Politics of Seeds:

Common Resource or a Private Property

Afsar Jafri

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Introduction

Seed is life.

Seed is the first link in the food chain. It is the soul of agriculture; a nation's agriculture is as strong as its seed system. The seed is not merely the source of future plants and food. It encodes the genetic message of the parent plants in a perfect manner that conserves all their characteristics and assures the survival of a particular plant species from one generation to another, even in periodically unfavorable conditions. Seeds also store the genetic keys to biodiversity and climate change resilience. They are records of cultural knowledge, reflecting historical breeding practices and are the ultimate symbol of food security.

A seed is also defined as a matured ovule, the result of sexual reproduction in plants. Not all plants produce seeds but those that do, often rely on these seeds to replicate themselves over successive seasons and years. Seed is both an input and an output in agriculture. This is a unique feature where one seed can produce hundred of seeds and over successive seasons. Seeds yield crops and crops yield seeds. Good seeds can yield good crops and good crops can give good seeds.

Seeds are of immense biological and economic importance. They contain high protein, starch and oil reserves that help in the early stages of growth and development in a plant. These reserves are what make many cereals and legumes major food sources for a large proportion of the world's inhabitants.

In traditional agriculture system, seed has been the farmers' collective property. Over centuries, farmers have been carefully breeding hundreds of crops and thousands of varieties within each crop to suit their needs and preferences. However in last few decades, especially since the advent of industrial agriculture and green revolution, seeds have become a private property of few transnational corporations (TNCs) across the world. In the name of technological advancement and honoring business innovations, private companies are monopolizing seeds and they dominate the seed sector with regard to research and breeding as well as marketing. The private sectors' increasing inroads into the seed sector are accompanied by noticeable changes in the supporting legal and public policy structures. International agreements like the World Trade Organisation (WTO) and UPOV (Union for the Protection of Plant Varieties) are pushing member States to bring in public policies to grant Intellectual Property Rights (IPR) over seeds and related technologies.

Besides, there are mergers and acquisition of seed companies, which lead to global and national consolidation of seed industries. As per the ETC Group Communiqué 115 (December 2015),[1] the "Big Six" mega seed and agrochemical corporations, namely: BASF, Bayer AG, Dow, DuPont, Monsanto

[1] "Breaking Bad: Big Ag Mega-Mergers in Play Dow + DuPont in the Pocket? Next: Demonsanto?," ETC Group, December 2015; http://www.etcgroup.org/sites/www.etcgroup.org/files/files/etc_breakbad_23dec15.pdf

and Syngenta - together control 75% of the global agro-chemical market, 63% of the commercial seed market and over 75% of all private sector research and development (R&D) in the sector.

The year 2018 witnessed the mega-merger of two big seed corporations - Bayer AG and Monsanto, when Bayer bought over Monsanto for an estimated $66 Billion US dollars (over Rs. 4.4 lakh crore) in cash. This merged entity will effectively control nearly 60% of the world's supply of proprietary seeds, 70% of the chemicals and pesticides used to grow food, and most of the world's GM crop genetic traits, as well as much of the data about what farmers grow, where, and the yields they get.[2]

It is the latest in a series of mega-mergers between the top six agricultural technology companies that otherwise also include the mergers between Dow and DuPont as well as ChemChina and Syngenta.

These three mega seed corporations will be able to influence what and how most of the world's food is grown, affecting the price and the method it is grown by. The trade rules, especially the new generation of Free Trade Agreements (FTAs) which demand for WTO Plus provisions on IPRs and investments, facilitates increased control of global seed system by these mega corporations. With the increasing concentration of seed corporations, competition will be limited and farmers will have few choices if one company raises its price. The concentration of seed corporations will also increase the pace of development of new technologies, like the genetic engineering, CRISPR,[3] synthetic biology and Bio-fortification, which would further consolidate their control over seeds and tighten their legal and biological grip over global farming.

In India, farmers are already losing their rights over seeds with the introduction of the Plant Varieties Protection and Farmers Rights Act, 2001, under which the collective rights over seeds have been individualized. With the green revolution, Indian agriculture has lost a large numbers of crops and varieties, accompanied by an erosion of farmers' breeding skills and an erosion of their many rights related to agriculture. There was a time in Indian agriculture when all seeds required for agriculture were bred and produced by Indian farmers. Thousands of varieties of paddy testify for the breeding skills of Indian farmers carried out over centuries, to suit their needs. But today most of these varieties are almost extinct and out of more than 100,000 paddy varieties that existed in the pre-independence era, today only around 5000 paddy varieties are in cultivation across India.

In India, the World Bank has played a pivotal role in transferring the control over seeds from communities to Transnational Corporations through its various projects, loan conditionalities and policy intervention. In the 1960s the World Bank played a role in building and strengthening the public sector seeds supply but by the end of 1980s it forced the Indian government to dismantle the very institution it had built. In the initial years of implementing green revolution in India, the World Bank started supporting several agricultural projects, viz., introduction of high yielding variety seeds,

[2] "Who should feed the world: real people or faceless multinationals?," John Vidal, The Guardian, 5 June 2018; https://www.theguardian.com/commentisfree/2018/jun/05/feed-the-world-real-people-faceless-multinationals-monsanto-bayer

[3] Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR)

introduction of industrial chemical fertilizers industry, promotion of ground water exploitation through pump sets and setting up of banking institutions to finance the industrial agriculture system. Later on, the thrust of the Bank's policy was directed towards crop diversification, integration of domestic markets with international markets and introduction of commodity futures and agribusiness enterprises.

Seed replacement programme and the promotion of high yielding, hybrid seeds has been the real curse for the Indian agriculture system and to the diversity of rice crops in the country. Indian government is still promoting 'seed replacement', which obviously means replacing traditional seeds owned by farmers with seeds produced by Transnational Corporations that are exclusively bred for 'higher yields'.

In other words farmer tested, biodiverse, affordable and reliable seeds to be replaced with TNC's costly, uniform, monoculture, unreliable and self-certified seeds. The forced replacement of traditional seeds by chemical responsive hybrid seeds (and GM in the case of Cotton crop) is eroding the rich genetic diversity that India's farmers have evolved over centuries, increasing farmers' vulnerability to climate change, floods, droughts and other environmental disasters. At the breakneck speed which the traditional seeds are already being replaced with company seeds, that day is not far when Indian farmers will be forced to become completely dependent for seed supply from TNCs.

To counter this trend, thousands of farmers have revived their efforts to save indigenous seed varieties, protect seed diversity as well as to preserve the heritage of seed sharing, exchange and conservation. These efforts are carried out with the objective to protect farmers' rights to grow what they want and to promote seed sovereignty. Promotion and protection of seed sovereignty will be the real challenge in the coming days when countries like India are negotiating mega trade deals like Regional Comprehensive Economic Partnership (RCEP) that mandates every member nation to accept UPOV 1991 which provides for patenting of seeds.

In this booklet,

Chapter 1 deals with the role of World Bank in the Indian seed sector;

Chapter 2 deals with Transformation of seeds from farm-saved traditional seed to monopolized GM seeds;

Chapter 3 deals with IPRs and Patents on Seeds, and the threat under FTAs/RCEP;

Chapter 4 deals with major Seed legislations in India;

Chapter 5 presents the alternative in the form of seed conservation and exchange to deal with seed monopolies and control

The World Bank and Indian Seeds Sector[4]

Throughout the 1960s, the formal seed sector in India was dominated by the public sector that was providing open pollinated seeds. In the beginning of 1960s the World Bank joined forces with the U.S. Agency for International Development (USAID) to promote "green revolution" and import fertilizer, seeds, pesticides and farm machinery. During this period, the Bank had required that the Indian public sector ought to play a key role in supplying seeds to its farmers. It also made available its finances, which were an important element in the spread of the vast network that was needed for distribution of green revolution high yielding varieties, dubbed as 'miracle seeds' during that time.

In 1963, the National Seed Corporation (NSC) was set up under the Ministry of Agriculture and led to massive imports of new high yielding varieties (HYV). The NSC was meant to create necessary infrastructural facilities for seed production, conditioning, storage and distribution of 'high quality seeds'. NSC was the center of seed production of breeders, foundation and certified seeds and their quality control.

In 1969, the Terai Seed Corporation was started with a US $13 million World Bank loan.

This was followed by two National Seeds Project (NSP) loans from the Bank. The Bank provided NSP with US $41 million between 1976 and 1978.

Classes of Seeds in India

There are three classes of seed in India, namely breeder seed, foundation seed and certified seed.

- Breeder seed is produced by the breeder or the breeding Institute and it is used to raise foundation seed. It is hundred percent physical and genetic pure seed.
- Foundation seed is progeny of breeder seed and are produced by recognized seed producing agencies in public and private sector, under supervision of seed certification agencies in such a way that its quality is maintained according to prescribed field and seed standards.
- Certified seed is produced mainly from foundation seed by registered seed growers under supervision of seed certification agencies to maintain the seed quality as per minimum seed certification standards. It is grown for commercial cultivation.

These projects were intended to develop public institutions and to create a new infrastructure for increasing the production of green revolution seed varieties. The project supported the infrastructure and systems required to replace farmers' traditional varieties with externally evolved and supplied high yielding dwarf varieties from Tarai Seeds Project.

In 1998, the NSP III took off with an investment of US $150 million and with the proclaimed intent to make India's seed sector more "market responsive." The last NSP, which continued till 1996, was

[4] This chapter was adapted from Afsar Jafri's deposition on the 'World Bank and Indian Seeds Sector' at the Independent People's Tribunal on the World Bank Group in India, held at Jawaharlal University in Delhi from 21 – 24 September 2007.

aimed to privatize the seed industry and to open India for transnational seed corporations, thus beginning the corporatization of India's agricultural system.

The private sector involvement in seeds production and distribution was made necessary because despite these aforementioned projects, the farmer-to-farmer transfer of open pollinated seeds continued, especially for wheat and rice and it accounted for much of the seed used. Some of the High Yielding Varieties (HYVs) were also inferior in grain quality to traditional seeds, thus losing favor among farmers.

Enabling the growth of market seeds was the main objective of 'developing' the seed 'industry' because farmers own seeds do not generate growth in money terms. Thus the World Bank's 1988 policy paved the way for the entry of international seed corporations like Monsanto, Novartis, ProAgro, DuPont, which, later on, started taking over India's seed supply. The most significant impact of National Seeds Project (NSP) was an increase in collaborative agreements between domestic and foreign companies, aiming at the import of technology and parental material.

The Green Revolution technologies transformed 'seeds' from being a common genetic heritage into becoming a private property of seed corporations. Sooner than later these corporations started demanding protection of their 'property' through patents and intellectual property rights. The shift also implied that from being a free resource that was reproduced on the farm, seeds were transformed into a costly input that had to be purchased. It meant that the peasants in India were no longer the custodians of their common genetic heritage but instead, were turned into a commercial users of seeds.

1.1 Promoting Private Seed Industry

The “New Policy on Seed Development” of 1988 heralded a new era of private enterprise in the seed sector, as well as a shift in emphasis from public to private sector investment.

In the late 1980s government control on production of hybrids through licenses were relaxed. Under pressure from World Bank, the Indian government also started withdrawing from supply of seeds to the farmers and started focusing exclusively on the production of breeder and foundation seeds. The production of certified seeds was left to the private sector.

The World Bank further pushed this development by providing loans to the private sector, thus facilitating the privatization of seed sector in India. In the case of NSP III a credit worth US $ 30 million was made available to private companies through the National Bank for Agricultural and Rural Development (NABARD) under favorable loan agreements.

The World Bank's increasing affinity for privatization also found mention in its Country Strategy for India (2004), that stated, “International Finance Corporation (IFC) will offer financing and technical assistance to companies in agriculture, agro-processing and agricultural input supply that expand

their operations and improve their productive efficiencies as a result of the ongoing deregulation of agricultural markets."[5]

In 1998, the seed sector was further opened up under the structural adjustment programme of the Bank thus changing the farm-input economy overnight. Farm saved seeds were replaced by corporate seeds which needed fertilizers and pesticides and could not be saved.

Privatization of seed sector has induced four major changes in agriculture.

Firstly, it has led to a change in cropping patterns of farmers varieties from mixed cultivation based on internal inputs to monoculture of hybrids based on external inputs.

Secondly, it has changed the culture of agriculture. Instead of growing food and maximizing ecological security and food security, farmers have been induced to grow cash crops for high profits, without any assessment of risks, costs and vulnerability.

Thirdly, the shift from a public system approach to a private sector approach in agriculture has also meant a reduction in public sector low-interest loans and extension services. Instead it has created an increased dependence on high interest private credit, as well as pushing sales of seeds and agro-chemicals under the guise of information and extension services.

Fourth, the public sector research establishments have been turned into mere providers of germ-plasm and parental lines for further development and refinement of the private sector seeds. These genetic materials are made freely available to private sector breeders.

As a result the public sector, including the State Seed Corporations, started supplying the private sector hybrids.[6] The agricultural department under the Agricultural Technology Management Agency (ATMA)[7] supplied hybrid seeds to tribals in several States and the agri-clinic programme is facilitating the access to seeds sold by private corporations. In Jharkhand, the agriculture department had not only supplied hybrid seeds to local communities, comprising mainly tribals, but has also allegedly forced them to handover their stock of indigenous seed varieties in return for those hybrid seeds.

1.2 Sponsoring Total Monopoly Over Seeds through 2nd Green Revolution

For several decades, the World Bank has used the mantra of 'development' and 'poverty reduction' to further corporate interests in agriculture. The same mantra was used to facilitate the total control of corporations over the seed sector in India through the National Agriculture Innovation Project (NAIP), which calls for patenting and intellectual property protection over seeds.

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[5] "Country Strategy for India," The World Bank, Delhi, 2004; http://documents.worldbank.org/curated/en/499021468752749490/pdf/293740REV.pdf

[6] Shiva, Vandana and Jafri, Afsar. *Seeds of Suicide*, Research Foundation for Science Technology and Ecology, New Delhi, January 2002

[7] Prasad, Bhedu. *Impact of Agricultural Technology Management Agency (ATMA) on Socio Economic Status of Tribal Farmers in Surguja District of Chhattisgarh,* M.Sc. (Ag.) Thesis, Indira Gandhi Krishi Vishwavidyala, Raipur, 2011;
http://krishikosh.egranth.ac.in/bitstream/1/80696/1/Bhedu%20Prasad%20_%20Agri.%20Extension%20T-2657_%202011.pdf

In 2006, the World Bank has extended a loan worth Rs.1200 crore to the Indian Council of Agricultural Research (ICAR) for "National Agricultural Innovation Project".[8] Apparently, the objective of this project was "to contribute to a sustainable transformation of Indian agricultural sector from food self-sufficiency to one in which a market orientation is equally important for poverty alleviation and income generation." But the project document indicates that the NAIP would push for the development of genetically modified seeds, plants and animals as well as providing IPRs protection to research and innovations under the project. Project Appraisal Documents of the NAIP says that, "in order to generate additional income and employment for the poor, the role of agricultural R&D is critical. Given the limited scope for area expansion, increase in productivity, profitability and competitiveness would be the main source of agricultural growth in the future and this should be led or triggered by advances, innovations and applications of science in agriculture. In other words, Indian agriculture will shift from resource or input based growth to knowledge or science based growth." It further says that, "Research consortia will be funded in four subject matter fields… Genetic enhancement of plants … Genetic enhancement of animals… Gene discovery, genetic enhancement and allele mining in farm animals and fishes." While the project implementation plan of the NAIP says that "the Intellectual Property Rights (IPR) generated through the programme will be governed by rules and regulations of IPR cell of the Indian Council of Agricultural Research, New Delhi…. the sharing of income from Intellectual Property Rights (IPR) from the Consortium would be in accordance with the proportion/percentage…"[9]

In last several years, the seed industries have kept on raising the demand for protection of their varieties. They pressurized the government to provide adequate intellectual property protection in the form of plant variety protection. In 2004, the Indian government brought out a draft seed bill (still pending in the Parliament) providing more protection to the seed industry, while completely finishing off farmers' rights over seeds.

Given the fact that the Indian government has already handed over the marketing of commercial agricultural inputs, such as seeds, completely to the private companies, now the total monopolization of seeds through this project will further undermine the food sovereignty of Indian farmers and consumers. Whilst the Green Revolution of the 1960s and '70s was orchestrated by the public sector, the so-called 'Second Green Revolution', based upon new hybrid and genetic technologies, is being driven by the private sector.

It is important to note here that the World Bank has very close relations with the biotech corporations and agrochemical industries. The Bank's agriculture policies have been practically written by corporations such as Monsanto, Aventis, Novartis and Dow. In the 90's, the Bank also entered into business partnerships with nearly all leading pesticide and biotechnology companies through a staff

[8] "WB grants Rs 1200 crore loan to ICAR," Vivek Sinha, *The Economic Times*, 22 November 2006

[9] "National Agricultural Innovation Project," Project Implementation Plan, ICAR, July, 2006,

exchange programme that involved 189 corporations, governments, universities and international agencies. Bank officials placed in Novartis and Rhone Poulenc Agro (now part of Bayer) in the late 1990s assisted them with biotechnology regulatory issues and rural development partnerships.[10] Therefore the NAIP would benefit only these corporations by facilitating access to farmers' traditional varieties and rich gene diversity preserved in the *ex-situ* and *in-situ* gene banks. The project indicates that the "the diversity of farmers' traditional varieties prevalent in several pockets of the country constitutes an invaluable reservoir of genes for sustainable utilization and development of superior varieties."

1.3 Contributing to the Present Agrarian Distress

India is presently witnessing an acute agrarian crisis with increasing hunger and malnutrition among food producers, mounting farmers' suicide and decreasing farm income. It is beyond doubt that the World Bank has also contributed to the present agrarian distress in India, through its projects and policy advice. Despite talking about improvements in governance in all its projects, it does not address the issue of accountability of the Bank to the communities that it affects, for its short-sighted policies.

The World Bank is also responsible for creating and furthering the ecological crisis in farming and for eroding the natural resource base of farmers, in irreversible ways at times. The World Bank's model of farming has eroded genetic diversity in farming and made farmers dependent on external resources for critical inputs like seeds. Repeated failures that are reported of the highly expensive corporate seeds show that the association of private sector with quality and reliability is false. India was always known for its native seed diversity, adapted to different growing conditions all across the country. However, the Green Revolution package, with specific seed-related projects supported by the World Bank led to erosion of the rich agrodiversity in the country. Erosion of seed diversity meant further vulnerability to pest and disease outbreaks. A self-reliant peasant seed system is gradually being replaced by a corporate seed system and public sector breeding is increasingly being handed over to private seed industry.

1.4 Erosion of Seed Diversity

Green Revolution, introduced in India with active backing from the World Bank and increasing industrialization of agriculture has caused massive erosion of crop diversity in the region..

