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Characterization of aromatic short grain rices of eastern Uttar Pradesh for qualitative traits

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Abstract

A field experiment was conducted at Crop Research Station, Masodha, Faizabad to agro morphologically characterize the aromatic short grain rices of diverse origin, collected from different districts of eastern Uttar Pradesh during kharif 2014 and 2015. Twenty one morphological traits viz. Leaf blade pubescence (LBP), Leaf blade color, Basal leaf sheath color, Flag leaf angle, Ligule color, Ligule shape, Collar color, Auricle color, Culm angle, Panicle type, Secondary branching of panicles, Panicle axis, Panicle exertion, Panicle therasability, Awning, Awn color, Apiculus color, Stigma color, Lemma & palea color, Lemma & palea pubescent and Sterile lemma color were used for qualitative characterization of forty five rice germplasms. No variation for secondary branching of panicle was recorded for all the tested germplasms. Leaf blade Pubescence (LBP) was glabrous in 17 germplasm while it was intermediate in 28 germplasm. Leaf blade colour was also varied from light green (18) to green (27) among germplasms. Leaf auricles were present in all germplasms studied (Subba Rao, 2013) and it varied from light green to purple in coloration. Partially exerted panicle was found in 42 germplasms while it was enclosed in 3 tested germplasms. The shape of ligule was found 2-cleft in 34 germplasms while it was acute to accinate in 11 germplasms.

Keywords: germplasm, leaf blade pubescence, ligule, auricle, accession

1. Introduction

Rice is the staple food for more than half of the world population and it is the major source of nutrition for the rice eating population of South and South East Asia. About 90% of the total rice production in the world is consumed in Asia

.Being one of the centers of origin for rice, a large number of native varieties and landraces having unique characteristics and great adaptability, are grown in different agro climatic zones of India. Altogether 425,500 rice germplasms/ accessions were conserved in various gene banks of the world are potential genetic sources for crop improvement. These conserved germplasm are not only good sources for the development of rice varieties being tolerant to biotic (Diseases and pest) and abiotic (Drought, Submergence and salt/Alkali) stresses but also potent source for development of new varieties having desired grain quality. Development of submergence tolerant varieties by introgression of sub-1 gene derived from local land race of Odisha is one of the few examples which emphasized the importance of these indigenous varieties and local land aces. India has one of the richest rice germplasm collections, with more than 60,000 accessions (Chakrabarty *et al.*, 2012) [3]. Eastern Uttar Pradesh is the natural gene bank of traditional aromatic short grain rices naturally conserved and adopted to diverse agroclimatic conditions. Major factors including adaptation to edaphic & topographic conditions and varying water regime contribute to genetic diversification and ecological specialization in eastern Uttar Pradesh. Introduction of high yielding varieties and hybrids become a great threat to the security of the age-old practice of growing traditional varieties and landraces which may have immense potential for different important traits. The information regarding Novelty, distinctness, uniformity and stability are the basic mandates for protection and conservation under the Protection of Plant Varieties and Farmers' Rights Act (PPVFRA), 2001. Morphological characterization of the aromatic short grain rices/ landraces helps in developing the database based on which new varieties developed can be distinguished and the characterization would also help in assessment of genetic diversity existing in the landraces and released varieties. The ability to distinguish and clearly identify the varieties of cultivated species is fundamental for the operational aspects in the seed trade. The new varieties developed in agricultural and horticultural crops should be distinct from other varieties, with the introduction of Indian legislation on 'The Protection of Plant Varieties and Farmer's Rights (PPV & FR) Act, 2001'. The present study is conducted to agro morphological characterize the aromatic short grain rices of diverse origin

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collected from different district of eastern Uttar Pradesh.

2. Materials and Methods

A field experiment was conducted at Crop Research Station, Masodha, Faizabad to agro morphologically characterize the aromatic short grain rices of diverse origin, collected from different districts of eastern Uttar Pradesh during kharif 2014 and 2015. Passport data of collected germplasm was presented in table-1. Soil of the experimental field was sandy loam in texture and slightly alkaline in nature (pH-7.3). Soil chemical analysis shows that the available nitrogen in the soil was 200 kg/ha and soil is deficient in phosphorous (available P_2O_5 (kg/ha) – 24). The experiment was laid out in

randomized block design with three replications. The plot size of the experimental plot was 20 m². The experimental material was consist of forty five germplasm. Twenty one days old seedlings of collected germplasm were transplanted in the 1st week of July in the both the year of study. Observations were recorded on five randomly chosen plants of each germplasm from each replication for 21 morphological traits according to the Descriptors for Rice *Oryza sativa* L. (1980) [7] developed by International Rice Research Institute (IRRI), Manila, Philippines. The observation of various morphological traits was recorded at different stage of crop growth and presented in table-2.

