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# Physico-chemical characterization of selected scented rice (*Oriza sativa*) varieties/genotypes

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**Abstract**
The present investigation was undertaken the Physico-chemical Characterization of some scented rice (*Oriza sativa*) varieties/genotypes.at the laboratory of department of agricultural biochemistry, Chandra shekhar azad university of agriculture and technology, Kanpur (U.P.) during the year 2018-2019 and 2019-2020. The experiment was laid out in complete randomized design with three replications and ten treatments. The result of an experiment on various physical characteristics of scented rice varieties, among which scented rice varieties are Tarawati Basmati, super Basmati, Basmati-1509,Basmati-370, PB-1, Ramraj, Doobraj, Kalmuhi, kalanamak, Type-3. Physical Parameter In various Scented rice, the highest Test weight (21.22%) in Tarawati Basmati, hulling % is (76.78%) in Super Basmati, Milling% (64.07%) in Super Basmai and HRR (57.79%) in Super basmati and in chemical composition, the highest starch % is (77.14%) in Basmati-1509 and protein % is (7.98%) in Basmati-1509. In respect to hulling%, Milling % and HRR super basmati are significantly better then all scented varieties and in respect to Protein % and Starch% Basmati- 1509 are found significantly better then all Scented rice varieties.

**Keywords:** Scented rice, test weight, hulling, milling, HRR, starch, protein

## Introduction
Rice (*Oryza sativa*) is a staple food for 2.5 billion people mainly in Asian and African countries. Asia is a major continent accounts for over 90% of the world's production of rice. In India rice is a paramount cereal and staple food crop which occupies an area of 43.97 million ha which is the largest in the world, with an annual production of around 106.3 million tones second largest in the world after China. India is one of the largest exporters of basmati rice in the world (Husaini *et al.*, 2009) [7].

The consumers demand has increased markedly to pay a premium price for fragrant rice (Louis *et al*., 2005) [9]. Aroma in scented rice depends on the levels of 2-acetyl-1-pyrroline content and it varies with genetic and environmental conditions. Rice is the predominant food crop of Goa occupying an area of 39% (52 442 ha) of the total cultivated land in the state (Manjunath *et al*., 2009) [11]. The kernel appearance, size, shape, aroma, nutritional value and cooking characteristics are important for judging the quality and preference of rice from one group of consumer to another (Dela Cruz and Khush, 2000; Sellappan *et al*., 2009) [5, 13].

## Method and Material
The laboratory experiment was conducted in the Department of Agricultural Biochemistry, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur (UP) India. The experiment was laid out in complete randomized design with three replications and ten treatments.

## Physical Properties
### Test weight
One thousand grains of each variety were weighted on physical balance and reported as 1000-grain weight in grams.

### Hulling percentage
Collected seeds of different varieties/ strains were weighed. Then, after de-husking with the help of Satak Dehusking hulling machine, again dehusked rice (brown rice) weight was recorded and calculated by (DelaCruz and Khush, 2000) [5].

$$\text{Hulling per cent} = \frac{\text{wt. of brown rice}}{\text{wt.of paddy}} \text{ x } 100$$

**Milling percentage**

Brown rice was milled or polished with the help of milling machine and weight was recorded and milling per cent was calculated by: (DelaCruz and Khush, 2000) [5].

$$\text{Milling per cent} = \frac{\text{wt.of miilled rice}}{\text{wt. of paddy}} \text{ x } 100$$

**Head Rice Recovery per cent (HRR %)**

Whole grains were collected from milled rice sample and then recorded weight of each variety/ strain was recorded separately and per cent HRR was calculated by (DelaCruz and Khush, 2000) [5].

$$\text{HRR \%} = \frac{\text{weight of whole grain of milled rice}}{\text{wt. of paddy}} \text{ x } 100$$

**Chemical Properties**

**Protein content (%)**

The crude protein content was estimated by the method Jayapraguam *et al*. (1988) [8] The principle involved in this method is the conversion of the nitrogenous compounds (present in grain), which are protein as well as non-protein nitrogen, into ammonium sulphate, by boiling the tissues with concentrated sulphuric acid, subsequent decomposition of the ammonium sulphate by means of NaOH and collection of liberated ammonia in a known amount of standard acid (using a distillation unit) and the excess acid is estimated by back titration with standard alkali. By this method the total nitrogen (in grains) is estimated first, and then protein nitrogen and non-protein nitrogen is separated by analyzing either both are superlatively. Both the analysis can be done separately in the Micro-Kjeldahl apparatus in a modification of the above method, the ammonia is distilled as usual, but it is fixed in boric acid solution.

