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Conservation of diversity of folk rice in West Bengal

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ABSTRACT

West Bengal is known as rice bowl of our country. Its cultivation is in the life of Bengalis since time immemorial. The crop is grown in highly assorted agro-climatic situations from hilly and terai soils to red lateritic and even in coastal saline soils. These diverse climatic and edaphic conditions persuaded great diversity to rice genome to adapt the class of geographic conditions. Folk rice have long been highly regarded in Indian society not only because some of their excellent quality but also because they had been considered auspicious. Folk rice is reservoir of many biotic and abiotic stress tolerance traits. The primary benefit derived from folk rice by breeders has been the introduction into commercial variety of genes to overcome stresses: examples include resistance to pests and pathogens, drought tolerance, cold tolerance, etc. Immense numbers of folk rice were grown in different districts of West Bengal. These different ecotypes were categorized into three broad groups viz., Aus, Aman and Boro. These land races are primarily grown in Aus and Aman seasons. With the popularization of semi dwarf high yielding cultivars, we started losing the wealth of rice land races. With the disappearance of thousands of rice landraces, an erosion of folk knowledge concerning to the properties of specific varieties, many traditional agricultural systems is in the step of extinction. So, documentation, characterization and conservation are an utmost need to avoid the drift of gene pools now a day. Thus, we can save our culture as well as agricultural systems through conserving the diversity of folk rice in West Bengal.

Key words: Rice, Land race, High Yielding Variety, Traditional agricultural systems, Conservation

Genetic diversity of rice hidden in folk varieties or landraces and its wild relatives provides the foundation of evolution to cultivated forms. In addition to this, primary benefit derived from folk rice is to overcome stresses like resistance to pests and pathogens, drought tolerance, cold tolerance, etc. Folk rice have long been highly considered in Indian society not only because some of their excellent quality but also because they had been considered auspicious. West Bengal particularly is known as rice bowl of our country and the cultivation landraces is in the life of Bengalis since time immemorial. Moreover, different folk varieties of rice have been blended with the culture of Bengal and sometimes represent the cultures of the land. However, this great genetic diversity began to decline in the 1970s being replaced by a series of miracle high yielding varieties (HYVs) (Thrupp, 2000; Deb, and Bhattacharyya, 2005). Over 5500 folk varieties were reported to be existed before 1970s (Deb, and Bhattacharyya, 2005). High yielding varieties were introduced to fight against the threat of famine and to enhance food production within shortest space of time during mid 60s (Paul, 2012). As a consequence, industrial agriculture came into existence. But the post green revolution farming practices have exhausted the soil fertility status. Subsequently the agro-chemicals used nourish the contemporary farming practices also entered into the food chain which increases human diseases and environmental pollution. So, modern farming has wiped away the folk varieties to some extent and most of the days old landraces is now noticed in a few gene banks only, not in the lands of the farmers. Thousands of folk rice has disappeared from the lands of West Bengal also which have significantly made an erosion of folk knowledge and folk cultures associated with the traditional agricultural systems. In this backdrop, it is the time to impart special attention to the rice land races to save valuable genes for important agronomic characters as well as the heritage of Bengal pertaining to the souls of *Bengalis*.

Rice bio–diversity in West Bengal

Crop diversity always offers the farmers to grow the cultivars in variety of environments. The differentiated growing conditions may be described by different temperature and rainfall regimens, soil qualities and topographies as well as exposures to a varied diseases and insects (NRC, 1993). It is conferred by the genetic base of the diverse landraces which are also a depot of precious genes for important agronomic traits. In West Bengal, there were about 4200 folk varieties under cultivation before green revolution (Paul, 2012). The

rich resources of folk rice of West Bengal have a blend of superior economic characters.