The Indian subcontinent is very rich in biological diversity and is home to 7.5% of the identified biological species, harbouring around 49,000 species of plants, including about 17,500 species of higher plants. The region possesses about 11.9% of world flora with 5725 endemic species of higher plants belonging to about 141 endemic genera and over 47 families. The Indian gene center holds a prominent position among the 12 mega-gene centers of the world. It is also one of the Vavilovian centers of origin and the diversity of crop plants.[11]

[10] Guttal, Shalmali. *Corporate Power and Influence in the World Bank*, Focus on the Global South, August 2007

About 166 species of crops including 25 major and minor crops as well as 320 species of wild relatives of crop plants have originated in India. A rich crop diversity is available in India in terms of both number of species and diversity within these species. Landraces, traditional cultivars and farmer's varieties in several agricultural and horticultural plant species are abundant but a decreasing trend is noted in areas moving towards advanced agricultural practices. Crops in which rich diversity occurs in the country include rice, wheat, maize, barley, pigeonpea, chickpea, minor millets, mungbean, urdbean, horsegram, mothbean, ricebean, clusterbean, sesame, forage grasses, lady finger, brinjal, cucumber, melons, citrus, banana and plantains, jackfruit, mango, tamarind, jamun, jute, cotton, ginger, turmeric, pepper, cinnamon and cardamom. Among tuberous crops, rich variability exists in sweet-potato, taros and yams. Native resources are also available in Coleus species, sword-bean, velvet-bean and several minor fruits, such as berries and nuts; and several species of Rubus, Ribes, Juglans, Pyrus and Prunus. Millet crops have been dominant components of rainfed agriculture on a regional basis in India. Millets are small grained, annual, warm weather cereals of grass family that includes 8000 species within 600 genera, of which 35 species comprising 20 genera have been domesticated.[12] Similarly, one species of rice has diversified into at least 50,000 distinct varieties, and one species of mango into over 1,000 varieties ranging from the size of a peanut to a small pumpkin.[13]

This vast diversity of plant genetic materials have been evolved, adapted and modified by Indian farmers over generations. And this was made possible by deliberate selection, planned exposure to a range of natural conditions, field-level cross-breeding, and other manipulations which Indian farmers have tried out over centuries. It is result of the ingenuity and innovative skills of India's farming communities which endowed us with this enormous biological diversity.

Over the years this unparalleled diversity of various crops of India has been eroded. The advent of the green revolution and introduction of company seeds and genetically uniformed modern varieties, heralded the process of genetic erosion and replacement of local varieties with high yielding and hybrid varieties. In other words, inter cropping was replaced by mono-cropping. Profit became the primary focus in crop selection instead of an extensive diversity of local species of crops. In this process, the great genetic diversity of crops were replaced by a narrow genetic range of crops. Local varieties of rice plant were replaced by new rice plant known as IR8, with a promise of 3-4 times more production per hectare. The majority of indigenous crop varieties, which had a special tendency to survive in adverse conditions due to low production, are no longer grown. Thousands of varieties of paddy or hundreds of varieties of pulses, millets and other coarse cereals providing diverse nutrient

[11] "State of Plant Genetic Resources for Food and Agriculture in India (1996 – 2006): A Country Report," National Bureau of Plant Genetic Resources, New Delhi, January 2007; http://www.fao.org/docrep/013/i1500e/India.pdf

[12] ibid.

[13] "Reviving Diversity in India's Agriculture," Ashish Kothari, *Seedling, GRAIN*, October 1994; https://www.grain.org/es/article/entries/514-reviving-diversity-in-india-s-agriculture

requirements and meeting farmers' diverse growing conditions have disappeared paving way for few varieties extensively grown and exclusively bred for 'higher yields'. This has landed the farmers and consumers in a sad state of perpetual dependency on the seed companies for the seed and thereby food choices. This has direct implications for farmers' income security as seed prices are growing exponentially, food and nutrition security and decision-making abilities.

According to a study conducted by FAO[14], the main cause of genetic erosion in crops is the replacement of local varieties by improved or exotic varieties and species. Besides that, genetic erosion also happens due to environmental degradation, population pressure, legislation/policy change, pests/weeds/diseases, changing agricultural systems and over-exploitation of species etc. Though there is no authentic detail of genetic erosion of traditional varieties in India, however, there are few examples. One green revolution wheat variety Sonalika, covering half the wheat growing area in North India replaced several traditional wheat varieties. Similarly, the adoption of `green revolution' rice in Andhra Pradesh led to the loss of 95% of traditional rice varieties.[15]

A large number of genetically rich rice varieties in Jeypore tract of Orissa state, rice varieties with medicinal properties, popularly called 'Njavara' in Kerala state and a wide range of millet species like Little millet *(Panicum sumatrense)*, Italian millet *(Setaria italica)*, Kodo millet *(Paspalum scrobiculatum)*, Common millet *(Panicum miliaceum)*, Barnyard millet *(Echinochloa colona)*, and Finger millet *(Eleusine coracana)* in Tamil Nadu have faded out of cultivation in their native habitats.[16] During the time of Indian independence, each region in the State of Chhattisgarh (then part of Madhya Pradesh) cultivated 19,000 rice varieties, which were quite suitable to the soil, climate and other variations. But these varieties are not in use anymore and they were replaced by a handful of high-yielding varieties of rice, which were insensitive to the local conditions. Moreover, these HYVs are depended on heavy use of fertilizers and pesticides for increased productivity. India, the home of cotton, has lost its cotton diversity and seed sovereignty after the introduction of GM cotton in India; 95% cotton seed is now Monsanto's Bt. Cotton.[17] It creates a debt cycle for farmers since they are compelled to buy cotton seed every year at a high price and also pay royalty charges, thereby increasing the input costliness. Over the last two decades, such debt traps have pushed hundreds of thousands of farmers to commit suicide and a large majority of them are from the cotton belts of India[18].

[14] "The State of the World's Plant Genetic Resources for Food and Agriculture", FAO, the United Nations, Rome, 1997

[15] "Genetic Erosion of Agrobiodiversity in India and Intellectual Property Rights: Interplay and some Key Issues," Sabuj Kumar Chaudhuri, *Patentmatics*, June 2005; http://eprints.rclis.org/7902/1/Patentmatics_June_2005.pdf

[16] "Conservation, Genetic Erosion and Early Warning System: Key Issues," V. Arunachalam, M.S. Swaminathan Research Foundation, Chennai; http://www.fao.org/wiews-archive/Prague/Paper6.jsp

[17] "Reclaiming the Seed," Vandana Shiva, *The Ecologist*, 20 August 2012; https://theecologist.org/2012/aug/20/reclaiming-seed

[18] "88 per cent of the suicides committed by farmers in 2015 happened in the seven states that grow cotton intensely". https://www.thehindubusinessline.com/specials/india-file/cotton-farmers-counting-the-losses/article9509968.ece

Chapter 2

Transformation of Seeds

Looking back at the past sixty years, we can see that the production of seeds and viability of seeds have been transformed. While prior to the Green Revolution only farmers were seed breeders, but today there are three main contributors to the Indian seed supply: farmers, public sector research institutions, and national and transnational seed companies. The entry of multinational companies in seed production and supply as well as new technologies for producing seed, seed varieties have been given a variety of names depending on who evolved it, how it was evolved and its potential for making profits.

2.1 Traditional Varieties

Small and marginal farmers in India continue to produce, save, and exchange a range of traditional native varieties, perennial and sustainable seeds which reproduce themselves indefinitely. These seeds have been developed by farmers over many years to suit their ecological, nutritional taste, medicinal, fodder, fuel and other needs. These “traditional or local or heirloom or farmer seeds” still remain a common good. These are open-pollinated varieties and they are openly available to everybody, almost free of charge. Farmers have, for millennia, studied, identified, modified, cultivated and exchanged these seeds freely in order that they may provide for themselves the best, both nutritionally, taste wise, and for other specific purposes. While performing these roles, the farmer has always been a scientific plant breeder. However, with the increasing domination of seed corporations, farmers are systematically stopped from being breeders, that is, they are excluded from seed innovation. Scientists (mainly working for private transnational interests) have exclusively taken over the breeding activities. As a result most farmers have lost the skill of seed saving.

Despite the strong presence of commercial seed sector, farm saved seeds still dominate the Indian seed market. Tradition of saving seeds, economic feasibility and ease of using local varieties have made farmers seeds the most favoured category of seed varieties among the Indian farmers. Therefore around 75 per cent of seed used in India falls in this category.

These locally available open pollinated seeds are the answer for any kind of problem related to seeds; whether it is about adapting to a changing climate or even disease and pest related problems. The local seeds not only make farmers self sufficient, leading to seed sovereignty in the region but also reduce the overall costs of inputs and keep the farmers out of the debt trap. The open pollinated seeds strengthen “seed sovereignty” and grant farmers' the right to breed, grow and exchange diverse varieties, which can be saved and which are not patented, genetically modified, owned or controlled by seed corporations.

2.2 Hybrid Seeds

Hybrid seeds are the first generation seeds (F1) produced from crossing two genetically dissimilar parent species. The progeny of the seeds cannot economically be saved or replanted, as the next generation will give much lower yield.[19]

The development of hybrids marked a new era in agriculture with the advent of newer technology that increased farmers' dependency on external seed sources. Hybridization is only one of the many breeding techniques. It does provide high-yielding varieties but so do other breeding techniques. Hybridization is also a form of biological patenting of the seed. No one else, neither the farmer nor a rival company, can produce exactly similar seeds unless they know the parent lines, which are the company's secrets. These characteristics of hybrid seeds have been fundamental to the rapid growth of seed corporations. The corporate sector in India is heavily involved in the development of hybrid seeds including seeds of maize, sorghum, rice, vegetables, and food grains.

Hybrid seeds are the result of cross-pollination, carried out for specific purposes, usually higher production and resistance to specific plant diseases or for a specific attribute such as shape or color. Hybrid crops are also more input-intensive, demanding more water or chemical inputs. They are also often highly prone to pest and diseases; and cannot produce seeds that are true to the parent plant, or may even produce sterile seeds. In other words, farmers have to buy their seeds each season. In all these respects, indigenous or traditional seeds score over hybrids.

While most hybrid plants do ensure a higher production to begin with, this is also accompanied by higher costs of cultivation, starting with the high cost of seed and including higher doses of inputs like fertilizers, pesticides and water. The effects of regular hybrid crop cultivation is felt by the soil in the long run as increased application of chemicals lead to severe deterioration of soil health. The use of hybrid seeds is therefore a major part of the "chemical-agriculture problem". Given these characteristics, we can say that hybrid seeds erode seed sovereignty because farmers have no control over them and with the increasing use of patents over these seeds, they are owned by big seed corporations.

An important concern related to hybrid seeds is that they are susceptible to poor germination, especially when they don't get the right genetic and environmental conditions such as temperature, light, and salinity. In India, cases of germination failure are widespread in hybrid maize and cotton crops. However, there is no safeguard to protect the interests of the farmers in case of crop failures, deformity or poor germination. The companies supplying hybrid seeds are under no obligation other than to replace seeds in case of failure of germination. For example, there are several instances of large-scale failure of maize crops in Bihar, first in 2002-03 when the maize crop failed in an area of

[19] Shiva, Vandana; Jafri, Afsar; Emani, Ashok; and Pandey, Manish. *Seeds of Suicide: The Ecological and Human Costs of Globalization of Agriculture*, Research Foundation for Science, Technology and Ecology, New Delhi, December 1998.

around 20,000 acres in Vaishali, East Champaran, West Champaran, Khagaria and a few other districts, where Monsanto's Cargill maize seeds worth Rs 30 crore was planted.[20] The Bihar Government had ordered a probe into the failure of the Monsanto's 'Kargil 900 M' maize crop, which was cultivated over 1.4 lakh hectares in the state. After the probe, the Bihar government suspended the supply license of Monsanto India Ltd and its dealers in the state[21]. One would assume at this juncture that Monsanto would have learned its lesson and made a course correction. On the contrary, they operated pretty much the same way. Another such tragedy with maize farmers happened in 2010, when 900 M Gold, 9081 and Pinnacle varieties of hybrid maize failed in Kosi region of Bihar and several farmers suffered heavy losses and many attempted suicide.[22] Bihar had bitter experience of private hybrids in maize in December 2009-10 as well. Around 50,000 of the 3.75 lakh hectares of land under maize cultivation in the State had been damaged.[23] When farm-saved corn seed was displaced by Monsanto's hybrid corn, the entire crop failed leading to losses to the tune of Rs. 4 billion.[24] But the private companies including Monsanto had disowned their responsibility and the State had to step in to provide assistance taking an extra burden of Rs. 61 crore.[25] Such bail-outs offered by State governments have ensured that corporations like Monsanto continue to thrive in States like Bihar even today, despite recording such high rates of germination failure. Farmers are drawn into intensive publicity campaigns on the ground that promise higher yields, while stories of widespread failures are carefully kept away from public scrutiny.

The problem of non-setting of grains was not observed in public sector hybrids. Even though Bihar had not seen farmers' suicide but with the failure of hybrid maize seeds, several maize growers committed suicide. Interestingly, instead of being penalized and prosecuted for selling spurious seeds, the industry sought more benefits in the name of making improved seed available to farmers as well as demanded to introduce crop insurance for hybrid maize seed crops.

The Indian hybrid seed market, with over 300 companies, has been growing at 15-20 per cent annually over the past several years and is projected to reach around Rs 18,000 crore by 2018. About 10 domestic and multinational companies control over 80 per cent of the market. The Indian seed industry market size has more than doubled when compared between 2009-10 and 2014-15. Within a period of five years, the market has grown from Rs.6,000 crores to Rs.13,500 crores. According to Ken Research's report, “India Seed Industry Outlook to FY'2018 - Rapid Hybridization in Vegetables,

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[20] “Seeds of Justice in Bihar,” India Environment Portal, 14 January 2015; http://www.indiaenvironmentportal.org.in/content/41884/seeds-of-justice-in-bihar/

[21] “Bihar Suspends Monsanto licence,” *Rediff.com*, 3 April 2003; http://www.rediff.com/money/2003/apr/03maize.htm

[22] “Maize Failures Drives Kosi Farmers around the Blend,” Aditya Jha, *Hindustan Times*, 12 March 2010, Patna.

[23] http://www.thehindu.com/news/national/other-states/Farmerrsquos-suicide-not-due-to-failure-of-maize-crop-Nitish/article16576993.ece

[24] One Billion is 100 crore, one million is 10 lakh, one lakh is 100,000

[25] “Seed of Contention,” Santosh Singh, Saharsa, 1 July 2011; http://indianexpress.com/article/news-archive/web/seed-of-contention/

Corn and Rice to Impel Growth", the hybrid seed market has grown at a stupendous CAGR (Compound Annual Growth Rate) of 36.1 per cent over the period FY'2007-FY'2013[26].

The Indian seed market is majorly contributed by non-vegetable seeds such as corn, cotton, paddy, wheat, sorghum, sunflower and millets. In FY'2013, the non-vegetable seeds accounted for 82.2 per cent of the overall seed market in India. Non-vegetable seed market in India is largely concentrated in cotton, contributing the largest share of 40.8 per cent. Overall, paddy, maize and vegetables are expected to drive the growth of Indian hybrid seed industry in the next five years. It is expected that better rice hybrids will be developed to give a yield advantage of at least 3-4 tonnes per hectare over the research varieties.

According to a recent study "Seed Industry in India: Market Trends, Structure, Growth, Key Players and Forecast 2018-2023", some of the growth inducing forces in India such as commercialization of agriculture, patent protection systems and intellectual rights over plant varieties have given a big boost to the seed market and as a result, the Indian seeds market is further expected to grow at a CAGR of 14.3% during 2018-2023, reaching a value of more than US$ 8 Billion by 2023[27].

2.3 Genetically Modified (GM) Seeds

Genetically Engineered or Modified (GM) seeds are those whose DNA has been modified by inserting part of DNA *(Deoxyribonucleic Acid)*[28] sequence from another organisms. This results in the organisms displaying new characteristics. The World Health Organisation defines GMOs as "Organisms in which the genetic material (DNA) has been altered in a way that does not occur naturally". The technology enables geneticists/breeders to insert genes from alien organisms into a host organism with the understanding that new traits or characteristics that hitherto did not exist in the host organism can be created. This would mean changing the way the plant grows, or making it resistant to a particular disease. Food produced using the edited crop is called GM or transgenic or Frankenstein food. For example, genes from bacteria, viruses, spiders, fish etc., have been/attempted to be, inserted into our food plants. Genetically engineered cells are then mass propagated through tissue culture methods to produce thousands of new life forms with new characteristics. For example, genes from a fish found in the Arctic Ocean have been introduced into soybean and tomato so that soybean and/or tomato plants can withstand cold and frost and also be refrigerated for long periods. The seeds produced by genetic engineering are in no way superior to farmers' varieties or even to the hybrid seeds of the Green Revolution. By their very nature they are monocultures, and are therefore highly vulnerable to diseases and pests.

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[26] http://agriculturetoday.in/img/archivies/2015/May%202015%20(2).pdf

[27] https://www.researchandmarkets.com/research/nf2gqz/seed_industry_in?w=4

[28] DNA (deoxyribonucleic acid): The chemical substance from which genes are made. DNA is a long, double-stranded helical molecule made up of nucleotides which are themselves composed of sugars, phosphates, and derivatives of the four bases adenine (A), guanine (G), cytosine (C), and thymine (T). The sequence order of the four bases in the DNA strands determines the genetic information contained.

Genetic Engineering (GE) is being done as a “cut and paste” technology that is not based on the complex regulatory networks that are at operation at the molecular level. For instance, characters like stress tolerance that GM proponents talk about are driven by almost 50 genes, whereas the current GE technology transfers at best one or two genes and that too without being able to predict where the gene will lodge in the DNA of the host plant.[29] This introduces instability in the existing host genome and induces unpredictable consequences because of this. It has to be remembered that this is a living technology which is irreversible and uncontrollable once released into the environment. That may be the reason new life forms are often called as "transgenic" - a term which conveys the sense that these seeds cross the boundaries of nature.

One of the serious issues with GM is that almost every GM technologies are combined with exclusive marketing rights in the form of Intellectual Property Rights (IPRs). Most of the GMO seeds are owned and controlled by few multinational seed companies who have proprietary control over the technologies, which creates new monopolistic hierarchies in the seed world. There is hardly any research taken up in GE without being accompanied by IPRs.

