etc. cannot be abolished in all cases, at least the primary agriculture produce should be exempted from their coverage.

10. Another approach could be the abolition of all indirect taxes on agricultural products as a policy that would not only resolve the problem of border taxes but would also be socially more equitable. A possible measure for compensating the States for loss of revenue could be to increase the devolution of funds from the Centre to the States most affected by incomes foregone. Another suggestion particularly relevant for compensating the loss of revenue could be the increase in VAT rate on processed and semi-processed products by say 0.5% or raising the tax say on petrol, by 0.5% to generate additional incomes to compensate loss of revenue by abolition of octroi, Central Sales Tax etc.

11. An important step could be to change the administration of taxes so that no border checks etc. are needed. Most of the physical barriers on primary agricultural

commodities at the State borders are on account of collection of sales/purchase tax or APMC cess or Octroi.

Transport related

12. Commercial vehicles moving across the borders face a multiplicity of checks from different authorities relating to road tax, license fee, payment of excise/VAT, Essential Commodities Act, forest conservation, pollution control, etc. Further the transport vehicles are required to obtain 'fitness certificate' and pay road tax on an annual basis. For movement beyond the State, the transport vehicle owner has to apply for 'National Permit' covering at least four States and is required to pay the road tax and permit fee for all the States concerned. The rate of road tax in different States is different. Further, the appropriate authority at the checkpoints reserves the right to stop and detain the vehicles, which significantly adds to the cost of transportation. The interruption of the trucks/transport vehicle could be on various grounds and it is quite possible for a particular vehicle to face detentions on each of them, increasing the transaction cost substantially and hurting internal trade especially in perishable products.

Suggestions

13. To simplify the arrangements, it is suggested that a uniform amount may be charged for the National Permit and the permit holder may be allowed to ply the vehicle anywhere in the country. Similarly, the system of annual fitness certification and road charges may be replaced by a lifetime charge assuming around ten-years life for a transport vehicle. For plying the vehicle beyond the above limit, the vehicle may be subjected to an annual fitness certification and payment of fee etc. Further, the centralization by truck operators is common which effectively bars entry of new players in the transport sector. This aspect leads to be studies and appropriate measures be derived to remedy the situation.

Agriculture Trade Related

14. The wholesaling of agricultural produce is governed by the Agricultural Produce Marketing Acts of various State governments. Once a commodity is notified, the APMC Act makes its transaction mandatory in the regulated market. APMCs have generally

failed to provide adequate infrastructure at the *mandis*. Further, the focus of the APMCs has been on regulation and not development of markets for the local products, introducing grading and encouraging local processing etc. The APMCs have also not played any significant role in bringing better market information to the farmers. It is felt that direct marketing could enable the farmers to sell their produce to the processors or bulk buyers at lower transaction costs and maybe at better prices than what they get from intermediaries or from the wholesale markets in the regulated markets.

Suggestions

15. In order to improve the transparency in the operation of the APMCs, it may be made obligatory for them to publish the daily arrivals, maximum and minimum prices and the balance of stock available. Availability of this information on the internet for all APMCs on a day-to-day basis could be the first step to develop an all India market. The monopoly of the APMCs has meant that the private sector including cooperatives have not been able to contribute towards developing and building up marketing infrastructure in the country and the farmers have been denied choice. The Ministry of Agriculture, Government of India have already formulated a Model Act on Agricultural Marketing incorporating the necessary reforms and circulated it among the States for suitable amendments in their respective APMC, Acts. However, **the Model Act would require a relook if all barriers to internal trade were to be removed.** There is also a need is to promote alternative and mega markets especially near the big cities and metropolitan towns outside the purview of the APMC Act.

Supporting Measures

16. A host of supporting measures would be needed to ensure that the benefits of the Indian Common Market reach the farmers and the consumers and are not appropriated largely by the traders/truckers etc. Some of the supporting measures needed are:

- ❑ Standardization and harmonization of the quality standards
- ❑ Policy support in creation of farmer communities/groups etc.
- ❑ Need for development of suitable agriculture credit policy framework for increase in investment credit, financing to farmers' groups/communities and new agri-business opportunities.

- ❑ The development of instrument based secondary market of negotiable warehouse receipt system.
- ❑ Attending to food security related concerns- increased employment opportunities, improved PDS and establishment of Grain Banks in areas with difficulty in access.
- ❑ An orderly functioning commodity forward market with orientation towards improving farmers' access.
- ❑ Improved market information
- ❑ Development of infrastructure and connectivity.

Conclusion

17. In FAO terminology, India is nearly a 'Common Market' as there are no customs duties and presently no absolute quantitative restrictions in movement of goods from one State to another. However, several steps are required to make it a Single Market. The need is to build over the developments already made like the introduction of Value Added Tax (VAT) by many States, introduction of the Food Safety and Standards Bill and the Warehouse Receipt Bill in Parliament, circulation of a draft Model APMC Act to facilitate amendment of the APMC Act by the States and reduction in the number of commodities covered under the Essential Commodities Act 1955. The need now is to expedite introduction of State VAT in the remaining States, introduce uniformity in taxes on commodities, withdrawal of octroi and other local taxes, replace annual payment of road tax and renewal of fitness certificate by a life-time (atleast ten year) payment/system and introducing a National Permit for plying commercial vehicles anywhere in the country. The tax administrations also have to change so that the border check posts are not used for collection/verification of payment of taxes. The above changes would need building a consensus and constant persuasion in our federal system. The matters relating to revenue sharing/compensation for loss of revenues to the State Governments, etc. may be referred to the Finance Commission for suggesting methods by which Indian Single Market may become a win-win situation for all.

EXECUTIVE SUMMARY

CHAPTER IV – TECHNOLOGY MISSIONS: WAY FORWARD

1. Technology Mission was conceptualized by late Shri Rajiv Gandhi, former Prime Minister of India in 1986 and designed and pursued by Shri Sam Pitroda. Five Technology Missions, including Technology Mission on Oilseeds, were launched. The key element of the Technology Mission approach involved effective transmission of available technology even while encouraging research on newer technologies, an end-to-end approach to meet all the requirements of the farmers in an integrated way, an effective coordination amongst stakeholder departments / organizations and the State Governments.

2. The Missions were, therefore, designed to be technology rich, paying due attention to its transfer for increasing the productivity of the crops grown by the farmers and also focusing on post harvest and processing issues. They were expected to be driven by dynamic and knowledgeable Mission Directors supported by full funding and dedicated staff. The Mission had to deliver identified objectives within a certain time frame and they were to cut across several Ministries with their own coordination hassles. Above all, there had to be an appropriate policy environment to protect the income of farmers.

Technology Mission on Oilseeds & Pulses (TMOP)

3. Since oilseeds were identified with a yield gap and since India had the advantage of a diversity of soils, climate, research and development infrastructure, oilseeds were chosen as a fit case for being targeted through a Technology Mission. Rising demand for edible oil, and insufficient use of technology for optimum oil extraction and rising import bills for edible oil were some other reasons for the need to enhance oilseed productivity through a Mission. Pulses were added as a target crop to the TMO in 1990 and a Technology Mission on Maize was also ordered in 1996 consequent to the early success of the TMO.

4. The Mission was set up with a full-time Mission Director and was operated through four Mini Missions dealing with crop technology and research, farmer support system, price support processing, storage and marketing and post harvest and processing technology. Seventeen different agencies were involved in various activities of the Mission and a bottom up participatory approach was followed along with a scheme of incentive prices for various oilseed crops to encourage the farmers.

5. This cooperative, coordinated approach with a sense of ownership and commitment by all partners was a major reason for the initial success of the TMO. The target was to raise oilseed production from 12.4 million tonnes to 26.0 million tonnes and vegetable oil production from 3.6 to 8.0 million tonnes by 2000 AD.

6. The initial results were heartening in that by 1998-99, the production rose to 24.75 million tonnes and the yield rose from 570 to 944 kgs. per hectare. The solvent extraction technologies, the conversion of hullers to shellers and rice bran extraction technologies also developed well, and led to substantial reduction in edible oil import bill by 1992-93.

7. The decline, however, set in with the decline in political direction from the Centre and in the States for the Mission consequent to the demise of Shri Rajiv Gandhi and departure of Shri Sam Pitroda. Simultaneously, the clamour of urban consumers for cheap edible oil, declining international prices, policies of liberalization leading to placement of edible oil under Open General License and reduction in bound rate for crude and refined soybean down to 45%, led to a severe adverse effect on the efforts of the oilseed farmers towards self-sufficiency. Briefly, therefore, the trade policy worked counter to the stated goals of the Technology Mission leading to the Mission being wound up with the beginning of the Tenth Plan. It was recognized at the highest level that the Technology Mission with its existing structure could not deal with major issues relating to procurement price and trade policies and, therefore, had obviously outlived its utility. The Government, however, reaffirmed its commitment to oilseeds, pulses and maize as important crops for small and marginal farmers in resource-poor conditions by launching a comprehensive and Integrated Scheme for Oilseeds, Pulses, Oilpalm and Maize (ISOPOM) with increased outlays and greater flexibility and involvement of the

private sector. Summing up, the Technology Mission displayed its capabilities in the early years when it was treated as a special-purpose vehicle with close monitoring and suffered its demise only because of reduced political and administrative direction and adverse trade policies. Therefore, a Mini Mission on Trade Strategy would be necessary since external environment is as important for production and income of farmers as dissemination of technology.

Technology Mission on Cotton (TMC)

8. Cotton is an extremely important commercial crop, providing livelihood to 60 million people depending on its cultivation, processing and textile trade and also provides raw materials for 1500 mills, 4 million handlooms and 7 million powerlooms. In view of lower yields and poor lint quality of cotton, TMC was launched in February, 2000 in 13 States. It was operated through four Mini Missions focusing on research, enhancement of production and productivity, development of market infrastructure and modernization of ginning/pressing factories. The Tenth Plan outlay is Rs. 568 crores consisting of Rs. 20 crores, Rs. 355 crores, Rs. 108 crores and Rs. 85 crores, respectively, for the four Mini Missions (MM). TMC has succeeded in producing 232 lakh bales during 2005 against the target of 215 lakh bales by 2007. However, merely good yields cannot prove the efficacy of MM-I and II since good prices, higher productivity through Bt. Hybrids and increased involvement of cotton mills in private sector for technology transfer have been equally responsible. MM-II should have resulted in quantum jump of supply of seeds of open pollinated varieties and adoption of INM/IRM/IPM technologies beyond project areas, which has not happened.

9. It is further noted that the four MMs have often operated in seclusion without observable linkages and integrations. Some States have also not contributed their share of the budget. TMC does not have an independent full-time Mission Director and there is no additional staff in support. TMC is, therefore, reduced to a routine departmental programme. Consequently, the periodicity and quality of inspections has suffered. The close monitoring of the early years of TMO is missing and there appears to be excessive reporting, leaving lesser time for field visits. No special procedures have been devised for release of funds to the States, leading to delays in the passage of funds to the field and this has worked adversely for time-bound field operations for cotton. In general, while

MM-I and II leave room for improvements, MM-III and IV have performed fairly well due to multi-stakeholder involvement and creation of a Cell in the Cotton Corporation of India (CCI) exclusively for MM-III and IV under a professional. In particular, MM-IV has benefited through operation of a single window system, demand for cleaner cotton through premiums and preference given by CCI to modernize units for processing its stocks. It is, however, felt that production and productivity of cotton can go up further, if the consumption of cotton in the mills rises. While the Technology Upgradation Fund of the Ministry of Textiles has benefited the mills, a lot can still be done beyond the stage of ginning. The real challenge lies in enhancing the quality awareness amongst farmers and ensuring transparent and scientific marketing as well as modernization at all stages of ginning, pressing, spinning, weaving etc. TMC can help through frequent interactions amongst farmers, NGOs, scientists and mills. **It would be useful to set up National Cotton Council with participation from all major stakeholders under the chairmanship of Union Agriculture Minister.**

Technology Mission for Integrated Development of Horticulture in North Eastern States, J&K, Himachal Pradesh and Uttaranchal (TMHNER)

10. TMHNER comprising four Mini Missions was set up with an objective to achieve Convergence and Synergy among numerous ongoing governmental programmes, timely and concurrent attention to all links in the production, and maximizing economic, ecological and social benefits and to promote product diversification and skilled employment.

