



## SCREENING OF TRADITIONAL RICE CULTIVARS GROWN BY TRIBALS OF THANE DISTRICT IN MAHARASHTRA.

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**ABSTRACT:** Thane is one of the major and tribal district of Maharashtra. Tribals of northern part of Thane district have conserved 28 land races of rice on farm by traditional methods of cultivation. Efforts are made to screen these 28 cultivars of rice for their yield characteristics and nutritional values. Findings of this work include scented, long grain, short and bold grain, high protein, high carbohydrate and high lysine content cultivars of the rice. The importance of conservation of such rich rice diversity from this fast changing agro-ecosystem of Thane district is discussed. Both in situ and ex situ conservation steps are necessary to conserve these cultivars of rice crop.

**Key words:** Land races, Rice, Diversity, Nutritional values, Yield characteristics, Conservation

### INTRODUCTION

Rice is a one of the major food crop grown on the planet. Two third of the world population eat rice as their staple food. About 80 percent of world rice production comes from the cultivation of *Oryza sativa*. There are over 140,000 varieties of rice known to grown world over. India is supposed to be the center of origin of idica rice of the species *O. sativa*. In India much of the work on rice diversity was reported from eastern states , rightly so because Orissa is considered to be cradle of rice .Considerably high genetic erosion had occurred in rice due to fast replacement of traditional cultivars by high yielding varieties (HYV) . Nearly 74% of cropped area under rainfed agro ecosystems is occupied by HYV and it could be even higher in irrigated ecosystems (Chauhan *et al.*,2000). There is an urgent need to collect, evaluate and conserve the genetic resources from the field where primitive cultivation is still found (Ishikawa *et al.*,2000). High degree of land races diversity still exist in rainfed agro ecosystems and areas inhabited by tribals.Several rice workers have been perusing the collection of traditional landraces of rice and their evaluation from such environments .(Sinha *et.al* ,1990; Chauhan *et.al.*,2000; Shukla *et.al.*, 1996; Shivraj and Pandravada, 1996; Sarwagi and Rastogi ,2000; Sing *et.al.*,2000 and Tomer *et.al.*,2000).While these reports are from the states of Bihar, Orissa, Andra Pradesh and Madhya Pradesh. Similar reports from traditional rice pockets of Maharashtra are meager .Verma and Hakim 1989 collected 55 samples of wild rice (*O. nivara*) and 39 of cultivated rice from Vidarbha region in Eastern Maharashtra. Kulkarni *et.al.* (1998) reported the collection, conservation and use of rice cultivars by Mahadev koli tribes in Western Maharashtra. Recently Bhasker & Patil (2005) and Patil (2007) reported 126 accessions of 31 land races of rice from tribal district Nandurbar in North Maharashtra. In the present paper 28 rice landraces are reported from tribal dominated region of Thane district in Maharashtra state for the first time.

### MATERIAL AND METHODS

**Area of exploration:** Thane is the largest and tribal district of Maharashtra state. Area selected for exploration of rice landraces is the north part of the district including four talukas namely: Talasari, Vkrangad, Jawar and mokhada.Shayadri mountain ranges run through these talukas .This area is totally rainfed ecosystem and purely tribal area. Tribes inhabiting these talukas are warli, Thakar, Mahadev koli and Katkari. Major crops in this region are Rice and Nagli.

**Survey and collection:** Ethno botanical principles were followed for the collection of different landraces of crops grown by tribal people of the district. Accession numbers were given to all samples and their passport information was recorded separately. Morphogenetic differences among the landraces and their yield characteristics are recorded.

**Analysis of grains:** Total carbohydrates were extracted by the method of Hegde and Hofreiter(1992) and estimated employing the method of McCredy *et.al.* (1950).The grain proteins were precipitated in TCA ,dissolved in 0.05 N NaOH and measured as per Lowry *et.al.* (1951).For estimation of free amino acids the grain powder extracted in 80% served as sample . The method of Harding & Maclean (1916) was employed for estimation of amino acids. Average of three replicates was recorded for every sample and the amounts were expressed in g/ 100g dry weight i.e. percentage. Screening of grains for lysine content is carried out as per Theymoli Balasubramanian and Sadasivam (1987)

## RESULTS AND DISCUSSION

In all 28 landraces of rice collected from tribal area of Thane district. Table- 1 showing levels of insoluble proteins, total amino acids and total carbohydrates of grains of different land races grown in tribal area of Thane district.

