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SHORT COMMUNICATION

Morpho-agronomic DUS Characterization of Scented *Harinakhuri* Rice Landrace of Coastal West Bengal

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The agro-morphological characterization of aromatic *Harinakhuri* rice landrace was done at Bidhan Chandra Krishi Viswavidyalaya (BCKV), Kalyani, West Bengal, India during *kharif* seasons of 2013, 2014 and 2015. This landrace had medium plant height (scale 5, 120-130 cm) with late maturity (scale 7, 140-150 days). The lemma and palea of matured grain was straw coloured with purple spot at tip and sterile lemma in purple colour. The grains were short (7.90 mm) and occasionally awned, which had low test weight (15.2 g). The white-coloured kernels belonged to medium-slender group (length 5.76 mm and width 2.00 mm), which had low amylose content (15.6%), high-medium gelatinization temperature (medium alkali value, score 3.66) and medium aroma (score 1.70).

Key Words: Aromatic rice, Grain quality, Morpho-agronomic traits

The South Bengal region consisting of *gangetic* plains is home to thousands of fine and coarse-grained rice landraces, which include small and medium-grained non-Basmati aromatic types as well. Among such scented rice landraces, *Harinakhuri* is traditionally cultivated in *lower gangetic* plains, particularly in the coastal saline zone of West Bengal since a long time. The name '*Harinakhuri*' paddy is composed of two Bengali words, '*Harina*' and '*Khuri*'; where '*Harina*' meaning deer in English probably representing the native deltaic Sunderban region and *'khuri*' meaning locally made small earthen bowl in rural areas. The earliest record of '*Harinakhuri*' could be found as *aman* paddy of Midnapur district in 'A Statistical Account of Bengal: Districts of Midnapur and Hugli (including Howrah)' (Hunter, 1876), and thereafter as a Burdwan variety having special virtues suited for ordinary paddy lands in the 'Handbook of Agriculture' (Mukherji, 1901).

With quick adoption of high-yielding rice varieties during the last 4-5 decades, *Harinakhuri* like other landraces was almost eroded except in few villages of coastal saline tracts of West Bengal, where it is under localized cultivation. Farmers cultivate *Harinakhuri* paddy following traditional practices during *kharif* (wet) season mainly for their domestic consumption especially for preparations of dessert (*payes*), *khichuri* (pulse-mixed rice), popped rice, *chira* (flattened rice), etc.

In the present-day agricultural system, it has become a necessity to register important landraces as farmers' varieties under PPV&FRA, 2001 to strengthen the right of the farming community to conserve, cultivate and protect the same against unauthorized utilization by multi-national seed companies at national and global level. Hence, morpho-agronomic characterization of *Harinakhuri* rice landrace has been taken up as a legal evidence to push for its registration with the plant authority.

The seeds of *Harinakhuri* paddy landrace was collected from Sagar Krishnanagar Swami Vivekananda Youth Cultural Society, South 24 Parganas, West Bengal. 25 days old seedlings @ single plant/ hill were transplanted in an open puddled field with five replications in the field of 'C' Block Farm (22º59′N, 88º27′E and 9.75 m above mean sea level) at BCKV, Kalyani, Nadia, West Bengal, India during *kharif* (wet) season of 2013, 2014 and 2015. Each experimental unit consisted of 6-metre row length comprising 30 rows including row to row distance of 30 cm and plant to plant distance of 20 cm. The morphological and

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related characteristics of *Harinakhuri* rice landrace were determined following 'DUS Test Guidelines for Rice' of PPV&FRA, Government of India (PPV&FRA, 2007). The grain quality parameters like size and shape of grain and kernel, amylose content, alkali spreading value and aroma were determined at Aromatic Rice Laboratory, Department of Agronomy, BCKV, Mohanpur, Nadia.

The *Harinakhuri* rice landrace was adapted to rainfed medium-low land in the coastal saline region of West Bengal, whose characteristics are described in Table 1. The summary of traits for plant, stem, leaf, inflorescence, flower and grain are as follow to get a overall picture of the ideotype of the landrace *Harinakhuri*.

Plant: *Harinakhuri* rice belonged to long-duration type with late heading (scale 7, 113 days) and late maturity (scale 7, 143 days).

Stem: Plants were medium-statured with average stem length of 126.4 cm excluding panicle. There was weak anthocyanin colouration (scale 2) (Fig. 1) on nodes and internodes. The attitude of the culm could be categorised as semi-erect (scale 3) at booting stage.

Leaf: Leaves were long, narrow and green. The colour of basal leaf sheath was light purple (scale 2), while the intensity of green colour of the leaf as well as anthocyanin colouration on inner surface of leaf sheath was medium (scale 5). The average length and width of leaf blade were recorded as 64.6 mm and 9.9 mm, respectively. Split-type ligule (scale 3) and sickle-shaped auricle at leaf base were observed in the leaf. The attitude of the flag leaf was erect (scale 1) at early, and semi-erect (scale 3) at late observation.

Inflorescence: The length of panicle was categorized as medium (scale 5, 26.6 cm) with the curvature of the main axis as deflexed (scale 5) (Fig. 2). The landrace produced medium (scale 3, mean 12.2) and well-exerted panicles in the field. The colour of lemma and palea was straw background with purple spot at the tip (scale 8) at ripening stage. The variations in size, shape and colour of grain between *Radhatilak* and *Harinakhuri* was reported by Ghosh (Personal Communication, 2015), which could be considered as an important parameter to differentiate these two traditional scented rice landraces.