11. A total of Rs. 453.36 crores were allocated for the Mission since inception in 2001 with more than 90% accounted for area expansion and creation of market infrastructure. So far the Mission has achieved limited success in area expansion, setting up of marketing infrastructure and a few processing units.

12. A review of the Mission activities shows a large gap between original concept and actual implementation in the field. Each MM is working independent of the other under the control of their respective administrative agencies. Linkages among the four MMs are weak both at the planning and implementation stages. The Five ICAR Institutes / Centres involved in implementing the R&D programmes of Mini Mission I in the region have

failed to provide assistance in need based research. The States in turn had not consulted the ICAR for the varieties/hybrids recommended for area expansion under MM-II suggesting weak linkage between MM-I and MM-II.

13. Allocations under MM-II for expansion of area under horticulture should have been made with an agro-ecological/comparative advantage approach. Besides the Mission should have disbursed subsidies with greater attention to choice of varieties, quality and sufficiency of planting material, field monitoring etc. Assistance for costly and highly technical units like tissue culture labs should have been provided after careful need assessment. Under MM-III, Infrastructure for Post Harvest Management (PHM) including marketing and processing need greater attention.

14. So far, only 9 units have been set up under MM-IV out of which two are upgradation ventures. Besides raw material shortages, the food processing sector faces a host of problems like poor infrastructure, credit, institutional factors like land tenure and inhospitable terrain etc retarding its development. This may lead to a serious mismatch between MM-II and MM-IV.

15. While the Technology Mission may not be flawed in conception, greater attention is needed for coordination and backward and forward linkages amongst participating departments and various stakeholders in the public and private sector at the Central, State and lower levels to achieve Mission objectives.

16. Several remedial measures have been suggested to bring the Mission activities on track which include: creation of adequate mother plant resources, specialization based on agro climatic zones, training and demonstration for beneficiaries, provisions of coupons for input purchase instead of cash subsidy and greater attention to marketing including border trade.

Technology Mission on Coconut

17. Technology Mission on Coconut was established in 2002 as a part of the Coconut Development Board's ongoing programmes with diversification of coconut derived products, value addition and remedy for severe pests and debilitating diseases as its focus, thereby helping the marginal farmers to optimize their income from coconut. It appears that significant departures have been made from the original concept of a Technology

Mission in the case of Coconut. The Technology Missions in other commodities have envisaged an end-to-end approach, including development and introduction of high yielding varieties and technologies, expansion of area, marketing and processing. Here, however, the entire focus is on disease control and product diversification. These issues may be having merit of their own in the context of coconut but use of Mission vehicle to achieve these objectives is debatable. Technology transfer, motivation and capacity building at farmers' level through a participatory approach involving farmers' field school, coconut growers group etc. and linkages to market information would be necessary. Micro-credit with promotion of farm level processing leading to large scale processing through public-private partnership can lead to a more competitive coconut industry and more profitable share holding of farmers' groups.

National Horticulture Mission

18. National Horticulture Mission (2005) addresses the issues of production, post harvest management and marketing. With area under horticulture already growing and responding to demand, focus should have been on infusion of technology to improve yield and quality and on post-harvest management, infrastructure and processing. It is observed that the National Horticulture Mission somehow misses out the term "Technology" in its name. Adequate attention should be paid to address low productivity, tremendous post harvest losses and insignificant presence in the world horticulture markets. A business as usual approach will not help. Instead, highest priority should be given to the prevention of post harvest losses, processing, value addition, quality and marketing. From the very beginning, synergistic and holistic approach should be adopted to integrate production, quality, post-harvest management, processing, value addition, pricing, marketing, sustainability, profitability and equity. All these could be done with the help of small farmers horticultural estates, packing houses, stress on capacity building and adequate provision of seed and services.

19. The Food for Work and Employment Guarantee Scheme should be used for expansion of area under horticulture. In order to achieve nutritional goals and also for price stability, domestic consumption of horticulture products should be increased. There should be a full time Mission Director. A separate Mission on Medicinal and Aromatic

Plants should be set up. National Horticulture Board (NHB) should run on the lines of National Dairy Development Board (NDDB).

Recommendations

Considering the original concept of the Technology Missions and the experience gained in formulating and operating the various Missions, the following recommendations are made:

20. Technology Missions should avoid becoming subsidy rich and technology poor. They should be characterized by well defined outcome indicators and monitoring tools. There should be a defined and end-to-end approach covering all subjects in the cultivation-consumption-commerce chain. Mission should be a stand alone autonomous entity with its own full time dynamic Mission Director who should be an achiever and accountable and have a supporting core group of multi-disciplinary posts, which should also be filled up on contract for five years not only from departments but from public/private sector/NGOs. Support staff must not have additional responsibilities in departments. Recognizing the role of Biotechnology, efforts of ICAR should be supplemented with those from other science departments like Department of Biotechnology and CSIR. Research should bear the cost return factor in mind in order to encourage easy adoption with minimal extension efforts and enhance the incomes of resource poor farmers. Research should also be gender sensitive and promote reduction of drudgery for women in Agriculture. Trade policies should not work at cross-purpose with Mission objectives, even though international trade environment and requirements of foreign policies may become pressing in the contemporary context. A Mini Mission on Trade Strategy should be added to every Technology Mission in view of its importance for incomes of farmers. There should be greater focus on marketing efficiency and price signals in attention to infusion of technologies. Excessive reporting should be avoided. Frequent inspection by small multi-disciplinary team of retired officials, scientists, NGOs, farmers etc should be encouraged. Concurrent evaluation for mid course correction would be critical and the agencies should be more broad based and independent. Specialized financial release procedure should be revised to ensure timely release of funds to States and above all release to field agencies. Farmers should be associated with all levels at decision making and monitoring. Watershed or irrigation

command area should be the point of convergence and integration of all relevant Technology Missions. All Missions should be integrated under an umbrella to be called **National Federation of Farm Technology Missions** to be chaired by a practicing farmer. Focus of the Technology Missions should not only be an enhancement in productivity but an increase in income levels of farmers. Village Knowledge Centres should work as front line delivery system for speedier and cost effective dissemination of technology. Centrality of Panchayati Raj Institutions must be built in while formulating the Technology Missions.

21. To sum up, the Technology Mission is an efficient tool for programme design and implementation for achieving well defined production goals on a time bound and cost effective basis. For its success, the following important ingredient identified by late Shri Rajiv Gandhi is fundamental – “We would like to put one person in charge of such a Mission with full funding and with no restriction on him whether bureaucratic or otherwise. The only limits will be certain achievements, which must come within a certain timeframe”. NCF recommends that the existing organizational and managerial structures, in the case of the Technology Missions in Cotton and Horticulture be reviewed in the above context. **Authority, Accountability, and Achievement**, should be the basic management principles underpinning Technology Missions.

Annexure - 1

Field visit of the team of NCF under Prof. M.S. Swaminathan, to Patiala, Sangrur, Mansa and Bhatinda Districts in Punjab during 16-18 October 2005.

A brief summary of observations and suggestions is as under:

1. Professor M S Swaminathan (Chairman), Shri Y C Nanda (Member), Shri Atul Sinha (Member Secretary) and Ms. R V Bhavani (Officer on Special Duty) visited a number of farmers' fields in cotton, rice and other crops in several districts of the Punjab and held discussions with farmers. We also visited the Sunam Grain Market and the Cotton Mandi at Mansa. In addition, visits were made to seed production plots, fish ponds, a soybean processing plant, Young Farmers' Association, crop diversification fields (tomato, capsicum, Jatropha etc.), breeding plots of Kohinoor Seed Fields India Pvt Ltd., and Preet Agro-industries Pvt Ltd at Nabha and saw some new agricultural implements. In addition to discussion with farmers and officials at every place, discussions were held with District Commissioners at Bathinda and Sangrur.
2. We had the privilege of being accompanied throughout by Dr. G S Kalkat, Chairman, Punjab State Farmers' Commission, Er. B S Sidhu, Director of Agriculture, Mr. S S Randhawa, General Manager, Punjab Mandi Board, Dr. Dhawan of PAU, several senior officers of the Government connected with marketing and input supply and scientists of the Punjab Agricultural University. Based on a wide range of discussions held with the principal stakeholders, the following observations and suggestions are made for appropriate follow-up action by the Central and State Governments.

A. Technology

1. There is need for extensive trials by PAU of the best available hybrids of Bt cotton and rice. The most suitable hybrids together with appropriate agronomic practices will have to be recommended for each agro-ecological zone. Bt cotton

- hybrids should be introduced alongwith an Integrated Pest Management (IPM) system, so that the resistance does not breakdown within a few years.
2. Cotton varieties with the Bt gene and *arboreum* hybrids need to be developed.
 3. There should be research backup for the crop diversification programme. **Diversification will succeed only if there are backward linkages with research and forward linkages with market.** Also, since soybean cultivation is likely to expand, a soybean processing plant should be established.
 4. Research on the breeding of potato varieties with red skin for export and trials with pigeon pea (*arhar*) hybrids need to be taken up
 5. In order to take advantage of the potential for fish production, including fresh and brackish water prawns, there is need for research on fish seed and feed production. There is scope for introducing the culture and marketing of air-breathing and ornamental fishes. This will be particularly helpful to landless labour families.
 6. In order to improve income and work security for farm families, farming systems research should be promoted (crop-livestock-fish-agro-forestry)
 7. There is need for better quality control of seeds and pesticides. Credible certification procedures will have to be introduced.

B. Conservation and enhancement of the ecological foundations essential for sustainable agriculture

8. Farmers should be issued with **Soil Health Cards** containing information on the chemistry (macro and micro nutrients), physics and microbiology of the soil. Such Soil Health Cards should be updated annually.
9. Guidelines for the sustainable use of ground water should e developed on a priority basis. In several places, the static component of the aquifer is being exploited. **Water harvesting and recharge of the aquifer should be made mandatory.** Farmers repeatedly emphasized the need for steps to recharge the aquifer. Water quality should also be monitored, particularly for pesticide residues.

10. **The State Land Use Board** should be revitalized and restructured. It should be managed professionally and should have the technical capacity to extend **proactive advice** to farmers based on meteorological and marketing factors. Matching cropping pattern with irrigation water requirements will have to be done by the Land Use Board. This is an area where collaboration with the US under the Prime Minister's Indo-US agricultural science collaboration programme will be very useful. Our farmers urgently need advice on Land Use, based on considerations of both ecology and economics.
11. **Energy Security:** With the rising cost of diesel, farmers need electricity. They need **reliable electric power supply**, more than free power. The Bio-diesel programme involving *Jatropha* cultivation needs considerable scientific underpinning and good quality planting material.

