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Characterization of Aromatic Short Grain Rice Varieties based on Sodium Hydroxide Test

Muthu M.C.*, Devraj Lenka, Bastia D.N., Samal K.C. and Simanta Mohanty
Department of Seed Science and Technology,
COA, OUAT, Bhubaneswar (Odisha), India.

(Corresponding author: Muthu M.C.)*
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ABSTRACT: Variety characterization and identification has become crucial for maintaining purity during seed production as well as varietal protection under plant variety protection laws. The current study was conducted in the Department of Seed Science and Technology at OUAT Bhubaneswar's laboratory. Sodium hydroxide test is used to identify fragrant short grain rice cultivars. The leachates from the seeds react with alkali to give a colour of varying intensity that can be used to identify rice cultivars. The NaOH test can be used to identify red kernel rice genotypes. In this study, all thirty aromatic short grain rice types responded satisfactorily to the sodium hydroxide test. The aromatic short grain rice types were divided into six groups based on the results of the NaOH test: light yellow (V1, V3, V4, V6, V7, V8, V11, V12, V13, V14, V15, V16, V17, V18, V20, V21), yellow (V23, V24, V26, V27, V28, and V29), brownish yellow (V2), light brown (V9, V19, and V25), brown (V30 and V22) and wine red(V5 and V10). Those genotypes can be efficiently differentiated based on the colour reaction of palea and lemma of seeds to the Sodium hydroxide test.

Keywords: Sodium hydroxide test, aromatic rice short grain rice varieties, colour reaction, characterization.

INTRODUCTION

Rice (*Oryza sativa* L.) is the world's most common food crop, accounting for 23.3 percent of gross planted area in India (Subbaiah *et al*., 2011). In India, rice accounts for 43% of total food grain production and 46% of overall cereal production. India has the world's largest rice-growing area (about 45 million hectares) and ranks second in rice output behind China (Kaul *et al.*, 2006). Aromatic rice variants are a small but distinct group of rice that has grown in importance as the global demand for high-quality rice has grown (Sun *et al.*, 2008). Because of their wonderful aroma and palatability, they have long been a favourite around the world. Aromatic rice has a prominent significance in Indian culture. Aromatic rice varieties include basmati rice from India and Pakistan, as well as Jasmine rice from Thailand. Basmati rice is mostly farmed in India's north-western states, such as Punjab, Haryana, Himachal Pradesh, Jammu & Kashmir, and sections of Uttar Pradesh. Basmati rice varieties are distinguished by three distinct quality characteristics: pleasant aroma, extra-long superfine grain, exceptional grain elongation, and cooked rice with a soft texture. As a result, small and medium grained aromatic rice is classified as a distinct type of non-basmati aromatic rice. Although no tangible proof exists, indigenous scented rice refers to the native locations of cultivation for the majority of these rice varieties. Farmers are recognised as breeders under the Protection of Plant Varieties and Farmers' Rights Act of 2001 (PPV & FR Act, 2001), which acknowledges farmers as breeders who have developed new varieties and preserved existing varieties. For protection under the Act, plant varieties must meet the distinctiveness, uniformity, and stability (DUS) criteria, which necessitates characterising aromatic short grain rice varieties according to the PPV and FR Authority's DUS test recommendations for rice (2007). Variety identification is crucial for a number of reasons, including avoiding legal claims, establishing intellectual property rights, and maintaining genetic purity. Plant morphological features have long been accepted as the indisputable descriptors for DUS testing and crop varietal characterisation. The current trend of continuous rice variety release by the Central and State Varietal Release Committees has necessitated the development of adequate methodologies for varietal identification at the laboratory level, particularly when seed purity analysis is being performed. Maintaining variety genetic integrity is critical for preventing varietal degeneration throughout subsequent regeneration cycles and ensuring varietal performance at the intended level. Chemical tests reveal variations between seeds and seedlings of various types; they require little technical knowledge or training and can be conducted in a short amount of time. The results of these tests are typically distinct, easy to understand, and aid in genotyping grouping.

MATERIALS AND METHODS

Seeds of fragrant short grain rice cultivars were soaked for one hour in a 2% NaOH solution, and the colour of the solution changed as a result. The fragrant short grain rice types were divided into six categories based on the strength of colour reaction: yellow, light yellow, brownish yellow, light brown, brown, and wine red.

