



Exploration Conservation and Characterization of Wild Rice Diversity of 'Rarh Bengal', India

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Abstract

Wild rice is a valuable tool for modern crop improvement. Present elite rice varieties evolved from the wild and weedy rice varieties through natural selection. Wild rice varieties consist of several important characteristics into their gene pool which may be utilized for the future crop improvement. Present investigation deals with the distribution, conservation and characterization of wild rice varieties presently available in the red and lateritic region of West Bengal. From the extensive survey it was observed that several accessions were present in the red and lateritic region and maximum number of accessions were reported from the species *O. rufipogon*, and *O. nivara*. Due to the various developmental work, climate change the diversity of these varieties are vulnerable day by day. Most of the varieties have been disappearing from their natural habitat. For the sustainability of the agriculture system the existence of these varieties are important.

Keywords: *Wild rice, red and lateritic region, West Bengal, conservation.*

Introduction

Wild rice varieties are the treasure of genetic resources grown abundantly all over the world. Genus *Oryza* contains 21 wild species which are grown throughout the globe. India also a good reservoir of wild species of rice, and found in almost all parts of the country. There are six different wild rice taxa had been reported from Indian sub-continent so far, these are—*Oryza meyeriana* var. *granulata*, *O. nivara*, *O. officinalis*, *O. rufipogon*, *O. sativa* var. *spontanea* and *Porteresia coarctata*. Among these species maximum number of accession were reported from the species *O. rufipogon*, and *O. nivara*. Mainly the Gangetic Plains and eastern region of India are the main reservoir of wild rice accession in India. Large number of accession of wild rice species had been reported from state of West Bengal, Odisha, Kerala, Chhattishgarh, Uttar Pradesh, Madhya Pradesh, Rajasthan etc. by various workers time to time. Several Indian institutes have been associated with the study of collection, conservation and characterization of wild rice species. Some important institute are ICAR-

National Bureau of Plant Genetic Resources (NBPGR), New Delhi, ICAR-NABPGR Regional station, Akola (Maharashtra), ICAR-NABPGR Regional station, Cuttack (Odisha), ICAR-NABPGR Regional station Thrissur (Kerala), Division of crop Improvement, National Research Institute, Cuttack, (Odisha), etc.

Wild rice varieties are important for the sustainable agriculture as these varieties possess valuable genes into their gene pool which may be utilized in future crop improvement. Due to various reason diversity of these varieties have been decreasing day by day. Present study associated with exploration and characterization of wild rice varieties currently available in different districts of West Bengal. Morphological and agronomic characterization of both these species has been evaluated and recorded as per DUS and IRRI-IPGRI guidelines.

Study area of wild rice distribution

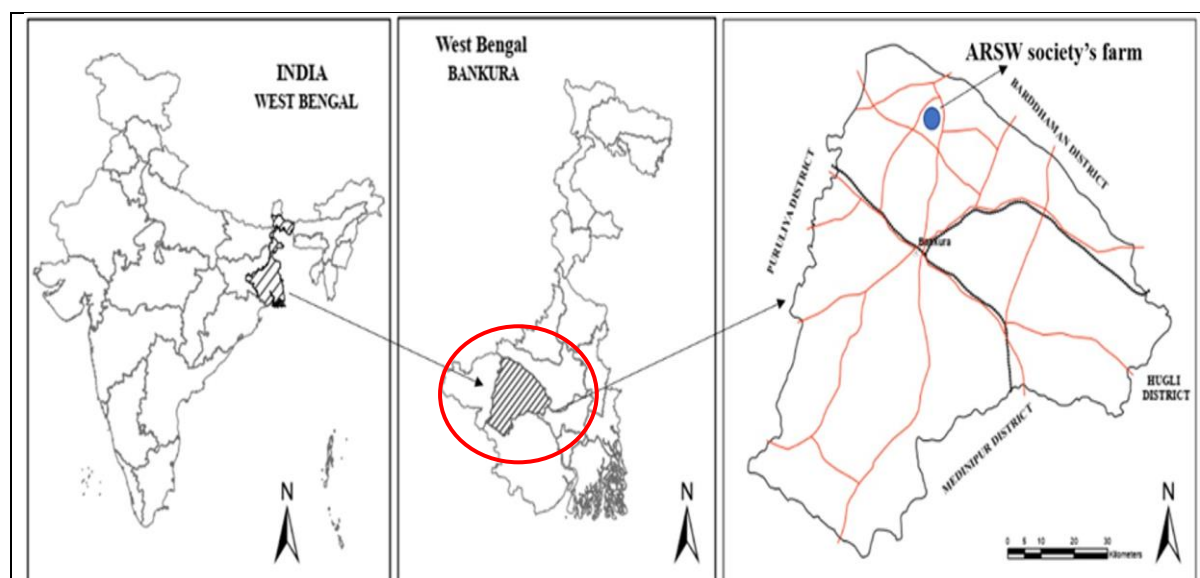
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Extensive study was conducted in the red and lateritic region of West Bengal in the year 2022-2023 kharif session. Several accession had been noticed from Bankura and Purulia district of West Bengal. From the extensive study two wild rice species namely *Oryza*