C. Economics

12. The cost-risk—return structure of farming is becoming adverse to farmers. Farmers are getting increasingly indebted and frustrated. Under these conditions, the younger generation may not take to farming. Urgent steps are needed to convert despair into hope on the farm front.
13. Input prices are going up (particularly diesel prices), while output prices are not keeping up with the rise in cost of production. **The Minimum Support Price (MSP) should not only be continued, but should be linked with the Wholesale Price Index**, as is done in the case of the salaries and allowances of government employees.
14. Interest Rates for farm loans should be brought down to the level of consumables like automobiles. **In China, the interest rate for loans to farmers is zero.**
15. **A Centre-State Contributory Price Stabilizations Fund** should be established, to insulate farmers from a significant fall in prices, either due to domestic factors or due to global trade factors (WTO regulations)
16. The quantum of NABARD loans should have flexibility in relation to the technologies adopted, such as Bt cotton and hybrid rice. The Policy relating to a uniform scale of finance needs review.

17. A special awareness programme should be started to impart **insurance literacy among farmers**, with reference to available crop, animal, weather, health and other insurance programmes relevant to farm families.
18. **A National Calamities Fund** should be established to insulate farmers from severe losses due to natural calamities.
19. Agricultural progress should be measured by **the annual rate of growth in farmers' income**, and not just by figures relating to production and productivity. For example, in China, the growth in the income of farmers during 2004-05 was 6%. In India, it will be on the whole negative, as indicated by the increasing debt burden faced by farm families.

D. Market Reform

20. The State has already amended the APMC Act, thereby facilitating the growth of pro-farmer markets. The transition from existing trade channels like *Arthias* should be brought about with care, so as to ensure that the new systems of farmers-purchaser linkages are both beneficial and sustainable. **Opportunities for assured and remunerative marketing hold the key for Punjab's agricultural future.**
21. Development of state of the art market infrastructure should become a part of the **Bharat Nirman** programme. Since the well-being of over 60% of India's population depends upon income security from farm enterprises (crop and animal husbandry, fisheries, forestry and agro-forestry and agro-processing)
22. Market modernization should include facilities for electronic weighing, grading and assessment of the quality parameters used for price fixation. Classification of cotton, rice, wheat and other crops for determining prices should be done on transparent and well-defined criteria, so that farmers do not get the feeling of discrimination in the market. Good facilities are now being developed under the Cotton Technology Mission Project. Similar facilities should be set up for fruits, vegetables and flowers under the National Horticulture Mission.
23. In the case of cotton, ICAR may be requested to set up a **Regional Centre of the Cotton Technology Research Laboratory, Mumbai, to serve the needs of**

- Punjab, Haryana and the Ganganagar district of Rajasthan.** The State Government may provide land and other facilities for the establishment of such a Centre at Bathinda – The Regional Cotton Technology Centre should have DNA finger printing facilities so that disputes relating to spurious Bt cottonseeds can be settled scientifically. At the moment, farmers have no way of knowing whether they are being cheated in relation to Bt seeds.
24. There is need for establishing a **Market Knowledge Centre**, at each of the major markets and mandis, with facilities for Internet connection and for operating a community radio station. This will help to spread market and trade literacy and also to link with Futures Markets. Such Centres can be established with support from NABARD under the RIDF (the Union Finance Minister has provided Rs.100 crores in the Union Budget for 2005-06 for establishing Village Knowledge Centres)
 25. FCI should develop a system of traceability of the material sold, so that farmers are not cheated by the rice millers.
 26. The infrastructure at Mandis and Markets should include facilities for farmers like canteen, drinking water, rest house etc.
 27. To augment farmers' income, there is need for multiple sources of income. Dairy and poultry farming can provide additional avenues of nutrition and income, particularly for women. There is need for greater R&D efforts in the areas of green fodder and feed production. Fodder and Feed Banks can be established to assist landless labour families, a large proportion of whom are *Dalits*, to take to stall-fed animal husbandry and backyard poultry farming. Market tie-up will be essential to ensure fair return and avoid risks. Micro-finance should be supported with appropriate backup services, so that it becomes **Livelihood Finance**.
 28. There is need for a **well-defined Code of Conduct for Contract Farming**, so that producers and purchasers experience a win-win situation.
 29. **Farmer to Farmer Learning** – NCF has recommended the establishment of **Farm Schools** in the fields of farmer-achievers. This will be appropriate particularly in the areas of horticulture and new technologies like Biotechnology

and Information Technology. The State Farmers' Commission can identify the fields of farmers where Farm Schools can be located.

30. Punjab agriculture is at the crossroads – economically and ecologically. There is need for once again introducing a symphony approach involving mutually reinforcing package of technology services and public policies in input and output pricing and investment in infrastructure. Punjab was the leader in the Green Revolution achievement. **It should now become the flagship of the Evergreen Revolution movement.**

Annexure - 2

Field visit of the team of NCF under Prof. M.S. Swaminathan to the Vidarbha Region of Maharashtra during 19-21 October 2005.

A brief summary of Observations and suggestions is as under:

1. Prof. M S Swaminathan, Chairman, NCF, Shri. Y C Nanda, Member, Shri. Atul Sinha, Member-Secretary and Ms. R V Bhavani, (OSD), visited farmers' fields as well as the homes of four farmers who had committed suicide, on 19th – 20th October and held discussions with farmers, officials, entrepreneurs, scientists and media personnel. We also visited two APMCs and discussed marketing problems in cotton and soybean. We had the benefit of listening to the widows and children of farmers who took the extreme step of taking their lives.
2. We were accompanied throughout by Hon. Rana Jagjit Singh Padam Sinh Patil, Minister of State for Agriculture and Employment, Dr. S K Goel, Commissioner (Agriculture), Shri. Vijay Jawandhiya, Farm Leader and Shri. P Sainath, a leading media analyst of farmers' distress.
3. We had the great privilege of visiting the Maharogi Sewa Samiti, Anandwan, Warora, and calling on Pujya Baba Amte. We were shown the remarkable transformation which has taken place in the lives of leprosy victims. The message of hope represented by Anandwan is the need of the hour. Dr. Vikas Amte showed us around Anandwan, where the concept "wealth from waste" has become a reality.
4. We are deeply indebted to the Hon. Chief Minister of Maharashtra Shri Vilasrao Deshmukh, Hon. Rana Jagjit Singh Padam Sinh Patil, Minister of State for Agriculture and Employment, Dr. S K Goel and the many government officers, and farm families of Vidarbha, for their extraordinary kindness and efforts to make every minute of our visit an educational experience of immense value to our work.
5. We were deeply moved by the courage shown by the widows and children of the following four families we were privileged to visit, to express our condolence and solidarity with them in their hour of sorrow.

- Late Shri. Prabhakar Shamrao Khatale, Asthi Village, Wardha District

- Late Shri. Ratilal Bapurao Rathod, Bandar Village, Yavatmal District
- Late Shri Maruti Mahadev Rasse, Pisgaon Village, Yavatmal District
- Late Shri Vilas Ramlu Ranganeniwar, Chalbardi Village, Wardha District

5.1 It was clear from these visits that there is an urgent need for action on both eliminating the circumstances under which farmers are forced to take such an extreme step of ending their lives, and initiating steps to provide livelihood security to the widows and educational opportunities for the young children.

5.2 Based on our visits and discussions, we would like to offer a few suggestions, for the consideration of the State and Central Governments. It will be an understatement if we say that there is a serious crisis developing in the health of our agriculture, which is the backbone of our food, livelihood and environmental security systems. For every problem, there is also an affordable and implementable solution. We should identify both short-term and long-term remedies both in public policy and technology development and dissemination. Water, credit, farmer-friendly services and technologies, and opportunities for assured and remunerative marketing are the basic needs of farm families.

6. **Agrarian Crisis – Maladies and Remedies**

6.1 The maladies affecting the farmers of Vidarbha and the potential remedies have been articulated clearly by both the State Government and the media. Print and electronic media have played a particularly valuable role in highlighting the quantitative and qualitative dimensions of the agrarian crisis. The most important among them relate to meteorological and marketing factors and the private and public credit and input supply systems. Some of these are following:

- Damage caused by unseasonal rain, to soybean, cotton and *Jowar*.
- High cost of inputs and unremunerative output prices; diesel and transport costs are rising continuously. The economics of farming as measured by its cost-risk-return structure is adverse to farmers.
- Farmers are facing high income insecurity. MSP for cotton is low and the payment is in installments and also highly irregular.
- Irrigation facilities are very limited. Water table is going down due to the unsustainable exploitation of the aquifer.

- Spurious inputs including seeds of Bt cotton are adding to the distress of farmers. There is no proper certification agency and often moneylenders are also merchants both for the sale of inputs and the purchase of the output. There is exploitation at every step in the Cultivation-Commerce chain.
- The famous Nagpur oranges are affected by *Phytophthora* and other diseases. There is no effective extension advice.
- Credit is the major problem. Interest rates are high. Those who are unable to repay loans to commercial banks due to crop failure are left with no option except to go to money lenders, who may charge 120% interest.
- There is no farmer-friendly insurance scheme. The insurance premium for agriculture is 16%, while it is 1% for non-agricultural enterprises.
- Wild animals are causing much damage in some areas.
- The economics of Bt cotton is adverse. *Aphids*, *jassids* and sucking insects cause much harm to the Bt cotton crop. Bt cotton cultivation can be taken up mainly by well to do farmers with irrigation facilities. Also several companies are selling Bt seeds and there is no clear advice to farmers on what to grow.
- Prompt payment in markets is rare. Payment in installments forces farmers to go to moneylenders for their immediate financial needs.
- Factor productivity is going down, since soil health maintenance is poor, particularly with reference to micronutrients.
- Modernization of market yard with reliable facilities for electronic weighing, grading, pricing etc. is an urgent need. Also, such market yards should provide facilities to farmers for lodging and boarding, since they come from long distances and generally have to stay for a couple of days.
- Availability of electricity is erratic. Diesel prices are constantly going up.
- Yield has gone up but income has come down due to adverse input-output price ratio.
- Animal husbandry is expensive due to high cost of fodder and feed. Fodder and Feed Banks have not been set up.
- Organic agriculture is spreading particularly among cotton farmers. Research support in the areas of soil health enhancement and plant protection is weak.

Also, there is no proper National Certification Agency and arrangements for getting premium prices in the home market.

- Cotton Corporation of India emulates the examples of traders, rather than serving as a friend of farmers. It needs to be made a farmer-centric organization.
- Farmers are not organized. Hence, they lack a collective voice in the shaping of Government policies in areas like pricing and marketing.
- The present crisis should serve as a **walk-up-call**. Delay in helping farm families to achieve income and work security will spell disaster to peace and national well being.
- Farmers need urgent help for saving them from usurious credit and unfair trade. **The trading and Diwali seasons are around the corner.** There is no time to relax on the action front.

7. **Remedies**

The following measures are urgently needed:

- Set up a Center-State **Contributory Price Stabilization Fund**.
- The Minimum Support Price (MSP) should not only be continued, but should be linked with the Wholesale Price Index, as is done in the case of salaries and allowances of government employees.
- **Restructure and retool and State Land Use Board** for giving proactive advice to farmers on land and water planning based on meteorological and marketing forecasts.
- Develop and introduce a **farmer-friendly** Insurance Policy, taking into consideration the suggestions of the Maharashtra Government.
- Introduce a pro-farmer **Code of Conduct** for Contract Farming.
- Without a huge infusion of credit, there is no hope. It should be remembered that much of what is called an increase in credit doesn't even restore it to status quo ante, i.e. to what it was before the crisis began. Interest rates for farm loans should be brought down to the level of consumables like automobiles. In China, the interest rate for loans to farmers is zero.