The characters are as follows-
1. Tolerance to high temperature stress
2. Tolerance to draught
3. Tolerance to salinity
4. Long grain aromatic
5. Submergence tolerance and growing habit with rising water level
6. Double and triple grained
7. Medicinal rice and many more

Table1. List of some traditional rice germplasm of West Bengal (Modified from Sinha and Ranbahal 2014)

Name of the Landraces	Important agronomic character
Bashkamini	Aromatic
Bahurupi	High yielding
Bhadoi	Short maturity duration
Badsha	Drought resistant
Dudherswar	Fine grain
Gobindabhog	Aromatic
Jhulur	Drought resistant
Khajurchari	Multiple spikelets
Keralasundari	High yielding
Kaloboro	Drought resistant
Lalpatni	Salt resistant
Randhunipagal	Aromatic
Seshphal	Very Short maturity
Tulaipanji	Aromatic, fine grain
Vutmuri	Making moori (rice bubbles)

Need to conserve folk rice bio- diversity

The HYVs were introduced for a noble cause *viz*., the average grain yield of these popular modern varieties ranged between 3-5 t ha^{-1}. Due to monoculture of the same variety over a vast area rendered these modern varieties prone to disease and pest which involved more use of pesticides to control them. As a consequence, *Boro* rice cultivation also came into practice with the introduction of photo-insensitive rice cultivars where a large quantity of ground water is required for irrigation to have substantial yield. So, the necessity has been felt to conserve the rice biodiversity by the farmers and scientists. The cultivation and demand of folk rice is increasing day by day since their several advantages. Spectacularly the cost of production of folk rice is low as compared to the input invasive modern cultivation techniques. As a result, substantial yield is obtained without compromising soil health and other environmental issues.

Involvement of farmers, institutes in conserving folk rice diversity

There are several governmental and non-governmental organizations are actively engaged in conserving the landraces of West Bengal. Amarkanan Rural Socio-environmental Welfare Society (ARSW society) of Bankura, West Bengal has reported to maintain more than 150 traditional rice lines (Sinha and Ranbahal, 2014). Another is *VRIHI* (situated in Bankura, West Bengal). This non-governmental organization is involved in conservation and characterization and seed exchange of folk rice varieties (Paul, 2012). Chinsura Rice Research Station (WB) is the pioneering work station in this regard. Apart from these, Agricultural Universities, KVKs, Agricultural Training Centres (ATCs), different Farmers' societies are engaged in conservation of folk rice varieties. Consequently farmers are getting interest to cultivate different folk rice in place of HYVs which are easy to cultivate with organic agriculture and without the exploitation of ground water and thereby lowering the cost of cultivation.

Conclusion

West Bengal is the leading producer of rice in the country and very often is known as the “food basket” states of India. Along with that, the state is the richest reservoir of rice biodiversity of India. Importance of the landraces can never be overlooked in agriculture system not only to save the environment but also the rituals and cultures of West Bengal. The post effect of cultivating HYVs and the impact of gradual urbanization has depleted the genetic resource of folk rice away. So, for sustainable growth of agriculture, there is an utmost need to implement the strategies to protect farmers’ varieties strictly. Otherwise, the threatened traditional rice is in the verge of extinction in near future.

References

Deb, D and Bhattacharyya, D., Seeds of Tradition, Seeds of Future: Folk Rice Varieties from East

India. Research Foundation for Science Technology & Ecology, New Delhi, 2005.

NRC (National Research Council, USA), Managing Global Genetic Resources: Agricultural Crop Issues and Policies. National Academy Press. Washington, D.C., 1993.

Paul, A., Crop Culture: Biotechnology Biodiversity, Centre for Advanced Research and Education (CARE), Saha Institute of Nuclear Physics (SINP), Kolkata, 2012, pp 29-38.

Sinha, A.K and Ranbahal, A., Threatened traditional rice (*Oryza sativa* L.) varieties of lateritic region of West Bengal - status, distribution and conservation. *International Journal of Applied Biosciences*., 2014, **2(2)**, 111-116.

Thrupp, L A., Linking agricultural biodiversity and food security: the valuable role of sustainable agriculture. *International Affairs*., 2000, **76 (2)**, 265-281.