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A Sociological Study on Hybrid Rice

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Abstract:

India's population has crossed one billion. There is a need to provide food for the large population. In India rice and wheat are the main food crops. There is a need to increase volume of production and productivity. In this context hybrid rice technology as an innovative technology has the potential to meet the increasing demand. The introduction of hybrid rice seeds in India has doubled the yield of food grains. Green Revolution has contributed to serious interrogation disparities in agriculture in India. Surplus production of foodgrains is not the true measure of sources of the Green Revolution. There are many areas in India are unaffected by employing this programme, and still vulnerable to famine.

Key words: Hybrid Rice, Innovative Technology, Green Revolution, Regional Disparities.

Almost a billion households in Asia, Africa and the Americans depend on rice system for their main source of livelihood. Rice is on the front line in the fight against world hunger and poverty and is also a symbol of cultural identity and global unity (Shakeelur Rahman et al. 2006). Rice is staple food for more than half of the world's population. In India, it occupies a pivotal place as it is not only the major food for than 70 percent of the people but also a source of livelihood for about 120-150 million rural households. Presently, rice is grown in an area of 44.6 million hectares with a production of about 89.5 million

tons. At the current rate of population growth (1.55%) in India, the rice requirement by 2020 would be around 120-125 million tons. Raising the rice production from the present level of 89.5 million tone to the anticipated 120-125 million tone is a herculean task especially in backdrop of plateauing yield of HYV's and the declining resource base in terms of land, water, labour and other inputs(Subbaiah 2005).

The term "Green revolution" is generally taken to mean the increase in cereal productivity experienced in some third World country as a result of the change in agricultural technology during the 1960s and 1970s.Generally, the Green Revolution involved the use of seeds of high-yielding varieties (HYVs), primarily of wheat and rice, and adoption of a package of improved agricultural practices involving fertilizers, pesticides, controlled water, credits, mechanical threshers, pumps, and so forth. The Green Revolution, which has made India self-sufficient in food grains even though it has spread only to a quarter of its arable land, may be characterized as the new technological paradigm that replaced the old one characterized by subsistence farming. In areas where the Green Revolution was successful (such as Punjab, Haryana, western Uttar Pradesh, and parts of Tamil Nadu and Kerala), the increased productivity of the land came with lasting and irreversible changes (Parayil 1992).

The adoption of the H.V.P. (High yielding Varieties Seed Programme) was facilitated by the "Intensive Agricultural District Programme" (I.A.D.P.), which was built into the existing community development organization. The major objectives of this programme have been to increase foodgrains production by demonstrating and promoting the adoption of improved farm practices and by making available the needed practices and by making available the needed facilities, credits, seeds, fertilizers, pesticides, and implements. Each farmer has been helped to develop a crop production plan for his land. The success of the new high-yielding seeds in I.A.D.P. districts has spurred rapid diffusion (Chakravarti 1973).

Criticism of Green Revolution:

There is large consumption of fertilizers in cultivation of High-yielding varieties seeds. One great hindrance is that many farmers in agriculturally back-ward areas cannot afford to purchase chemical, fertilizers, and distribution centres and credit facilities are also inadequate in most of these areas. High-yielding varieties seeds need more effective disease and pest controls than traditional varieties, because conditions which are conducive to the growth of the varieties are also favourable for pests and diseases. Therefore, most of the small and medium farmers didn't like to cultivate High-yielding varieties seeds of rice. The H.V.P. has been adopted mainly in areas with well developed irrigation facilities (Chakravarti 1973). As we know, Indian farmers depend on monsoon and there is great lack of adequate facilities of irrigation in India and specially small and poor farmers. The poor farmers do not want to borrow money from private sources or governmental agencies such as co-operative society or banks, they scare their land would be confiscated if they failed to pay instalments because of poor harvesting. The mostly farmers have no bullocks, there are no tractors or farm machines, and fifty percent of the cultivated area has canal irrigation.