- The number of rural branches of banks has declined in both absolute numbers and percentage terms since 1991. Rural credit has to be the top priority alongwith renewed and increased investment in agriculture.
- The Cotton Federation should revert to paying cash and should pay the amount, at one time not in installments. It should leave the issue of the bank dues to the banks and pay the advance bonus in this crisis year. Farmers must have the assurance that the Federation will buy their output at a fair and decent price.
- The Government needs to – (i) revise the import duty on cotton upwards, and (ii) check the dumping, so as to prevent distress sales.
- The Government is taking up the issue of price distorting subsidies by nations like the USA and EU that are harmful to Indian cotton. The MSP should thus reflect what the international price would be if these price-distorting subsidies were not there, like what is done in the case of sugar.
- A far better monitoring mechanism for Bt cotton needs to be set up than that which presently exists, using the technologies developed at CICR. A proper regulatory framework is a must to ensure that farmers do not suffer on this count. The legal framework has to be developed that makes quality control more rigorous.
- Vidarbha needs a huge investment and effort on the irrigation front. It is also important that the projects be of a manageable size and sustainable in nature. Water harvesting should be made mandatory.
- The State must articulate that it will never allow a system of water control that is harmful to farmers. A study needs to be made of the rainfall patterns to see if any long-term shifts are occurring. Since the headquarters of the Meteorology Department for the whole region is located in Nagpur, they could undertake this at once.
- Some control has to be exercised over racketeering and trading in distress. The Government must intervene far more strongly in this sector.
- Development of state of the art market infrastructure should become a part of the **Bharat Nirman** programme.
- The State has to help create a viable insurance programme for the farmers.

- Some ethical code is a must in the rendering of advice to farm communities. It also needs to be studied how existing technologies can be upgraded, apart from ensuring that new ones of an appropriate nature are introduced. No hybrid of a private company must be allowed in the market without a trial period of 3-5 years on the plots of Agricultural Universities. Only on strict verification of performance can these be allowed into the market.

8. **Immediate Action**

- Health indebtedness is increasing. The Government of India's Rural Health Mission should operate immediately in the Farmers' Suicide Hotspots.
- Agricultural progress should be measured by the rate of growth in farmers' income.
- The Ministry of Agriculture, Government of India should be redesignated as **Ministry of Agriculture and Farmers' Welfare**.
- An Employment/Livelihood Impact Analysis should be made with reference to both capital-intensive technologies and agriculture imports.
- The following livelihood security package should be introduced for the wives and children of farmers who have taken their lives:
 - i) A source of steady income to widows, through viable on-farm / non-farm enterprises.
 - ii) An education programme upto 12th standard for young children, which covers expenses relating to clothing, nutrition and education.
- The **Every Village a Knowledge Centre Programme** should be introduced in distress hotspots.
- A study should be made on "**What can we learn from Anandwan?**" in terms of integrating humanism in the treatment of HIV/AIDS, Tuberculosis etc.
- The criteria now used for deterring eligibility for government support to the widows of farmers who have committed suicide are the following:
 - a) Should have been a farmer
 - b) Should have taken loan from a financial institution
 - c) Received Notice of compulsory recovery
 - d) Instance of Crop failure

8.1 This set of criteria need review, particularly from the point of view of the support being restricted to loans from financial institutions only. Non-institutional credit for moneylenders is the major problem and it will not be proper to ignore this reality.

Annexure - 3

Salient Points with Policy Implications Emerging from the Consultation with Farmers on Draft National Biotechnology Policy, organised by the National Commission on Farmers on 22.09.2005.

Biotechnologies can offer new hope for increased productivity, sustainability and profitability, if the research priorities are right. Tissue culture in banana and Bt cotton hybrid are the most widely adopted agricultural biotechnologies in India. Area under Bt cotton is expanding, having doubled from the last year acreage to over one million ha (under legally released Bt cotton hybrids) during 2005. Some participating farmers, cultivating Bt cotton for the last three years, reported additional net profit of at least about Rs.12,000 per ha, and about 40 to 50 per cent savings in the pesticide use and in the numbers of sprayings, while others reported failure due to drought and multiple pest epidemics. Moreover, the Bt hybrids were early maturing, thus enabling double cropping in otherwise single-cropped areas.

2. Awareness about biotechnology, especially transgenics/GMOs, varied from as low as 2% to as high as 80% in different cotton growing areas. However, genetic literacy was generally low as most of the Bt cotton farmers grew no **refugia** and did not provide recommended isolation distances needed for preventing cross-pollination between Bt and non-Bt strains so as to reduce the chances for the breakdown of resistance to bollworm in Bt cotton varieties. A general misgiving prevails, maybe partly due to aggressive advertisement by seed companies, that the Bt cottons need no pesticide application, forgetting that the Bt provides protection (often not 100 percent) only against bollworms. For controlling other pests, which at times assume serious proportions, such as aphids and white fly, pesticides will need to be applied as per recommendations. In fact, **IPM in Bt cotton fields is essential for durability of the resistance of the varieties.**

3. Although none of the Bt cotton farmers reported of any health, food or environmentally negative effects associated with Bt cotton, some of the farmers' leaders questioned the efficacy of Bt technology and expressed deep concern about possible risks, whereas several of them emphasised the need a cautious approach while exploiting

the technology and asked for a **science-based pre- and post-release testing and monitoring system**. Given the biodiversity richness of the country, the Consultation particularly emphasised that biotechnology should in no case be allowed to reduce naturally occurring biodiversity, instead it should be used to enrich and conserve indigenous biodiversity.

4. Inadequate testing under the major cotton growing agro-climatic conditions is a serious problem. Atleast three years testing should be done by ICAR to gather information on genotype x environment interaction as well as on isolation distances under a special All India Coordinated GM Crop Testing Project as recommended by the Swaminathan Committee. Special **National Demonstrations and Lab-to-Land programme** should be organised for such varieties.

5. **Awareness on biotechnology and genetic literacy should be enhanced**. While the private sector is active in popularising its products, the public sector is not doing enough to disseminate integrated information on various aspects of biotechnology. This gap should be bridged and the public sector should give high priority to increase the awareness of all stakeholders - farmers, private sector, extension agents, consumers, civil society and NGOs so that only science-based true information reaches all concerned, confusions are avoided and informed and well-considered decisions are taken at various levels. **All biotech products, especially those derived from GMOs, should be labelled. The precautionary principle should guide our policy**. Village Knowledge Centres, along with other information and communication channels, can play an important role in this regard.

6. “Illegal” Bt cotton is occupying almost as much area as occupied by “legal” Bt cotton varieties. With no quality assurance, no after-sale support and no answerability, this malady is bound to hurt all parties. **Farmers must be educated of the consequences and must shun the temptation of quick profit and should buy only certified seed. Clear guidelines for risk assessment and transparent and unbiased testing procedures and approval of GMOs are *sine qua non* for rational development and utilization of the technology. Unofficial release of transgenics must be prevented.**

7. The public sector, especially the ICAR and SAUs, have so far not been able to give any hardcore (based on r-DNA) crop biotech product in the hands of farmers. The system should respond to this serious gap and streamline and prioritise its biotechnology research and product development to serve the farmers as well as consumers. Due to a sort of monopoly, the hybrid Bt cotton varieties seed are priced highly, and are generally economically out of reach of resource poor farmers. **The public sector must come up with competitive Bt cotton hybrids so as to lower the seed cost and benefit resource poor farmers. Further, non-hybrid Bt cotton varieties should be developed** not only to further reduce seed prices, but also to enable the farmer to retain his own seed and to share it with other farmers. The Farmers' Rights provisions of the Protection of Plant Varieties and Farmers' Rights Act (2001) should be enforced without further delay.

8. The farmers identified the following areas for priority application of biotechnology: (i) tolerance to drought and other abiotic stresses, (ii) tolerance to saline conditions, (iii) nutritional enrichment, (iv) diagnostic kits, (v) resistance to diseases and pests, (vi) development of efficient bioagents - biofertilizers and biopesticides, (vii) **in vitro** culture for micropropagation and (viii) germplasm conservation and enhancement.

9. The extension system and Central-State linkages have generally been indifferent to biotechnology-led agricultural development. Extension personnel, particularly in those areas where commercialisation of biotech products, especially transgenics, is being promoted, should be adequately trained. **In Krishi Vigyan Kendras, a section on training in biotechnology should be introduced** to ensure safe and effective transfer of the technologies/products.

10. In congruence with CBD, Gene Treaty, National Plant Variety Act, Farmers' Rights, the proposed Seed Bill and the Food Safety Bill, the Biotechnology Policy must seek harmonization of the concerned standards and guidelines, especially of sanitary and phytosanitary measures and codex alimentarius provisions. **Farmer friendly IPR provisions and trade and legal literacy should be promoted. Syngenta's efforts to patent the rice genome and other such moves should be resisted.**

11. Since GM seeds are costly and the risk taking capacity of the majority small farmers is low, **insurance should be introduced alongwith GM seed sale, as recommended by the Swaminathan Committee.** Further, in order to curb production

and distribution of spurious seed, if the crop fails due to poor quality and genetic infidelity of the seed, **the company must compensate the losses incurred by the farmer.**

12. The Consultation strongly endorsed the establishment of an autonomous **National Biotechnology Regulatory Authority as recommended by the M.S. Swaminathan Committee on Agricultural Biotechnology.** The Authority, steered by an Advisory Committee comprising scientists, representatives of public and private sectors, industry, CSOs, NGOs and farmers, should combine both advisory and regulatory responsibilities and coordinate and harmonise the various development aspects, including IPR, SPS and bioethical and biosafety norms.

13. Farmers in industrialized countries are supported by capital, technology and subsidy. In contrast, Indian farmers, a majority of whom cultivate 1 or 2 hectares or less are handicapped by a very unfavourable cost-risk-return structure in farming. Interest rates are high, drought is frequent and markets are not pro-small farmers. Hence, farmers can take to new technologies like biotechnology only if they are supported by appropriate packages of services and public policies. In a globalised world, we have to enhance our agricultural competitiveness through productivity and quality revolutions. Biotechnology can help, but only if it is pro-poor, pro-women and pro-environment.

Annexure- 4

November 25, 2005

Dear,

Sub: Mission 2007 : Every Village a Knowledge Centre

You are aware that in his budget speech delivered on 28th February, 2005 the Finance Minister announced the decision of the Government of India to accept a recommendation made by the National Commission on Farmers last year that we should achieve knowledge connectivity throughout rural India by August 15, 2007, which marks the 60th anniversary of India's 'tryst with destiny'. During this year, several important steps have been taken to take the benefits of the Information and Knowledge age to rural families. Some of these are:

- Establishment of 100,000 ICT based Community Service Centres (CSC) by August 15, 2007, by the Department of Information Technology, Government of India. Leveraging SWAN (State Wide Area Network) infrastructure, CSCs will provide reliable broadband connectivity to remote villages.
- Decision of the Ministry of Panchayati Raj to establish internet connected ICT centres in all the 240,000 Panchayats/local bodies in the country by 15th August 2007. This will help to provide a public space for VKCs, characterized by access to all sections of the rural society.
- The Rural Information Society Initiative (RISI) of Bharat Sanchar Nigam Ltd (BSNL) which will aim to set up 100,000 VKCs each covering a population of 2000 or more.
- Support by NABARD through the Rural Infrastructure Development Fund to State Governments to organize ICT – Self Help Groups to establish and manage VKCs
- Promotion of e-governance as a key component of the National Common Minimum Programme and the proposal to include Knowledge Connectivity as an essential component of the **Bharat Nirman Programme**.
- Setting up of Public Tele Information Centres (PTICs) through the Universal Service Obligation Fund.