Flower: The landrace produced bi-sexual flowers including six yellow coloured anthers, and an ovary with purple coloured feathery stigma.

Grain: The grains were short in size (mean length 7.90 mm and width 2.30 mm) and occasionally awned (Fig. 3). The weight of 1000 fully-developed grains was low (15.2 g). The colour of lemma and palea was straw background with purple spot at the tip (scale 8), while that of sterile lemma was purple (scale 4).

Fig. 1. Nodes and internodes of '*Harinakhuri*'

Fig. 2. Panicle of '*Harinakhuri*'

The kernels were medium slender in shape (length 5.76 mm and width 2.00 mm) and white in colour (Fig. 3), which had low amylose content (15.6%), high-medium gelatinization temperature (medium alkali spreading value, score 3.66) (Fig. 4) and medium aroma (score 1.70).

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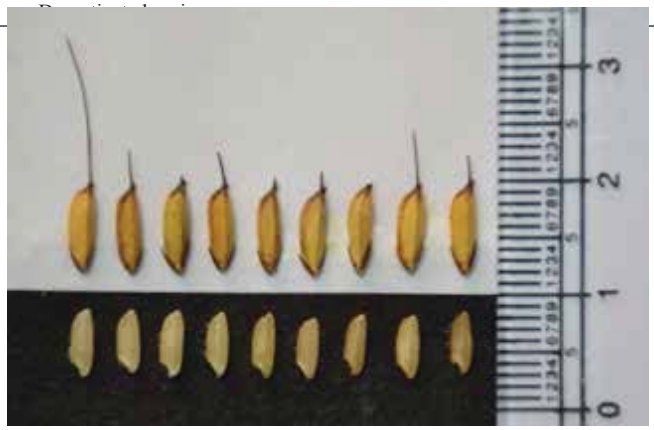
Table 1. DUS characters of *Harinkhuri* rice landrace of West Bengal

S. No.	Characteristics	Scale	Remarks / Measured values etc.
1	Coleoptile: colour	1	White
2	Basal leaf sheath colour	2	Light purple
3	Leaf: Intensity of green colour	5	Medium
4	Leaf: anthocyanin colouration	1	Absent
5	Leaf sheath: anthocyanin colouration	9	Present (inner side of leaf sheath)
6	Leaf sheath: intensity of anthocyanin colouration	5	Medium
7	Leaf: pubescence of blade surface	5	Medium
8	Leaf: auricles	9	Present
9	Leaf: anthocyanin colourations of auricles	1	Colourless
10	Leaf: collar	9	Present
11	Leaf: anthocyanin colouration of collar	1	Absent
12	Leaf: ligule	9	Present
13	Leaf: shape of ligules	3	Split
14	Leaf: colour of ligule	1	Green
15	Leaf: length of blade	7	Long (64.6 cm)
16	Leaf: width of blade	3	Narrow (9.9 mm)
17	Culm: attitude	3	Semi-erect
18	Time of heading (50% of plants with panicles)	7	Late (113 days)
19	Flag leaf attitude of blade (early observation)	1	Erect
20	Spikelet: density of pubescence of lemma	5	Medium
21	Male sterility	1	Absent
22	Lemma: anthocyanin colouration of keel	5	Medium
23	Lemma: anthocyanin colouration of area below apex	3	Weak
24	Lemma: anthocyanin colouration of apex	7	Strong
25	Spikelet: colour of stigma	5	Purple
26	Stem: length (excluding panicle)	5	Medium (126.4 cm)
27	Stem: anthocyanin coloration of nodes	9	Present
28	Stem: intensity of anthocyanin colouration of nodes	3	Weak
29	Stem: anthocyanin colouration of internodes	9	Present (weak)
30	Panicle: length of main axis	5	Medium (26.6 cm)
31	Flag leaf: attitude of blade (late observation)	3	Semi-erect
32	Panicle: curvature of main axis	5	Deflexed
33	Panicle: number per plant	5	Medium (12.2)
34	Spikelet: colour of tip of lemma	5	Purple
35	Lemma & palea : colour	8	Purple spot at tip on straw background
36	Panicle: awns	9	Present
37	Panicle: colour of awns (late observation)	8	Purple
38	Panicle: length of largest awn	5	Medium (12.0 mm)
39	Panicle: distribution of awns	3	Upper half only
40	Panicle: presence of secondary branching	9	Present
41	Panicle: secondary branches	2	Strong
42	Panicle: attitude of branches	5	Semi-erect
43	Panicle: exertion	7	Well exerted
44	Time of maturity	7	Late (143 days)
45	Leaf: senescence	5	Medium
46	Sterile lemma: colour	4	Purple
47	Grains: weight of 1000 fully developed grains	3	Low (15.2 g)
48	Grain: length	3	Short (7.90 mm)
49	Grain: width	2	Narrow (2.30 mm)
50	Decorticated grain: length	3	Medium (5.76 mm)
51	Decorticated grain: width	5	Medium (2.00 mm)
52	Decorticated grain shape	3	Medium-slender
53	Decorticated grain: colour	1	White
54	Endosperm: presence of amylose	9	Present
55	Endosperm: content of amylose	3	Low (15.6%)
56	Gelatinization temperature through alkali spreading value	5	High-medium (Alkali value /score 3.66)



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