nivara and *Oryza rufipogon* has been recorded and documented from the different parts of both the districts. The distribution of wild rice varieties were not uniform. Maximum number of accession were observed on the bank of seasonal ponds and swampy area.

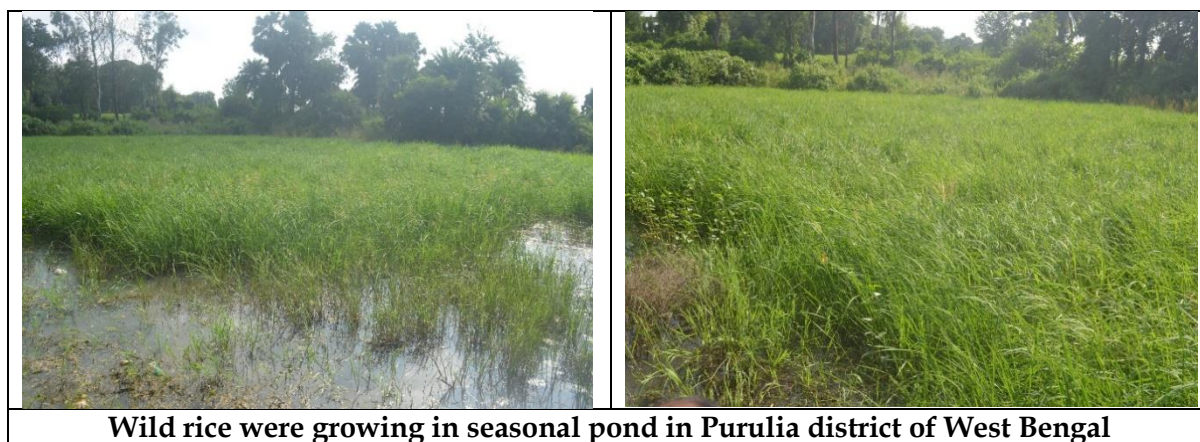


Study area of wild rice distribution (hand drawing map, not in scale)