- Setting up Village Resource Centres (VRCs) at the Block level by the Indian Space Research Organisation (ISRO) in collaboration with appropriate public and civil society institutions to provide a wide range of services including tele-conferencing facilities
 - Inclusion of e-health facilities under the National Rural Health Mission by the Ministry of Health and Family Welfare.
2. There are many other initiatives by both Central (eg. DST, CAPART, etc.) and State Governments. In addition both private industry and academic and civil society organizations are actively involved in bridging the urban-rural digital divide and in assisting rural families to have access to the information they need in relation to health, livelihood, food, water and income security. An International Support Group has also been formed to harness global support for Mission 2007.
3. I enclose two publications which will provide an idea of the current status of Mission 2007 ; Every Village a Knowledge Centre. It is obvious that if we can achieve convergence and synergy among the numerous on-going as well as emerging programmes, the goal of achieving a Rural Knowledge Revolution by 15th August 2007, can become a reality. While the green revolution helped us to improve the productivity and production of rice, wheat and other crops, the knowledge revolution will help to enhance human productivity and entrepreneurship in every sphere of human activity.
4. An urgent need is training and capacity building in ICT. The Jamsetji Tata National Virtual Academy for Rural Prosperity will be happy to assist in the area of capacity building. The training has to be in the local language. To promote the spread of local language computing in the country, software tools were recently released in Tamil and Hindi in Chennai and Delhi.
5. I am glad to inform you that at the World Summit on Information Society (WSIS) held at Tunis recently, Mission 2007 was highlighted as an outstanding example of the power of partnership in achieving the goal of “Connect the World by 2015”. The whole world is looking up to us in spreading the digital revolution on the principles of social inclusion, gender equity, reaching the unreached and voicing the voiceless. The provisions of the Right to Information Act (2005) can be implemented effectively if the ‘Every Village a Knowledge Centre’ movement gains momentum.

6. The Tunis World Summit on Information Society demonstrated the enormous progress made in technology development since the WSIS held at Geneva in 2003. The world is thus witnessing two opposite trends. The explosive progress in science and technology is providing uncommon opportunities for health, food, water, work, energy and literacy for all. On the other hand, a considerable proportion of humankind living under conditions of poverty, hunger and deprivation feels a sense of social exclusion and injustice. Consequently, there is a growing violence in the human heart. While WSIS was in progress in the midst of a feeling of a brave new world of technological breakthroughs, the main news in the media every day was the loss of innocent lives caused by bomb explosions in different parts of the world. The extensive co-existence of unsustainable life styles and unacceptable poverty is not conducive to either harmony with nature or with each other. This is why the success of “Mission 2007 : Every Village a Knowledge Centre” is so important for human security and well-being in our country. We should ensure that Government initiatives like CSCs of DIT, RISI of BSNL, etc. are pro-poor, pro-women and pro-livelihood in both their design and implementation.

7. I **shall be grateful if you would kindly set up a small group of concerned Ministers and officials under your Chairmanship to monitor progress** in achieving the goal of taking the benefits of the digital revolution to every village in your State by 15th August, 2007.

With warm regards,

Yours sincerely,

-Sd-

(M.S. Swaminathan)

Addressed to All Chief Ministers

Annexure – 5

Press Release of the National Advisory Council

29th October, 2005

The Eighteenth Meeting of the National Advisory Council (NAC) was chaired by Smt. Sonia Gandhi in New Delhi today and was attended by ten Members of the Council.

2. The National Commission of Farmers made a Presentation on the First and Second Reports of the Commission, in the backdrop of the problems arising in the Farm Sector leading to sub-optimal growth rate in Agriculture and distress amongst farmers. The NAC expressed deep appreciation of the work done by the Commission to formulate a comprehensive blueprint for the development of Indian Agriculture. Amongst other subjects, the following were discussed:-

- i) There needs to be a paradigm shift from micro finance to livelihood finance and technology empowerment as well as market reforms in order to promote the concept of livelihood security in areas characterized by farmers' distress,
- ii) An integrated "Parivar Bima Policy" may be introduced for the rural poor for providing hospitalization expenses, life cover for death/disability and cover for the dwelling units. This could be linked to Self-Help Groups (SHGs) and largely funded by Members' contributions,
- iii) A Gram Panchayat Mahila Fund could be set up with earmarked outlays for group activities and common amenities for women for on-farm and other gender specific needs. Legal land titles and allotment of surplus lands, including State Farm lands, to women SHGs should be ensured for the empowerment of farm women,
- iv) Mission 2007 involving the establishment of Village knowledge Centres may be considered for early implementation to promote Knowledge Empowerment and Capacity Building in the areas of agriculture and animal husbandry, fisheries, forestry, agro-processing, marketing and genetic literacy. Steps may be initiated to establish cotton

estates, horticulture estates, organic agriculture estates and aquaculture estates for small holders,

v) The Essential Commodities Act and other legal instruments relating to marketing, storage and processing of agricultural produce need to be reviewed in order to meet the requirements of modern agriculture. The Land Use Boards at the Centre and in the States may be restructured and supported by Teams of Experts to reach pro-active advice to the farmers based on meteorological, marketing and managerial information and to help in providing early warning on possible surpluses (and shortages) on farm commodities,

vi) A Technology Mission on sugarcane may be organized jointly with the Sugarcane Growers' Organizations, Cooperatives and the Sugar Factories with focus on research, technology transfer and optimization of productivity and quality of sugarcane,

vii) Institutional strengthening through the setting up of such bodies as a Livestock Feed Corporation and a National Fisheries Development Board may be expeditiously examined,

viii) Farm schools may be established to promote farmer-to-farmer learning and Farmers' Markets revamped to meet the needs, particularly, of small producers.

Annexure – 6

Gist of the communication regarding Revitalization of Indian Agriculture sent by the National Advisory Council (NAC) to the Government.

Recently, the National Commission on Farmers (NCF) have made a Presentation on the **comprehensive blueprint** that they have drawn up to revitalize Indian Agriculture. The Government would agree that such a blueprint needs to be implemented on priority and with a great sense of purpose and determination. Four decades ago, the political, scientific and administrative leadership had combined and interacted in a remarkably effective manner to take the country forward towards self-reliance in foodgrains. It is that spirit which needs to be recaptured to provide a **New Deal** to our farmers and their families. This is, in fact, the cornerstone of the National Common Minimum Programme which, among other priorities, stresses vastly increased public investment in agriculture and vastly expanded supply of agricultural credit to small and marginal farmers.

2. NAC is aware that a separate Meeting of the Planning Commission has been held to review the policies and programmes in the agriculture sector. Reforms to strengthen credit cooperatives are also on the anvil and the budgetary allocations for the Indian Council of Agricultural Research (ICAR) have gone up substantially. At the same time, **Bharat Nirman** would impart new momentum to the expansion of Irrigation.

3. It is felt that the Government have now to give serious thought as to how best the various Recommendations of the NCF can be implemented and operationalized by the Central and State Governments. The NAC is of the view that while implementation would have to be the direct responsibility of the Government Agencies and other Institutions, there would still be need for an Independent Expert Body with credibility and expertise (like the NCF) to monitor and evaluate this process closely.

4. An Empowered Group of Ministers could, perhaps, be of help in reaching conclusions expeditiously. The real challenge is to launch the implementation phase in a coordinated and systematic manner and to underline high-level public visibility for and accountability of our agricultural revival programmes. It will be necessary to break away from the bureaucratic mould in order to achieve this vital objective.

Annexure-7

Subject: Constitution of the Agriculture Coordination Committee.

Government had earlier decided, vide O.M. of even number dated 19.10.2005, to constitute an Agriculture Coordination Committee. In partial modification of the O.M. under reference, it has been decided that the revised composition of the Agriculture Coordination Committee would be as follows:-

- | | | | |
|-------|--|---|----------|
| i) | Prime Minister | : | Chairman |
| ii) | Minister for Agriculture & Food &
Civil Supplies & Consumer Affairs | | |
| iii) | Minister for Fertilizers & Chemicals | | |
| iv) | Minister of Finance | | |
| v) | Minister of Commerce & Industry | | |
| vi) | Minister of Water Resources | | |
| vii) | Minister of Rural Development | | |
| viii) | Minister of Panchayati Raj | | |
| ix) | Minister of State for Food Processing | | |
| x) | Minister of State for Science & Technology | | |
| xi) | Deputy Chairman, Planning Commission | | |
| xii) | Chairman, Economic Advisory Council | | |
| xiii) | Chairman, National Commission on Farmers | | |
| xiv) | Member (Agriculture), Planning Commission | | |
| xv) | Principal Secretary to PM | : | Convenor |
- 2) Secretaries of the Ministries/Departments concerned would be permanent invitees.
- 3) The Chairman could invite any Minister/Officer depending upon the context.
- 4) The Committee may commission specialized studies depending upon the requirements, which arise from time to time and could engage in the following tasks:

- a) Identify key areas that require fresh policy initiatives, particularly those of an inter-sectoral nature.
- b) Outline the follow-up action that needs to be taken to implement identified policy initiatives.
- c) Identify institutional mechanisms to implement policies and programmes
- d) Monitor key policy initiatives
- e) To oversee and coordinate the integrated implementation of those recommendations of the National Commission on Farmers that are accepted by the Government

Sd/-
(T.K.A. Nair)
Principal Secretary to PM

Annexure- 8(a)

Consultation on “Empowering male and female members of elected local bodies to discharge effectively their role in conserving and improving the ecological foundations for sustainable agriculture like land, water, agro-biodiversity and the atmosphere with priority attention to irrigation water”.

1. The terms of National Commission on Farmers inter-alia provide “Suggest methods of Empowering male and female members of elected local bodies to discharge effectively their role in conserving and empowering the ecological foundation for sustainable agriculture like land, water, agro-biodiversity and the atmosphere with priority attention to irrigation water”.

2. Section 243G of the Constitution 73rd Amendment Act, 1992 empowers state legislature to endow the panchayats with such powers and authority as may be necessary to enable them to function as institutions of self-government and such law may contain provisions for the devolution of powers and responsibilities upon Panchayats at the appropriate level, subject to such conditions as may be specified therein with respect to-

- (a) The preparation of plans for economic development and social justice.
- (b) The implementation of schemes for economic development and social justice as may be entrusted to them including those in relation to the matter listed in the Eleventh Schedule.

3. It is however; well known that in spite of efforts at various levels, Panchayati Raj has still not been achieved commensurate with the letter and spirit of the constitution 73rd Amendment Act, 1992. A task force on devolution of power and function upon Panchayati Raj Institutions was set up and its Report(2001) had made several Recommendations. A comparison of snapshot captured in 2001 and now shows that the situation does not appear to have substantially changed. The Consultation was convened to discuss the various issues related to the empowering of the elected Members of the Local Bodies. It was attended by renowned subject experts, civil servants, civil society representatives and NGOs.

