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## Agro-morphological characterization of germplasm accessions of rice (*Oryza sativa* L.)

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### Abstract

Principal component analysis were carried out in rice germplasm for eight characters. The experiment was conducted at instructional cum Research Farm, Department of Genetics and Plant Breeding, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) during *kharif* 2017 to access association analysis of the 55 germplasm accessions of rice along with popular standard checks Chattisgarh Zinc rice 1, Samleshwari Danteshwari, Indira Barani dhan and Indira Aerobic1. The 55 germplasm accession of rice including five checks were characterized on the basis of agro-morphological characters. A majority of accessions were found to possess coleoptile colour (green 72.72%), Basal leaf sheath colour (83.63% green), Leaf blade colour (81.81% green), Leaf Pubescence (65.45% glabrous), Panicle exertion (45.45% well exerted), Stigma color (100% white), Apiculus color (60% white), Panicle type (17% compact), Awning (38.38% long and fully awned), Seed coat color (69.09% white), Hull Color (30.90% straw), Flag Leaf Angle (76.36% erect), Leaf senescence (63.63% early) and Auricle colour (80% light green).

**Keywords:** Agriculture, leaf blade colour, flag leaf angle, hull color

### Introduction

Rice (*Oryza sativa* L.) ( $2n=24$ ) is the most important cereal crop that has been referred as “Global Grain” because of its use as prime staple food in about 100 countries of the world. In world, rice has occupied an area of 160.6 million hectares, with a total production of 738.20 million tonnes and productivity 3424.41 kg/ha. In India rice is cultivated round the year in one or the other part of the country in diverse ecologies spread over 43.38 million hectares with a production of 104.32 million tonnes during 2015-16. Chhattisgarh popularly known as “Rice Bowl of India” occupies an area around 37.73 lakh hectares with the production of 60.28 lakh tonnes and productivity 1597 kg/ha. In any crop, germplasm plays as an important role as a source and provides scope for wide variability. The goal of principal component analysis is to explain the maximum amount of variance with the fewest number of principal components to explain at least 90% of the variation in the data. The knowledge about genetic variability of yield contributing characters, inter relationship among them and their relation with yield are necessary for an effective breeding programme (Nayak *et al.*, 2016) [3].

### Materials and Methods

The accessions of rice were evaluated in the field during *kharif* 2017 at Research Cum Instructional Farm, Deptt. of Genetics & Plant Breeding, College of Agriculture, IGKV, Raipur. The field trials were conducted under irrigated transplanted condition. The plant materials were sown in raised bed nursery on 2nd July 2017. Twenty five days old seedlings were subsequently transplanted into the field in augmented design (only checks are replicated) in *kharif*-2017. Each entry was transplanted in two rows with 20 cm of spacing between row to row and 15 cm between plant to plant. The check varieties were randomized within blocks. Fertilizer dose @ of 80 N: 50 P: 30 K kg/ha was applied. The entire dose of phosphorus and potassium along with half the dose of nitrogen was applied as basal dose before transplanting. The remaining dose of nitrogen was applied in two splits, first at the time of beginning of tillering and second one week after it. The standard agronomic practices were adopted for normal crop growth.

**Results and Discussions:** The 55 germplasm accessions of rice including five checks

were characterized on the basis of agro-morphological characters.

**Table 1:** Frequency distribution of agro-morphological traits based on descriptors of NBPGR New Delhi.

S. N.	Character	Categories or type	Marking	Accession number	Frequency in%
1	Coleoptile colour	Green	1	40	72.72
		Purple	2	15	27.27
2	Basal leaf sheath colour	Green	1	46	83.63
		Purple lines	2	3	5.45
		Light purple	3	1	1.81
		Purple	4	5	9.09
3	Leaf blade colour	Green	2	45	81.81
		Dark green	2	2	3.83
		Purple tip	4	1	1.81
		Purple margin	5	7	12.72
4	Leaf pubescence	Glabrous Intermediate	1	36	65.45
		Pubescence	2	16	29.09
			3	3	5.45
5	Panicle exertion	Well exerted	1	25	45.45
		Moderate exerted	2	9	16.36
		Enclosed	4	21	38.18
6	Stigma colour	White	1	55	100
7	Apiculus colour	White	1	33	60
		Red	4	2	2
		Purple	6	20	38
8	Awning	Short and partly awned	1	14	25.45
		Short and fully awned	5	20	36.36
		Long awned	7	21	38.38
9	Seed coat colour	White	1	38	69.09
		Red	5	17	30.90
10	Hull colour	Straw	1	17	30.90
		Golden	2	1	1.81
		Golden brown	3	11	20
		Brown furrow on straw	4	2	3.63
		Purple	5	15	27.27
		Brown (dirty)	7	5	9.09
11	Flag leaf angle (early observation)	Erect	1	42	76.36
		Horizontal	3	1	1.81
		Dropping / Deflexed	4	12	21.81
12	Ligule shape	Truncate	1	1	1.81
		Split	3	54	98.18
13	Leaf senescence	Early	1	35	63.63
		Medium	2	20	36.36
14	Auricle colour	Light green	1	44	80
		Purple	2	11	20

#### **Coleoptile colour**

The coleoptiles colour of all 50 landraces and 5 checks studied were divided into three categories: green, purple and other (based on NBPGR, New Delhi descriptors). Green coleoptiles were found in 40 out of the 55 rice germplasm samples, whereas purple coleoptiles were found in 15.