The green revolution has had a very concrete political effect; it has changed the relationships between social classes in the poor world, changed peasants and small entrepreneurs into proletarians and divided people into upper and lower classes in areas where such divisions were not clear before - all due to the reproduction of capita- list technology in new societies. Indian agricultural production has become dependent on international petrochemical industry to a remarkable extent. Its present agricultural strategy was developed in connection with experts from the Rockefeller and Ford Foundations and the US Department of Agriculture opening up for private investment instead of the previously preferred imports of technological know-how in concrete cases. The permanent presence of

international petrochemical industry in India has made it possible for the companies to stipulate prices and ac- quire a monopoly of distribution. The Indian surplus of naphtha is not used for production of fertilizers, but ammonium is imported from abroad, thus putting local Indian oil refineries in an awkward position and a strain on Indian foreign exchange reserves. Extensive use of fertilizers and irrigation may have long-run ecological consequences. The additional circulation of water will leave more salts behind that accumulate in the upper layers, and nitrogen and phosphate fertilizers can become the prime cause of eutrophication and soil toxicity (Reinton 1973).When the Green Revolution had reached at saturation stage then the productivity of food grains became stagnant. Farm land became unfertile due to excessive utilisation of chemical fertilizers, insecticides and pesticides. As a result the second Green Revolution has started in agricultural. That is known as Hybrid Technology across the world.

Hybrid Rice Technology in India:

Hybrids are crosses between two parents that either occur naturally in plant populations or occur when plant breeders and geneticists manually produce crosses between selected parents (Burton 1983 and Stoskopf 1993).In allogamous (cross-fertilization) plant species each plant is theoretically a hybrid because of the union of gametes between the male and female parents. Except for specific instances, the frequency of hybrid would be less in autogamous (self –fertilization) plant species. In most plant breeding programs, hybrids are produced between elite parents to develop F2 populations by either selfing or sibling (plant-to-plant crosses) the hybrid (F1) plants. Selfing and selection is initiated within the F2 populations to develop pure lines (or inbreds) that may be used either as pure-line cultivars for autogamous plant species or as parents to produce hybrids for allogamous crop species. Hybrids for

autogamous crop species are vehicle to develop segregating populations in which selection is practiced to develop pure-line cultivars for use by the producers (Hallauer 2004). Hybrid rice is developed by exploiting the phenomenon of heterosis. Rice, being a strictly self-pollinated crop, requires the use of a male sterility system to develop commercial rice hybrids. Male sterility (genetic or nongenetic) makes the pollen unviable so that rice spikelets are incapable of setting seeds through selfing. A male sterile line is used as a female parent and grown side by side with a pollen parents in an isolated plot to produce a bulk quality of hybrid seed because of cross pollination with the adjoining fertile pollen parent. The seed set on male sterile plants are the sterile seed that is used to grow the commercial hybrid crop (Virmani 2003).

Methodology:

Two states Jharkhand and Bihar has been selected for taking experience of farmers on hybrid rice cultivation and two districts (Darbhanga and Muzaffarpur from Bihar and Ranchi and Hazaribagh from Jharkhand)of each states has also been chosen with help of schedule-interview from farmers perspective to collect data. Random sampling is used from sample size 100 respondents. Interview has also taken from governmental agencies as well private hybrid rice dealers of Bihar and Jharkhand.

Farmers Experience on Hybrid Rice in Bihar and Jharkhand:

Hybrid rice cultivation has been cultivating in kharif season in Bihar and Jharkhand mainly. The major hybrid rice cultivation rice growing states are Uttar Pradesh, Jharkhand, Chhatisgarh, Bihar, Punjab and Haryana. The rate of adoption of hybrid rice of Jharkhand is much greater than Bihar. Because there is great exposure of private agencies in remote

areas of Jharkhand. The staff of these company use to go village level and arrange demonstration programme in village and also prefer to present some kind of gift in that village. The cost of hybrid rice cultivation of Jharkhand is lower than Bihar because the irrigation cost is low due to using bullock-cart for ploughing the field and farmers of Jharkhand also use the bio-fertilizers such as burnt of wood and straw. The farmers of Jharkhand mainly depend upon monsoon so they have to invest less money in irrigation. The farmers of Jharkhand are mostly tribes and according to these tribes, they need more rice production. Hence they have been adopting hybrid rice cultivation at great extent in Jharkhand. The farmers of Bihar are afraid of natural calamities such as flood, drought and untimely arrival of monsoon due to which they would not like to adopt rice cultivation In Bihar, respondents said that boiled hybrid rice cannot be stored for more than two or three hours as it gets fermented and its taste deteriorates. The chance of pest attack is more in hybrid rice and pesticides have been using more to prevent pest, it affect adverse on soil and natural environment. There is big paradox behind the hybrid seeds that it is male sterile. Hybrid seeds cannot reuse in next season for cultivation. Therefore, the farmers have to buy hybrid seeds in every season. As we know the Indian farmers have been storing from many years seeds for next coming season and they are able to cultivate that store seeds in next year cultivation. So they have no to bother to purchasing traditional or inbred varieties of rice cultivation in every season. One major thing is that hybrid rice technology is totally based on IPR (Intellectual Property Rights) notion. IPR is governed by private agencies or private organization. Therefore, farmers have to purchase hybrid rice seeds from multinational companies. They have own monopoly in production of hybrid seeds. The farmers of Bihar and Jharkhand have been using the different companies seeds, such as Pioneer, Advanta, Mayhco, Jk Agri Genetics Ltd, and Aditya Birla. The name of hybrid seed which used by farmers in Bihar and Jharkhand, Dhaanya, JK 6444, Pan, PHB-71, BSHR-