Table 1: Passport data of collected accessions

Accession name	Location		Topography	Population description		Collection site
	Place	District		Cultural type	Origin	
Lalmati	Gandhi Nagar	Barabanki	Plain level	Irrigated	Local	Field
Lalmati	Tulsipur	Barabanki	Plain level	Irrigated	Local	Field
Nanchuniya	Mohanlalganj	Raibareilly	Plain level	Irrigated	Local	Field
Kalazeera	Sohawal	Faizabad	Plain level	Irrigated	Local	Field
Kalanamak	Sohratgarh	Siddharthnagar	Plain level	Irrigated	Local	Field
Kalanamak	Medawal	Siddharthnagar	Plain level	Irrigated	Local	Field
Kalanamak	Uskabazar	Siddharthnagar	Plain level	Irrigated	Local	Field
Chini Kamni	Khalilabad	Siddharthnagar	Plain level	Irrigated	Local	Field
Kalanamak	Birdpur	Siddharthnagar	Plain level	Irrigated	Local	Field
Lalmati	Ranibazar	Faizabad	Plain level	Irrigated	Local	Field
Kalanamak	Ridhaulti	Basti	Plain level	Irrigated	Local	Field
Tulsi Amrit	Bhinga	Saravasti	Plain level	Irrigated	Local	Field
Type 3	Tarun	Faizabad	Plain level	Irrigated	Local	Field
Lalmati	Raunahi	Faizabad	Plain level	Irrigated	Local	Field
Dhuriya	Phulpur	Azamgrah	Plain level	Irrigated	Local	Field
Dubraj	Tiloi	Raibareilly	Plain level	Irrigated	Local	Field
Jeera Sambha	Amethi	Sultanpur	Plain level	Irrigated	Local	Field
Kalanamak	Nichnaul		Plain level	Irrigated	Local	Field
Sakkar chini	Payagpur	Behraich	Plain level	Irrigated	Local	Field
Lalmati	Kurauli	Barabanki	Plain level	Irrigated	Local	Field
Jeera Sambha	Amethi	Amethi	Plain level	Irrigated	Local	Field
Badshah Pasand	Jalalpur	Ambedkarnagar	Plain level	Irrigated	Local	Field
Zeera Battis	Jalalpur	Ambedkarnagar	Plain level	Irrigated	Local	Field
Sakkarchini	Katka	Sultanpur	Plain level	Irrigated	Local	Field
Badshah Pasand ()	Malipur	Ambedkarnagar	Plain level	Irrigated	Local	Field
Sakkarchini	Bheriyadeeh	Balrampur	Plain level	Irrigated	Local	Field
Sakarchini	Balrampur	Balrampur	Plain level	Irrigated	Local	Field
Sakarchini	Payagpur	Behraich	Plain level	Irrigated	Local	Field
Badshahpasand	Purabazar	Faizabad	Plain level	Irrigated	Local	Field
Juhi Bengal	Sohratgarh	Siddharthnagar	Plain level	Irrigated	Local	Field
Kalanamak	Mahrajganj	Mahrajganj	Plain level	Irrigated	Local	Field
Type 26	Barausa	Sultanpur	Plain level	Irrigated	Local	Field
Juhi Bengal	Naugarh	Siddharthnagar	Plain level	Irrigated	Local	Field
Kanakjeer	Naugarh	Siddharthnagar	Plain level	Irrigated	Local	Field
Shyam Zeera	Bansi	Siddharthnagar	Plain level	Irrigated	Local	Field
Kalanamak	Padrauna	Kushinagar	Plain level	Irrigated	Local	Field
Chini Kapoor	Mankapur	Gonda	Plain level	Irrigated	Local	Field
Lalmati	Rudaulti	Faizabad	Plain level	Irrigated	Local	Field
Badshah Pasand	Babaganj	Bahraich	Plain level	Irrigated	Local	Field
Kalanamak	Itwa	Siddharthnagar	Plain level	Irrigated	Local	Field
Gopal Bhog	Mehdawal	Santkabar Nagar	Plain level	Irrigated	Local	Field
Kalanamak	Tulsipur	Gonda	Plain level	Irrigated	Local	Field
Kalanamak	Pachperwa	Balrampur	Plain level	Irrigated	Local	Field
Sakkar Chini	Maskanwa	Gonda	Plain level	Irrigated	Local	Field
Badshah Pasand	Gosaiganj	Faizabad	Plain level	Irrigated	Local	Field