#### **Basal leaf sheath colour**

The colour of the basal leaf sheath were classified into five categories: green, purple lines, light purple, purple and miscellaneous. Out of 55 rice germplasm samples, 46 had a green basal leaf sheath colour, three had a purple line, one was light purple and five had a purple basal leaf sheath colour.

#### **Leaf blade colour**

**The colour of leaf blades were classified into eight categories:** light green, green, dark green, purple tip, purple margin, purple splotch, purple and others. 45 rice germplasms

had green leaf blades, two rice germplasms had dark green leaf blades, one rice germplasm had purple colour on the tip of the leaf blade and seven rice germplasms had purple colour towards the border of the leaf blade.

#### **Leaf pubescence**

Leaf pubescence were classified into four groups: glabrous, intermediate, pubescent, and others. Out of 55 rice germplasm samples, 36 had glabrous leaf pubescence, 16 had intermediate leaf pubescence and the remaining three exhibited pubescence type leaf pubescence.

#### **Panicle exertion**

Six distinct kinds of panicle effort were detected. Well exerted, Moderately exerted, Exerted, Partially exerted, Enclosed and Others are the many types of exertion. Out of 55 rice germplasm samples, 25 had a panicle that was well exerted, 9 had a panicle that was moderately exerted and 21 had a panicle that was partially exerted.

**Stigma colour**

White, light green, Yellow, Light purple, Purple and Light purple were the six distinct classes of stigma colour observed. The stigma colour of all 55 rice germplasm is white.

**Apiculous colour**

White, Straw, Brown, Red, Red blue, Purple, Purple green and others were the eight colour classes of apiculous colour. Out of 55 rice germplasm samples, 33 had white apiculous colour, one had red apiculous colour and the remaining 20 had purple.

**Awning**

Short and partially awned, Short and fully awned, Long awned, Long and fully awned, and others were the five types of awning classification. Out of 55 rice germplasm samples, 14 were short and partly awned, 20 were short and completely awned and 21 were long awned.

**Seed coat colour**

White, Light brown, Spotted brown, Brown, Red, Variable purple, Purple and Others were the eight various seed coat colours classified. There were 38 rice germplasm with white seed coats and 17 rice germplasm with red seed coats.

**Hull colour**

Hull colour were observed under nine different classes Straw, Golden, Golden brown, Brown furrow on straw, Purple, Purple furrow on straw, Brown (dirty), Black and Other. Out of 55 rice germplasm, 17 had straw, one had golden, 11 had golden, two had brown furrow one straw, 15 had purple, 5 had brown dirty and 3 had black.

**Flag leaf angle (early observation)**

Flag leaf angle were observed under four different classes: Erect, Semi erect, Horizontal, Dropping/deflexed. Out of 55 rice germplasm, 42 had erect type flag leaf angle, one had horizontal type flag leaf angle and rest 12 had dropping/deflexed type flag leaf angle.

**Ligule shape**

Ligule shape were observed under three different classes: Truncate, Acute and Split. Out of 55 rice germplasm, truncate type ligule shape was found in one rice germplasm and rest of 54 rice germplasm were split type ligule shape.

**Leaf senescence**

Leaf senescence were observed under three different classes: Early, Medium and Late. Out of 55 rice germplasm, 35 were early season germplasm and 20 were medium season germplasm.

**Auricle colour**

Auricle colour was observed under two different classes: Light green and Purple. Out of 55 rice germplasm, 44 rice had light green and rest 11 had purple auricle colour.

Similar type of work was also reported by Pachauri *et al.* (2017)<sup>[4]</sup> which possess Basal leaf sheath colour (81% green), Leaf blade colour (37% dark green), Leaf Pubescence (67% Intermediate), Panicle exertion (76% well exerted), Stigma color (76% white), Awning (96% Absent), Seed coat color (85% white), Hull Color (67% straw), Flag Leaf Angle (75% open), Leaf senescence (47% medium) and Auricle colour (90% light green). Similar type of work was also reported by Bisne and Sarawgi (2008)<sup>[1]</sup>, Sinha and Mishra, (2013)<sup>[5]</sup>.

**Conclusion**

In the present investigation, among the morphological characters basal leaf sheath colour, leaf blade colour, leaf pubescence, panicle exertion, apiculous colour, awning, seed coat colour, hull colour, Flag leaf angle (early observation), ligule shape, leaf senescence and auricle colour recorded the highest variation among accessions.

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