4. Important issues expected to be covered in the Consultation included:-
- (a) Issues regarding devolution of exercisable powers along with administrative and financial support to the members of Panchayati Raj Institutions particularly its female members for the conservation and improvement of ecological and financial sustainable agriculture including priority attention to irrigation waters.
 - (b) Adequate monitoring mechanism with “teeth” for the implementation of the 73rd Constitutional Amendment Act, 1992 and the recommendations of the Seven Round Tables of Ministers In-Charge Panchayati Raj between July-December, 2004.
 - (c) Activity mapping for these Recommendations.
 - (d) Equipping the Members of elected local bodies through training and re-training to discharge their responsibilities. This is particularly important in view of the reservation available for women in the Panchayati Raj system. The specific solutions to the problems of training of elected women members may be discussed.
 - (e) Considering the ground realities of politics in the rural areas and the trend towards populism at the cost of ecological well being, the reconciliation of democracy with sustainable development may also be discussed.
 - (f) Lessons learnt from Success stories including those in the Ministry’s website at www.panchayati.nic.in as well as the large areas of darkness, even throwing up the informal institution of “Sarpanch Pati”.
 - (g) Roadmap for further work of NCF on the subject mentioned in its terms of reference.

Observations & Suggestions

5. The salient observations and recommendations that emerged on diverse issues related to empowering male and female members of elected local bodies are summarized below:
- (i) Meeting should be convened with the state ministers to address the issue of devolution of exercisable powers. Most of the states do not have a separate ministry of Panchayati Raj. It is generally MoRD, which also handles Panchayati Raj. At present the principal sources of Panchayat funds are from GOI. Under the 12th Finance

Commission, Rs.20, 000/- crores will be made available to Panchayats through the state consolidated fund. States have to release this fund within 15 days of sanction; otherwise they will have to pay interest on it. For efficient functioning disbursed amount to the States will be displayed on the website on the Ministry of Panchayati Raj.

(ii) Holding of elections is mandatory for the transfer of the funds to Panchayats. Panchayats will also monitor the transfer and proper utilization of the disbursed fund. Although a Panchayat empowerment incentivisation fund is being framed, to get things done, persuasion is more important than financial incentives.

(iii) Functioning of parallel agencies must be stopped and there must be one central agency to look after all the schemes run by these parallel agencies in order to check duplication of schemes and wastage of resources. The various schemes should be routed through a single agency and decision makers should be Panchayats.

(iv) There is also a need to check the bypassing of the Panchayats in flow of funds. A case in point is recent success the MoPR had in bringing about changes in Section 13, 15, and 16 of the recently passed NREG Act, 2005. Under Section 13, the principle implementation agency will now be the Panchayat, at the district, intermediate and village level. Under Section 15, in every Panchayat there will be a programme Officer of the rank of BDO to assist the Panchayat. Under Section 16, the Programme Officer will allocate at least 50% of the work to the Gram Panchayat.

(v) The weakest link at present is the Gram Sabha. The Gram Sabha has to formulate and approve the Panchayat plan. The MoPR is now insisting that every Gram Sabha have a Mahila Sabha which must also meet regularly and contribute to discussion. The Gram Sabha should develop as an instrument for social audit.

(vi) Official reluctance to work with the Panchayat leaders is undesirable. The Panchayat system needs to be protected from the corruption especially from the lower level.

(vii) The Committee headed by Mr. P. Ramachandran had recommended that in the 11th FYP, there should be state plan, district plan and panchayat plan. District Plan Committees (DPCs) are crucial for the success of Panchayati Raj. And at least 4/5 of the members of the District Planning Committee should be Panchayat members. At present DPCs exist only in a few states.

(viii) Panchayats must be answerable and accountable for activity mapping. Ideally, consolidated plan must be prepared at the level of Gram Panchayat and fed into the district plan.

(ix) There is a need to develop a village level database as the data below the district is not available in almost all the states. The Village Knowledge Centre(VKC) could be the focal point for maintaining this database. GIS maps are needed for micro level planning.

(x) There is a need to develop the plans based on the local problems by the Panchayats themselves rather than DPC. The plan made by Panchayat should be approved by the Gram Sabha.

(xi) There is a need to develop micro plan for preserving ecology, biodiversity and sustainability of agriculture. Micro plan development by the Gram Sabha can bring to the forefront the link between democracy and development.

(xii) For every plan there should be a link with technological backup and we can have services of retired persons as well as scientists of the SAUs/ICAR to assist in making a complete action plan for the villages to address their problems keeping in mind the available resources.

(xiii) Awareness, training and capacity building are crucial for the successful Panchayati Raj. There is a need to systemize training and capacity building of Panchayat members and awareness of rights and duties of members of Gram Sabha should go together.

(xiv) Access to information is also very important. Village Knowledge Centers (VKCs) can become an important link in the training and capacity building exercise. Every Panchayats should have a VKC. Access to information and awareness should be linked with mission 2007 “Every Village a Knowledge Center”.

(xv) There is a need to adopt of flexible technology for training of women by SIRD & NIRD. The modules should be gender sensitive which help to women open up. A gender sensitization module has been developed by MSSRF but the same has not been adapted by Agricultural Universities.

(xvi) Advisory research in training and research for training will be helpful for preparation of modules on gender specific issues. There is a need to intensify the efforts

for the states like UP, Bihar, Rajasthan and Orissa where the solution of the problem of the training to women is crucial and there is a need to establish to and fro feedback to the arrangements on the training.

(xvii) Women need information on how to discharge their roles as most of the women are involved in multifarious activities.

(xviii) Training is important not only for the representatives of their panchayats but also for the govt. officials at the block and district level working with them. A change in mindset is needed among officials.

(xix) Leadership training is crucial. Experience has shown that good leaders can do a lot to bring about positive changes.

(xx) Training is not one time exercise, follow up is needed. The training module and format has to be suited to local needs. Training has to be at the Gram Sabha level.

(xxi) Institutions like ICRISAT should work at the grassroots level with KVKs which provide technical support under the programmes like the NREG. Rs. 100 cr should be recommended for KVKs to play proactive role in capacity building and training.

(xxii) There is a need to discuss developmental issues rather than just political issues on the public platform. There is a need to pass orders that no body can supercede the elected male and female members of the local. Self-Help Groups (SHGs) becoming parallel structures was discussed and it was felt that SHG promotion if felt necessary, may be through Panchayats.

(xxiii). There is a need to highlight the success stories and exchange information about them.

Annexure- 8(b)

Consultation on “Hindu Succession (Amendment) Act, 2005 and its Impact on Rights to Land Ownership for Women in the Context of Increasing Feminization of Agriculture” held on 21st September, 2005

1. It is heartening to note that the Parliament has passed the Hindu Succession Amendment Bill, 2005 and the Act has come into effect from the 6th September 2005. This in turn is of great relevance in the context of NCF terms of reference which inter-alia cover “Recommendation to be made for the credit, knowledge, skill, technological and marketing empowerment of women, taking into consideration the increasing feminization of agriculture and the proposed conferment of right to land ownership”.

2. In the First Report accelerated programme activity were recommended to be taken up for (i) Existing policy pronouncements and directives of direct transfer of land to women (ii) Improving inheritance rights of women to land by bringing changes in laws and working towards better implementation (iii) Enabling women to buy land from the market. In the interest of social justice as well as well-being of the families, enhancement of women’s rights and entitlement to lands deserves to be the first priority on the agricultural agenda.

3. The Hindu Succession Amendment Bill, 2005 addresses access to private land through inheritance. One of the most significant Amendment in the 2005 Act is deleting the gender discriminatory section 4(2) of the Hindu Succession Act (HSA), 1956. Section 4(2) exempted from the purview of the HSA significant interests in agricultural land, the inheritance of which was subject to the devolution rules specified in state level tenurial laws. But in several states the tenurial laws specify inheritance rules that are highly gender unequal. The 2005 Act brings all agricultural land on par with other property and makes Hindu Women’s inheritance rights in land legally equal to men’s across states overriding in consistent state laws. Secondly it provides daughters including married daughters birth right in Joint family property. If implemented in letter and spirit the act will have widespread ramifications for women’s access to agricultural land.

4. The consultation was convened to discuss the implementation of the HSA amendment Act, 2005 in particular and women's access to land in general. It was attended by renowned subject expert, civil servants, civil society representatives and NGOs. It was expected that the consultation would focus on:

- a) The adequacy of the provision of the Hindu Succession (Amendment) Act, 2005 for land rights for women.
- b) The steps required for effective implementation of the provision of the Act by the States.
- c) Difficulties foreseen in the implementation of its provisions both in letter and spirit.
- d) States requiring special attention.
- e) Issues relating to supportive services like credit, technology, knowledge and skills for farm women.
- f) Any other issue relevant for converting conferment of land rights into an effective tool for empowerment of women in agriculture in rural areas particularly for on-farm/ off-farm income generation.

Observations & Suggestions

5. The salient observations and recommendations that emerged on diverse issues related to women's land rights issues are summarized below:

- i) There cannot be a unique model for solution of the problems prevalent in different areas. Different models are needed for different areas.
- ii) The voluntary transfer of land rights of women should be there. Often a woman wants to give land to her daughter, but she is restrained from doing so because of mafia/ criminal pressures who simply grab her land.
- iii) In most villages women get married within 7-8 km distance and they can take care of the land of their parents. Institutional mechanism to implement the law bypassing the obstructions should be thought out. Without protective mechanisms, it will be difficult to implement the Act.

- iv) It is essential that similar rights for cultivation be provided to married and unmarried women. Right to cultivation should be determined by being a resident of the village. If a married woman comes back for some reason she should get access to land.
- v) The Hindu Succession Act should be renamed Indian Succession Act and be available to any citizen of India on demand. The option should be available to women from minority communities also to appeal under the act.
- vi) Bureaucratic will is needed to address gender inequality. Creating a conducive environment to implement the act honestly is also necessary. The initiative of local officials in the implementation of the act should be publicized for greater adoption by others.
- vii) MPs/ MLAs should set an example by applying the act to themselves. It should be also a part of the service condition of IAS/Central Government employees, Panchayat members etc. Government should also provide incentives to local officers to proactively implement the act. This will promote acceptance by the citizen at large.
- viii) With the Hindu Succession (Amendment) Act now in place, it is necessary that the government fixes a time frame for its implementation.
- ix) A change in mind set is needed to address the issues facing women. There have been instances that the training has been provided to men folk to write their will so that no land is left intestate (without a valid written will), enabling women to demand their rights. Training for writing of will that benefit women folk should be provided.
- x) Ceiling law and definition of the family must be made uniform across the country. The importance of the act when the male members of the family migrate was emphasized.
- xi) In the case of surplus land transfers, steps should be taken to avoid poor women getting poor quality of land.
- xii) The cost of land registration should be waived or reduced when the land is registered in the name of women or a group of women.

