The Pharma Innovation Journal 2022; 11(2): 2923-2925

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(2): 2923-2925

www.thepharmajournal.com
Received: 13-11-2021
Accepted: 22-12-2021

Muthu MC
Ph.D., Scholar, Department of Seed Science and Technology, COA, OUAT, Bhubaneswar, Odisha, India

Devraj Lenka
Professor and Head, Department of Seed Science and Technology, College of Agriculture, OUAT, Bhubaneswar, Odisha, India

Bastia DN
Professor, Department of Plant Breeding and Genetics, College of Agriculture, OUAT, Bhubaneswar, Odisha, India

Samal KC
Professor and Head, Department of Plant Physiology, College of Agriculture, OUAT, Bhubaneswar, Odisha, India

Simanta Mohanty
Assistant Professor and ASRO, Seed Technology Research AICRP on Seed (Crops) Department of Seed Science and Technology, College of Agriculture, OUAT, Bhubaneswar, Odisha, India

Corresponding Author:
Muthu MC
Ph.D., Scholar, Department of Seed Science and Technology, COA, OUAT, Bhubaneswar, Odisha, India

Characterization of aromatic short grain rice varieties based on modified phenol test

Muthu MC, Devraj Lenka, Bastia DN, Samal KC and Simanta Mohanty

Abstract
The present investigation was carried out at laboratory of Department of Seed Science and Technology OUAT Bhubaneswar. To identify aromatic short grain rice varieties by using modified phenol. In the present study, among thirty aromatic short grain rice varieties twelve aromatic short grain varieties reacted positively whereas remaining eighteen aromatic short aromatic grain rice varieties reacted negatively to modified phenol test. Based on modified phenol test, the aromatic short grain rice varieties were classified in to five groups as no change in colour (V_3, V_4, V_6, V_7, V_{11} V_{13}, V_{15}, V_{16}, V_{17}, V_{18}, V_{20}, V_{21}, V_{24}, V_{25}, V_{26}, V_{27}, V_{28} and V_{29}) light brown (V_5 and V_{14}), brown (V_{12}), dark brown (V_{10} & V_{22}) and Black (V_1, V_2, V_8, V_9, V_{19}, V_{23} and V_{30}). Thus, based on the colour reaction of palea and lemma of seeds to Modified phenol test can be effectively distinguished.

Keywords: Modified phenol test, aromatic rice short grain rice varieties, colour reaction, Characterization

Introduction
Rice (*Oryza sativa* L.) is the staple food crop in the world particularly in India (Subbaiah *et al.*, 2011) [8] occupying a total of 23.3% of gross cropped area. Rice contributes 43% of total food grain production and 46% of total cereal production in India. Among the rice growing countries in the world, India has the largest area under rice (about 45 m. ha.) and ranks second in production next to China (Kaul *et al.*, 2006) [6]. Aromatic rice varieties constitute a small but special group of rice and have gained greater importance with the worldwide increase in the demand for fine quality rice (Sun *et al.*, 2008) [9]. These are preferred around the world since ages because of the excellent aroma and palatability. Aromatic rice has occupied a prime position in the Indian society. There are many known groups of aromatic varieties such as basmati rice from India and Pakistan and Jasmine rice from Thailand. Usually in India, basmati rice is grown in north western states like Punjab, Haryana, Himachal Pradesh, Jammu and Kashmir and parts of Uttar Pradesh (Nene, 1998) [7]. Basmati types enjoy a unique place for three distinct quality features like pleasant aroma, extra-long superfine grain and extreme grain elongation and soft texture of cooked rice. Accordingly, small and medium grained aromatic rice are being regarded as a separate class of non-Basmati aromatic rice. Although no concrete documentation exists, native areas of cultivation for most of these rice are known, are referred to as indigenous scented rice. The Protection of Plant Varieties and Farmers' Rights Act, 2001 (PPV & FR Act, 2001) recognizes the farmers as breeders who bred new varieties as well as conserved the traditional varieties. The plant varieties must fulfil the distinctiveness, uniformity, stability (DUS) criteria for protection under the Act and hence, there is a need to characterize the aromatic short grain rice varieties according to DUS test guidelines for rice prescribed by PPV and FR Authority (2007). The variety identification serves the important goals such as mitigating legal claims and confirming intellectual property rights and maintenance of genetic purity. Plant morphological characters have been recognised as the universally undisputed descriptors for DUS testing and varietal characterization of crop varieties. The present trend of continuous release of rice varieties from Central and State Varietal Release Committee has warranted to develop suitable techniques for varietal identification at the laboratory level particularly when the seeds have been submitted for seed purity analysis. Maintenance of genetic purity of varieties is of primary importance for preventing varietal deterioration during successive regeneration cycles and for ensuring varietal performance at an expected level. The chemical tests reveal differences among the seeds and seedlings of different varieties. These tests require virtually no technical expertise or training and can be completed in a relatively short time.