**Table 1. Contents of insoluble proteins, free amino acids and carbohydrates in rice landraces grown in Tribal area of Thane district- Maharashtra.**

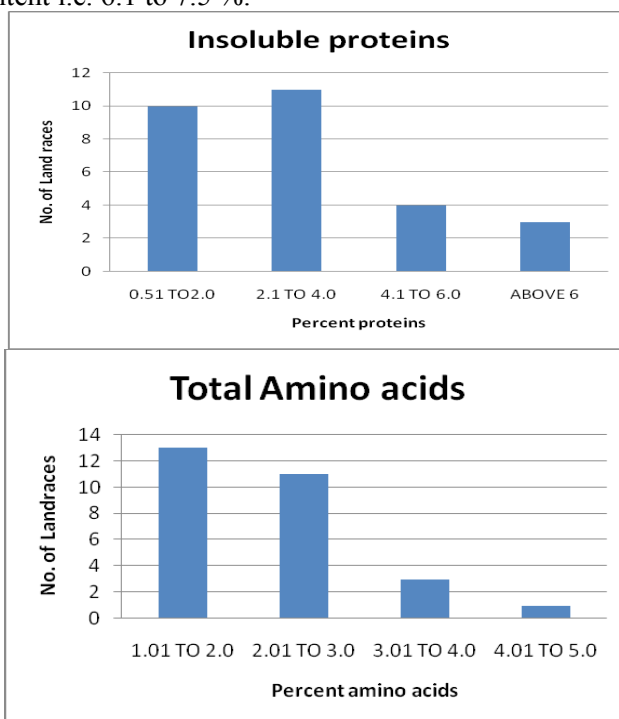
| Accession No. | Landrace (Local name) | Insoluble Proteins g/ 100 g | Total Amino acids g /100g | Lysine g/16g N | Total Hydrolysable Carbohydrates g / 100 g |
|---------------|-----------------------|-----------------------------|---------------------------|----------------|--|
| R-01          | Rajghudya             | 4.4                         | 4.20                      | 2.36           | 64   |
| R-02          | Malghudya             | 4.2                         | 3.84                      | 2.13           | 70   |
| R-03          | Lal kudai             | 7.5                         | 3.00                      | 1.06           | 40   |
| R-04          | Dangi                 | 3.2                         | 2.18                      | 2.75           | 80   |
| R-05          | Jira bhat             | 4.2                         | 2.00                      | 1.90           | 40   |
| R-06          | Tornya                | 0.8                         | 2.00                      | 2.32           | 70   |
| R-07          | Kolpi                 | 3.8                         | 1.84                      | 2.31           | 82   |
| R-08          | Kolam                 | 3.6                         | 3.00                      | 2.44           | 95   |
| R-09          | Dodkya dangi          | 2                           | 3.20                      | 4.00           | 95   |
| R-10          | Kolpi 2               | 2.4                         | 2.20                      | 3.33           | 95   |
| R-11          | Patanya               | 1.2                         | 1.44                      | 3.33           | 80   |
| R-12          | Javarya               | 1.6                         | 1.50                      | 3.50           | 89   |
| R-13          | Varangal              | 3.8                         | 2.12                      | 4.40           | 60   |
| R-14          | Mal kolam             | 1.2                         | 2.34                      | 2.66           | 95   |
| R-15          | Suganta               | 3                           | 1.18                      | 3.20           | 60   |
| R-16          | Badmya                | 3.2                         | 2.16                      | 1.25           | 65   |
| R-17          | Salva bhat            | 3.8                         | 1.70                      | 3.50           | 80   |
| R-18          | Tychun                | 6.2                         | 1.84                      | 2.32           | 82   |
| R-19          | Sag bhat              | 2                           | 1.70                      | 3.20           | 58   |
| R-20          | Masala bhat           | 1.6                         | 2.12                      | 3.50           | 89   |
| R-21          | Solam                 | 3.2                         | 1.70                      | 2.25           | 66   |
| R-22          | Jhini                 | 3.4                         | 2.14                      | 2.25           | 40   |
| R-23          | Bhai bhat             | 1.2                         | 1.90                      | 4.00           | 80   |
| R-24          | Dhundhunya            | 6.5                         | 3.84                      | 1.60           | 85   |
| R-25          | Kalait                | 3.2                         | 2.37                      | 3.75           | 58   |
| R-26          | Surati                | 1.2                         | 2.00                      | 3.33           | 95   |
| R-27          | Masuri                | 1.2                         | 1.20                      | 3.63           | 82   |
| R-28          | Chimansal             | 4.4                         | 2.14                      | 3.09           | 80   |

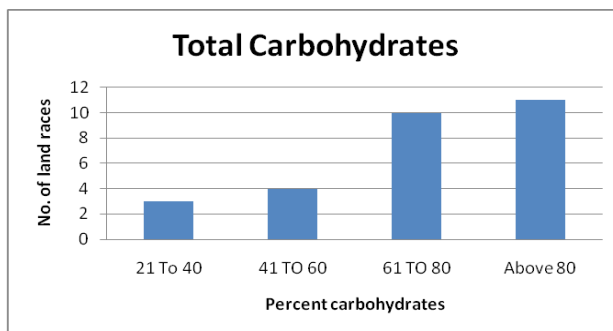
**Table 2. The range of diversity in Morphogenetic, yield and Nutritional Characteristics of rice cultivars from tribal area of Thane district of Maharashtra.**