- xiii) There should be a control on leasing out practice because if the land is leased out to women farmers or group farmers then they do hard work to develop the land and get better productivity out of it only to find the owners wanting to take back his land. The lease agreement should be such that it can be upheld in a court of law.
- xiv) There is a order from the State Government that the wasteland should be distributed to women's groups by the Panachayats but the order is not having the desired effect.
- xv) There is a need to start registration for land with joint pattas and it will be good if men will go for registration. State Govt. should document the wasteland, which is distributed under joint pattas. A wide campaigning is needed to promote joint pattas.
- xvi) The ceiling surplus land should be provided to women first, then in joint pattas and remaining land could go to men.
- xvii) At present data on ceiling surplus land, land acquired by the govt. and land distributed buy the govt. land under litigation is available for ten states only. There are no records available on how much land is registered in the name of men and women in agriculture. There is need to collect and computerize the data regarding this aspect and without any bias. There is need to continue consultation with state governments and try to get data in women farmers at Tehsil levels. Data should be gathered to capture the fragmentation of land holdings.
- xviii) There is a need to go for Cadastral survey in the North East especially Meghalaya.
- xix) There is a need to operationalise the law with greater awareness and opportunities to take maximum benefit of it.
- xx) There is an urgent need for legal literacy to women in particular and farmers in general about the act. There is a strong need to strategies how this can be done and start legal literacy from school level. Legal aid should be available to the women. Small NGO group exist that are working in this area. Farmer's organizations, bankers and panchayats should play a proactive role

in the awareness and implementation of the Act. VKCs can also play an important role in this.

- xxi) Groups of women should be formed to access land accompanied by support services to improve the economies of scale because it is difficult to manage the land by individual women as she cannot access the services therefore, often sells the land. There is a need to develop village fund for women's groups to purchase land for agriculture and other developmental activities.
- xxii) 80% of the SHGs are women SHGs but virtually none of them are land based. Necessary action should be taken to promote land based women SHGs.
- xxiii) There is a need for crop diversification and a consolidated approach for off-farm and on-farm activity to enhance the income and productivity of the farm as well as assurance of livelihood and nutrition security at household level.
- xxiv) Lack of access to finance is a major issue in rural areas. Inability of land banks to provide credit in spite of legislation to the effect in place should be addressed. Loans should be provided at concessional rates where land is in the name of women. Need for changes in collateral system of banking have also to be examined.
- xxv) A holistic approach towards allotment of land to women should be adopted. The govt. should also help in developing the land, other basic facilities and soft loans (e.g. Malaysia).
- xxvi) There is a need for strengthening training for farm women and engendering of training institutions. Training on entrepreneurship development should be made a part of the Agricultural University curriculum.

6. Some other Suggestion in this regard would be:

- (i) Ensure the recording of womens in heritage shares by the patwaries, in all land records and in cases where women own land (via any means), ensure that their names are entered in the corresponding land record.

- (ii) Promote schemes which fostered women owned group assets, including but not restricted to, village commons lands and village forests.
- (iii) Provide insurance coverage to farmers for crop failure caused by lack of rain, drought, and damage by wild life and land slides.
- (iv) Through media raise awareness of relevant legislation on women's right to land and resources.
- (v) To ensure the institutionalization and codification of inheritance laws for tribal communities.

Annexure – 8 (c)

Women in Agriculture – What next?

1. A two-day workshop was organized by the M S Swaminathan Research Foundation (MSSRF), Chennai, on November 11 and 12, 2005, on the theme: Women in Agriculture in India: What Next? The aim of the workshop was to discuss the status and problems of women in agriculture in India ten years after the Fourth World Women's Conference held in Beijing in 1995, in the light of the commitments made by the Government of India at the Beijing conference and later in the Common Minimum Programme of the UPA Government. About 25 participants drawn from government, academia and civil society, including Chairman, NCF and Member Secretary, NCF participated.

2. The workshop benefited greatly from a review paper presented by Ms. C.P. Sujaya, IAS (Retd.) and Visiting Fellow in Gender and Development for 2005 at the MSSRF, who had earlier been commissioned to undertake such a review. In her paper entitled Beijing + 10: Women in Agriculture in India, Ms. Sujaya dwelt on the three major themes of growing feminisation of work, of agriculture and of poverty in the last decade, the problems in women's access to land and other assets, and the lacunae in policies and schemes, supported by data and case studies. She also summed up, in conclusion, the policy changes required to address these issues effectively. A succinct presentation by Prof. M.S. Swaminathan, Chairman, National Commission on Farmers and Chairman, MSSRF, provided guidance to the workshop participants on areas where concrete recommendations could be made.

DISCUSSIONS

3. The consensus that emerged, noted that issues concerning Indian women ten years after the Beijing Conference of 1995 must be seen in the background of the consequences of the implementation of neoliberal macroeconomic policies since 1991, as well as the overall path of economic development since Independence. The structure of the economy inherited at the time of Independence and the nature of policies followed since then by successive governments at the Centre and in most States had, by and large, failed to address adequately the deeply entrenched inequalities of class, caste and gender. Often,

they had contributed to the widening of inequalities. The status of women in India even before the neoliberal reforms began therefore left a lot to be desired.

4. The reforms, which consisted, in the main, of policies of liberalization, privatization and globalization (LPG for short), were highly deflationary, and especially disastrous for agriculture and the rural economy, as also for key social sector areas such as health and education. Rural women, engaged mostly in agriculture, primarily as labourers and to a lesser extent as cultivators, were especially badly hit. While the reforms have been lauded by some as having ushered in an era of 6% annual growth rate of GDP, these figures provided poor consolation to rural workers, as the rate of employment fell sharply between 1993-94 and 1999-2000 as compared to the period 1987-88 to 1993-94. Agriculture and the rural economy bore the brunt of neoliberal policies of removal of all quantitative restrictions on imports, steep lowering of import duties on agricultural produce, slashing of input subsidies, collapse of institutional credit, near-absence of public investment, reduction in rural development expenditures, weakening of the public distribution system and decline in allocations for agricultural research and extension. The rate of growth of agricultural output in the post-reform period stands at less than 2% per annum, while the rate of growth of foodgrains output has fallen below the rate of growth of population for the first time since Independence during this period. These trends have been well-documented elsewhere and taken note of in the earlier Reports of the National Commission on Farmers.

5. It is against this disastrous performance of agriculture and the rural economy that the problems facing women in agriculture have to be understood and discussed. Women have been negatively impacted upon by these policies which have added to the problems women already face in a deeply patriarchal social milieu with structured gender inequality along economic, social, political and cultural dimensions. The collapse of rural and agricultural employment under neoliberal policies has led to large-scale migration, often (though not always) sex-linked. The migration of male earners has led to a certain degree of feminization of agriculture, as well as to a significant proportion of female-headed households. This in turn has meant that a disproportionate share of the agricultural crisis is borne by women. In many States of India, property and inheritance laws have traditionally discriminated against women, and despite some steps taken in

recent years to redress the situation, women are still mostly to be found recorded as agricultural labourers rather than as cultivators. The traditional patterns of community land and forest management in many tribal areas (Schedule 5) and especially in the hill States of north-eastern India (Schedule 6 and other areas) have entirely different property and inheritance laws, and here too the brunt is borne by the women. This is of course partly also due to the non-recognition of the work women do on their family farms.

6. The decline of institutional credit for agriculture and the onerous terms on which farmers are having to borrow are major factors contributing to rural distress. At the same time, during the last decade, there has been a highly visible micro-credit initiative, directed mostly through SHGs of women. The growth and experience of SHGs across the country is highly variable and region specific. While in some parts of the country, there has been a phenomenal disbursement of funds to women in rural areas, and some capacity building, via the intermediation of NGOs State agencies, line departments etc., which has enabled them to meet some pressing consumption needs it is far less clear to what extent this has enabled access to improved technology, higher productivity and profitable enterprise. SHGs in themselves can and certainly do provide women a new and legitimate social space where they can come together and explore avenues of collective action, but such instances have been only part of the story.

7. On the one hand, there is evidence that already overburdened rural women have now to shoulder even more responsibility and work, while the withdrawal of the State in crucial areas of rural infrastructure and welfare is justified in the name of empowering women and reducing the dependency culture. On the other hand, in some places, where the agriculture sector has been depressed and offering limited opportunities for work, the SHG movement has provided some diversification, off-farm employment and greater awareness of technological inputs. The conclusion that emerged recognized the value of SHGs as a space for women's agency, but also noted that a great deal of capacity building of women in SHGs was still required to enable them to truly empower themselves. It was also pointed out that the promotion of SHGs and the provision of micro credit can only be a supplement to direct measures which provide women land and other productive assets, individually or in groups, that can serve as collateral for larger-scale, productive loans.

8. The conditions of existence of women in rural areas have been further worsened by the withdrawal of the state from education and health. Women now have to manage even more stringent family budget constraints in the face of increasing costs of health care and education. Evidence of greater violence against women in various forms points to the impact of the rural economic crisis in a context of embedded patriarchy as well as the rampant consumerism promoted by the forces of globalization.

9. The emergence of an active land market, dominated by speculators, especially in rural areas adjoining urban centers has led to encroachment on, or outright destruction of, common property resources, where again poor and dalit rural women are among the worst sufferers. They are now not only having to trek longer distances to fetch water, fuel and fodder and to attend to their ablutions, but also find their productive activities adversely affected.

10. While neoliberal policies had caused great distress to the rural economy in general and rural women in particular, this period has had some positive developments as well. Important among these were the emergence of Panchyati Raj Institutions (PRIs) and peoples' movements of various kinds, including the SHG movement and wider movements questioning the logic of LPG policies and seeking a more people-centred policy frame. The workshop participants felt that both PRIs and SHGs needed considerable resource support for capacity building and that the processes of capacity building should be strongly engendered to strengthen and empower rural women. A stronger and more effective interface is needed between PRIs at all levels, particularly their women members and the SHGs and their federations, wherever they exist.

11. The issues of land reforms and land rights for women were both important, and the State should play a crucial role in the gendered implementation of land reforms, wherever relevant, since in almost all of the north-east hill States it is not the State but the village communities that control land. Preventing the erosion of the few traditional systems wherever these continue to exist where authority and agricultural decision-making is shared by women and men, is also a goal to be kept in mind.

12. The question of land lease is tricky, but lease arrangements that empower poor rural women without allowing land grabbing by more powerful forces including corporates

should be the desirable approach. In this context, it is noteworthy that the Common Minimum Programme (CMP) of the UPA Government provides:

i) “The UPA government should ensure that at least one-third of all funds flowing into panchayats should be earmarked for programmes for the development of women and children. Village women and their associations should be encouraged to assume responsibility for all development schemes relating to drinking water, sanitation, primary education, health and nutrition”.

ii) “Complete legal equality for women in all spheres should be made a practical reality, especially by removing discriminatory legislation and by enacting new legislation that gives women, for instance, equal rights of ownership of assets like houses and land”.

13. Apart from removing discriminatory legislation and new legislation, legal and civil society supports are required to ensure that new rights are not inherently biased against community group rights and against non-land holding individuals - women, *dalits*, and the poor.

14. The recommendations that were made at the meeting are presented under the following heads: Land and Productive Assets, Labour and Employment Generation, Common Property Resources and NRM, Support Services, Self Help Groups, Data Gathering, Women in Technology and Research

RECOMMENDATIONS

15. Land and other productive assets: Ideally, both men and women should be recognized as heads of the household, and all property be jointly held, though provision would have to be made for equal sharing of all property in the event of cessation of marriage. While this may be a long-term goal, in the present context, it is necessary to urgently take steps to reduce the burdens and disadvantages faced by women due to lack of title to property, especially land, which excludes them from access to resources and inputs, particularly land. This is particularly true with reference to the banking system and its structural limitations, which require proof of title as collateral. Hence it is recommended that:

- i. From a gender perspective, because of women’s multiple productive roles, it is necessary that agricultural policy and programmes adopt a farming

systems approach that integrates agriculture, livestock, fish, forestry and water resources, instead of treating these as separate sectors as at present.