The results of these tests are usually distinct, easily interpreted and help in grouping of the genotypes.

Materials and Methods

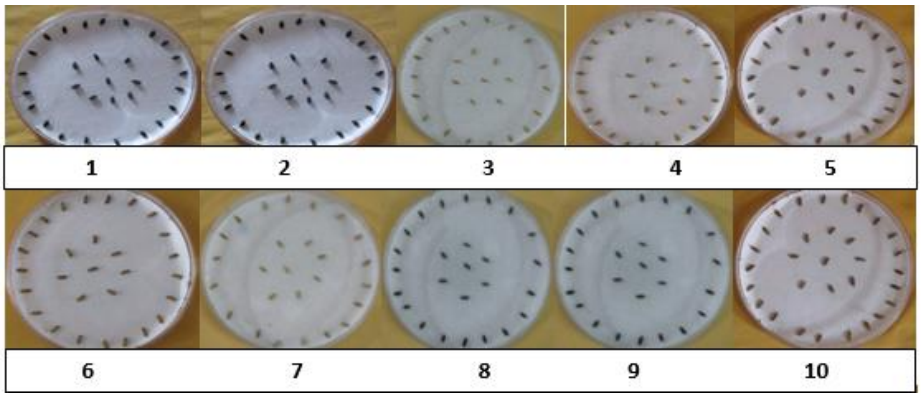
Modified phenol test was conducted similar to standard phenol test except the seeds of aromatic short grain rice varieties were soaked in 0.5 per cent copper sulphate solution (0.5 gm. of copper sulphate was fully dissolved in distilled water at first and then volume was made up to 100 ml by adding distilled water) for 24 hours instead of distilled water. The colour reactions were noted after 48 hours of incubation and the aromatic short grain rice varieties were classified into five categories, according to Jaiswal and Agarwal (1995) [4], as:

No change in colour
Light brown: +
Brown: ++
Dark Brown: +++
Black: ++++

Based on the development of seed coat colour, the aromatic short grain rice varieties are classified according to Jaiswal and Agarwal (1995) [4] No change in colour, Light brown, brown, dark brown and black. Although a set of morphological descriptors of seed are used for broad classification of aromatic short grain rice varieties are less distinct making morphological evaluation much more difficult for identification. In view of this biochemical tests are being used concurrently to reveal chemical differences among the seeds of aromatic short grain rice varieties. They require virtually no technical expertise or skill and can be completed in a relatively short time. Since the results of these tests are usually distinct and easily interpreted, an attempt was made to characterize and identify the aromatic short grain rice varieties.

Table No 1: The colour reaction of palea and lemma of aromatic short grain rice varieties to modified phenol test