Second key concern with GM is that in GM cultivation, contamination is inevitable. In any plant population, different varieties pollinate one another by wind, insects or animals. If a farmer and his/her neighbor plant the same crop, the two populations will cross-pollinate. If a farmer plant a transgenic crop but his/her neighbor opposes GMOs and plants only traditional/local varieties, the two field crop populations will inevitably cross-pollinate and eventually, the non-GMO farmer crops will contain DNA from neighboring GMO plants (and vice versa). Genes can spread from transgenic plants by ordinary cross-pollination to non-transgenic plants of the same or similar species, and also by horizontal gene transfer (HGT) to unrelated species, e.g. bactreia, fungi and viruses in the soil. As a result, GM farmer will have introduced patented seed into his/her neighbour's non-GM field and with the help of the gene markers it can be identified that the patented gene belongs to which company. For a farmer who wish to grow non-GM crops and want to remain organic, they get penalized in two ways, their crop gets contaminated and then they are fined for stealing intellectual property rights of the seed company who have sold the patented GM seeds. In this crazy patent system, companies like Monsanto gets paid for contaminating non-GM fields rather than being held liable for contaminating non-GM/ organic field. There are hundreds of such cases of contamination in USA, Canada, Argentina where Non-GM fields got contaminated by neighboring GM fields, which resulted in multiple court cases[30], including the famous case called Monsanto Canada Inc. Vs. Percy Schmeiser of Saskatchewan province in Canada. In this case Monsanto seeds from a neighboring farm accidentally mixed with crop in Percy's farm. He accidentally replanted seeds from those plants, claiming the seed was his

[29] “Can Transgenics (GM) and Organic Farming Co-exist in India?,” Alliance for Sustainable and Holistic Agriculture (ASHA); August 2014.

[30] “Seed Giants Vs. U.S. Farmers,” A Report by the Center for Food Safety and Save Our Seeds, 2013; https://www.centerforfoodsafety.org/files/seed-giants_final_04424.pdf

because it was grown on his land. The case was heard in the Canada's Supreme Court, which ruled in favour of Monsanto, citing Percy's intentional decision to replant the seed he had saved.

Genetically modified crops are grown in 28 nations around the world, while nearly thirty-nine (39) countries have officially banned the cultivation of GMO crops on health and environmental grounds[31]. GMO bans received considerable attention in 2015, when a majority of the European Union nations decided to ban the growth of GMOs within their borders and Russia issued a ban on both cultivation and imports.

The 2017 GM industry figures indicate that 50% of the total area under genetically engineered crops are soybean; corn (maize) represents 31%; cotton is 13%; and canola (rapeseeds) is 5%. Apart from a few virus-resistant or drought resistant GE varieties, herbicides tolerance and insect resistance (the Bt. trait) are the two traits that dominate the field of genetically engineered seeds. Approximately 47% of the crops are engineered for herbicide tolerance, with another 41% for stacked traits (herbicide tolerance coupled with other traits), usually including herbicide tolerance. 12% are insect resistant using the Bt. trait[32].

2.3.(a) Herbicide Tolerance GM Seeds

More than eighty per cent of GE plants worldwide carried the herbicide tolerance trait and the remaining carried the Bt. trait. The Biotechnology industry, which owns both these traits, is therefore very keen to promote them as much as possible. Herbicides are chemicals, which are used to kill unwanted plants or 'weeds'. Herbicide tolerant crops contain a gene that makes them resistant to the herbicide that is sprayed to kill herbs and weeds. It is important to note that weeds that are considered a nuisance in the monoculture agricultural systems of industrial nations have several useful functions critical to the well being of rural communities. Weeds are largely nutritious leafy greens used as vegetables, have medicinal properties and are valued source of nutrition in the family's diet.

Herbicides constitute 48.7% of the world pesticides market, followed by insecticides (24.3%), fungicides (23.6%) and others (3.5%). In India, insecticides continue to be the largest used pesticides in agriculture, with 20% of the pesticides being herbicides/weedicides. The most commonly used herbicides are: 2,4-D, atrazine, glyphosate, glufosinate ammonium, paraquat, pendimethalin, dicamba, fluroxypyr, metalochlor etc. In India, Isoproturon, butachlor, fluchloralin, paraquat etc., are the most consumed herbicides. Glyphosate, especially under the brand name of Roundup from Monsanto is the widest-selling herbicide especially in a country like the USA. It is a broad spectrum, non-selective, systemic herbicide. Some reports suggest that glyphosate products constitute 60% of the world's non-selective herbicides market[33].

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[31] https://sustainablepulse.com/2015/10/22/gm-crops-now-banned-in-36-countries-worldwide-sustainable-pulse-research/#.W_mZe5MzZ0s

[32] http://www.isaaa.org/resources/publications/briefs/53/download/isaaa-brief-53-2017.pdf

The seed corporations that owns the herbicide tolerant crops are also the ones that own the herbicide. Hence, the company promoting herbicide tolerant crops makes a double profit, one through the sale of the herbicide itself, and two, on the sale of the crop varieties which are tolerant to that proprietary herbicide.

It is important to note that this technology is of herbicide-tolerance (HT) and not herbicide-resistance. This would mean that the HT GM plant develops the capability of withstanding/ assimilating the herbicide without getting destroyed. For instance, in Roundup Ready (RR) GM crops (the brand name for Monsanto's[34] trait of herbicide tolerance, for a plant to withstand Monsanto's brand of glyphosate), a gene from an agrobacterium strain CP4 (CP4 EPSPS), that is resistant to glyphosate is inserted. This gene encodes for a version of an enzyme called EPSPS that is highly tolerant to inhibition by glyphosate, which in turn works by specifically binding to and inactivating EPSPS enzyme (this enzyme is important in the biosynthesis of certain aromatic aminoe acids which are essential for a plant's survival).

Glyphosate has been promoted as 'safe'. However, mounting scientific evidence questions the safety of glyphosate and its most well known formulation, Roundup. It is now an open secret that glyphosate-based products can have adverse impacts on human and animal health. On 20 March 2015, the World Health Organisation's (WHO) cancer arm, International Agency on Cancer Research (IACR) released a report[35], which reinforced the long-held belief about the causative role played by herbicides in serious diseases. The report mentions herbicide glyphosate and insecticide malathion as carcinogenic. The Indian Institute of Toxicology Research also echoes these findings. As a part of the report, IACR has issued an advisory to various Governments and concerned regulatory organisations across the world to design suitable legislation in the light of the new findings. The IACR report is alarming since glyphosate is the most produced weed killer in the world. First introduced in the 1970s, under the brand Roundup, glyphosate is now manufactured generically.

In October 2017, there was another report published in the medical Journal of the American Medical Association (JAMA) which suggested that glyphosate is not only getting into human bodies, but has been doing so at increasing levels for decades. According to the study, there is emerging evidence that long-term exposure to glyphosate causes cancer[36].

The carcinogenic effect of Monsanto's herbicide glyphosate was validated in a landmark judgment on

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[33] "Briefing Paper on Herbicide Tolerant GM Crops (India)," Coalition for GM Free India, January 2011

[34] In 2017, Monsanto was bought over by Bayer AG of Germany for an estimated cash deal of $66 billion US dollars.

[35] "Herbicides that weed out humans," Kota Sriraj, *The Pioneer*, 26 March 2015; http://www.dailypioneer.com/columnists/oped/herbicides-that-weed-out-humans.html

[36] "Glyphosate, main ingredient in India's widely-used weedkiller, may cause cancer," *Times Now News*, 28 October 2017; https://www.timesnownews.com/health/article/glyphosate-main-ingredient-in-india%E2%80%99s-widely-used-weedkiller-may-cause-cancer/114338

10th August 2018 at the San Francisco's Superior Court of California where the jury found Monsanto liable in a lawsuit filed by a school groundskeeper, Dewayne Johnson, who alleged the company's glyphosate-based weed-killers, including Roundup, caused his cancer and ordered the company to pay $289 million in damages. Monsanto, now a unit of Bayer AG following a $62.5 billion acquisition by the German conglomerate, faces more than 5,000 similar lawsuits across the US. The California Court jury deliberated on this case for three days before finding that Monsanto had failed to warn Johnson and other consumers of the cancer risks posed by its weed killers. It awarded $39 million in compensatory and $250 million in punitive damages[37]. Johnson's case was filed in 2016 when he alleged that his non-Hodgkin's lymphoma, a cancer of the lymph system, was caused by Roundup and Ranger Pro, another Monsanto glyphosate herbicide. Brent Wisner, a lawyer for Johnson, in a statement said jurors (read jury) for the first time had seen internal company documents "proving that Monsanto has known for decades that glyphosate and specifically Roundup could cause cancer."

Herbicide tolerance was developed for industrial agriculture with its large farms and labour-starved conditions, where weed control was possible only by using chemical herbicides. In India, weeds are controlled manually. Weeding is a source of income, especially for women, in rural areas. Thus, herbicide tolerance trait is essentially a labour saving and hence a labour-displacing trait. The Government of India Taskforce[38], headed by Dr. MS Swaminathan, on Biodiversity and Genetically Modified Organisms (GMOs) in its report submitted in 2004, stated that India should not permit herbicide-tolerant, genetically modified crops as they would lead to a loss in employment in the agriculture sector, especially for women whose survival depends on manual weeding.

In India, in last ten years there were several cases of illegal planting of the herbicide tolerant (HT) genetically engineered crops, especially maize[39], soyabean[40] and cotton[41]. On 12th November 2013, the GM Free India campaign wrote a letter to then Union Minister for Environment and Forests[42], Smt. Jayanthi Natarajan, seeking her urgent intervention and action to curb the illegal spread of the unapproved herbicide tolerant GM cotton. That letter indicates that it was not the first time that the matter of illegal HT cotton has been brought to the attention of the GEAC (Genetic Engineering Appraisal Committee). In 2009, on a complaint lodged by Ms Aruna Rodrigues (the lead petitioner in

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[37] "Monsanto fined $289 million in world's first Roundup cancer trial", *Live Mint*, 11 August 2018; https://www.livemint.com/Companies/INzYDS5ZxK5eo0M9rdChaI/Monsanto-fined-289-million-in-worlds-first-Roundup-cancer.html

[38] "Recommendations of the Task Force on Biodiversity & Genetically Modified Organisms (GMOS) for the Environment & Forests Eleventh Five Year Plan (2007-2012)," Planning Commission, New Delhi; http://planningcommission.nic.in/aboutus/committee/wrkgrp11/tf11_biodiv.pdf

[39] "Monsanto conducted trials of GM maize without approval, reveals RTI reply," Jyotika Sood, *Down to Earth*, 4 July 2015; https://www.downtoearth. org.in/news/monsanto-conducted-trials-of-gm-maize-without-approval-reveals-rti-reply-35916

[40] "Illegal GM Soybean: Farmers' body demands CBI probe into GEAC inaction," Jitendra, *Down to Earth,* 9 March 2018; https://www.downtoearth.org.in/ news/agriculture/illegal-gm-soybean-farmers-body-demands-cbi-probe-into-geac-inaction-59850

[41] "Illegal GM cotton spreads across India," Latha Jishnu, *Down to Earth,* 17 August 2015; https://www.downtoearth.org.in/news/illegal-gm-cotton-spreads-across-india-41147

[42] GEAC (Genetic Engineering Approval Committee), the national regulatory body which gives clears GM crops in India comes under the Union Ministry for Environment and Forests, which is renamed as Ministry of Environment, Forests and Climate Change.

the Supreme Court PIL on GMOs), the GEAC discussed the issue and confirmed that illegal HT cotton cultivation is indeed happening in at least three states (Andhra Pradesh, Gujarat and Madhya Pradesh). In that meeting, it was also reported that in at least one instance in Andhra Pradesh, the crop was destroyed and license suspended for one supplier.

In October 2017, the Bhartiya Kisan Sangh (BKS) from Gujarat wrote to the Chairman of the GEAC complaining against the illegal cultivation of HT soya in the state. When no action was taken by the GEAC, in March 2018, they demanded CBI probe against biosafety regulatory body GEAC and a case of treason against its officials. They also demanded ban on Glyphosate because they claim that it is carcinogenic. In October 2017, the Gujarat government had also detected HT Soybean crops and registered police complaint against seed sellers and farmers too. It has been said that HT soya seeds have been illegally supplied to farmers of Gujarat, Maharashtra and Telangana. Laboratory tests, which were also conducted by the Gujarat government, confirmed that these were indeed GM HT Soya, which have not been granted permission for field trials, let alone large-scale cultivation.

The illegal spread of HT crops must be treated as serious assaults on the health of consumers, life and livelihoods of farmers, destruction of biodiversity and agro-diversity and deliberate violation of our national laws. Glyphosate must be banned immediately. Without glyphosate sale there is no incentive to promote or use a herbicide crop tolerant to it. In 2018, in order to prevent the indiscriminate use of herbicide, three states, Andhra Pardesh, Telengana and Maharashtra, restricted the use of glyphosate to curb illegal cultivation of genetically modified herbicide-tolerant crops. According to the state governments order, the herbicides cannot be used in any of the crops in the Kharif season, i.e. June to November and the approval of the Central Insecticides Board & Registration Committee is mandatory to recommend/procure/store/use any agro chemical, as per the Insecticide Act, 1968.

2.3.(b) Insect Resistance (Bt. Trait) GM Seeds

Bt. draws its name from the soil bacterium *Bacillus thuringiensis* (Bt.).

Many subspecies of *Bacillus thuringiensis* are found in soils and are in general known to be toxic to various genera of insects. Farmers and gardeners have used natural Bt. as an insecticide for ages to control insects. In the 1980s, biotechnology companies identified the Bt. gene that has insecticidal properties. They synthesized this gene, and inserted it in crops, as in-built pesticide, so that the plant produces toxins throughout most of its life. When an insect feeds on a crop with this Bt. gene, the Bt. toxin disrupts its digestive system and kills it.

The *Bacillus thuringiensis* strains produce three types of insecticidal toxins, crystal *(Cry)* toxins, cytolytic *(Cyt)* toxins and vegetatively expressed insecticidal proteins *(vip).* These toxins are highly specific to certain insect species. Thus far until September 2012, a total of 229 cry toxins *(Cry1Aa* to *Cry72Aa)*, 11 cyt toxins *(cyt1Aa* to *cyt3Aa)* and 102 vip toxins *(vip1Aa1* to *vip4Aa1)* have been discovered. A total number of 342 Bt. toxin genes are available for research to develop insect resistant

GM crops[43]. The Bt. gene *cry1Ac* was used to develop the first Bt. cotton variety.

The genetically engineered Bt. crops are being offered as a sustainable pest control strategy. However, the Bt. crops are neither ecological nor sustainable. They are not ecological because internalising toxin production in plants is not a toxic free strategy — it merely makes toxics internal to plants rather than applied externally. The ecological impacts of this strategy of internalising toxics have not been looked at, though there are several studies, which indicates that genetically engineered Bt. is harmful to beneficial insects such as bees and ladybirds. The Bt. crop strategy is not a sustainable method for pest control either because Bt. plants releases toxins continuously. Constant long-term exposure of pest populations to Bt. encourages survival of individual pests that are genetically resistant to the toxin.

On 26th March 2002, Bt. cotton was officially approved for commercial cultivation in India by the GEAC, and within ten years by 2012, there were 1128 Bt. cotton hybrids available in the Indian markets, developed by 40 seed companies[44]. And the Bt. cotton varieties not only replaced the local or traditional cotton varieties but the non-Bt. cotton hybrids got wiped out from the market. In India which used to have more than 4700 varieties of desi/traditional (G.arboretum, G.herbaceum and G.barbadense) cotton, 95% of these local cotton varieties are almost extinct today. Infact the Status Paper on Indian Cotton (January 2017) by the Directorate of Cotton Development (Nagpur), Government of India, clearly indicate that after the introduction of Bt. hybrids for commercial cultivation in the year 2002-03, the composition of cultivation of species drastically changed. Presently, all the cotton in India is under *G.hirsutum* (American Cotton) group (>95%, 2012) leaving only <5% under *G.Arboretum*, *G.Herbaceum* and *G. Barbadense*[45]. This will be the case with any other Bt. crop once they are commercialised whether it is Bt. Brinjal or Bt. Mustard or any other crops especially in a tropical country like India, which is rich in agro-biodiversity. The table below shows how Desi cotton varieties disappeared after the introduction of Bt. cotton in India.

Table 1: Species wise percentage of cotton in India

Cotton Species	% in 1980	% in 1990	% in 2000	% in 2008	% in 2012
G. hirsutum	54	48	69	90	96
G. arboreum	20	30	17	4	3
G. herbaceum	14	12	11	5	1
G. barbadense	11	10	3	1	Negligible

Source: Status Paper on Indian Cotton (2017) National Food Security Mission, Govt of India; https://www.nfsm.gov.in/StatusPaper/Cotton2016.pdf

[43] Kranthi, KR. *Bt Cotton - Question and Answer*; Indian Society for Cotton Improvement (ISCI), Mumbai, 2012 [44] ibid,

[45] "Status Paper of Indian Cotton," Directorate of Cotton Development, Government of India, Nagpur, January 2017; https://www.nfsm.gov.in/StatusPaper/Cotton2016.pdf

Within few years of introduction, the target pest pink bollworm, developed resistance to the Bollgard-1 (BG1) variety, the Bt. cotton seed which was introduced with *Cry1Ac* gene in it. Infact the *Cry1Ac* is suppose to be most toxic to American bollworm *Helicoverpa armigera*, spotted bollworm *Earias vittella* & the pink bollworm, *Pectinophora gossypiella*. However on 5th March 2010, Monsanto reported to the GEAC that the pink bollworm has developed resistance to its Bt. cotton variety Bollgard-1, in Amreli, Bhavnagar, Junagarh and Rajkot districts in Gujarat[46]. "The bollworm is bound to develop resistance to the Bt. toxin in about 10 generations of crop," said Dr. Keshav Kranthi.[47] Pink bollworm developed resistance to Bollgard-I in 2008 and Bollgard-II in 2012.[48] However, scientists at the Central Institute of Cotton Research (CICR) in Nagpur dismissed Monsanto's claim as a gimmick to promote its more expensive 2nd generation Bt. cotton variety, Bollgard-2, which was already introduced in the market with two Bt. genes in it, *Cry1Ac* and *Cry2Ab*. Monsanto in its statement to the GEAC had said that, "resistance to pest is natural and expected". After Bollgard-1 failed, Monsanto started advising farmers to buy Bollgard-2. This means that as pests eventually develop resistance to Bt. cotton, Indian farmers are being advised to use more pesticides or forced to buy new and expensive brands of GM seeds.

Fortunately the commercial release of Bt. Brinjal was blocked on 9th February 2010, through an indefinite moratorium, otherwise the Bt. Brinjal, which was developed with *Cry1Ac* gene, would have seen the similar pattern. The impact would have been much worse because it would have been the first transgenic food crop released for commercial cultivation in India. Later the Bollgard-2 also proved ineffective to control Bollworm.

