QUALITATIVE ASSESSMENT OF 30 FOLK RICE (*Oryza sativa* L.) VARIETIES OF WEST BENGAL USING DESCRIPTOR CODES

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Abstract

The diversity data generated in time and space have been valuable to communities, scientists and policy managers to formulate and implement conservation strategies of *in situ*, on-farm as well as *ex situ* conservation and management of genetic resources. West Bengal has rich rice genetic wealth. But this genetic wealth is being silently depleted due to the onslaught of the high-yielding varieties (HYVs) and neglect. There is an urgent need to document, characterize and conserve these varieties. Descriptor codes were used for the qualitative evaluation of genetic diversity among the 30 rice genotypes collected from different parts of West Bengal, following the Standard Evaluation System (SES) for rice developed by the International Rice Research Institute (IRRI).

Keywords: Genetic diversity, folk rice variety, descriptor codes, qualitative characterization

Introduction:

The basic diversity data of landraces has been found important to monitor the dynamics of crop genetic resource management. Rice (*Oryza sativa* L.) diversity data generated in time and space have been valuable to communities, scientists and policy managers to formulate and implement conservation strategies of *in situ*, on-farm as well as *ex situ* conservation and management of genetic resources (Li *et al*, 2000, Hien, 2007, De, 2014a). The agro-morphological characterization is fundamental in order to provide information for plant breeding programs (Lin, 1991).

Folk rice varieties

Folk rice varieties are the heterogeneous crop populations that humans deliberately cultivate. The amount of genetic diversity within species is essential for the survival of species and their adaptation to changing environments. (Gao, 2003). For farmers, genetic diversity means varietal diversity, which farmers can clearly distinguish on the basis of agromorphological traits, phenological attributes, postharvest characteristics, and differential adaptive performance under abiotic and biotic stresses (De and Dey, 2013). Importance of folk varieties landraces can never be denied in agriculture system, because improvement in existing variety depends upon desirable genes which are possibly present in landraces and wild varieties only (Shiva, 1991). Landraces offer a valuable gene pool for future breeding program (Patra *et al,* 2003).

Biological poverty in the rice genepool

The widespread adoption of high-yielding rice varieties (HYVs) has led to the biological poverty of rice germplasms, as local rice varieties are abandoned for modern varieties. (Pant, 2010). At present significant numbers of the West Bengal rice landraces are on the verge of being eroded (Deb, 2000, 2005). This wealth of genetic resources as found in rice may provide the base for future progress in rice improvement in the face of shrinking resources both biological and physical (Chang, 1984).

Objective of the investigation

Plant genetic resources are among the most vulnerable of all non-renewable natural resources. Once lost, they are lost forever. For many morphological features often more than two character states are observed. Descriptor codes are then used for qualitative assessment. Documentation and awareness of the ecological, agronomic and cultural importance of the still extant West Bengal folk rice varieties is necessary as many of the indigenous folk rice varieties are on the verge of extinction due to rampant cultivation of modern, high yielding varieties (HYVs). The aim of the present study was to characterize

30 accessions of folk rice (*Oryza sativa* L.) varieties of West Bengal, based on qualitative agro-morphological descriptors.

Methodology

Plant Material: Rice germplasm used in this study consisted of 30 folk rice varieties of West Bengal collected from different districts of West Bengal.

Experimental design

The rice genotypes were grown in a randomized block design (RBD) with three replicates of 40 plants each. Seeds were sown in the seed bed on the last week of June and one healthy seedling/hill was transplanted after 30 days at a row x plant spacing of 25cm x 15cm. Normal agronomic practices were followed.

Descriptor Codes used for the qualitative assessment

Qualitative characters are important for plant description and mainly influenced by the consumers preference, socio-economic scenario and natural selection (Hien *et al*., 2007). Some morphological characters could be grouped into distinct classes on the basis of each of these characteristics. Qualitative characterization was done following the Standard Evaluation System (SES) for rice developed by the International Rice Research Institute (IRRI, 2002). Morphological characters and their respective descriptor codes used for the qualitative evaluation of genetic diversity among the 30 rice genotypes are given in Table 2.

Table 2. List of Descriptor codes used for the qualitative evaluation of genetic diversity among the 30 rice genotypes.

SL. NO	TRAIT	ABV.	GROWTH STAGE	METHOD OF SCORING	CODE	DESCRIPTION
1	**Auricle Colour**	**AC**	Stem elongation to booting stage	Ocular inspection	1	Light green
					2	Purple
2	**Basal Leaf**	**BLSC**	Early to late	Visual observation	1	Green

	Sheath Color		vegetative stage		2	Purple lines
					3	Light purple
					4	Purple
3	**Collar Color**	**CC**	Stem elongation to booting stage	Ocular inspection.	1	Light Green
					2	Green
					3	Purple
4	**Culm Angle**	**CmA**	Milk stage to mature grain stage	Visual observation. Readings are based on majority of plants grown in the entire plot	1	Erect ($<30^0$)
					3	Intermediate ($\sim45^0$)
					5	Open ($\sim60^0$)
					7	Spreading ($>60^0$)
					9	Procumbent (the culm or its lower part rests on ground surface)
5	**Culm Internode Colour**	**CmlC**	Milk stage to mature grain stage	Visual observation of the outer surface of the internodes of the culm is recorded.	1	Green
					2	Light gold
					3	Purple lines
					4	Purple
6	**Flag Leaf**	**FLA**	Stem	Visual observation.	1	Erect