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



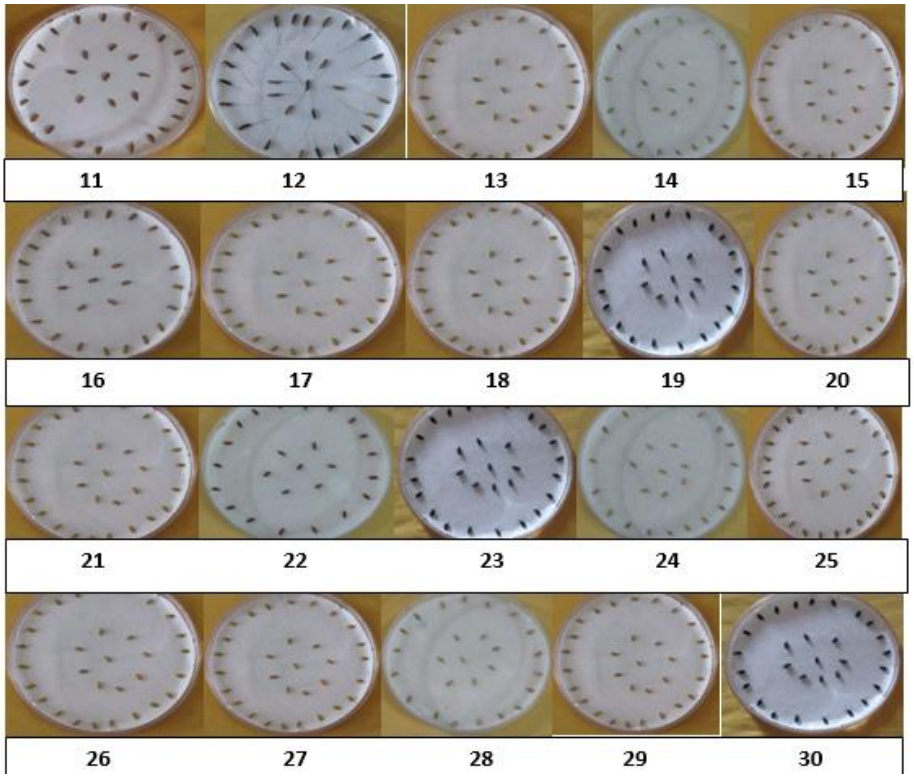


Plate 1: The colour reaction of palea and lemma of aromatic short grain rice varieties to modified phenol test

In the present study, twelve aromatic short grain varieties reacted positively whereas remaining eighteen aromatic short grain rice varieties reacted negatively to modified phenol test. Based on modified phenol test, the aromatic short grain rice varieties were classified in to five groups as no change in colour (V_3, V_4, V_6, V_7, V_{11} V_{13}, V_{15}, V_{16}, V_{17}, V_{18}, V_{20}, V_{21}, V_{24}, V_{25}, V_{26}, V_{27}, V_{28} and V_{29}) light brown (V_5 and V_{14}), brown (V_{12}), dark brown (V_{10} & V_{22}) and black (V_1, V_2, V_8, V_9, V_{19}, V_{23} and V_{30}). Thus, based on the colour reaction of palea and lemma of seeds to modified phenol test, genotypes can be effectively distinguished. The reliability of modified phenol test with copper sulphate was checked in aromatic short grain rice varieties. Janaiah *et al.* (2003) [5] opined that phenol colour test and its modifications in rice can be used to identify varieties with uniform negative colour reaction. Thus, based on the colour reaction of palea and lemma of seeds to modified phenol test can be effectively distinguished. The presence of metallic ions Fe++ and Cu++ in modified phenol test enhances activity of the enzyme, since these ions acts as catalyst for the tyrosinase enzyme which was further, confirmed by Gupta and Agarwal (1988) [3]; Agarwal and Karki (1989) [1]. Anitha Lakshmi (2002) [2] revealed that colour reaction test of modified phenol along with Cu++ and Fe++ ions was useful in effective identification of rice genotypes.

Acknowledgement
The authors acknowledge the WOS-A, Department of Science and Technology, Govt. of India for funding this project.

References

1. Agarwal RL, Karki BS. Identification of wheat varieties on the basis of laboratory evaluation. Univ. Agric. Technol. Pantnagar Res. Bull. 1989;116:81.
2. Anita Lakshmi. Characterization and identification of cultivars based on morphological and biochemical markers in rice (Oryza sativa L.) M.Sc. (Agri.) thesis submitted to the University of Agriculture Sciences, Bengaluru. 2002.
3. Gupta PK, Agarwal RL. Determination of varietal purity of paddy varieties by laboratory evaluation. Oryza. 1988; 25:310-314.
4. Jaiswal JP, Agarwal RL. Varietal purity determinations in rice modification of the phenol test. Seed Sci. & Technol. 1995;23:33-42.
5. Janaiah K, Kant K and Sharma SP. Use of phenol colour test for characterization of rice Varieties, Seed Res. 2003;31:141-147.
6. Kaul S. Economic Analysis of Productivity and Profitability in Rice Production in India, Agriculture Situation in India. 2006, 12.
7. Nene YL. Basmati rice a distinct variety (cultivars) of the Indian sub-continent, Asian Agric. Hist. 1998;2(3):175-188.
8. Subbaiah PV, Sekhar MR, Reddy KHP, Reddy NPE. Variability and genetic parameters for grain yield and its components and kernel quality attributes in CMS based rice hybrids (*Oryza sativa* L.), International Journal of Applied Biology and Pharmaceutical Technology. 2011;2(3):603-609.
9. Sun GX, Williams PN, Carey AM, Zhu YG, Deacon C, Raab A *et al*. Inorganic As in rice bran and its products are an order of magnitude higher than in bulk grain, Environ Sci Technol. 2008;42:7542-7546.