The Cotton Association of India[49] in its July 2018, Issue 16 of *Cotton Statistics & News* said that in last three years, "reports have emerged of the pink bollworm becoming immune to Bollgard II in India…Even though Bollgard-2, or BG-2, Monsanto's second generation insecticidal technology for cotton, was supposed to protect crops against the pink bollworm, the pest has grown resistant to the toxins produced by this trait. As a result, farmers now spend more on pesticides to control infestations. This, along with the high cost of Bt. seeds, is driving farmers to indigence." A recent study published in Society of Chemical Industry (2018)[50] and funded by Mahyco establishes that proportion of pink bollworm on green bolls of Bt. cotton plants in Central Indian states rose from 8.06 % in 2010 to 73.82 % in Bollgard-1 and 5.71% in 2010 to 64.43% in Bollagrd-2. In a startling revelation, MS

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[46] "Bt cotton has failed admits Monsanto," Dinesh C Sharma, *India Today*, New Delhi, 6 March 2010; https://www.indiatoday.in/india/north/story/bt-cotton-has-failed-admits-monsanto-68749-2010-03-06

[47] https://www.scidev.net/global/biotechnology/feature/gm-in-india-the-battle-over-bt-cotton.html

[48] https://economictimes.indiatimes.com/news/science/non-compliance-of-guidelines-led-to-resistance-of-cotton-pest/articleshow/58923292.cms

[49] http://www.caionline.in/site/publications

[50] Naik, Vakudavath CB; Kumbhare, Sujit; Kranthi, Sandhya; Satijaa, Usha and Kranthia, Keshav R; "Field-evolved resistance of pink bollworm, Pectinophora gossypiella (Saunders) (Lepidoptera: Gelechiidae), to transgenic Bacillus thuringiensis (Bt) cotton expressing crystal 1Ac (Cry1Ac) and Cry2Ab in India"; *Society of Chemical Industry*, 26 April 2018

Swaminathan, the Father of Green Revolution in India and a big supporter of genetic engineering, in his recent article published in Current Science[51] quotes Keshav Kranthi [former Director of Central Institute for Cotton Research (CICR)] who had said "Bt. cotton was supposed to have conferred two major benefits to cotton production: (a) high yields due to effective protection of bolls from bollworm damage and (b) reduction in insecticides recommended on bollworm control. Official data show that none of these promises was kept in the past ten years in India". The article by Kesavan and Swaminathan further says that "there is no doubt that GE Bt. cotton has failed in India: it has failed as a sustainable agriculture technology and has therefore also failed to provide livelihood security of cotton farmers who are mainly resource-poor, small and marginal farmers."

The Coalition of GM Free India in its study[52] on "15 Years of Bt. Cotton in India" says Bt. cotton was a failure because it failed to contain the use of pesticides. Rather it led to increase in cost of production. According to the data from the Ministry of Agriculture and Farmers' Welfare (from their Directorate of Economics and Statistics), in 2002 when Bt. cotton was approved, the cost of cultivation of cotton was just Rs.20,603/- per hectare but in 2013 it increased to Rs.72434/- per hectare. The use of chemical fertilizer increased five times, from Rs.1621 per hectare in 2002 to Rs.8246/- per hectare in 2013. The cost of production of one quintal of cotton in India rose from Rs. 2220/- in 2002 to Rs. 3893/- by 2013. Overall, cost of production increased by 2.7 times between 2006 (when Bt cotton's real expansion began) and 2013, while yields were stagnant. The data from the Comprehensive Scheme (Directorate of Economics and Statistics, Ministry of Agriculture) also shows that the insecticide usage was 0.88 kilos per hectare in 2002 when Bt. cotton was introduced, but in 2013 the pesticide usage touched 0.97 kg/ha.

The Coalition also cites a study by the University of California (Berkeley, 2015)[53] which found that annual suicide rates of farmers in rainfed areas are directly related to increase in Bt. cotton adoption. The study also found that farmers were driven to suicide from increased costs of not being able to save seeds, increased chemical inputs and inadequate access to agronomic information. Even the Union of India in its counter affidavit in the Delhi High Court[54] (in WPCC) No. 12069 of 2015, has correlated farmer suicides with the failure of Bt. cotton.

In the last fifteen years of Bt. cotton cultivation in India, there were several instances of crop failure. Most recently there was large scale failure of Bt. cotton in over 56,000 hectares in seven districts of Karnataka in 2014 where the state government had to pay around Rs.35 crore to farmers while

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[51] Kesavan P.C., and Swaminathan, M.S., "Modern Technologies for Sustainable Food and Nutrition Security"; *Current Science*, Vol. 115, No. 10, 25 November 2018; http://www.currentscience.ac.in/Volumes/115/10/1876.pdf

[52] http://indiagminfo.org/wp-content/uploads/2017/06/15-yrs-of-Bt-Cotton-in-India.pdf

[53] Gutierrez AP, Ponti L, Herren HR, Baumgärtner, J, Kenmore PE (2015): "Deconstructing Indian cotton: weather, yields, and suicides". Environmental Sciences Europe 2015; https://enveurope.springeropen.com/articles/10.1186/s12302-015-0043-8

[54] See Footnote 47.

Maharashtra Hybrid Seeds Company Private Limited (Mahyco) which is partly (26%) owned by Monsanto refused to take any liability.[55] In 2015, two third of the cotton crop was destroyed in Haryana and Punjab due to sucking pest attack (whitefly). In 2017, Bt. cotton failed in almost whole of Maharashtra and according to Vijay Kumar, Principal Secretary in the Maharashtra Agriculture Department, "around 80% of the cotton-growing area is affected by pink bollworms".[56]

With the increasing cases of large scale failure of Bt. cotton, especially in controlling Bollworm, as well as failure of Monsanto to own the responsibility of failure of their technology (since Bt. is a Monsanto's proprietary technology), the government of India in March 2016, decided to protect farmers' right to affordable and reliable seed and capped the price of BG-2 seeds at Rs.800 per 450 gm pack (it had been selling at Rs.830 to Rs.1000 in different states) and also reduced the royalty amount paid to Monsanto at Rs.49 per packet, compared to Rs.184 earlier. GM seeds are four to five times more expensive than normal certified seed because they carry exorbitantly high trait value and hence farmers have to pay royalty on each packet of Bt. cotton seeds because they are patented property of multinational companies like Monsanto.

On 11th April 2018, on the issue of license fees, the Delhi High Court ruled that Monsanto's patent for the Bt. cotton (Bollgard-2) seed was not valid under Section 3J of the Patent Act 1970 which does exempt seeds and plants from patentability. Monsanto can avail a different kind of Intellectual Property Rights (IPR) protection, a registration under a separate law called the Protection of Plant Variety and Farmers' Rights (PPVFR) Act 2001. Under PPVFR, the company will receive a trait fee fixed by the PPVFR Authority, but it can no longer negotiate licensing agreements with local seeds companies who have to pay to Monsanto to produce and market Bt. cotton, ever since Monsanto-Mahyco have introduced the GM trait (Bt cotton) in India.

Kesavan and Swaminathan argue in their recent paper in *Current Science* that both genetically engineered herbicide tolerant (HT) and Bt. crop have proven to be unsustainable agricultural technologies. These technologies have not decreased the need for toxic chemical pesticides, which was the reason for them in the first place. The paper says, "the Technical Expert Committee (TEC) appointed by the Supreme Court of India recommended a total ban on HT crops. Now, in view of the unsustainability and failure of Bt. cotton in the country, and the rising health concerns associated with Bt. crops, the recommended indefinite moratorium of the TEC in its final report on Bt. crops (2013), must now, like HT crops, translate into a ban on Bt. crops as well (apart from Bt. cotton)".

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[55] "Fly in the face of Bt cotton," Saurabh Yadav, *Hindu Business Line*, 6 May 2016; http://www.thehindubusinessline.com/blink/know/fly-in-the-face-of-bt-cotton/article8561303.ece

[56] "These two issues could put the brakes on the Bt cotton story," G Seetharaman, 21 January 2018; https://economictimes.indiatimes.com/news/economy/agriculture/the-brakes-are-applied-on-the-bt-cotton-story/articleshow/62583116.cms

Chapter 3

Seeds and IPR's Systems: Monopolizing Agriculture

The Intellectual Property Rights (IPRs) over seeds is yet another attempts to further privatize the seed system in order to interrupt farmers' ability to regenerate their own seed. IPR is a ploy to turn a 'common resource' into something that must be bought every year. The green revolution technologies, hybridization and entry of private sector in the seed business at the cost of the public seed supply system were among the earlier attempts towards privatizing agriculture and forcing farmers to be dependent on external inputs. The main objective of introducing IPR system on seeds was to stop farmers from saving, exchanging and re-sowing seeds and make them an illegal activity under the law. The IPR systems, especially patents, became an important tool for giant seed corporations to monopolize seeds. They do so by investing heavily into research and development of new variety of seeds, while the public institutions were made to starve for funds.

The IPR monopolies, as we see in the case of Bt. Cotton, compel the farmers to be dependent on patented seeds that they need to buy every year at higher prices including royalties. Such a system eventually pushes the input cost and trap the small scale and marginal farmers in a cycle of debt.

The seed corporations want every farmer in the world to buy their seeds in every season so that they can collect royalties and earn super profits. Despite that, millions of farmers in India still follow the tradition of informal innovation and experimentation. They continue to develop, preserve and propagate their varieties. Even today a large farming population in India prefer farmers' varieties and use farm-saved seeds year after year, which are nobody's patents.

However the IPRs system recognized only those inventions in the field of agriculture, which are being done in the laboratories and research stations and is biased against the informal innovations done by farmers and local communities in their field.

Infact these informal innovations and experimentation by local communities and farmers who have developed, preserved and propagated genetic resources and safeguarded the tremendous biodiversity because the genetic resources found within the national boundaries of gene rich sovereign nations was always considered as the common heritage of man kind. The conventional breeders and seed industry use these genetic resources as raw material for plant breeding, but the rural communities who preserve and conserve them do not get anything in return.

This bias has roots in a bunch of resolutions and conventions that came about in the 80s and 90s , some of which are listed below;

In 1983, the United Nations Food and Agriculture Organisation (UNFAO) adopted a resolution called as the International Undertaking on Plant Genetic Resources, which recognized “that plant genetic

resources are a common heritage of mankind and should be available without restriction". Common heritage meant free access.

However, in 1989 the FAO Undertaking was modified and it recognized the breeders' rights as well as farmers' rights. In this Undertaking, farmers rights evolved to also include recognition of the informal innovation by farmers and compensation or royalty in return for their utilization by breeders for scientific breeding. With regard to the Breeders Rights it stated that rights as provided under International Union for the Protection of New Varieties of Plants (UPOV) Convention are compatible with the International Undertaking.

In 1991, in another important development regarding the ownership of genetic resources, the FAO Conference recognized that "nations have sovereign rights over their plant genetic resources".

The United Nations Convention on Biological Diversity (CBD) signed at the Rio de Janeiro Earth Summit in June 1992, also acknowledged the sovereignty of nations over the biodiversity found in their territories.

In less than a decade, the position on the ownership of plant genetic resources changed from being a common heritage to national sovereignty. This was a significant move because in the regime of patent and biotechnology, the principle of common heritage for genetic resources cannot survive.

There are mainly two kinds of IPR systems that are being used to protect innovations in field of agriculture and seeds, which include Patents as well as Plant Variety Protection (or Breeders Rights). Many countries (like Canada and European countries) allow producers to protect their innovations only under Plant Varieties Protection (PVP) while there are countries (like USA, Japan, Australia) which allow Patent and PVP to coexist. Like any IPR, both patents and PVP provide exclusive monopoly rights over a creation, for commercial purposes over a period of time. A patent is a monopoly granted to an inventor to prevent all others from making, using, and/or selling or distributing the patented product for 15 to 20 years and after the lapse of this period the product goes into the public domain. The criteria for a patent are novelty, inventiveness (non-obviousness), utility, and reproducibility. A patent is granted by the legal system, be it under national law (such as the Indian Patent Act) or regional law (such as the European Patent Convention). Although patents were designed for industrial application, with biotechnology, patent offices now grant patents on microorganisms and, in some countries, on all life forms. A patent prevents the producer from saving and exchanging seeds, and making it a private commodity, thus undermining the farmers' right on seeds. Most of the GM seeds, which are produced by TNC's are patented, which means farmers are under compulsion to buy seeds every season.

On the other hand, PVP gives patent-like rights to plant breeders. What gets protected under PVP is the genetic makeup of a specific plant variety. PVP refers to the protection provided legally to a

breeder, originator or owner of a variety to control its production and marketing. The criteria for protection under PVP include: novelty, distinctiveness, uniformity, and stability. PVP laws can provide exemptions for breeders, allowing them to use protected varieties for further breeding, and for farmers, allowing them to save seeds from their harvest. Because of these exemptions, PVP is considered as a weaker sister of patenting. But in last few years, the PVP laws have been made as stringent as patents by removing exemptions for farmers and breeders.

In India, the history of IPR system began during the British period with the Act VI of 1856 and its objective was to encourage inventions of new and useful manufactures and to induce inventors to disclose secret of their inventions. Then came the Indian Patents and Designs Act, 1911, (Act II of 1911) which replaced all the previous patent and designs Acts but even this Act was further repealed and replaced by the Indian Patent Act 1970. However after the establishment of the World Trade Organisation (WTO) on 1st January 1995, the agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS) became the base for all international law on the subject of Intellectual Property. The Patent Act of 1970 was further amended under the obligation of TRIPS and one significant change was introduced which provided for filing of applications for product patents in the areas of drugs, pharmaceuticals and agro-chemicals. Another significant change was that TRIPS demanded for IPRs even on plant varieties. Prior to becoming a member of the WTO, India neither allowed IPR on seed nor on agro-chemicals.

3.1 Seeds and Convention on the Protection of New Varieties of Plants (UPOV)

Article 27.3(b) of the TRIPS Agreement allows WTO members to exclude some kind of inventions from patenting i.e. "plants, animals and “essentially” biological processes (but micro-organisms, and non-biological and microbiological processes have to be eligible for patents). However, plant varieties have to be eligible for protection either by patents or by an effective *sui generis* system or by a combination of the two". In other words, TRIPS Agreement excludes plants and animals from patentability but includes “micro-organisms” and “micro biological processes” within the purview of patents. Microorganism refers to very small form of life like bacteria, viruses and even genes. In genetic engineering it is possible to shift genes from microorganisms to plants and animals and vice versa, and it is possible to make what are called as transgenic plants and animals. These transgenic plants and animals attract provisions of TRIPS even though there is no *de jure* patents for plants and animals.

Secondly, the WTO did not define what constitutes "an effective *sui generis* system". A Sui Generis implies that it is up to the individual member countries to design their own system of protection for plant varieties in their country, keeping in view their specific socio-economic conditions. Here the key term is “effective” and the only model that is recognized as effective at the international level by the

developed countries is the system of Plant Breeder Rights (PBRs) as codified in the Convention on the Protection of New Varieties of Plants (UPOV) established in Geneva in 1961 and amended in 1972, 1978 and 1991. The developing world is being forced to adopt the UPOV model, rather than the *sui generis* option, which a country can evolve on their own. The seed industry have also aggressively promoted the UPOV model as the only appropriate system of *sui generis* protection because the UPOV system does not serve either biodiversity or the farmers of the developing world. Instead, it gives monopoly market to breeders of new varieties.

Since the last two decades, India has been under enormous pressure to join the UPOV. On 31 May 2002 the Indian Cabinet approved the government's decision to seek accession to the UPOV 1978 Convention. It is important to point out here that since 1998, when UPOV 1991 entered into force, new parties to the Convention must adhere to the 1991 version, rather than that of 1978. Yet, UPOV bent its own regulations [Article 37(3) UPOV 1991][57] by allowing India to join 1978 because by encouraging India, a large developing country with major public and private plant breeding sectors, to join UPOV, other Asian countries would follow suit rather than try and introduce their own *sui generis* legislation. The reluctance of Asian countries to join the UPOV is clearly demonstrated as to date only five Asian countries (China, Japan, Vietnam, Singapore and the Republic of Korea) are members of the UPOV. India has not joined UPOV till today.

If India or any other country wants to join UPOV, it may only join the UPOV 1991 Convention. However, countries seeking to implement the provisions of the TRIPS Agreement pertaining to plant variety protection may use UPOV 1978 as a model, but it will not entitle them to membership of UPOV. Secondly, original UPOV members are not bound by the 1991 Convention and they may decide to remain bound by the previous Convention models, and as a result 17 countries are still bound by the 1978 Convention including China and New Zealand. Belgium is the only country that remains bound by the 1961/1972 Convention. There are, so far, 75 members of UPOV and 57 of them are bound by the 1991 model, including some of the members of the Mega FTA, RCEP, which include Australia, Japan, South Korea, Singapore, Vietnam.

3.2 What is UPOV 1991?

Under the UPOV 1991, a much higher level of protection is provided to breeders. Through successive revisions of the Convention in 1978 and 1991, the rights granted to breeders have become more and more similar to those granted under the patent system. So in 1991 Act, while breeders get exclusive commercial control over the reproductive material of their varieties and the right to enforce licenses, farmers planting PVP varieties are prohibited from saving seeds for replanting except under highly

[57] [Closing of the 1978 Act] No instrument of accession to the Act of 1978 may be deposited after the entry into force of this Convention according to paragraph (1)... https://www.upov.int/export/sites/upov/upovlex/en/conventions/1991/pdf/act1991.pdf

restricted conditions. Thus it does not provide for the protection of farmers' rights. And increasingly in many countries practicing PVP, the right of the breeder extends to the farmers' harvest and the direct products of that harvest.

Table 2: Comparison between UPOV 1978 and UPOV 1991

Criteria	UPOV 1978	UPOV 1991
Requirements	. Distinctiveness · Uniformity · Stability	Novelty Distinctiveness Uniformity Stability
Seed Saving	Allowed for private and non-commercial use	For use on own holding only (but for listed crops only) and if government permit legally
Seed Exchange	Allowed for non-commercial use	Not allowed without consent of right holder
Breeder's Exemption	Use in breeding allowed	Use in breeding allowed [but sharing rights in case of essentially derived varieties (EDVs)]
Duration of Monopoly Rights	15 yrs. from application date (18 yrs. for trees and vines)	20 years from application date (25 years for trees and vines)
Double Protection with Patents	No	Yes

Though some of the IPR protection criteria for UPOV 1978 and 1991 are same, but UPOV '91 model for the protection of plant varieties is fundamentally different from its older versions because the rights of conventional breeders was dramatically expanded, going far beyond seed multiplication and in several respects being very close to a patent. It is important to highlight the difference for the sake of understanding the significance of the Plant Varieties Protection and Farmers Rights Act, 2001, which the Indian government had enacted under the obligation of TRIPS Agreement but also to analyse the dangers of the patents on seeds and plant varieties, which the 1991 UPOV model would bring in, if India decide to join UPOV 1991.

Under UPOV 1978, a breeder is entitled to protection through being the "discoverer" of the new plant variety, whereas under the 1991 Act, mere discovery is not sufficient. The 1991 Convention added the criteria of novelty, in the sense that the varieties are NEW and that they have not been previously commercialized or sold prior to the UPOV application being submitted [subject to the grace period outlined in Article 6(1b)].