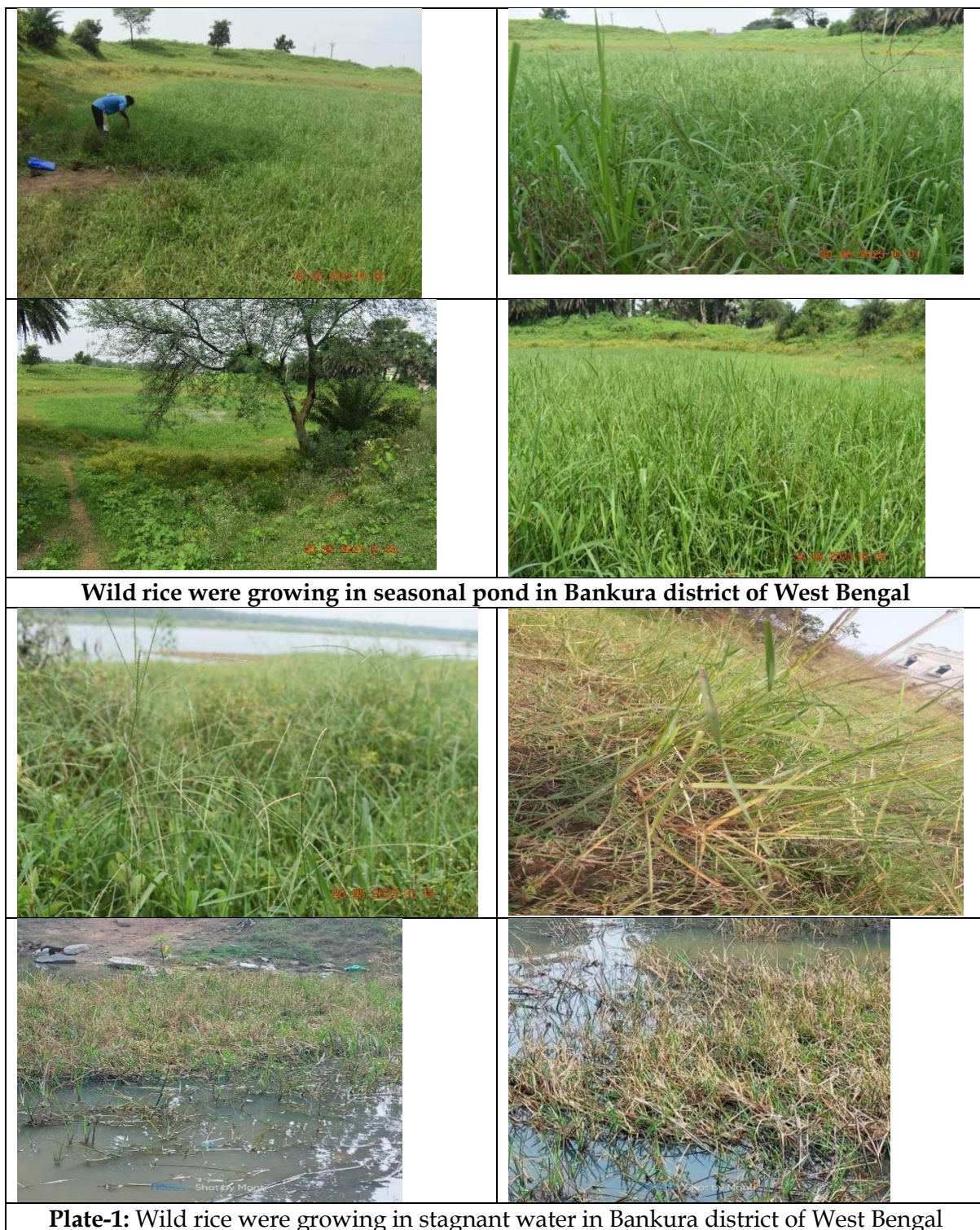
Habitat

Wild rice species were found in different types of habitat. Number of accession of *O. nivara* and *O. rufipogon* had been collected from the different swampy places of Bankura and Purulia district. Most of the accession were grown abundantly in semiaquatic condition. Number of accession were found growing in seasonal pond or ditches, in stagnant water near rice field and some

species are weedy type and grown in association with cultivated rice species (Plate-1). The population flowers but it was hard to observe any seed particularly accession grown on aquatic condition. Accession grown on semiaquatic condition, grown along with cultivated rice produced seed. Seeds are tiny and have high suturing characters. Maximum varieties are vegetatively propagated.



Wild rice were growing in seasonal pond in Purulia district of West Bengal



Morphology

Agromorphological characters of various wild rice accessions are given in Table-1 & 2, and Plate: 2.