**Starch content (%)**

Estimation of starch was done by Anthrone Reagent methods as described by (Hodge And Hofreiter, 1962 and Thayumanavan Sadasivam, 1987) [6, 14].

**Statistical analysis**

All sample extracts were prepared and analysis done using a complete randomized design at 5% level of critical difference. Analysis of variance (ANOVA) for the design was carried out to determine the significance of differences among different treatments.

**Result and Discussion**

In conclusion, study showed that varietal differences were evident in physico-chemical characteristics of rice

**Physical properties**

Test Weight-A Presented of data obtained on Test Weight During both years and pooled analysis are given in Table-1. Which clearly indicates that the highest test weight reported in Kalmuhi (22.38gm) and lowest test weight reported in variety Basmati 1509 (21.22gm) As per the report of kala and singh (2011) Abayeet *et al.* (2004) [16, 1].

**Hulling Percent**

The data obtained on hulling percent during both years and pooled data value are presented in Table-1. Maximum Hulling Percent are reported in variety Super Basmati (77.15%) fallowed by PB-1 (76.83%) and Tarawati Basmati (76.81%) while lowest hulling percent reported in variety Type-3 (75.63%) similar observation has been reported by Sarkar *et al.* (1994) [12].

**Table 1:** Test Weight (gm) and Hulling (%)

| Treatments | Test Weight (gm) | | | Hulling (%) | | |
|---|---|---|---|---|---|---|
| | 2018-2019 | 2019-2020 | Pooled mean | 2018-2019 | 2019-2020 | Pooled mean |
| PB-1 | 21.63 | 21.60 | 21.62 | 76.81 | 76.84 | 76.83 |
| Basmati-370 | 21.84 | 21.81 | 21.83 | 76.15 | 76.13 | 76.14 |
| Basmati 1509 | 21.20 | 21.24 | 21.22 | 77.05 | 77.08 | 77.06 |
| Super Basmati | 22.25 | 22.27 | 22.26 | 77.13 | 77.17 | 77.15 |
| Tarawati Basmati | 22.30 | 22.33 | 22.32 | 76.83 | 76.80 | 76.81 |
| Type-3 | 21.38 | 21.35 | 21.37 | 75.62 | 75.65 | 75.63 |
| Ramraj | 21.60 | 21.57 | 21.58 | 76.25 | 76.27 | 76.26 |
| Doobraj | 22.10 | 22.07 | 22.09 | 76.50 | 76.48 | 76.59 |
| Kalmuhi | 22.39 | 22.37 | 22.38 | 76.80 | 76.77 | 76.78 |
| Kalanamak | 21.90 | 21.87 | 21.88 | 76.65 | 76.68 | 76.66 |
| S.E. | 0.1633 | 0.1549 | 0.112 | 0.2113 | 0.3415 | 0.200 |
| CD(5%) | 0.3403 | 0.3232 | 0.227 | 0.4407 | 0.7121 | 0.405 |

**Milling Percent**

A perusal data on milling percent showing pooled values of two years data in respect to different varieties are given in Table-2. Highest Milling Percent reported in variety Super Basmati (64.07%) fallowed by Basmati-1509 (63.59%) and Tarawati Basmati (63.24%) while lowest milling percent reported in variety, Kalanamak (61.82%), Similar observation has been reported by Mahendra kumar (1995) [10] and Ali *et al.* (1992) [2].

**Head Rice Recovery**

The data pertaining to Head Rice Recovery Showing mean values of two years as well as pooled data in respect to different varieties are presented in Table-2. Highest Head Rice recovery reported in variety Super Basmati (58.17%) fallowed by Basmati-1509 (58.11%) and Basmati-1509 (57.12%) while lowest head rice, recovery reported in variety PB-1(52.23%), Similar observation has been reported by Verma and Srivastava (1991) [15].