UPOV 1978 allows farmers privileges and does not prohibit the practice of saving and exchanging part of their harvest from protected varieties for planting as seeds in the next season. UPOV 1991 restricts this right of farmers to freely use their farm-saved seeds or propagating material for further cultivation. Only as an optional exception can a government legalize seed saving for the farmer's own use – but still the breeder/company commercial interest has to be protected and the farmer has to pay legitimate royalties to the breeder/company. Article 15.2 of UPOV 91 states[58], "to permit farmers to use for propagating purposes, on their own holdings, the product of the harvest which they have obtained by planting, on their own holdings, the protected variety", which member countries could implement, if they wish. But this exception is very limited. It excludes propagation material which is not the product of the harvest (e.g. fruits or berries) and it prohibits all exchange and selling of protected material - as farmers are only allowed to reuse their seed on their own holding. It means that the breeders/company monopoly extends to the harvest, and optionally even to products made from the harvest. If a royalty has not been paid on the seed, the breeder/company who own the variety can claim ownership of the harvest and the products made from the harvest.

UPOV 1978 provides breeders exemption where protected variety could be freely used to develop another variety with slight variation and the subsequent breeder can protect the 'New' Variety without any obligation towards the first breeder of the initial variety. But in UPOV 1991, the breeder exemption was taken away and if a breeder is using a protected variety for breeding another variety, the breeder/company has to make a major change or introduce an important trait. In the absence of that the 'New' variety will not be considered as 'New' and it will be considered as 'essentially derived variety' from the initial protected variety which cannot be commercially exploited without the authorization of the first breeder. It seems this new provision has been introduced to prevent breeders/seed companies from getting new PVP protection on existing protected varieties by making slight changes in the variety's characteristic by adding a gene through genetic engineering.

Under UPOV 1978, there was a specific ban on the double protection which means, a variety can be protected under PVP as well as patents, whereas in UPOV 1991, double protection is allowed.

3.3 Farmers' seed saving under threat in Free Trade Agreement (especially RCEP)

Even though India has adopted IPR system for seeds which is Plant Variety Protection and Farmers Rights Act 2001, which provides PVP/ PBR over varieties, farmers are allowed to continue with their seed saving, exchange and replanting the saved seeds except a ban on the sale of packaged seeds of protected varieties. But this freedom will soon be lost because India is under tremendous pressure to accept UPOV 1991, and consequently would have to change the PVPFR Act in line with UPOV 1991, under new FTAs which India is negotiating, including RCEP and India EU FTA. These trade agreements

[58] http://www.apbrebes.org/content/upov-impacts-farmers-seed-systems

demand TRIPS plus Intellectual Property protection for seeds, which undermines farmers' seeds systems. Some of the RCEP member countries like Japan and South Korea are demanding from other members who have not yet accepted UPOV 1991 to accept it and change their IPRs laws accordingly because it gives primacy to corporate plant breeders and restricts seed-saving and seed exchange by farmers as well as restricts freedom of researchers and breeders to access protected plant varieties for further research and development. Not only that UPOV 1991 also establishes rights of breeders over the harvest of the protected varieties if royalty is not paid on the protected varieties. It is rather much worse because those farmers who have not planted patented seeds may have to pay compensation if the patented plants/ seeds start growing in their farm by accident. As per the leaked information on RCEP negotiation, India has probably accepted to join UPOV 1991. Which would mean India accepted to grant patents on life, i.e. over seeds and planting material. And once RCEP is signed (most probably by early 2019), India will have to give up its existing PVP legislation and abide by UPOV's 1991 provisions.

UPOV allows its members to terminate its membership by formal announcement and after one year, they are absolved of all obligations under UPOV. However, the trade agreements create problems for the UPOV members to terminate their membership of UPOV if reference to the UPOV convention is included in the trade agreement.[59] In such case, termination of UPOV membership or discontinuing to follow the UPOV rules might result in a breach of said trade agreement. In other words, if a country wants to avoid triggering a dispute settlement mechanism, and thus risking sanctions, it is *de facto* forced to continue adhering to UPOV 91 rules even after termination of UPOV membership. The only way out is to amend the trade agreement by mutual consent of all parties to that agreement. If this is not possible, the only option left is to not only terminate UPOV membership, but to also terminate the trade agreement, which is not a likely solution for countries like India which is desperate to sign trade/FTA deals like EU India, RCEP or with Israel, New Zealand, Australia and other developed countries.

Indian civil society groups like Forum Against FTAs, and almost all the farmers' groups in India have demanded to keep agriculture and seeds out of all FTAs which India is negotiating or have already signed. They have also demanded for total moratorium on new FTAs. The Bharat Beej Swaraj Manch (India Seed Sovereignty Alliance) in their India Seed Sovereignty Declaration[60] rejects the existing patent and Intellectual Property Rights (IPR) regime on life forms, including plant varieties, seeds, and related traditional knowledge; and demand that all information and material must remain as a collective, open-source heritage, which the governments, acting as trustees of/for the people, must safeguard from privatization, IPRs, or any kind of exclusive proprietary control/rights.

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[59] "UPOV 91 and trade agreements: Compromising farmers' right to save and sell seeds," discussion paper, Bothends, October 2018

[60] Bharat Beej Swaraj Manch (India Seed Sovereignty Alliance), consist of seed savers, breeders, farmers, gardeners and biodiversity/organic farming activists issued the India Seed Sovereignty Declaration on 25th April, 2014, at New Delhi.

Chapter 4

India and IPRs on Seeds: Compromising Farmers' Freedom

In India, there was not much demand for IPRs and PBRs from the private seed companies until the New Seed Development Policy came in October 1988 and with that issues relating to IPRs, PBRs, plant variety protection were raised more often than before. The absence of plant variety protection became a matter of discussion because the private sector felt that it is acting as a disincentive for strengthening research and marketing of new improved varieties of self-pollinated crops, since after the first sale such varieties would essentially be public varieties available for one and all to multiply and sell. The private seed companies realized that there would be no chance to recoup their investment in research for development of improved varieties. Taking consideration of the private sector demand as well as to express its commitment towards the WTO and to fulfill its obligation (in advance) under TRIPS agreement, the Ministry of Commerce, Government of India, drafted and circulated in February 1994, the Plant Variety Protection Bill 1993. India was overboard in fulfilling its obligation under the WTO much before it came into existence (on 1st January 1995). Interestingly the developing countries like India were allowed a special transition period of four years (till 1st January 2000) to apply the provisions of the TRIPS Agreement[61] (to bring in a national legislation for a *sui generis* system for plant protection). This was the first ever draft legislation for IPR protection of plant varieties on the Indian soil. The full title of the 1993 Bill was "An Act to encourage the Development of Novel Varieties of Plants and ensure availability of quality seeds and planting material of such varieties to farmers by Protecting the Rights of Breeders, Researchers and Farmers, 1993".[62] The PVP draft almost copied the provisions of the UPOV 1991 so far as the breeders/researchers' exemption and farmers' exemption were concerned. The scope of the bill was also wider than the UPOV 1978 which can be applied to 24 genera or species, where the draft bill covered entire plant genera and species, similar to UPOV 1991 provisions.[63] The draft bill also contained a clause on community rights and farmers' rights. The farmers right under this draft included farmers' right to save, use, exchange propagating material of seed and benefit sharing but there was no concept of farmers' rights as ownership rights or rights to register their varieties in this draft.

The second draft of the Plant Varieties Protection bill was drafted by the Ministry of Agriculture in 1996 and then the third one in 1997 and the fourth draft was prepared in 1999, which was tabled in the Lok Sabha in December 1999, and later it was referred to a Joint Parliamentary Committee (JPC).

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[61] https://www.wto.org/english/tratop_e/trips_e/tripfq_e.htm

[62] Jafri, S. Afsar Hussain. *The Indian Plant Varieties Bill 1993: A Review*; M.Phil Dissertation submitted to International Legal Studies Division, School of International Studies, the Jawaharlal Nehru University, New Delhi, 5 January 1995.

[63] Ibid.

The JPC tabled its Report, along with a revised draft (fifth version) of the PVP bill in the Lok Sabha on 25 August 2000, which had a separate chapter on Farmers' Rights. The Bill was passed by the Parliament in August 2001, received the assent of the President of India on 30 October 2001 and became a law. It was called as the Plant Variety Protection and Farmers Rights Act (PVPFRA), 2001. The PVPFRA was passed by India even though the review of TRIPS Article 27.3(b) was pending and the developing countries in the WTO were quite aggressively against intellectual property protection on any forms of life. India had the option to delay the enactment of the PVPFRA 2001 atleast till the time the TRIPS Review process was completed. The Act became operational several years after its enactment and the applications for registering varieties started coming in from May 2007. In order to operationalize the Act, the PVPFRA provides for setting up of a Authority which would be known as the Protection of Plant Varieties and Farmers' Rights Authority.

4.1 Plant Variety Protection and Farmers Rights Act (PVPFRA), 2001

The Indian piece of legislation on PVP was unique because it simultaneously aims to protect the interest of public and private sector breeding institutions and the farmers and it was the first ever *sui generis* IPR law establishing a legal framework for farmers' rights. The PVPFRA 2001 defines farmers as cultivators, as conservators as well as breeders and the Act also provides for three different rights - the Farmers' Rights, the Plant Breeders' Rights and the Researchers' Rights. The Act ensures that farmers will be treated like commercial breeders and would receive the same kind of protection. They are also free to use, exchange, save, resow registered varieties. But they can't create a brand out of varieties registered by others to sell them in the market. It is important to mention here that the PVPFRA does not impose any restrictions on farmers' unregistered traditional varieties and they can continue to produce and distribute their unregistered traditional varieties. The rights that have been granted to farmers under the Act include:

- the rights to save, exchange and sell seeds and propagating material (except selling of branded seeds of a protected variety in sealed package),
- to register varieties,
- to recognition and reward for conservation of varieties,
- to benefit sharing (to be facilitated by a centralised National Gene Fund),
- to information about expected performance of a variety,
- to compensation for failure of variety (if the variety they purchased fails to perform as per the disclosure made by the breeder),
- to availability of seeds of registered variety, free services for registration, conducting tests on varieties, legal claims under the Act, and
- to protection from infringement (if a farmer, at the time of infringement, is not aware of the

existence of breeder rights) is a unique feature of PVPFRA (not present in UPOV 1978 or 1991) and align with the International Treaty on Plant Genetic Resources for Food and Agriculture 2001 (of which India is a party) which also recognizes farmers' rights.

The process of granting *sui generis* right or the PBRs is called registration and those who register they are issued a plant variety certificate (PVC) from the PPVFR Authority. Registration is possible only for those genera or species notified by the government. The Government of India has notified 114 crops with their genera and species eligible for registration as new varieties (See Table-3). But there will be no registration in cases where prevention of commercial exploitation of such variety is necessary to protect public order; public morality; human, animal and plant life and health; the environment. Similarly there will be no registration of varieties, which involve any technology (like terminator technology), which is injurious to the life or health of human beings, animals or plants.

Table 3 : Crop Species (114) Notified for Registration[64]

GROUP	CROP SPECIES
Cereals & Millets	Bread wheat, Durum wheat, Dicoccum wheat, other Triticum species, Rice, Pearl millet, Sorghum, Maize, Barley, Foxtail millet and Finger millet
Fibre Crops	Diploid cotton (two species), Tetraploid cotton (two species) and Jute (two species)
Oilseeds	Indian mustard, Karan rai, Rapeseed, Gobhi sarson, Groundnut, Soybean, Sunflower, Safflower, Castor, Sesame and Linseed
Legumes	Chickpea, Mung bean, Urad bean, Field pea, Rajmash, Lentil, Pigeon pea
Sugar Crops	Sugarcane
Vegetables	Tomato, Brinjal, Okra, Cauliflower, Cabbage, Potato, Onion, Garlic, Bottle gourd, Bitter gourd, Cucumber, Pumpkin, Vegetable Amaranthus, Ridge gourd, Spinach beet, Chilli, Bell pepper and Paprika
Spices	Black pepper, Small cardamom, Ginger, Turmeric, Coriander, Fenugreek, Nutmeg
Fruits	Mango, Pomegranate, Almond, Apple, Pear, Apricot, Sweet Cheery, Walnut, Grapes, Ber, Banana, Watermelon, Muskmelon, Papaya, Peach, Japanese Plum, Strawberry, Noni, Bael, Jamun, Custard apple, Acid Lime, Mandarin, Sweet orange

[64] Presentation on PPV&FR Act: Salient Feat & Way Forward presented by D.S. Mishra, Deputy Commissioner (QC), Ministry of Agriculture and Farmers Welfare, Govt. of India

Plantation crop	Coconut, Eucalyptus, Casuarina, Tea,
Flowers	Rose, Chrysanthemum, Bamboo Leaf Orchid, Spray Orchid, Vanda or Blue Orchid, other Orchid sp, Bougainvillea, Canna, Gladiolus, Jasmine, Tuberose, China aster, Carnation
Medicinal and Aromatic plants	Isabgol, Menthol mint, Damask Rose, Periwinkle, Brahmi, Kalmegh

The PVPFRA grants plant variety protection on new varieties (largely modelled on UPOV), extant varieties and essentially derived varieties. Extant varieties include farmers' varieties, varieties in the public domain and varieties about which there is common knowledge. As per the PVPFRA, the essentially derived varieties cannot be used for further research without the permission of the holder of rights in the protected initial variety. The criterion for registration of new varieties is same as in UPOV, which is novelty (commercial), distinctiveness, uniformity and stability. However the criterion of novelty has been exempted for extent varieties but they have to satisfy the other requirements of distinctiveness, uniformity and stability. In PVPFRA, the requirement of distinctiveness is also unique (and not present in UPOV) and that is, the variety has to be clearly distinguishable by atleast one essential characteristic from any other variety whose existence is a matter of common knowledge, and the essential characteristic contributes to the principle features, performance or value of the plant variety. The duration of the IPR protection, following the successful registration of new variety shall be valid,

- Initially for 9 years in case of trees and vines, thereafter they can be reviewed and renewed for a maximum period of 18 years from the date of registration, subject to payment of annual fee.
- Initially for 6 years in case of other crops, thereafter they can be reviewed and renewed for a maximum period of 15 years from the date of registration, subject to payment of annual fee.

The PVPFRA provides for disclosure requirements and benefit sharing and proposes setting up of centralised National Gene Fund to facilitate sharing of benefits. If a breeder uses a genetic material conserved by farmer, tribal or rural communities to develop new varieties, it is mandatory for the breeder/company to not only disclose that information but also share the benefits arising out of the registration of the variety with the farmer/rural communities whose knowledge/genetic resources contributed towards developing of that new variety. Failure to disclose such information will result in the rejection of the registration application. The Authority is also required to publish the registered varieties and invite claims for benefit sharing. The PVPFRA states that any person or group of persons or firm or governmental or non-governmental organization can submit its claim of benefit sharing.

The amount of benefit sharing would be deposited in the National Gene Fund and will be used to implement benefit-sharing mechanism including measures for conservation of plant genetic resources. If the breeder fails to deposit money, it would be recoverable as an arrear of land revenue by the District Magistrate within whose local limits of jurisdiction the breeder liable for such benefit sharing resides[65]. In the many years since the PPV&FR Act has been in force, not a single case of benefit sharing with farmers has occurred if and when their seeds have been used by the seed industry as base material for developing commercial seed products.

Though the PVPFRA recognizes farmers' rights but the Act is being misused to provide recognition to a farmer or a rural community who first registers a variety even though the knowledge of that variety has been in public domain for ages and farmers across multiple states in India have already been growing that variety. Since the Protection of Plant Varieties and Farmers' Rights Authority has been set up and varieties are being registered for plant variety protection, several instances has come to light where plant varieties traditionally grown and developed by farming communities from one or different regions are being registered in the name of one farmer or a group of farmers and NGOs or organisations from another region. This is creating a new problem where a farmer or a group of farmers are staking ownership over the traditionally-shared varieties and, thus creating a situation whereby farmer/s from one region would be competing with their counterpart in another region in India. In such a situation how can only one or a group of farmers from one region be allowed to claim exclusive rights over such varieties under IP 'protection'?

Alliance for Sustainable and Holistic Agriculture (ASHA) had once written to the Registrar of the Protection of Plant Varieties and Farmers' Rights Authority (in July 2015) regarding this. As per ASHA, Gobind Bhog is a popular scented rice variety grown in West Bengal and neighbouring states, has already been registered in a society's name (Shyamsundar Sister Nivedita Sangh-Bardhaman) supposedly to help farmers, whilst farmers in states other than Bengal also grow the same. Likewise, Kalagoda rice variety is listed in PPVFR Authority records in the name of a farmer/group from a particular village in Sundargarh District, Odisha, but it is not restricted to or "owned" only by those farmers. It is widespread in the entire region and cultivated by thousands across 4 to 5 states. For instance, farmers in Sundarpahari have been growing it for the last 4 years, having collected it from Khunti district of Jharkhand. Goda Dhan, which is an upland variety of Red Rice cultivated by tribal and non-tribal in entire Chotanagpur plateau (spread over states of Jharkhand, Odisha, West Bengal, Bihar and Chhatiisgarh), is registered in the name of one farmer, Mukund Sai.

Infact seed savers and organisations associated with ASHA feel that there seems to be a rush for registration of both farmers' varieties and varieties of common knowledge (VCK) without:

[65] Bhutani, Shalini. 2015. *"IPRs for Farmers: Role of Agricultural Intermediaries"* Economic and Political Weekly, Vol – L, No. 32, 08 August, 2015

- Any due process of checking the probable use of those varieties by other farmers;
- The farmer in question being fully aware of the effects of a PVP being filed singularly in his/her name;
- A wider survey by either the local authorities or state agricultural departments on where else it is in use by small farmers for their use.

Large numbers of farmers' varieties, which are in the public domain are getting protected under IPR laws in the name of an individual farmer or a farming community, and this trend will only increase in the coming years. More and more farmers will be seduced into this IP system through the Plant Genome Saviour Award instituted by the Ministry of Agriculture in 2007 to encourage seed conservation and honour those farmers who register their varieties under PVPFRA. To attract farmers to register varieties, government also waived off registration fee for farmers varieties and the annual fee for the maintenance of registration for farmers' varieties has been reduced to Rs. 10. Therefore the time has come for the Authority to insert a clause in the PVPFRA to treat such varieties as national heritage and exclude them from any registration process of control and exclusivity. It is also the time to have an assessment on the socio-economic impacts of registration of farmers' varieties on farmers.