129, Champion. North Bihar is most flood prone area that's why the rate of adoption of hybrid rice cultivation in these areas is less in comparison to other areas. Because the cost of hybrid rice cultivation is higher than inbred or tradition rice varieties. There is more chance to ruined hybrid rice during flood season which comes in rainy season (kharif season).The farmers of Bihar have to face selling problem in hybrid rice. There is lack of proper functioning of PACS (primary agricultural credit societies) in Bihar for selling of hybrid rice. The Government does not provide cash money for farmer at PACS, when farmers sell their hybrid rice at these institutions. Similarly, LAMPS (Large area multipurpose society) is running in Jharkhand but does not work properly. They have to wait some days or month for getting their sold price of hybrid rice. The productivity of hybrid rice is twice in comparison to inbred or tradition rice varieties. So farmers have to face some problem after harvesting of hybrid rice and there is no adequate facility to storage of rice at home. That's why farmers would like to sell their rice as soon as possible.

Extension Facilities in Hybrid Rice Technology:

Bihar is covered by the large national agricultural agricultural research networks with the Indian council of Agriculture Research as the apex organisation. ICAR has seven research centres/stations to address the specific needs of Bihar's agriculture. There is, however very little synergy between the Agriculture University and ICAR institutions. Bihar has not able to take full advantage of the various schemes offered by ICAR.As in several other parts of the country ,the weakest link in agriculture in Bihar too in extension. There is evident from the fact that a dismal 0.4 per cent of farmers in Bihar received information on modern technology extension agents. This is lowest percentage among the major Indian states. There are three main public public players for agricultural technology dissemination in Bihar. These institutions are Krishi Vigyan

Kendra (KVKs), government departments and the Agricultural Technology Management Agency (ATMA). (Towards Accelerated Agricultural Development in Bihar: Report of Steering Group on Vision of Agriculture Development in Bihar, Development of Agriculture, Government of Bihar,Patna,2010).The role of agriculture colleges, agricultural sub-stations, kisan mela (farmers fair) are playing vital to providing new agricultural innovation training to the farmers. But in case of hybrid rice, adequate training programmes are not provided for farmers at district level or block level or panchayat level and only some limited farmers who have good approach or effective farmers could avail this extension programme either district level or block level or panchayat level.

Risk:

The main disadvantage of hybrid rice is that there is more chance of attacking of pest on hybrid rice plants, the farmers have to use pesticide at large scale, as a result sometimes it affect adverse to soil, other animals, birds and also environment. The local name of pest diseases such 'Bakki', 'Gobrain' (dung like), black before grain formation, leaf yellow are in Jharkhand but 'Khakhra' or 'Marhana' (no grain) 'Kaili' (black), and milk come before germination of full grain then pest attack and suck it, this is occurred in Bihar. If boiled hybrid rice is eaten after delaying of two-three hours then it becomes fermented and spoils. This is the main drawback of hybrid rice in India and there is also presence of stickiness in hybrid rice. The small farmers are not adopting hybrid rice cultivation because they have to sufficient money for cultivation and hybrid rice cultivation cost very high. So hybrid rice is increase disparity among big farmers and small farmers.

Conclusion:

The cost of hybrid rice (input) and production of hybrid rice is more in comparison to inbred or hybrid rice in Bihar and Jharkhand. The disease is more common in hybrid rice. The chemical fertilizers are utilizing at large amount in cultivation of hybrid rice and there is lack of extension facilities in hybrid rice cultivation. Stickiness and fermentation problems are found in hybrid rice.

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