Table 2: Frequency distribution of Traditional Aromatic Rices germplasms for different agro- morphological characters

S. No	Character	Particular	Code	No. of cultivars
1.	Leaf blade pubescence (LBP)	Glabrous	I	17
		Intermediate	2	28
2.	Leaf blade color	Light green	I	18
		Green	2	27
3.	Basal leaf sheath color	Green	I	42
		Purple Lines	2	3
4.	Flag leaf angle	Erect	1	12
		Intermediate	3	33
5.	Ligule color	White	1	7
		Purple lines	2	38
6.	Ligule shape	Acute to acuminate	I	11
		2-cleft	2	34
7.	Collar color	Light green	I	32
		Green	2	13
8.	Auricle color	Light green	I	34
		Purple	2	11
9.	Culm angle	Erect	1	30
		Intermediate	3	14
10.	Panicle type	Open	5	5
		Intermediate	5	25
11.	Secondary branching of panicles	Open	9	20
		Absent	0	45
12.	Panicle axis	Straight	I	36
		Droopy	2	9
13.	Panicle exertion	Partially exerted	7	42
		Enclosed	9	3
14.	Panicle therasability	Moderately difficult	3	36
		Intermediate	5	4
15.	Awning	Easy	9	5
		Absent	0	32
16.	Awn color	Short and partially awned	1	10
		Short and fully awned	5	3
17.	Apiculus color	Long and partially awned	2	-
		Awnless	0	32
18.	Stigma color	Straw	1	-
		Gold	2	10
19.	Lemma and palea color	Purple	5	3
		Black	6	-
20.	Lemma and palea pubescent	White	1	32
		Straw	2	6
21.	Sterile lemma color	Brown	3	7
		Red apex	5	-
22.	Sterile lemma color	Purple	6	-
		White	1	6
23.	Sterile lemma color	Light green	2	35
		Yellow	3	4
24.	Sterile lemma color	Straw	0	13
		Gold and gold furrows on straw back ground	1	4
25.	Sterile lemma color	Brown spot on straw	2	19
		Brown furrows on straw	3	9
26.	Sterile lemma color	Glabrous	1	13
		Short hairs	2	21
27.	Sterile lemma color	Hairs on upper portion	3	10
		Short hairs	4	I
28.	Sterile lemma color	Straw	I	23
		Gold	2	20
29.	Sterile lemma color	Red	3	I
		Purple	4	4

3. Results and Discussion

Morphological characters are considered as marker characters in the identification and purification of landraces of rice as they are less influenced by environmental factors. Inheritance and Linkage of morphological traits was prior reviewed by

various workers. Twenty one morphological traits viz. Leaf blade pubescence (LBP), Leaf blade color, Basal leaf sheath color, Flag leaf angle, Ligule color, Ligule shape, Collar color, Auricle color, Culm angle, Panicle type, Secondary branching of panicles, Panicle axis, Panicle exertion, Panicle

therasability, Awning, Awn color, Apiculus color, Stigma color, Lemma & palea color, Lemma & palea pubescent and Sterile lemma color were used for qualitative characterization of forty five rice germplasms. Among the 23 morphological characters utilized in the characterization of forty five rice germplasms, no variation was recorded for secondary branching of panicles. Variability was recorded for all other morphological traits among tested germplasms. Leaf blade Pubescence (LBP) was glabrous in 17 germplasm while it was intermediate in 28 germplasm. Leaf blade colour was also varied from light green (18) to green (27) among germplasms. Leaf auricles were present in all germplasms studied (Subba Rao, 2013) ^[15] and it varied from light green to purple in coloration. Partially exerted panicle was found in 42 germplasms while it was enclosed in 3 tested germplasms. The shape of ligule was found spilt in 34 germplasms while it was acute to accuminate in 11 germplasms. Similar findings were reported by Chakravorty and Ghosh (2012) ^[2] and Subba Rao et.al. (2013) ^[15]. 32 germplasm were awn less while 10 were short & partiall awned and 3 were short & fully awned. Variation for lemma and palea coloration was also observed among germplasm. It was found straw colour in 13 germplasms, Gold and gold furrows on straw back ground in 4 germplasms, Brown spot on straw in 19 germplasms and Brown furrows on straw in 9 germplasms.

4. Conclusion

Results of agro morphological characterization of short grain aromatic rices of diverse origin shows that all the collected germplasm possesses distinct and unique morphological traits which will be helpful in identification and conservation of these valuable genes.

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