The PVPFRA does not offer solution towards conflicting claims over a variety by farmers from different parts of the country. Since farmers traditionally re-use the seed from their harvests, they are considered direct competitors of breeders who develop plant varieties for commercial interests and then seek legal protection for the exclusive market exploitation of their varieties. Such a regime not only takes away the traditional and community-centred control over seed conservation and use, which has been the regular practice of farming communities all over the country, but it would also create confusion as well as potential conflicts amongst farmers who have up until now peacefully shared seeds and knowledge. It is creating a situation that is both grossly unjust and contrary to farmers' cultures of sharing. In light of this situation, ASHA demanded that the PPVFR Authority:

- Give public notice of local varieties being registered, not only in the Plant Variety Journal of India (which stays inaccessible to many small farmers and seed keepers) but also in regional languages in local media;
- Set up a functional Standing Committee in line with the legal requirement under Section 3(7) of the PPVFR Act to advise the Authority on all issues relating to farmers' rights;
- In compliance with Section 8(2)(c) of the PPVFR Act undertake documentation, indexing and cataloguing of farmers' varieties;
- Require both National Bureau of Plant Genetic Resources (NBPGR) and the National Biodiversity Authority (NBA) to work in tandem to screen the locational spread of the said

variety and its use by local communities when anyone does seek registration under the PVPFRA.

Despite that, the PPVFR Authority encouraging more and more farmers to register their varieties under the IPR system by seeking a plant variety certificate (PVC) under the category of farmer variety. Till October 2018, a total of 3504 registration certificates were issued for varieties of notified crop species. Of these, 1587 were issued to individual farmer/farming community, 1143 to public research organisations/SAUs, and 774 to private seed companies (see Table-4).[66]

Table-4: Details of the PVP Registration Certificates issued (till October 2018)

CATEGORY	Type of Variety	YEAR										Grand Total
		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
FARMER	Farmer	3			3	46	459	200	344	221	310	1586
	New								1			1
	Sub-Total	**3**			**3**	**46**	**459**	**200**	**345**	**221**	**310**	**1587**
PRIVATE	EDV				1							1
	Extant	14		9	29	62	45	64	78	56	58	415
	New	2		12	25	42	80	57	70	39	32	359
	Sub-Total	**16**		**21**	**55**	**104**	**125**	**121**	**148**	**95**	**90**	**775**
PUBLIC	Extant	144	44	53	121	113	146	42	37	33	14	747
	New			3	1	11	25	7	51	7	1	106
	Sub-Total	**144**	**44**	**56**	**122**	**124**	**171**	**49**	**88**	**40**	**15**	**853**
SAU*	Extant	5	5	39	32	30	75	15	18	10	46	275
	New						3		6	5		14
	Sub-Total	**5**	**5**	**39**	**32**	**30**	**78**	**15**	**24**	**15**	**46**	**289**
Grand Total		**168**	**49**	**116**	**212**	**304**	**833**	**385**	**605**	**371**	**461**	**3504**

**SAU = State Agriculture Universities*

The government of India is giving incentives to Krishi Vigyan Kendras (KVKs) & public scientists to help gather registrations from farmers. As per the government, farmers should

- Seek IPR on the variety before any one else can do 'biopiracy'
- Get eligible for 'benefit sharing' if their registered variety is used as genetic resource for developing new variety.

[66] Compendium of PVP Varieties, 27 October 2018. http://plantauthority.gov.in/pdf/CompendiumFinal27Oct2018.pdf

The PVPFR law is limited in its scope and can only ensure registration of varieties but it can't offer protection against biopiracy or for furthering agro biodiversity. That's why despite all efforts by the government to encourage registration of farmers' varieties, a large majority of farmers and seed savers still remain oblivious to this IPR system on seeds and do not accept it as an effective mechanism to prevent biopiracy. Many still believe that the registration of farmers' varieties in the PVPFRA does not establish "prior art" which guarantee protection against biopiracy and they still fear that in the age of genetic engineering the farmers' varieties and its trait can be used as the base for developing GM varieties, irrespective of any 'benefit sharing' or not.

However, some farmers and seed savers have registered their varieties in the name of farming community with the PVPFRA and at the same time have also used other protective mechanisms to save their extant varieties from Biopiracy,[67] e.g. maintaining a Community or Peoples Biodiversity Register (CBRs)[68] and publishing them as well as taking copyright on that publication in the name of farmers (as done by Dr. Debal Deb of VRIHI/Basudha who has more than 1300 rice varieties in their collection). At the same time, some farmers still believe that the only protection against Biopiracy is by not falling prey to an IPR system like the PVP Act but by reviving the diversity and bringing back all kinds of seeds and its associated knowledge into the hands of farmers and by keeping them in circulation among farmers all the time. The only way to beat the IPR seed system and to prevent Biopiracy of the farmers' knowledge and genetic resources is to actively practice diversity based farming, and to conserve diverse seeds (whether it is registered for IPRs or not) to be used and exchanged.

4.2 The Seed Bill, 2004

The controversial Seeds Bill 2004 was first introduced in Rajya Sabha (the Upper House in the Parliament) on 9th December 2004, then referred to the Joint Parliamentary Committee on 16th December 2004 and the JPC submitted its report on 20th November 2006 but the bill remained pending in the House despite several reviews by the inter-ministerial committees and the Cabinet as well as five amendments to the original bill. The National Democratic Alliance (NDA) government infact revived this bill in November 2014 immediately after coming into power but it was again put on hold in 2015 after the backlash against an enabling provision for genetically modified (GM) crops. In February 2017, the Economic Times[69] reported that National Democratic Alliance (NDA) government

[67]Biopiracy, a term originally coined by ETC Group, refers to the appropriation of the knowledge and genetic resources of farming and indigenous communities by individuals or institutions that seek exclusive monopoly control (patents or intellectual property) over these resources and knowledge.

[68] CBRs to be set up by the government under the Biological Diversity Act of 2002 could be a good idea to support local communities in efforts to preserve knowledge about their local seeds and the uses of them.

[69] "Government looks to bring out seeds bill from cold storage, push for passage," Yogima Seth, *The Economic Times*, 14 February 12017;
https://economictimes.indiatimes.com/news/politics-and-nation/government-looks-to-bring-out-seeds-bill-from-cold-storage-push-for-passage/articleshow/57135472.cms

is planning to revive the bill again. The bill was listed for tabling in the Parliament during the Budget Session 2018 but due to constant disruptions, it was not tabled and is still pending[70] in the Rajya Sabha. The proposed Bill would replace the Seeds Act, 1966, once it becomes a law.

Being an Intellectual Property Rights legislation for the protection of plant varieties, the India's PVPFRA 2001 is unique because it recognizes farmers as breeders and grants them exclusive rights to save, exchange (in other words barter), use, reuse and sell (except branded seeds) their registered/ unregistered traditional varieties. On the other hand, the Seeds Bill 2004 has one and only objective, i.e. stopping farmers from saving seed, exchanging seed and reproducing seed, even traditional varieties, and replace them with seeds from private seed corporations.

The most controversial provision of this Bill is that it requires mandatory registration of all seeds and varieties (including farmers' seeds) and prohibits use of unregistered seeds. As per this provision every Indian farmers has to register their seeds with the proposed national seeds authority and are entitled to use only registered seeds. Moreover this Bill prevents barter or exchange of seeds among farmers and curbs their fundamental right to save and exchange seeds. This is a "TRIPS plus" provision which goes beyond the provisions of the PVPFRA 2001. The PVPFR Act 2001 enacted under the obligation of WTO TRIPS recognizes this right. The 2004 Bill also infringes the rights and freedom of farmers to grow and produce seeds, when it says, "no producer shall grow or organize the production of seeds unless he is registered (section 21.1)". Traditionally majority of Indian farmers generate the seeds for the next crops from the produce of the present one. This customary right of our farmers to save, use, exchange and sell seeds is the foundation of our agri-CULTURE which is threatened to be eliminated under the new Bill.

On the pretext of increasing food production, the Seeds Bill was drafted to benefit multinational seed companies, as evident from its stated objective i.e. (i) to create facilitative climate for growth of seed industry, (ii) enhance seed replacement rates for various crops and (iii) boost the export of seeds and encourage import of useful germplasm, and (iv) create conducive atmosphere for application of frontier sciences in varietal development and for enhanced investment in research and development.[71] The objects and reasons of the Bill also clearly state that the proposed legislation provides for increasing private participation in seed production, distribution, certification and seed testing.

Another anti-farmer provision of this Bill is that a farmer would be punished if s/he is found guilty of using, exchanging or selling non-registered seeds (section 38.3). In this situation, the farmer, upon conviction will be punishable with imprisonment for a term which may extend to six months or with

[70] Bills pending in the Rajya Sabha but not passed by the Lok Sabha does not lapse and remain alive.

[71] The section on Seeds Bill 2004 is adapted from Afsar H. Jafri article "New Seeds Bill: The Fast Track to Doom of the Indian Farmer" published in the *Special Edition of Focus on India*, November 2006. https://focusweb.org/system/files/resisting-corporate-india.pdf

fine which may extend to fifty thousand rupees or both. The farmer's house can also be searched by the Seed Inspector, appointed by State Government, who has been given powers to break open anyone's door, enter his/her house and search if he feels the proposed seeds Act is being violated. In India where farmers' seeds are the main source of seeds and planting materials, such criminalization of everyday activity of farming appears to dissuade farmers from using their own seeds and varieties and become dependent on TNC seed supply. This also shows that instead of regulating and punishing the seed industry for supply of spurious seeds, the proposed legislation is aimed at policing the farmers and declaring them criminals if they produce and sell their own seeds.

The other serious flaw in the Seeds Bill 2004 is that it fails to establish any strict liability on the part of the seed companies for failure of their seeds. In case of seed failure, the victim farmers, who would loose their crop and their livelihood, can only appeal for compensation from the producer, dealer, distributor or vendor under the local Consumer Court. If a farmer has to look to Consumer Protection Act of 1986 for redress, then why do we need a new seeds law? The failure of company seeds has become a general trend and the non-renewability, non-reliability and high cost of company seeds have created havoc in the Indian agriculture and indebted large majority of farmers, forcing several thousands of them into committing suicide. Despite this, the Seeds Bill is neither harsh in its punitive action against the seed manufacturers nor it makes the government official liable for any of their official omission.

However the Indian bureaucracy have legally protected their interest under this bill, leaving the millions of farmers at the mercy of the seeds industry. The Bill protects the government officials through its provision which says "no suit, prosecution or other legal proceeding shall lie against the government or any person for anything which is in good faith done or intended to be done (Section 44)." It clearly indicate that the government wants only farmers to be regulated, monitored, punished, while effectively saving the interests of the seed manufacturers and the government officials.

Another anti farmer provision of the Seeds Bill 2004 is its stated objective of “increasing the seed replacement rate” which obviously mean farmers traditional seeds be replaced with company seeds. In other words farmers tested, biodiverse, affordable and reliable seeds to be replaced with TNC's costly, uniform, monoculture, unreliable and self-certified seeds. The forced replacement of traditional seeds by chemical responsive hybrid and GM seeds would lead to the destruction of our biodiversity, thereby increasing farmers' vulnerability to climate change, floods, droughts and other environmental disasters.

The proposed seed law also fails to protect farmers from high prices of company seeds. If the Bill is introduced with an intention to regulate seed companies, then the provision of price regulation becomes obligatory, which is conspicuously missing in the Bill. This could result in a high cost of seeds

fixed arbitrarily by the seed companies, as we have seen in the case of genetically engineered Bt. cotton. Moreover there is also no provision on the limit of profits a seed company can make from a given brand. The absence of effective price control safeguards indicate that the government does not want to regulate seed prices and is willing to abdicate its responsibility to ensure adequate seed supply at reasonable price to farmers.

The proposed legislation is also silent on the origin and ownership of the seeds and denies Indian farmers their due rights over their seeds. Even in the PVPFR Act 2001, there is a provision to disclose the ownership of the seeds under protection but the draft seeds legislation does not require disclosure of parentage of seed varieties during registration, thus facilitating unrestricted commercialization of seeds, which are in the public domain. It means that the seed companies could use farmers' varieties without giving any credit to them and farmers may end up paying hundreds of times the cost of a "registered" seed, which could have been bred from their own traditional varieties. India had witnessed how the seed giant Syngenta tried to steal and monopolize more than 22,972 varieties of paddy seeds collection from Chattisgarh through signing a Memorandum of Understanding (MoU) with the Agricultural University in Raipur in Chattisgarh.[72] Moreover, the Seeds Bill has no provision for helping Indian farmers in innovating, evolving and commercializing their varieties. On the contrary, the Bill tries to wipe out the very existence of farmers varieties and their innovation.

Last but not the least, the proposed seeds legislation ensures fast track clearance of GM seeds and crops thus bypassing the well established system of biosafety clearance through the Genetic Engineering Approval Committee (GEAC) under the Ministry of Environment, Forest and Climate Change (MoEFCC) set up under the GMOs Rules of 1989. The Bill advocates for grant of provisional permission to GM seeds and varieties thus violating the biosafety norms for monitoring and regulation of GM products under the GMOs Rules of 1989.[73] This also indicates an active involvement of seed corporations like Monsanto and Syngenta in pushing this Bill so that they can bypass GEAC in commercializing their GM seeds.

The objective to promote seed industry and consolidate their control over seeds can be achieved only through crushing farmers' traditional rights over seed. This bill, as seen in several of its provisions, does exactly this and deny farmers their right over seeds. The repeated reference to 'barter' in the proposed Bill would prevent farmer's exchange, a necessary aspect of maintaining high quality seed supply at the community level. Therefore the Seeds Bill 2004 or its last amended draft version

[72] "Seed Freedom, A Global Citizens' Report," Navdanya, October 2012; http://www.indiaenvironmentportal.org.in/files/file/Seed%20Freedom.pdf

[73] Rules for Manufacture, Use/Import/ Export & Storage Of Hazardous Micro Organisms/ Genetically Engineered Organisms or Cells, 1989

(February, 2011)[74] is overwhelmingly anti-farmer[75] and is meant to benefit the seed corporations by facilitating their monopoly ownership over seeds and control over food production and consumption. The objective of any model seeds law should be to ensure seed security for farmers and to provide equitable, affordable and timely access to good quality agricultural seed of the required varieties and save farmers from dependency over seed companies for their seed supply. The Seeds Bill 2004, however, denies farmers their seed security and would create a forced dependence over seed companies for seed, an essential input for agriculture and the foundation for the food security of a country. This Bill has therefore potential to spell doom for Indian farmers and farming whenever it becomes a law.

Till today, the Indian social movements, especially farmers' organizations, have resisted and mobilized to prevent such anti-farmer laws being passed in the Parliament. Even today, resistance against such laws continues and can even count some victories, like delaying of the Seeds Bill 2004 or the Protection and Utilisation of Public Funded Intellectual Property (PUPFIP) bills which lapsed due to peoples opposition. However it would be difficult to delay the Seeds Bill further under the new wave of political and economic pressure - especially the mega free trade agreements like RCEP which demand for TRIPS plus provisions for seeds, which would restrict all form of farmers ownership rights over seeds. Seed laws and plant variety rights are being revised again and again to adapt to the new demands of the seed and biotechnology industry which are also driving these free trade regimes.

It is therefore imperative for us to demand from the Government of India to let this bill die because it does not have any component to protect Indian farmers from the onslaught of the seed TNCs, and makes the farmers completely dependent over the seeds companies for seed supply. Instead the government should strengthen the Seeds Bill 1966 in order to regulate the national and international seed companies and to protect the interest of farmers and their rights over seeds. An agrarian country like India requires a Seeds Act that is strong, transparent and unambiguous in regulating the seed trade and makes the providers of seeds accountable. At the speed at which the traditional seeds are already being replaced with the TNCs seeds, that day is not far when Indian farmers would be forced to become completely dependent for seed supply from transnational corporations like Bayer, Dow-DuPont, Chemchina and BASF who are controlling and monopolizing the seed business through mergers and acquisition. These corporations would try their best to hijack India's seed supply and undermine India's seed sovereignty but we can never let this happen. If we loose control over our seed, we loose our freedom. This would be disastrous for the seed security, food security and freedom of our farmers in India.

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[74] The Seed Bill 20104; https://www.prsindia.org/sites/default/files/bill_files/amendments%20seeds%2017%20feb%202011.pdf

[75] Till the time a new version of the Seeds Bill get introduced in the Parliament in future, we have to base our arguments and critique on the provision of the original version of the bill moved in 2004.

4.3 Protection and Utilisation of Public Funded Intellectual Property (PUPFIP) Bill 2008

The PUPFIP Bill 2008, which seeks to provide incentives for creating and commercialising intellectual property from public funded research[76], was yet another attempt by the IPR lobby, to bring in legislation in India, which allows IPR regime on plant varieties. It was also an attempt to bring in legislation, which are FTA complaint like the Seeds Bill 2004 or the Pesticide Management Bill 2008 because these bills bring in provisions, which restrict use of farmers' seeds/varieties, and introduces IPR like provisions to promote TNCs seeds.

The PUPFIP Bill was introduced in the Rajya Sabha and it was referred to the Parliamentary Standing Committee on Science and Technology, Environment and Forest in December 2008. The Bill sets out rules for the private appropriation of public funded research and development (R&D) outcomes through intellectual property protection (IP) mainly through patents and its licensing.[77] The key concern about the bill was that it envisaged IP and licensing as the sole vehicle for the commercialisation and dissemination of the outcomes of public funded R&D. The bill, infact, mandated universities and research institutions getting government grants to create Intellectual Property out of the research, which would then be commercialized.

Secondly, the definition of intellectual property in the PUPFIP Bill included patents, trademark, plant varieties and design. This bill brought in Intellectual Property Rights (IPR) on seeds and plant varieties through back door because the definition of Intellectual Property in the bill included plant varieties. The bill had no provisions on ensuring that the public has access at affordable rates to the research or the option for researchers to put their research out in the public domain.

This would have adverse implications for the dissemination and access of plant varieties developed using public funds. If the PUPFIP Bill had become a law, the varieties developed through public funds would be protected under IPR, which would then be able to create a seed monopoly by those who would have bought the varieties developed by public funded institutions. Given the state of agriculture research in the country and especially the active involvement of seed corporations in the public agricultural institutions, the bill would completely kill any public accountability the research institutions had. The bill would have ensured that the research priorities are set by the market and not by the agricultural or hunger needs of the country and if a useful research comes out of these institutions, a monopoly would be created on it and then sold to the private sector with no safeguards on ensuring public access. The Bill provided no option for researchers who would like to keep their

[76] The Protection and Utilisation of Public Funded Intellectual Property Bill, 2008; https://www.prsindia.org/billtrack/the-protection-and-utilisation-of-public-funded-intellectual-property-bill-2008-83

[77] "Private appropriation of public funded research," KM Gopakumar, 11 August 2010; http://www.d-sector.com/article-det.asp?id=1338

research in the public domain. In fact, the Bill provided hefty financial penalties on scientists and institutes that do not comply with its provisions. Fortunately, the bill was later withdrawn.

