

Crop Residue Burning

Solutions Marred by Policy Confusion

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Are the ongoing debates on solutions to crop residue burning marred by policy confusion? While bio-compressed natural gas and ethanol producers want farmers to collect paddy straw from their farms to be supplied to plant locations, another lobby of machine sellers wants the straw to be processed in the fields itself. Would the success of one commercial proposition lead to the failure of the other?

The assured irrigation-based agriculture of north-west India produces a large quantity of wheat and paddy to ensure food security of the country. This region produces an equally large quantity of crop residue. Wheat straw is considered a good fodder and is separately harvested using harvester combines with the help of tractor-operated machines. A very small part, around the boundaries of fields, is burnt by the farmers. However, paddy straw that contains silica is not considered suitable for use as animal feed and it is burnt in the fields by farmers after harvesting during October–November. As the time lag between harvesting of the paddy and sowing of wheat is only three weeks, farmers burn paddy straw to quickly clear their fields. There is a general perception among the farmers that if paddy straw is not cleared from the fields immediately, it would hamper the growth of the succeeding crop. Thus, during late October to middle November, the whole of the north-west region appears to be burning and the sky is filled with gases injurious to health. This makes children and the elderly prone to sickness, which often proves fatal in many cases. With decline in visibility due to smog, road/rail accidents also take place frequently, snatching away thousands of lives.

Due to high levels of pollution in the air, the National Green Tribunal (NGT) has been issuing directions to governments of Punjab, Haryana, Uttar Pradesh and Rajasthan to take concrete steps to check this menace. The governments have been issuing orders to fine those farmers found burning crop residue. But, until now, these orders have been largely defied by farmers who find no other alternative to burning. They hold the view that alternatives are costly. Zero tillage technology through the use of Happy Seeder machines or mixing of crop residue in the soil through mulching requires purchase of costly machines

beyond their reach. The operation of these machines requires tractors with stronger horsepower than those possessed by most of the farmers.

Paddy Straw as a Resource

Punjab, Haryana and western Uttar Pradesh produce nearly 40 million tonnes of paddy straw annually. Punjab alone produces 22–23 million tonnes of paddy straw which is mainly burnt (CRRID 2018). This precious raw material, when burnt, causes pollution, environment degradation, and warming of temperature, leading to accidents as well as afflicting people with breathing-related diseases. This is avoidable as paddy straw can be used for the production of energy, thereby generating employment and incomes for farmers. At the same time, productivity of soil can be maintained, environmental pollution can be contained and consequently, ill health of the people and smog-related accidents can be avoided. There are several uses suggested by experts to convert crop residue, which is an important resource. There are four uses for paddy straw and other crop residues, such as generation of power, production of cardboard and packing material, production of ethanol by fermentation, and bio-compressed natural gas (CNG). In addition, the agricultural research system has been working on building new machines to mulch paddy and other crop residues in the soil itself to increase fertility.

Alternative Technologies

In view of the hazards of crop residue burning, scientists and technologists have been working on the alternative uses of paddy straw. The technology for production of thermal power and production of cardboard and packages appeared early. The power generation technology using paddy straw could not become a commercially viable business model due to the fact that it involved high costs of production with a tariff rate of ₹7.51 per unit. This tariff rate works out to be more than two times that of the actual average purchase rate of power at ₹3.5 per unit in the open market. Since electricity tariff rates of solar and wind energy are continuously falling, this makes production of thermal power from paddy straw financially

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unviable. The production of cardboard and packaging material did not take off. In both cases, the collection of paddy straw from fields and its transportation to production places remained costly and problematic.

Ethanol production remains on the radar of the national policy on biofuels. This policy has set a target of 20% blending of ethanol both for biofuels and diesel (GoI 2015). Minimum support price and appropriate fiscal and financial support for non-edible oil seeds used for biodiesel are being contemplated. This policy supports G-2 technology for ethanol production from paddy straw. There is a proposal by Hindustan Petroleum Corporation Limited to set up a paddy straw-based biorefinery at Bathinda (Punjab) for ethanol production from fermentation, with an investment of ₹600 crore. However, according to one estimate, an alternative technology of production of methane gas through anaerobic digestion provides 37% more energy compared to ethanol production by fermentation.