	Angle		elongation to booting stage	Sample size = 5.	3	Intermediate
					5	Horizontal
					7	Descending
7	**Leaf Angle**	**LA**	Stem elongation to booting stage	Visual observation. .	1	Erect
					2	Nearly erect, acute angle formed.
					3	Angular
					4	Wide angular to horizontal.
					5	Horizontal
					9	Droopy
8	**Leaf Blade Colour**	**LBC**	Stem elongation to heading stage	Visual observation. Readings are based on majority of plants grown in the entire plot	1	Light green
					2	Green
					3	Dark Green
					4	Purple tips
					5	Purple margins
9	**Leaf Blade Pubescence**	**LBP**	Booting to heading stage	Ocular inspection, then fingers were rubbed from the tip	1	Glabrous
					2	Intermediate

				down on the leaf surface. Presence of hairs on the blade surface was classified.	3	Pubescent

Result and Discussion

The present study revealed sufficient genetic divergence for various qualitative traits. The rice genotypes selected for this study belonged to the indica group of *Oryza sativa* L. These rice landraces were collected from different districts of West Bengal where there are distinct eco-geographic variations. Though all the rice genotypes belonged to *Oryza sativa* L. considerable amount of variation was reflected during the grain morphological characterization. This variation reflects the capability of the indigenous farmers for developing and sustaining diverse landraces.

A total of 9 (nine) morphological characters were taken and the genetic diversity of the rice genotypes estimated. The results are shown in table 3.

Table 3. Qualitative evaluation: Use of descriptor codes to estimate genetic diversity among the 30 folk rice varieties

Sl. No.	**Folk rice variety Name**	**AC**	**BLSC**	**CC**	**CmA**	**CmlC**	**FLA**	**LA**	**LBC**	**LBP**
1	CHAKRAMALA	1	1	1	1	1	3	3	2	3
2	DUDHKALMA	1	2	1	3	1	5	3	2	3
3	DUMURSAIL	1	3	1	3	1	1	3	1	3
4	GOBINDOBHOG	1	1	2	1	1	3	3	2	3
5	JUGAL	2	3	2	1	1	3	3	2	3
6	LATASAIL	2	4	3	3	2	5	5	2	3

7	KHIRABICHI	2	3	3	3	1	3	3	2	3
8	LALBADSHAHBHOG	1	1	1	1	2	5	5	2	3
9	MALA	1	1	1	1	1	5	3	1	3
10	MANIKKALMA	1	1	1	3	1	1	3	2	3
11	MURGIBALAM	1	1	2	3	1	1	3	2	3
12	NYATA	1	1	1	5	1	1	3	1	3
13	PADMASAIL	1	1	1	3	1	5	5	1	3
14	PANCHALI	1	1	2	5	1	5	4	2	1
15	PAAN	1	1	1	3	1	5	3	2	1
16	PATNAI	1	1	1	1	1	1	3	2	3
17	RUPSAIL BOLD	2	3	2	3	1	5	3	2	3
18	SWARNA	1	1	1	1	1	1	3	2	3
19	TIKARNADI	1	1	1	5	1	1	3	7	3
20	RADHUNIPAGOL	2	1	1	3	1	5	5	2	3
21	KATARIBHOG	1	1	2	1	1	3	4	2	3
22	BADSHAHBHOG	1	1	2	1	1	5	5	2	3
23	SWAPANDALI	2	1	1	1	1	1	3	2	3
24	CHIKON MAHSURI	1	1	2	1	1	1	3	1	3
25	CHOLISH	1	1	1	1	1	5	3	2	3
26	CHANDRAKANTA	2	1	2	1	1	3	3	1	3
27	RAGHUSAIL	1	1	1	3	1	3	3	2	3
28	TULAIPANJA	1	1	2	3	1	5	5	2	3

29	SHOTPUT	1	1	1	3	3	3	3	2	3
30	SONAJHULI	1	1	1	1	1	1	3	2	3

Considerable variation was observed in the qualitative morphology among the 30 genotypes as observed in Table3.

Conclusion

Rice is one of the very few crop species endowed with rich genetic diversity which account over 100,000 folk varieties or landraces and improved cultivars and makes it one of the most researched crop. West Bengal has rich rice genetic wealth. But this genetic wealth is being silently depleted due to the onslaught of the high-yielding varieties (HYVs) and neglect (De, 2014b). There is an urgent need to document, characterize and conserve these varieties.

Acknowledgment: This work has been carried out with the financial assistance of the Minor Research Project of the University Grants Commission (UGC). The author gives thanks to the Director, Bose Institute, Kolkata and Dr. Tapas Kumar Ghose for providing the laboratory and experimental garden infrastructure.

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