4.4 Policy on Intellectual Property Rights, 2014

More recently, yet another attempt has been made to compromise farmers' rights to seeds in the National Intellectual Property Rights Policy, which was approved by the Indian Cabinet on 12 May 2016. The Policy as stated under Objective 3.2 says "Engage constructively in the negotiation of international treaties and agreements in consultation with stakeholders; examine accession to some multilateral treaties which are in India's interest; and, become signatory to those treaties which India has *de facto* implemented to enable it to participate in their decision making process". This clearly indicate towards the UPOV because India has not yet joined UPOV but its provisions has been *de facto* implemented through the Plant Varieties Protection and Farmers Rights Act 2001. This also indicate towards a more serious concern which is, India is again intending to accede to UPOV Convention. And as discussed in previous chapter, the mega FTA, Regional Comprehensive Economic Partnership (RCEP), which India is negotiating with fifteen other countries, mandates member countries like India to join UPOV, and that too UPOV 1991, which would mean accepting patent on seeds and plant materials. This would be quite disastrous for Indian farmers and would restrict their rights over seeds and would promote patent protected seeds, which would lead to increase cost of production as we had seen in Bt. cotton.

Another serious concern about the IPR policy is that it promotes IP generation from traditional knowledge and genetic resources. Objective 1, which focuses on "creating public awareness about the economic, social and cultural benefits of IPRs among all sections of society" further says in 1.2.2 that "it is also necessary to reach out to the less-visible IP generators and holders, especially in rural and remote areas. Emphasis would be laid on creating awareness regarding the rich heritage of India in terms of our Geographical Indications, Traditional Knowledge, Genetic Resources, Traditional Cultural Expressions and Folklore". In India, there are still large number of farmers who have conserved hundreds of plant varieties of different crops and despite all efforts by the Government of India and the PPFR Authority, they have not come forward to register their traditional varieties under PVPFR Act. Through the IPR policy, government would try to entice these seed savers to register their varieties and take IPR protection over the genetic resources and knowledge.

The government of India intention gets more clear in the stated Objective 2 which is to stimulate generations of IPRs out of the local knowledge and genetic resources. It is quite strange that in a country like India which is rich in genetic resources and traditional knowledge about these resources, the policy should be laying out plans for its protection and not promoting its appropriation through intellectual property rights. Our apprehension about appropriation of farmers varieties and landraces gets obvious in this paragraph under objective 2 which says, "In the area of plant varieties

and farmers' rights, the number of filings and registrations are very encouraging. There is considerable unexplored potential for developing, promoting and utilizing traditional knowledge, which is a unique endowment of India. Activities for promotion of traditional knowledge have to be conducted with effective participation of holders of such knowledge". Under Objective 2.30 it further says that "Promote India's rich heritage of traditional knowledge with the effective involvement and participation of the holders of such knowledge. Traditional knowledge holders will be provided necessary support and incentives for furthering the knowledge systems that they have nurtured from the dawn of our civilization". This paragraph indicates towards some kind of benefit sharing with farmers and holders of traditional knowledge if their resources or knowledge is protected under IPRs but nowhere does the policy specifically elaborate on the issue of benefit sharing.

The IPR policy therefore is a big threat of the traditional knowledge and genetic resources, especially the large collection of the indigenous seed varieties, which are in the possession of seeds savers, rural and tribal communities.

4.5 International Treaty on Plant Genetic Resources for Food and Agriculture

It is believed that the FAO International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)[78] (popularly known as the International Seed Treaty) would be a savior of farmers rights (once it get implemented at the national level) and its provisions would help to counter the UPOV 1991 provisions which restricts farmers rights. But the fact is that the provisions of UPOV undermine implementation of Article 9 of the ITPGRFA, which concerns "Farmers' Rights" to save, use, exchange and sell farm-saved seed and other propagating material. There is a deep contradiction between provisions farmers' right under ITPGRFA and the provisions of UPOV 1991. It is evident from the Malaysian and Philippines cases (both are members of ITPGRFA) where UPOV explicitly required them to delete *inter alia* provisions in their national plant variety protection legislation that implemented farmers' right to save, use, exchange and sell farm save seeds, if they wished to join UPOV 1991. [79]

In 2005, in order to become member of UPOV 1991, Malaysia submitted its PVP legislation to the UPOV Council, for assessment of conformity with UPOV 1991. In examining the conformity of Malaysian PVP legislation with UPOV 1991, the UPOV Secretariat expressly stated that "the exchange of protected material for propagating purposes would not be covered by the exceptions under Article 15 of the UPOV 1991 Act," and on that basis recommended deletion of Section 31(1)(e) of the Malaysian Protection of New Plant Varieties Act, which contained the following exception: "any

[78] The International Seed Treaty (ITPGRFA) was approved during the FAO Conference (31st Session resolution 3/2001) on 3 November 2001 and it came into force on 31 March 2004.

[79] http://www.apbrebes.org/news/upov-symposium-reveals-conflict-interrelations-between-upov-and-itpgrfa-upov-consider-proposals

exchange of reasonable amounts of propagating materials among small farmers".[80]

In the case of the Philippines,[81] UPOV found the farmers' exception in Section 34(d) of the PVP legislation to be incompatible with the 1991 Act. Section 34(d) states that "the Certificate of Plant Variety Protection shall not extend to: [...] d) The traditional right of small farmers to save, use, exchange, share or sell their farm produce of a variety protected under this Act, except when a sale is for the purpose of reproduction under a commercial marketing agreement….". In its comments, UPOV noted "the exchange and sale of seeds among and between the said small farmers in their own land, as provided in the third sentence of Section 43(d) of the Law, go beyond the exception of Article 15(2) of 1991 Act". As expected UPOV wanted that Section to be amended.

It is now clear that the impact of restrictions on rights of farmers to freely use, save, exchange and sell seeds/propagating material will be quite devastating. A human rights impact assessment of UPOV that examined the potential impact of UPOV in the Philippines, Peru and Kenya concluded that "UPOV 1991 restrictions on the use, exchange and sale of farm-saved PVP seeds will make it harder for resource-poor farmers to access improved seeds. This could negatively impact on the functioning of the informal seed system, as the beneficial inter-linkages between the formal and informal seed systems will be cut off. Moreover, selling seeds is an important source of income for many farmers. From a human rights perspective, restrictions on the use, exchange and sale of protected seeds could adversely affect the right to food, as seeds might become either more costly or harder to access. They could also affect the right to food, as well as other human rights, by reducing the amount of household income which is available for food, healthcare or education".[82]

In view of this, it can be said that if India decides to join UPOV 1991 under the pressure from member countries at the RCEP negotiations, there will be drastic change in the Indian PVPFRA as well and the chapter on farmers' rights will be compromised forever because it will not be acceptable to UPOV as seen in the case of Malaysia or Philippines.

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[80] Shashikant, Sangeeta and Meienberg, François. *International Contradictions on Farmers Rights: The interrelations between the International Treaty, its Article 9 on Farmers' Rights, and Relevant Instruments of UPOV and WIPO*, Third World Network (Malaysia) and Bern Declaration (Switzerland), October 2015, http://www.twn.my/title2/intellectual_property/info.service/2015/ip151003/457628655560ccf2b0eb85.pdf

[81] ibid

[82] ibid

Chapter 5

Seed Sovereignty to Resist Seed Monopolization and Control

The three decades of privatization and control over seeds (since 1986) have failed to break the strength of India's seed sovereignty, which lies in the rich tradition of conservation, exchange and re-sowing of the traditional (desi) seeds or farm saved seeds. And this is manifested in the number of applications of farmers' varieties[83] received by the Plant Varieties Protection and Farmers Rights Authority for registration from individual farmers or farming/ tribal communities. Until 30th October 2018, a total of 10916 farmers' variety applications have been received from farmers' communities across India and out of that 1587 registration certificates were issued to individual farmer/farming community for varieties of notified crop species from 2009 till October 2018. This shows that Indian farmers still conserve and preserve crop and variety diversity. That may be the reason the PVPFR Authority has joined with some public agencies in agriculture like Krishi Vigyan Kendras, State Agricultural Universities (SAU) and institutes associated with Indian Council of Agricultural Research (ICAR) across India to entice farmers to register their varieties. Not only that, every year the Authority confers five Plant Genome Saviour Community Awards (of worth Rs 10 Lakh each), ten Plant Genome Saviour Farmers Rewards (of worth Rs 1.5 Lakh each) and twenty Plant Genome Saviour Farmers Recognitions (of worth Rs 1 lakh each) along with citation and memento to lure farmers to become part of the intellectual property system on seeds. The Authority as well as ICAR associates also organizes several workshops and training programmes to bring farmers breeders into the fold of the IP system.

All these efforts by PVPFR Authority also tells us that seed savers and farmer breeders have not much faith in this IPR system which can protect their varieties from biopiracy and for them keeping all their seeds in circulation among farmers is the only effective way to defeat IPRs and monopolization of their seed varieties. Secondly, whatever varieties samples are being collected by the PVPFR Authority after registration are deposited in the National Gene Bank i.e. the National Bureau of Plant Genetic Resources (NBPGR), and once the seeds are kept in this *ex-situ* conservation, farmers almost lose their access to these seeds. There are rare cases where seeds kept at the gene bank are given to farmers for multiplication and cultivation. This needs to end and government should make proactive steps to facilitate and simplify access for farmers to their heritage varieties preserved in national gene bank.

5.1 Seed Conservation

Ex-situ Seed Banks

The seed conservation mechanism is designed with the aim of widening the genetic resources base to make indigenous resources available to farmers. There are two types of conservation activities. One

[83] Farmers' varieties are defined as varieties that have traditionally been cultivated and developed by the farmers in their fields, or varieties that are a wild relative or land race of any variety about which farmers possess common knowledge.

type of conservation is when seeds and propagating material of plants are collected by groups of people (not necessarily farmers) and are stored in special gene banks away from the field. This is called *ex-situ* conservation. As discussed above, India has its own *ex-situ* gene bank called as the National Bureau of Plant Genetic Resources (NBPGR) based in New Delhi. Currently the national gene bank holds a total of 4,34,946 accessions of different agri-horticultural crops and ranks fourth in the world.[84] This includes 1,61,816 accessions of Cereals like Paddy, Wheat, Maize and others; 58,443 of Millets like Sorghum, Pearl millet, Minor millets and others; 6,925 of Forage; 7,295 of Pseudo Cereals like Amaranth, Buckwheat and others; 65,675 of Legumes like Chickpea, Pigeon pea and Mung pea and others; 58,571 accessions of Oilseeds like Groundnut, Brassica, Safflower and others; 15,573 of Fibre like cotton, Jute and others; 26,071 of Vegetables like Brinjal, Chili and others; 273 accessions of Fruits & Nuts like Custard Apple, Papaya and others etc.

There are also international *ex-situ* gene banks, for example, the International Rice Research Institute (IRRI) in Los Banos in Philippines which conserve all the rice varieties of the world, as CIMMYT (International Maize and Wheat Improvement Center) in Mexico does for wheat. Wheat holdings at CIMMYT comprise some 150,000 seed samples from more than 100 countries; the largest unified collection in the world for a single crop. The maize bank contains 28,000 samples of seed. The International Centre for Agricultural Research in the Dry Areas (ICARDA), situated at the war torn Syrian town of Tal Hadya, conserves over 135,000 seed samples of Wheat, Barley, Oats and other cereals; food legumes such as Faba bean, Chickpea, Lentil and Field pea; Forage and Rangelean crops, as well as the wild relatives of each of these species. Similarly the ICRISAT (International Crops Research Institute for the Semi-Arid Tropics) in Hyderabad (India) saves several thousand seed samples of chickpea, pigeon pea, groundnut, pearl millet, sorghum and little millets.

In 2007, another global *ex-situ* Seed Bank, the Doomsday Vault was set up which is world's largest Seed Bank, having around 800,000 specimen samples of germplasm, and is situated on the Norwegian Island of Spitsbergen near Longyearbyen in the remote Arctic Svalbard Archipelago, about 1300 kilometers from the North Pole. This mass collection of frozen samples is funded by a consortium known as the Global Crop Diversity Trust, consists of the Gates and Rockefeller Foundations and their corporate partners including Monsanto, Syngenta, and Bayer CropScience. The Svalbard bank as it is planned will eventually conserve a sample from all collections currently housed in more than 1400 gene banks across the world. The reasoning is that if disaster strikes any one or more of the banks, the seed material will not be lost since it will be backed up in the bomb proof bunker built some 400 feet inside Norwegian mountain covered in permafrost.[85]

To match the effort in Europe, Indian authorities are going ahead with the construction of a similar

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[84] "Management of Plant Genetic Resources in India: An Overview" A presentation by Dr. Kuldeep Singh, Director, National Bureau of Plant Genetic Resources in March 2018. http://www.nbpgr.ernet.in/Training_Management_PGR/Kuldeep_Singh_Role_NBPGR.pdf

[85] Permafrost, or permanently frozen ground, is soil, sediment, or rock that remains at or below 0ºC for at least two years. It occurs both on land and beneath offshore Arctic continental shelves, and its thickness ranges from less than 1 meter to greater than 1,000 meters.

permafrost gene-seed bank in Chang La in Ladakh, at a height of over 17,500 feet.[86] The Chang La Seed Bank is about 75 km from Leh and is under the stewardship of the Defence Institute of High Altitude Research. Intended to be a national conservation centre initially, it is proposed to make available the Chang La gene bank for the seed collections of developing and developed countries. Chang La's permafrost conditionally below minus 18 degrees Celsius are ideally suited to conserving seeds at low temperature without the energy costs. More than the calamities like cyclones, hurricanes or bombs, the world's genetic material and its seeds are threatened steadily by warming planet and consequent change in the climate.

Though saving seed collections in Svalbard and Chang La is of great significance but these can't compete with the grassroots seed-exchange networks and gene banks maintained by indigenous and traditional farmers and producers of agrobiodiversity. Infact seed savers and plant-breeding farmers view *ex-situ* type of centralized bureaucratic and corporate control of seed diversity collection with a skeptical eye because it seems intrinsically anti-democratic and reflects an arrogant presumption that privileges top-down, expert-driven, and elitist policy as superior to all other models of agrobiodiversity conservation.

In-situ Seed Banks

The second type of seed conservation is farm based, where the farmer conserves a traditional/ extant/ desi variety by continuing to cultivate them regularly. This kind of conservation is called *in-situ* (in-place) or *in-vivo* (living) conservation model maintained by farmers and seed savers who always renew their seed stocks through multiplication, sharing and exchange. Preserving seeds, whether in national, regional or global seed banks like Svalbard Vault cannot compete with the ongoing diversity maintained by these indigenous farmers and their networks. The *in-situ* conservation not only protects seeds but it also protects the farmers. The need of today's time is to save not only the seeds that feed us but also the farmers who grow and select them--those "vernacular plant breeders" on whom the long-term vitality of those seeds and a diverse agriculture depends.

The *in-situ* conservation has been proposed as a method to:

- Conserve the processes of evolution and adaptation of crops to their environment;
- Conserve diversity at all levels – ecosystems, species and within species;
- Improve the livelihood of resource-poor farmers
- Support agro-ecosystem health;
- Maintain or increase farmers' control and access over their genetic resources;
- Integrate farmers into national plant genetic resources systems

The large-scale registration of farmers'/traditional varieties at PVPFRA tells us that Indian farmers are still conserving traditional seeds and even breeding new varieties. The seeds of various crops,

[86] "A repository of seeds on cliff top of Himalayas," Sarah Hiddleston, *The Hindu*, Chennai, 17 February 2010; https://www.thehindu.com/news/national/A-repository-of-seeds-on-cliff-top-of-Himalayas/article16815067.ece

vegetables, fruits, tubers, and millets developed by the farmers proclaim the unique biodiversity of the country and back their demand to be treated at par with agriculture researchers. Over generations, farmers have perfected their practices in all aspects of agriculture including developing new varieties by closely following natural practices. It also proves that agricultural innovation does not just happen in laboratories but also in the farms and that's how India had more than 100,000 varieties of rice in pre-independence era.

Sadly, the Green Revolution led to extinction of thousands of such varieties. A traditional variety of rice is passed from generation to generation and family to family. "It took almost 12,000 years for these diverse varieties to be created," said Dr. Debal Deb, a rice conservationist and a biologist. "We destroyed or lost them in just 30 years or so. This is the sad state of our heritage".[87] Farmers stopped saving and exchanging seeds, and instead started buying them from the market, thus their native expertise and knowledge of breeding new varieties in the farm became irrelevant. Seeds that was a 'community resource', carefully bred, conserved and evolved over thousands of years, has transformed into a 'commercial proprietary resource'.

To counter this and to protect traditional seeds from monopolization and control, there are thousands of Indian farmers who are continuing with seed saving and have conserved hundreds of traditional/desi varieties in order to revive seed diversity as well as preserve the heritage of seed sharing, exchange and conservation with the objective to protect farmers' rights to grow what they want and to promote seed sovereignty. These farmers have in their collection a number of landraces of food crops that are resistant to pests, can grow on poor soils and can sustain under the changed climatic conditions with high nutritive values which give hope for not only nurturing agro-biodiversity but also for providing food security and sustainable livelihoods. Their in-depth knowledge and understanding of crops, seed selection and local conditions has meant that they have created a wide range of germplasm, from which they can further breed and adapt new resilient and nutritious varieties. Dr. Debal Deb also argues that traditional seeds are vitally important, not just to ensure food security, but also for protecting local food sovereignty against the corporate control of food systems around the world.

Importance of traditional (or desi) seed varieties

- Traditional/desi seeds are locally available because farmers collect good seeds from their own farm and keep them for the next season to grow;
- Farmer either buys or exchanges their seeds with other farmers or grows their own seed. So the cost of seed is either minimal or almost nil;
- Traditional/desi seeds are geared to a subsistence economy as the farmer first grows food for her/his sustenance and sell surplus in the markets;
- Traditional/desi seeds embody indigenous knowledge. A farmer who uses native seeds uses

[87] http://timesofindia.indiatimes.com/city/ahmedabad/Rice-and-fall-of-great-desi-crop-India-has-lost-1-10-lakh-traditional-varieties/articleshow/51861214.cms

her/his traditional knowledge, skills and wisdom to grow them. S/he does not depend on 'expert'. It therefore promotes self-reliance.

- An outstanding feature of traditional/desi seeds is diversity.
- Traditional/desi seeds are hardy, as they have, over the years, developed resistance to the pests and disease-causing organisms in the system;
- Traditional/desi seeds have high levels of tolerance of stress and are adapted to local agro-climatic conditions.