There are several proposals with the Punjab government to set up plants for bio-CNG that can substitute natural CNG for all purposes. Indian Oil Corporation is ready to market bio-CNG produced by the proposed plants. Some private companies are claiming that bio-CNG is cheaper by ₹10–₹15 per kg than commercial natural CNG. Bio-CNG also produces decomposed organic manure, fit to maintain soil fertility. The latter has been duly tested by the Punjab Agricultural University. Some of the private investors are willing to pay to farmers ₹150 per quintal (₹1,500 per tonne) of paddy straw supplied to their production plants. These private investors are neither demanding any subsidy for production of bio-CNG, nor do they want any free land from the government or village panchayats. This business model seems to be viable in the context of the ground reality of the region on several counts. It is more efficient in energy generation compared to production of ethanol from paddy straw. It produces bio-CNG cheaper by ₹10–₹15 per kg. It does not require any subsidy and seems to be a self-sustaining commercial proposition. This model provides ₹150 per

quintal (₹1,500 per tonne) to farmers for collection and transport of paddy straw to the plant location. The farmers are willing to avoid paddy straw burning provided they get an assured price for it. The conversion of paddy straw into generation of bio-CNG can be a game changer in the state. It will lead to production of energy worth crores of rupees on a sustainable basis while also generating several direct and indirect jobs for the youth. It would make farmers partners in resolving the problem of air pollution and environmental degradation. This model can be applied for the production ethanol. Biomass will return to the soil in the form of manure produced by bio-CNG plants, or as animal feed in the case of ethanol plants. It also has the capacity to use all types of biomass such as crop, vegetable and fruit waste, waste of poultry and meat and urban sewerage.

Policy Confusion

In the ongoing debate on resolving the issue of crop residue burning, policy statements have created confusion. First, the national policy on biofuels does not cover support to bio-CNG produced from paddy straw in the form of minimum support price for straw (GoI 2018). Second, a budgetary provision of ₹1,151 crore for Punjab, Haryana, Delhi, Uttar Pradesh and Rajasthan with nearly half of the share for Punjab has been created in the current budget. The amount for providing subsidy, for the purchase of agricultural machinery to retain crop straw as mulch or to be incorporated into soil for maintaining soil productivity and fertility, is to be spent within two years, or else it would lapse. This incentive/subsidy is meant to discourage the farmers from collecting the straw for disposal to bio-CNG plants. In fact, two lobbies have become active in the state/region. The first lobby consists of producers and dealers of agricultural machinery for mulching straw in soil. This lobby has considerable support from the state agricultural department of Punjab and agricultural extension experts. The second lobby consists of investors and potential investors in bio-CNG and ethanol. They are pulling the policy in opposite directions. The state

governments in the region are declaring themselves to be neutral, but are bound by the union government's budgetary provision of ₹1,151 crore support for agricultural machinery subsidy for mulching of crop residue in the soil. In practice, the officials in agricultural departments are required to use this amount for purchase of requisite machinery by the farmers. As usual, the agricultural subsidy would land in the pocket of machinery producers and distributors.

The difference between pronouncements and practice is going to create a situation in which this precious resource (40 million tonnes of paddy straw) will be put back to the soil without producing bio-CNG/ethanol worth several thousand crores of rupees. There seems to be a lack of coordination between the Ministry of Agriculture and Farmers' Welfare and Ministry of New and Renewable Energy as policy documents create confusion among the state governments, which are supposed to tackle the issue of paddy straw burning under the directions of NGT. These documents have also set in motion forces in the states which work in opposing directions and lobby for solutions for their own self-interests. Bio-CNG and ethanol producers want farmers to collect paddy straw from their farms to be supplied to the plant locations, while another lobby of machine sellers wants the straw to be processed in the fields itself. The success of one solution would lead to the failure of the other.

This is an avoidable confusion if coordination is done properly. A common agency like the National Institution for Transforming India (NITI) Aayog, can play this role better by involving different ministries and experts. The states need to be given a solution acceptable to all the stakeholders. In order to tackle this problem, there is a need to take a relook at the national policy on biofuels, and budgetary allocation of ₹1,151 crore for machinery subsidy in light of the emergence of new and efficient technologies for bio-CNG, ethanol, and manure production.

It needs to be noted that the whole region is water-stressed and groundwater tables are falling at alarming rates. Production of paddy is the major factor causing water shortage in the region. Agricultural

experts are stressing the need to reduce this crop from at least 20% of sown area. The supply of paddy straw should not be calculated at present rates in the near and distant future, for the policy towards utilisation of paddy straw as a resource has to

take this aspect into consideration. This is neglected in the policy documents.

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