- ii. All NEW assets which have accrued to the household (before a specified cut-off date) by any means (purchase, transfer, grant etc) should be registered in the name of both husband and wife, applicable to all assets such as land, houses, trees, animals, equipment etc.
- iii. The above should also apply to membership of groups/categories which are prerequisites for access to resources, e.g. water users' associations.
- iv. Banks should be asked to accept spousal ownership/membership as collateral for loans and extend Kisan Credit Card to women.
- v. The distribution of land mandated by Government of India in the 1980s with regard to surplus land, wasteland, and ceiling surplus land should be monitored and recorded and up to date records prepared within a specified time limit
- vi. Lands, particularly wastelands, vested with government should be transferred to women's groups (including SHGs) for productive use and appropriate economic activity.
- vii. The implementation of land reforms in a gender-sensitive framework should be closely monitored and up to date records prepared, keeping in mind recent legislation (Amendment to Hindu Succession Act 1956). The issue of community-held land has to be separately addressed.
- viii. Given the failure of successive attempts to ban swidden (jhum, podu) cultivation in which women are especially involved, it is necessary to develop and diversify swidden with multiple species and high value crops (medicinal, aromatic plants) to increase diversity, enhance food security and perhaps improve women's income.
- ix. Resource support, value addition and market linkages for the traditional crafts in which farming women are involved, either full time or as supplementary activities, need special attention.

16. Labour and employment generation: Wage employment is still and will continue to remain the most important source of income for the rural poor, especially women, and hence the primary need is to revive and strengthen capital investment in agriculture and rural infrastructure, which will generate farm and non-farm employment. In this context, the NREG Act as well as six major schemes - National Horticulture Mission, Bharat Nirman (New Deal for Rural India), National Rural Health Mission, *Krishi Vigyan Kendras* in all districts (ideally to be re-designed as *Krishi aur Udyog Vigyan Kendras*), setting up of SHG Capacity Building and Mentoring Centres (as recommended by the NCF), and establishing women-managed Community Food, Water, Fodder and Feed Banks – provide immense scope for employment of poor rural women. Equally important, the new policy arrived at after a series of Round Tables of State Ministers and Secretaries for Panchayati Raj have arrived at new modalities for disbursement of funds to Panchayats, and for the planning process, which is now to be initiated at the level of Gram Panchayat and built up from below. Major Central schemes are now to be channeled directly to Panchayats. Safeguards have been built in to ensure that the funds are not delayed in payment.

It is hence recommended that:

- i. There should be adequate representation of women in all bodies at Gram Panchayat, Block and District levels in all bodies concerned with generating, planning, designing and implementing employment. For example, a) Standing Committee on Planning of the Panchayats at village, Block and District level b) Technical Support groups set up at each level c) All Standing Committees at the three levels. In the Sixth Schedule areas where the 73rd Amendment does not apply, the engendering of traditional institutions at the village level should be encouraged and supported.
- ii. There should be similar adequate representation of women in all bodies concerned with training and capacity building at village, Block and District levels – a) in setting up of training and capacity building institutions and b) in planning the content and methodology of training.
- iii. Forty per cent of all employment generated through new schemes should be reserved for women.

- iv. Similar reservation should be made for the support services arising out of new employment opportunities for women to ensure not only that women's services are utilized, but that their labour is recognized and their knowledge and skills built up.
- v. Increased emphasis should be placed on implementation of Minimum Wages, Equal Remuneration and other existing laws.

17. Common Property Resources and NRM: Increasing illegal encroachment on common property resources (village grazing lands, ponds etc) with the approval of the local authorities, PRIs and traditional community authorities, who are often governed by patriarchal values and may not be gender sensitive, has severe consequences for the poorest and most marginalized, especially women, who depend on CPRs for livelihood. So does disposal of wastelands to commercial interest. In order to prioritise livelihoods of the poor/women over commercialisation it is recommended that:

- i. 17.1 To discourage local authorities, Gram Panchayats or equivalent body from commercial disposal of village CPR and wastelands, they should be required to place such issues before the Gram Sabha for decision, in order to ensure that voices of marginalized sections (women, dalits and poor) are not excluded.
- ii. 17.2 Awareness generation should be enhanced at all levels, and especially among the bureaucracy and local level traditional and elected bodies, to support poor women/marginalized groups in their struggle to protect their existing use rights over CPR.
- iii. 17.3 Institutional and funding support for the formation of women producers' associations to process, transport and market farm produce, milk, fish, crops etc. should be provided.
- iv. 17.4 Commercial interests/companies should be banned from acquisition of wastelands for purposes of direct cultivation. CBOs (women's groups, Dalit groups, tribal groups, SHGs) should be given priority for acquisition, lease, or grant of wastelands for cultivation.

- v. 17.5 Since submergence of ecologically important watersheds, pastures and agricultural lands through hydro-electric schemes in the hills has a far-reaching impact on women's livelihoods in both the upland and downstream areas, run-of-the-river schemes should be preferred to reduce displacement of people and erosion of agro-biodiversity.
- vi. 17.6 Monopolies in the NTFP trade in different States and for different produce should be reduced with a view to their ultimate elimination and to ensure fair prices to the producers.
- vii. 17.7 Different kinds of social networks of women producers (or of women and men) that already exist should be strengthened to enhance their ability to negotiate with traders and others.
- viii. 17.8 The question of individual vis-a-vis common property resources needs to be carefully studied and addressed, so that public policies do not erode systems of common access and use even as they ensure individual rights, both of which are important.

18. Support services - The various social services provided by the State and community groups, such as health services, child care services, early childhood education, midday meals, ration shops are generally perceived, both by the concerned departments and the public at large as welfare measures. Their role as support services for poor women is less understood, and hence close linkages are not established, nor are the programmes adequately structured to be flexible in addressing these needs in a context-specific manner. Hence, it is recommended that:

- i. ICDS should be redesigned to become more context and gender sensitive to the needs of poor working women, especially in the rural areas, by a) its decentralization and management by PRIs and b) enabling local managements to modify the timings, location, provision for care of younger children, child: worker ratio to suit local needs c) providing additional funds from sources such as NREG/ powers to raise additional funds to meet such context-specific needs.

- ii. Innovative proposals to provide crèches for young children (below three) and cooked meals on site for women labour should be worked out in the case of NREG work-sites, which can be adapted elsewhere.
- iii. Identity cards for migrant women workers should be provided to enable them to access PDS, secure admission to primary school/anganwadi/ etc for their children.
- iv. The social security provisions in the two Acts before Parliament relating to unorganized workers should specifically include all categories of women workers in the agricultural and rural sector.
- v. Common facility (meeting place/workshed) for women should be provided from the Gram Panchayat Mahila Kosh, (as already proposed in the First Report of NCF, Chapter IV on New Deal for Women in Agriculture).

19. Self-Help Groups - The tremendous expansion and visibility of SHGs in the last decade and a half has brought many gains, both social and economic, to poor rural women, though there are marked regional differences. There is debate about the extent and nature of gains, as increasing burden of work and responsibility on women, increased domestic violence, limited economic advancement, continuing social and caste oppression, and constraints to decision making in the home have also been observed. While recognizing the tremendous employment potential of SHGs, the continuing dependence of poor women on multiple sources of livelihoods implies that there are no panaceas, and multiple solutions have to be sought. At the same time, empowerment of women at the political, community, family and social levels is emerging as a precondition for further gain. It is hence recommended that:

- i. Critical and region-specific studies of the SHGs drawing on available studies and data should be taken up to look into the financial, economic-productive, social-community, political, family-household, and personal levels of women's empowerment.
- ii. Based on such studies, a more detailed understanding of the place of SHGs in women's multiple livelihoods may be built up, as well as mapping the location of women in the rural and agricultural sector.

- iii. The banking system should be urged and enabled to develop a broad structure of varied financial services to support the multiple livelihoods of rural poor women, using the SHGs as the basic organisational structure.
- iv. A network of capacity building institutions should be set up to strengthen and develop SHGs to undertake the various functions into which they are expanding, including ToT, and to nurture and mentor them during the process.
- v. A series of training modules should be developed and delivered through various mechanisms including AIR and mass media, distance education providers, Village Knowledge Centres with the help of ICT.
- vi. Awareness creation through mass media, people's organisations, and networks should be used to create visibility, not only for SHGs and their achievements, but for the role of women in the economy.

6. Data-gathering and use - The importance of gender-disaggregated data in all fields and areas cannot be over-emphasised, not only in order to create visibility for the role of women in the economy, society and polity, but also as a tool for planning, monitoring and evaluation. It is equally important that in future all records and documentation of all types are gendered, for the same purposes. The endeavour should be to make the process of data-gathering participatory and to include qualitative measures of development and poor women's lives and livelihoods. Measures of gender equality including the gender disaggregated data collected and collated through the different recommendations above, should not be an academic exercise but be incorporated into agricultural and related development policies. Hence, it is recommended that:

- i. Time use studies should be extended to all the States, and should be repeated at regular intervals. These will strengthen the process of creating visibility for women's unpaid labour and domestic work.
- ii. Discussions with the national data-gathering agencies should be initiated by the concerned Ministries (Ministry of Agriculture) to continue and strengthen the process of gender-disaggregated collection of basic information through the decennial Census, the National Sample Surveys, and other occasional and regular data collection surveys of all Departments.

- iii. Gender-disaggregated data on vital statistics should be collected through District level surveys, which would enable estimates of district level IMR, U5MR, MMR, JSR, and other important development indicators.
- iv. The next Agricultural Census should collect gender-disaggregated data on operational holdings.
- v. To begin the process of estimating women's contribution to GDP, pilot studies at district level should be initiated to work out the methodology for such calculation.
- vi. The responsibility for collecting gender-disaggregated information on vital statistics should gradually be shifted to PRIs, after ensuring that a) the elected leaders as well as the concerned functionaries are sensitized to its importance and the methods needed and b) that the necessary funds and facilities are transferred to them.
- vii. Institutions must be sensitized to the need to maintain records of the representation of women in all committees.

7. Skill Empowerment and Technology for Women

7.1 Technology for women requires special attention and the impact of major on-going schemes (and any future schemes) on the knowledge and skills of poor, rural women engaged in farming and allied activities needs to be systematically studied. The lack of tools designed with women in mind is yet another area of concern. With the objective of empowering women in all fields of environmental management, including water harvesting, wasteland development, sustainable agriculture and livestock development, biodiversity conservation and its sustainable and equitable use, ongoing schemes should be “engendered” on priority basis. The National Commission on Farmers was requested to develop a strategy and set up mechanisms to advise on “engendering” four major programmes where women's concerns should receive attention. These are:

- National Horticulture Mission
- Bharat Nirman Programme
- Capacity Building and Mentoring Centres for SHGs
- Revitalisation of Krishi Vigyan Kendras

7.2 All of these programmes need to be assessed in order to see firstly, how the present design impacts on poor women and secondly, whether and how these could be used to strengthen women's capacities. Skill development of women will be a major focus, and the engendering of these programmes can offer a guideline for the inclusion of women in other technology-based or technology-rich programme areas.

8. Research - The NCF chairman's suggestion to set up a national level action and policy research network to carry out longitudinal studies of women's roles in agriculture and rural livelihoods in the various agro-ecological regions of the country was strongly endorsed. The network can be on the lines of a Hub and Spokes model, with the hub centre performing servicing, facilitating and integrating roles, and mobilising the power of partnership for women's empowerment in agricultural and rural development

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