Vegetative characters of some wild rice varieties grown on aquatic condition.













Plate 2: Reproductive character of some aquatic wild rice varieties. Young panicle of wild rice varieties

Table-1: Morphological characterization wild rice varieties.

Sl. No.	Morphology	Observation
1.	Coleoptile: colour	Not observed
2.	Basal leaf: sheath colour	Green
3.	Leaf: anthocyanin colouration	Absent
4.	Leaf sheath: anthocyanin colouration	Absent
5.	Leaf sheath: intensity of anthocyanin colouration	NA
6.	Pubescence Of blade surface	Medium
7.	Leaf: Auricles	Present
8.	Anthocyanin colouration Of auricles	absent
9.	Leaf: collar	Present
10.	Anyhocyanin Colouration of collar	Colourless
11.	Leaf: ligule	Present
12.	Shape of ligule	Split
13.	Colour of ligule	White
14.	Width of blade (cm)	1.25cm
15.	Culm attitude	Semi-erect to spreading
16.	50% flowering (days)	70-100 days
17.	Anthocyanin colour of apex	Purple
18.	Stem: thickness(cm)	Medium
19.	Stem: length(cm)	162.25cm
20.	Panicle: length of main axis (cm)	
21.	Flag leaf: attitude (Late observation)	
22.	Grain Length	8-7.08mm
23.	Grain width	3mm

Table 2: Agro-Morphological characterization wild rice varieties

Sl.	Morphology	Observation	Morphology	Observation
1.	Length of blade (cm) 63.2 cm.		Flag leaf: attitude (early stage) Semi erect	
2..	density of pubescence of lemma Medium		Lemma: Anthocyanin Colouration of keel Purple	
3..	Lemma: Anthocyanin Colouration of area below apex Purple		Colour of Stigma Purple	
4..	Anthocyanin colouration of nodes purple		Anthocyanin colouration of internodes Absent	
5..	Panicle: curvature of main axis erect		Lemma and palea: colour	

Various agro-morphic characterization of wild rice varieties.

Discussion

Most of the accessions are grown wildly in different habitats like seasonal ponds, ditches, in stagnant water near rice fields, some

accessions are grown near the cultivated land, locality, etc. This population is quite endangered due to overpopulation, extension of agricultural land, construction of roads and other developmental work. Accession found

far from the locality, in the forest area, river bank, unused pond etc. are quite safe and produced successfully. Several accessions were found very close to the paddy field. Some accessions were quite common in the paddy field itself. But these are rare or not observed frequently at present. Several workers have been working on the conservation, characterization and protection of wild rice diversity in India. Wild rice consists of a valuable gene pool which is valuable for the future crop improvement (Brar, 2003). Several workers have been working on exploration, collection and conservation of wild *Oryza* species of India (Patra, *et al.*, 2008, Lu & Sharma, 2003, Tiwari, *et al.*, 2015, Sing, *et al.*, 2016) etc. Several wild rice varieties had been documented from the North-East India (Hore & Sharma, 1993) (Samal, *et al.*, 2018) to the eastern part of India. Singh, *et al.*, (2013) had worked on wild rice diversity of eastern Indo-Gangetic plains of India which had high genetic diversity. Sing, *et al.*, (2016), Sing, *et al.*, (2018) have worked on population structure of Indian wild rice accessions. Many workers have been working on molecular characterization of crop wild relatives of rice and found a valuable gene pool which would be utilized in future crop improvement (Tiwari, *et al.*, 2015; Sharma & Shastri, 1965; Roy, *et al.*, 2014; Roy, 2015; Roy, *et al.*, 2016). But the unfortunate aspect is that the diversity of wild rice varieties are decreasing very fast as the other landraces varieties of rice (Sinha & Mishra, 2016). Conservation and protection of these varieties (both in-situ and ex-situ) is essential for the future crop improvement as well as for sustainable agriculture.

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