The vast diversity of crops and its desi varieties that we see in Indian agriculture would not have been possible if it hadn't been for the constant engagement of the farmer with the seed, trying it in different environments. And this enriching diversity is what gives resilience to a way of life. Infact this is also an act of protest against seed development being the monopoly of just a few, and against the appropriation of people's knowledge systems.[88] At another level, it is not just the question of learning and mastering a technique or technology. It is the significance of farmers seeking a deeper engagement with their agriculture and their ecology from which they are forcibly being marginalized. They are seeking to become, once again, the masters of their own agriculture. And as farmers begin to cross-breed on their own lands, and others learn from them, they also begin to strengthen their claim to being the true agricultural scientists on the ground.[89]

Seed saving is a set of practices which involve planting, observing, selecting, breeding, harvesting, storing and saving, and replanting the seed next year as well as attend to other processes of seed exchange and knowledge-building. Farmers might save seeds in old glass bottles, in clay pots, in plastic bags or in gunny bags. The approaches may vary. But it is their believe which tells them that the field is the place for the seeds and the only means to save seed varieties is to grow them, use them, keep them in circulation on the land. The seed savers are high on skills and unlike the farmers who practice intensive agriculture, they are knowledgeable about their varieties and know how and where their varieties can be adapted. When they save seed, they also claim and rejuvenate knowledge - the knowledge of breeding and conservation, like knowledge of seed and farming. Farmers gather knowledge about the seeds they want to grow by watching them grow in their fields. This practice have helped farmers to creatively cultivate ever more crop varieties to deal with many different challenges of soils, climates, nutrition, flavour, storage, pests and diseases. Women farmers, in particular, play a significant role as seed savers or custodians of traditional seeds.

Seed saving is therefore Indian farmers' constant struggle to defend their seeds against monopolization and control. Indian farmers cannot let their genetic commons and bio-cultural heritage be privatized and monopolized by a few; and assert their sovereign rights to freely plant, use, reproduce, select, improve, adapt, save, share, exchange or sell their seeds – without restriction or hindrance – as they have done for centuries.

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[88] "Grassroots scientists challenge seed monopolies," Biju Negi, *Infochange News & Features*, October 2011 [89] ibid

5.2 Community Seed Banks

Community-based organisations such as Basudha in Orissa, Sahaja Samrudha (Karnataka), Save Our Rice Campaign (Kerala), Kheti Virasat (Punjab), DRCSC (West Bengal), Sampark (Madhya Pradesh), Pebble Garden (Pondicherry), Nagpur Beejutsav Group (Maharashtra), Richaria Campaign (Chhattisgarh), Bhoom Gaadi (Chhattisgarh), MITTRA (Maharashtra), Bewar Swaraj Abhiyan (Madhya Pradesh), Dang Collective (Gujarat), Beej Bachao Andolan (Uttrakhand), Navdanya and Gene Campaign are among dozens of such organisations who are preserving and promoting traditional/desi seeds. Most of them are part of the Bharat Beej Swaraj Manch (India Seed Sovereignty Alliance) at the India level, which have been formed to strengthen seed conservation and participatory plant breeding in the communities. The national network would focus on unifying the efforts of individual seed savers and farmer plant breeders and handle the issue of purity of seed varieties through capacity building workshops across the country.[90] They also impress upon the government the need to promote diversity conservation and prevent biopiracy and corporate monopolisation. For them, the immense biodiversity of seeds, plants and life forms is their collective heritage and are sacred. These belong to all as an inviolable birthright, essential for survival and well-being; and they consider their duty to preserve them for future generations. These genetic resources cannot be seen as mere commodities or 'proprietary intellectual resources' for corporate profiteering. Efforts of some of these organisations are worth mentioning here. For example:

Basudha, set up by Dr. Debal Deb (who started a Seed Bank in 1998 called Vrihi (Sanskrit for rice) initially in Bankura, West Bengal and letter shifted to Orissa) is one of the largest in situ collections of one crop diversity, with a current repository of around 1320 rice varieties. Intended to facilitate a free exchange of local crop varieties among farmers, the seed bank is not an expensive air-conditioned facility but relies on the use of natural materials to store seeds. Farmers who approach Basudha for seeds get them free of cost, with a plea to grow them and in turn become distributors to other farmers, to help reduce the chances of the variety becoming extinct. Basudha/ Vrihi's collection includes a number of unique rice varieties such as Jugal which have two rice grains in one kernel, and Sateen has three; some varieties can grow without a single drop of water while others can be grown in ponds that are 3 to 4 feet deep and a few can grow even under 12 feet of water. One traditional variety called `Garib Sal' has silver in it and for the first time a plant has been discovered where silver was absorbed from the land. Debal feel that this type of rice may have been used for medicinal purposes and it was given to people with gastric infections as silver kills germs. Debal says, "We came across this rice grain while looking for varieties having metals such as iron and zinc".[91] He also has seeds that can grow in soils with high salinity, and there are other varieties, which are resistant to attacks from varying pathogens; some are

[90] "Every seed makes a political statement," Manu Moudgil, 17 June 2017; https://yourstory.com/2017/06/seed-economy/

[91] http://timesofindia.indiatimes.com/city/ahmedabad/Rice-and-fall-of-great-desi-crop-India-has-lost-1-10-lakh-traditional-varieties/articleshow/51861214.cms

suited to dryland cultivation. Dr. Deb also rubbishes the government official arguments that indigenous varieties result in inferior yields: "I have several varieties which outperform the so-called high-yielding varieties." High yields do not ensure food security, he reminds, pointing out that India is home to record stockpiles of rice and wheat, as well as a quarter of the world's undernourished.[92]

Sahaja Samrudha (Bountiful Nature) was started with just nine farmers in 2000, but today it has grown into a large network of small farmers that shares practices and exchanges knowledge about seed conservation and sustainable agriculture. Sahaja provides good quality traditional seeds to farmers to help them grow any kind of produce, right from paddy and millets to fruits and vegetables. It has conserved 700 traditional paddy varieties including Diana rice, which is great for diabetics, and Black Burma rice, which is indigenous to northeast of India. They have also facilitated the growth and conservation of more than 68 varieties of millets, ancient Indian grains that are hardy, drought resistant and extremely nutritious. Sahaja farmers have some unique varieties, for example Bore Gowda, a farmer from Shivahalli in Mandya district, has inspired several farmers to preserve and produce the various strains of Rajamudi rice, because it remains unspoiled for two days after cooking. Similarly, Mukappa Pujar of Haveri district has guli ragi that increases the yield by four times. Syed Ghani Khan of Mandya district has conserved over 700 varieties of paddy, 120 varieties of mango and many types of vegetables and legumes.[93]

Besides them, there are hundreds of individual farmers/ seed savers who have conserved seeds of different crops varieties, while some specializes in a particular crop. For example Deepika Kundaji, a farmer from Auroville, has saved around 90 indigenous seeds of vegetables from various parts of India.[94] Similarly, a women farmer from Kombhalne village in Maharashtra, Rahibai Soma Popere, has conserved many native crops including 15 varieties of rice, nine varieties of pigeon pea and sixty varieties of vegetables, besides many oil seeds. She also started a self-help group (SHG) named Kalsubai Parisar Biyanee Samvardhan Samiti to conserve native seeds. The seed bank distributes 122 varieties of 32 crops. For Rahibai, "Native crop varieties are not only drought and disease resistant, but are nutritive and retain the soil fertility as they do not need chemical fertilizers and excessive water".[95] Farmer Vijay Jardhari from Uttrakhand, who is the main pillar behind the Beej Bachao Andolan, has so far conserved 350 varieties of rice, 220 beans varieties, 30 wheat varieties, 11 maize, 4 barley, 3 amaranth, 8 potato, 20 rice bean, 12 ragi millet, 8 barnyard millet, 8 cowpea, 5 local soyabean varieties, many more local grains, vegetables and oilseeds varieties. Jardhari has inspired several hundred farmers in Uttrakhand and Uttar Pradesh to conserve traditional varieties as well as impart training in the traditional practices of selecting and conserving good seeds - and even developing new varieties

[92] "Debal Deb - The barefoot conservator," Chitrangada Choudhury Aga, The Live Mint, 9 August 2014; http://www.livemint.com/Leisure/bmr5i8vBw06RDiNFms2swK/Debal-Deb--The-barefoot-conservator.html

[93] "Over 5000 Organic Farmers Are Reviving Traditional Crop Varieties. Thanks to One Organization," Sanchari Pal, 11 January 2017;

[94] "Every seed makes a political statement," Manu Moudgil, 17 June 2017; https://yourstory.com/2017/06/seed-economy/

[95] "Maharashtra seed mother pioneers conservation of native varieties," Ashlesha Deo, Village Square, 8 September 2017; https://www.villagesquare.in/2017/09/08/maharashtra-seed-mother-pioneers-conservation-native-varieties/

through natural pollination. This would help farmers to establish food sovereignty by encouraging them to delve into the deep reservoir of their traditional knowledge and agro-biodiversity, reclaim lost crop varieties, and develop new ones in accordance with their priorities and needs.

Indrajit Sen from Mumbai Mirror[96] reported from West Bengal about Bhairav Saini and his fellow farmers in a remote village in Bankura district, who have conserved around 50 rice varieties, some of which has medicinal values, for example:

- Tin Satin rice cures stomach upsets and infections
- Dui Satin rice is fluffy and light and it takes time to metabolise, and keeps one feeling sated for a long time
- Parmaishal, Bhootmuri or Phoolkathi rice varieties also work wonders with stomach ailments
- Heera-Moti has high iron content, while Garib-shal or Naichishal rice, makes expectant women stronger
- Kobiraj-shal rice, has rich source of iron (12 to 16 mg per 100 grams of rice) and is normally given to mother after child birth
- Karim-shal has the highest iron content of 16 mg and zinc content of almost 46 mg (which helps in the remission of diarrhea)
- Damodargetu rice variety is believed to increase one's stamina
- Kaala bhaat or black rice is rich in antioxidants
- Parmaishal rice has anti-carcinogenic properties

There is another rice variety Mappilai Samba (conserved by farmer Bhaskaran), which is quite popular in Tamil Nadu, because it has medicinal properties that can enhance the libido and it is nicknamed as rice viagra. Similarly, another traditional rice variety Kattuyanam (conserved by farmer Karikaalan) is a wonder of nature and it is suitable for climatic aberration because it can withstand both droughts and floods.[97]

The India Seed Sovereignty Declaration, issued on 25th April, 2014 at Seeds Exhibition in New Delhi by Bharat Beej Swaraj Manch says that the traditional / indigenous seeds represent the collective bio-cultural heritage – including biodiversity, food culture, ecological knowledge and value systems – of local communities that freely shared and passed them down from generation to generation. Such seeds are a vital resource that must be reclaimed to safeguard farm livelihoods and the people they feed, especially in a scenario of rapidly depleting and increasingly expensive fossil fuels and chemical inputs, together with soil degradation, climate change, water scarcity and erratic weather conditions. Unless farmers can adopt bio-diverse ecological agriculture with their own locally adapted seeds, severe food scarcity looms ahead.

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[96] "Bengal's rice revivalists," Mumbai Mirror, 30 July 2017; https://mumbaimirror.indiatimes.com/others/sunday-read/bengals-rice-revivalists/articleshow/59826424.cms

[97] "A silent revolution grows in the farm" by Devinder Sharma, Tehalka Magazine, Issue 24, Volume 11, 14 June 2014

These seeds network and community based organisations are holding seeds festivals in almost every states of India. In some states it has become an annual event where farmers from that state as well as neighboring states gather to showcase their collection of traditional varieties as well as share and exchange information and seeds. The Triennial Kisan Swaraj Sammelan organized by the Alliance for Sustainable and Holistic Agriculture (ASHA) as well as Biennial Conventions by Organic Farming Association of India (OFAI) are other occasions when seeds festivals are being organized. The Seed Festival organized during the 19th IFOAM Organic World Congress (OWC) in Greater Noida (in November 2017) was a grand event to celebrate biodiversity where about 60 seed saver groups from 15 states of India – practicing on-farm conservation and promotion of seed diversity and related knowledge – participated and over 4,000 different varieties of seeds were on display.

These Community Seed festivals are being organized with the following objectives:

- To show-case, celebrate and conserve India's incredibly rich diversity of agricultural seeds and bio-cultural heritage
- To highlight community conservation traditions of participatory selection, innovation and shared rights over diversity of crop seeds and related knowledge
- To inspire policy changes and initiatives towards community led in-situ conservation, regeneration, use and sharing of locally adapted crop diversity and related knowledge, protected from exclusionary/patented private property claims

Conclusions

While efforts like conservation and revival of traditional varieties, selections by farmer breeders, Community Seed Banks, seed fairs are to an extent addressing the local farmers' seed needs they still remain as informal systems and do not receive any support from the governments. It is time the Central and State governments should come forward and recognize the importance of the conserving traditional varieties (irrespective of whether these are registered under PVPFRA or not) and the efforts of farmers communities and individual farmers who are conserving and preserving these traditional varieties. Government encouragement and support will bring in more and more farmers to save seeds and plant traditional varieties in their farm. The other way to encourage farmers to grow these traditional crop varieties is to create a market for them and make consumers aware about the specialty and nutritional aspects of these crops. And this can be made possible when sustainable farming and agroecology can be mainstreamed into Indian agriculture and all the States adopt agroecological policies with public consultation to enable large investments to support production and marketing of organic produce. The defense of seeds is part of the defense of traditional ways of farming, because seed sovereignty is a key part of food sovereignty. Agroecology and organic farming cannot sustain on hybrids or GMO seeds, and it needs indigenous local seeds, therefore promotion of agroecology is key to the sustenance of conservation and propagation of indigenous seeds diversity.

With the increasing challenges resulting from climate-induced stresses, building resilience should be

the high priority for the government. And this can come only through the conservation and propagation of drought resistant, robust and resilient indigenous seeds and genetic diversity of local peasant and peasant seed systems. It is a known fact that commercial 'high yielding' varieties are proving less effective with climate change, making farmers more vulnerable. Therefore the need to preserve traditional and local varieties of seeds is all the more important because they do not need much water or chemical fertilizers and pesticides to grow. They can withstand the rigors of climate change and its harsh side effects. To ensure that farmers and our food systems have the capacity to adapt to climate change, India urgently need strategies and policies that support them to revive their seed diversity and related knowledge.

Given the merger and acquisition among large seed companies, we should demand that the Indian government should support peasant seed systems based on recovering, saving, multiplying, storing, breeding and exchanging seeds at the local level, instead of favoring the interests of seed industry.

The government of India must also ensure seeds policies that guarantee the collective rights of peasants' and indigenous peoples' to use, exchange, breed, select and sell their own seeds. The policy should ensure that farmers reclaim control of seeds and reproductive material and implement farmers' rights to use, sell and exchange their own seeds.

This can be the only effective protection against the IPR and patent on seeds and it is only way to deal with the monopolization and control over the farmers seeds system.

Right to Seeds in the Declaration on Rights of Peasants and Other People Working in Rural areas

On 17th December 2018, the United Nations General Assembly (UNGA) adopted a landmark UN Declaration on the Rights of Peasants and Other People Working in Rural Areas. With 121 votes in favor, 8 votes against and 54 abstentions, the forum of UNGA representing 193 Member States expressed widespread support for the promotion and protection of human rights of all the rural populations including peasants, small-scale fishers and fish workers, pastoralists, foresters, agricultural workers, indigenous peoples and other local communities.

Article 19 of the Declaration is about the Right to Seeds, which extends human rights protections to farmers whose “seed sovereignty” is threatened by government and corporate practices and IPR laws. The Declaration is also a powerful international tool to defend farmers from the onslaught of policies and initiatives, which replace native seeds with commercial varieties, the kind that farmers are compelled to buy every year.

Some of the provisions of the Right to Seeds (Article 19) say that:

1. Peasants and other people working in rural areas have the right to seeds, including:
   (a) The right to the protection of traditional knowledge relevant to plant genetic resources for food and agriculture;
   (b) The right to equitably participate in sharing the benefits arising from the utilization of plant genetic resources for food and agriculture;

(c) The right to participate in the making of decisions on matters relating to the conservation and sustainable use of plant genetic resources for food and agriculture;

(d) The right to save, use, exchange and sell their farm-saved seed or propagating material.

2. Peasants and other people working in rural areas have the right to maintain, control, protect and develop their own seeds and traditional knowledge.

3. States shall take measures to respect, protect and fulfill the right to seeds of peasants and other people working in rural areas.

5. States shall recognize the rights of peasants to rely either on their own seeds or on other locally available seeds of their choice, and to decide on the crops and species that they wish to grow.

6. States shall support peasant seed systems, and promote the use of peasant seeds and agrobiodiversity.

8. States shall ensure that seed policies, plant variety protection and other intellectual property laws, certification schemes and seed marketing laws respect the rights of peasants, and take into account their needs and realities.

During the course of the negotiation at the UN Human Rights Council, some delegations did not recognize the peasants right to seeds and called instead for access to seeds because they were concerned that this article could undermine international agreements on intellectual property and UPOV mandate. Despite that the iconic provisions on the right to seeds got support from numerous other delegations, who clarified that the right to seeds is a fundamental right for peasants which is threatened by changes to patent law such as allowing patents to be taken out on existing varieties.

In that respect the provision about right to save, use, exchange and sell their farm-saved seed or propagating material and more importantly the provision where the State is required to take measures to respect, protect and fulfill the right to seeds of peasants and other people working in rural areas is the key. The States should also ensure that seed policies, plant variety protection and other intellectual property laws, certification schemes and seed marketing laws respect and take into account the rights, needs and realities of peasants.

In view of the ongoing threat of UPOV 1991 being forced upon countries like India who are negotiating RCEP, the right to seeds provisions in the Declaration would provide necessary support to protect its farmers by maintaining the provision of the PVPFR Act, which provides for farmers to save use, exchange and sell their farm-saved seed or propagating material. The international legal recognition of farmers rights to seeds given under the UN Declaration needs to be implemented at the domestic level through the Seeds Act, which Indian government must bring in soon before it accepts the UPOV 1991 under RCEP. In view of the international legal recognition of peasants right to seeds, it is now obligatory on India to ensure that this right is granted to the farmers of India and no Act or policies is made which impinges Indian farmers right to seeds and propagating materials.

Focus on the Global South

Focus on the Global South is a policy research organisation based in Asia (Thailand, Philippines and India). Focus provides support to social movements and communities in India and the Global South by providing research and analysis on the political economy of globalisation and on the key institutions underlying this process. Focus' goals are the dismantling of oppressive economic and political structures and institutions, the creation of liberating structures and institutions, demilitarization, and the promotion of peace.

Rosa Luxemburg Stiftung (RLS)

The Rosa Luxemburg Stiftung (RLS) is a Germany-based foundation working in South Asia as in other parts of the world on the subjects of critical social analysis and civic education. It promotes a sovereign, socialist, secular and democratic social order, and aims to present alternative approaches to society and decision-makers. Research organisations, groups for self-emancipation and social activists are supported in their initiatives to develop models which have the potential to deliver greater social and economic justice.