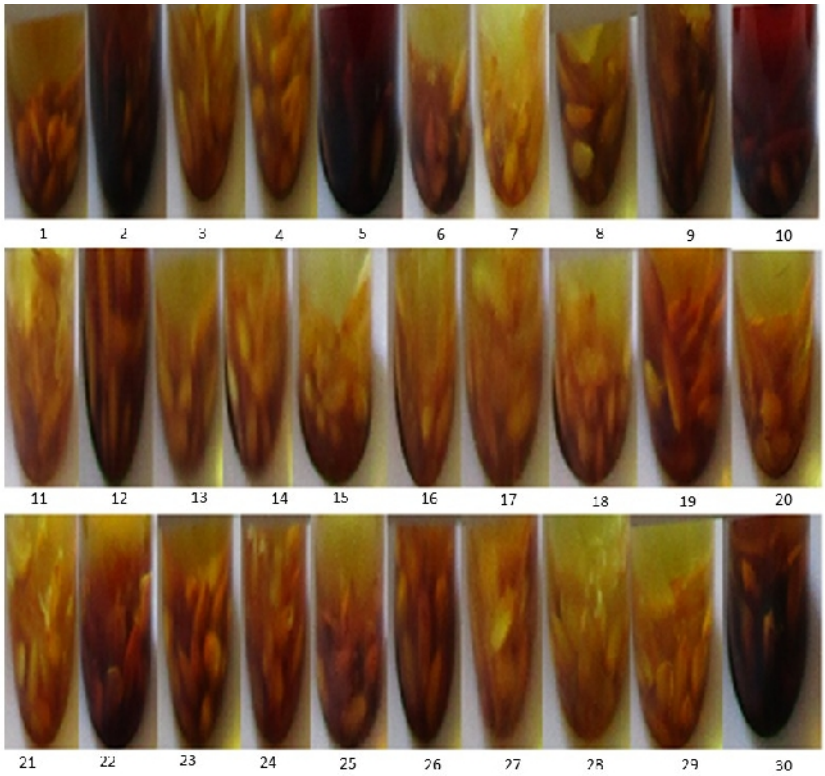
RESULTS

Aromatic small grain rice cultivars are less distinguishable, making morphological evaluation much more difficult for identification. As a result, biochemical tests are being utilised in tandem to show chemical changes amongst aromatic short grain rice cultivars' seeds. They don't involve much technical knowledge or talent, and they can be performed in a short amount of time. Because the findings of these tests are usually unique and straight forward to understand, an attempt was made to characterise and identify aromatic short grain rice cultivars. The leachates from the seeds react with alkali to give a colour of varying intensity that can be used to identify rice cultivars. The NaOH test is helpful in determining the identity of red kernel rice genotypes.

Aromatic short grain rice varietals' degree of colour reactivity to NaOH

Sr. No.	Variety	Colour reaction of lemma and palea
V1	Nua Acharmati	Light yellow
V2	Nua Kalajeera	Brownish yellow
V3	Nua Dhusura	Light yellow
V4	Nua Chinikamini	Light yellow
V5	Barikunja	Wine red
V6	Basumati	Light yellow
V7	Badshabhog	Light yellow
V8	Bishnubhog	Light yellow
V9	Chatianaki	Light brown
V10	Deulabhog	Wine red
V11	Dhanaprasad	Light yellow
V12	Dubraj	Light yellow
V13	Dulhabhog	Light yellow
V14	Dangerbasamati	Light yellow
V15	Ganagabali	Light yellow
V16	Gopal bhog	Light yellow
V17	Heerakani	Light yellow
V18	Kanak champa	Light yellow
V19	Karpurabasa	Light brown
V20	Kusumabhog	Light yellow
V21	Mugajai	Light yellow
V22	Nalidhan	Brown
V23	Neelabati	Yellow
V24	Nanu	Yellow
V25	Pimpudibasa	Light brown
V26	Ratnasundari	Yellow
V27	Sirimula	Yellow
V28	Tulasi phoola-1	Yellow
V29	Thakurasuna	Yellow
V30	Thakurabhoga	Brown

The leachates from the seeds react with alkali to give a colour of varying intensity that can be used to identify rice cultivars. The NaOH test can be used to identify red kernel rice genotypes. In this study, all thirty aromatic short grain rice cultivars tested positive for sodium hydroxide in the sodium hydroxide test. The aromatic short grain rice varieties were divided into six groups based on the results of the NaOH test: light yellow (V1, V3, V4, V6, V7, V8, V11, V12, V13, V14, V15, V16, V17, V18, V20, V21), yellow (V23, V24, V26, V27, V28 and V29), brownish yellow (V2), light brown (V9, V19, and V25), brown (V30 and V22) and wine red (V5 and V10). The colour reaction of the palea and lemma of seeds to NaOH may thus be discriminated efficiently. In rice, Rohini Devi (2000); Anithalakshmi (2002); Dhanaraj (2001); Nethra *et al.* (2007); Rimpi Bora *et al.* (2008) found similar observations. showed that the colour response test of Sodium hydroxide test was efficient in effective genotype characterisation.



The colour reaction of aromatic short grain rice varieties' palea and lemma to the NaOH test.

CONCLUSION

Based on NaOH test, the aromatic short grain rice varieties were classified in to six groups as light yellow, yellow, brownish yellow, light brown, brown and wine red.

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Conflict of Interest. None.

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