**Table 2:** Milling (%) and Head Rice Recovery (%)

| Varieties | Milling (%) | | | Head Rice Recovery (%) | | |
|---|---|---|---|---|---|---|
| | 2018-2019 | 2019-2020 | Pooled mean | 2018-2019 | 2019-2020 | Pooled mean |
| PB-1 | 61.81 | 61.85 | 61.83 | 52.21 | 52.25 | 52.23 |
| Basmati-370 | 62.50 | 62.53 | 62.52 | 57.13 | 57.10 | 57.12 |
| Basmati 1509 | 63.58 | 63.60 | 63.59 | 58.10 | 58.13 | 58.11 |
| Super Basmati | 64.06 | 64.09 | 64.07 | 58.15 | 58.18 | 58.17 |
| Tarawati Basmati | 63.25 | 63.23 | 63.24 | 57.87 | 57.85 | 57.86 |
| Type-3 | 62.02 | 62.07 | 62.04 | 54.80 | 54.77 | 54.79 |
| Ramraj | 62.80 | 62.76 | 62.78 | 55.15 | 55.11 | 55.12 |
| Doobraj | 62.15 | 62.18 | 62.16 | 54.36 | 54.39 | 54.78 |
| Kalmuhi | 61.90 | 61.87 | 61.88 | 53.25 | 53.28 | 53.27 |
| Kalanamak | 61.81 | 61.84 | 61.82 | 52.40 | 52.45 | 52.43 |
| S.E | 0.4508 | 0.4885 | 0.333 | 0.2977 | 0.3224 | 0.219 |
| C.D(5%) | 0.9405 | 1.0189 | 0.672 | 0.6205 | 0.6731 | 0.442 |

## Chemical property

**Protein Percent:** The data pertaining to Protein Percent Showing mean values of two years as well as pooled data in respect to different varieties are presented in Table-3. Highest Protein Percent reported in variety Super Basmati (7.98%) fallowed by Basmati-1509(7.88%) and Type-3 (7.88%) while lowest Protein Percent reported in variety Kalanamak (7.63%), As per the report of Bechtel *et al.* (2009) [4].

## Starch Percent

A Presented of data obtained on Starch Percent during both years and pooled analysis are given in Table-3. Highest Starch Percent reported in variety Basmati-1509(77.14%) fallowed by Kalmuhi (77.04%) and Kalanamak (76.63%) while lowest Starch Percent reported in variety Ramraj (75.84%) similar result reported by Atwell *et al.* (2008) [3].

**Table 3:** Protein (%) and Starch (%)

| Treatments | Protein (%) | | | Starch (%) | | |
|---|---|---|---|---|---|---|
| | 2018-2019 | 2019-2020 | Pooled mean | 2018-2019 | 2019-2020 | Pooled mean |
| PB-1 | 7.65 | 7.67 | 7.66 | 75.85 | 75.83 | 75.84 |
| Basmati-370 | 7.70 | 7.72 | 7.71 | 76.19 | 76.22 | 76.20 |
| Basmati 1509 | 8.01 | 7.96 | 7.98 | 77.13 | 77.15 | 77.14 |
| Super Basmati | 7.95 | 7.97 | 7.96 | 76.51 | 76.54 | 76.52 |
| Tarawati Basmati | 7.65 | 7.79 | 7.72 | 76.18 | 76.15 | 76.16 |
| Type-3 | 7.90 | 7.87 | 7.88 | 75.90 | 75.93 | 75.91 |
| Ramraj | 7.81 | 7.83 | 7.82 | 75.82 | 75.86 | 75.84 |
| Doobraj | 7.75 | 7.79 | 7.77 | 76.28 | 76.31 | 76.30 |
| Kalmuhi | 7.69 | 7.67 | 7.68 | 77.02 | 77.07 | 77.04 |
| Kalanamak | 7.64 | 7.62 | 7.63 | 76.65 | 76.61 | 76.63 |
| S.E | 0.0632 | 0.0683 | 0.047 | 0.1581 | 0.1095 | 0.098 |
| C.D(5%) | 0.1886 | 0.1992 | 0.133 | 0.4674 | 0.3253 | 0.281 |

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