| S. No. | Character                    | Max.  | Min.  | Mean   | Accession useful in further breeding programme |
|--------|------------------------------|-------|-------|--------|--|
| 1      | Plant height (cm.)           | 150   | 80    | 107.21 | R-18, R-07                                     |
| 2      | Days to maturity             | 160   | 60    | 90.45  |  |
| 3      | No. of Tillers               | 8     | 2     | 4      | R-22,R-27                                      |
| 4      | Panicle length (cm)          | 27    | 17    | 21.50  | R- 25,R-28                                     |
| 5      | Number of grains per Panicle | 260   | 62    | 127    | R-22   |
| 6      | Kernel length (cm)           | 0.95  | 0.59  | 0.79   | R-13   |
| 6      | Length & breadth (L:B) ratio | 5.176 | 1.923 | 3.319  | R-01,R-24                                      |
| 7      | 100 grain weight (gm.)       | 2.984 | 0.996 | 1.708  | R-23, R-24                                     |
| 8      | Total Proteins (%)           | 7.5   | 0.8   | 3.13   | R-03,R-24,R-18                                 |
| 9      | Total carbohydrates (%)      | 95    | 40    | 74.46  | R-26, R-09,R-03                                |

The insoluble proteins levels of these landraces ranged between 0.8 to 7.5%. While total amino acid level ranged between 1.5 to 4.5 percent. Level of total carbohydrates showing wide range from 40% to 95%. Level of Lysine content ranging from 1.06 to 4.00. Higher lysine content is shown by 3 landraces i.e. R-23,R-13 and R-09.

Fig. 1. Shows the number of landraces of rice falling in different class intervals of insoluble proteins, total amino acid and total carbohydrates levels. Ten landraces showed protein content 0.5 to 2.00%. Another 11 landraces showed protein content 2.1 to 4.0 % and four landraces showed protein content 4.1 to 6.0 %. While three landraces –Lal kudai, Dhundhuniya and Tychun showed higher protein content i.e. 6.1 to 7.5 %.





**Figure 1. Number of Landraces of rice showing different ranges of levels of Insoluble Proteins, Total Amino acids and Total carbohydrates.**

Total amino acid content ranging from 1 to 2 % showed by 13 landraces, 2 to 3% showed by 11 land races , 3 to 4% showed by 3 land races . Whereas the range of 4 to 6% amino acid is showed by only one landrace i.e. Rajghudya.

Result of screening of landraces for total carbohydrates content showing the wide range. Total carbohydrates content 21 to 40 % found in three land races, 41 to 60 % found in four land races, 61 to 80 % found ten land races and above 80% found in 11 landraces.

Table 2. Shows only range of diversity in morphogenetic characters and content of total carbohydrates and proteins of the grains of collected landraces .Values of these characters for every land race is not shown. The genetic diversity in plant height varies from 80 cm to 150 cm. The results indicate that accession R-18 and R- 7 are short whereas R-27 is the tallest one. All other land races showing average height i.e. 107 cm.

The genetic diversity in number of tillers produced ranges from 2 to 8. Accession R-3 and R-9 produce two to three tillers per plant. The farmers correlate this with drought tolerance. They consider land race with less number of tillers can tolerate drought condition in better way as compare to landraces with more number of tillers. Recently less number of tillers per plant correlated with high drought tolerance capacity of rice plant (Pradhan S.K. *et. Al.* 2003).

Accession R-1, R-22 and R-14 are showing long and slim type of grains. Among these R-22 i.e. Jhini is most popular in Mumbai and Thane market. Jhini is popularly called Vada Kolam. Few years back the Vada kolam (Jhini) was the most common landrace grown by farmers of Vada taluka . But now it is totally replaced by the H.Y.V. Some other varieties of rice are being sold in the market by the name of Vada kolam. Another important character of Jhini is higher number of grains per panicle i.e. 260. one of the reason for replacing Jhini or Vada kolam by local farmer is its low disease resistance and low drought tolerance.

Accession R-03, R-24 and R-18 are showing high protein content.

Among these R-24 i.e. Dhundhunya having short and bold grains with 100 grain weight 2.984 which is highest among the recorded 28 landraces. Accession R-03 is important landrace as it is showing high protein content with low carbohydrate content and less number of tillers. However, the protein content of these landraces is less than the WHO standard of 9-12 % for rice. In the present report the grains are screened for only insoluble protein levels , if the fraction soluble fraction is also considered than total proteins may be still higher to touch the WHO standard.

The range of carbohydrate content of the grain is from 40% to 95%. Low carbohydrate level in landraces like accession R-03 and R-05 indicates less starch and glutinous endosperm. This endosperm character is rare among indica rice and is the character of japonica rice. Chuhan et.al. and Nayak et.al. have screened several collection from Bihar and Orissa for amylase content and found the presence of sticky and nonsticky cultivars. A detail analysis of the ratio of amylase and amylopectin of these landraces will through more light about their endosperm character and genetic diversity.

In the present collection Suganta(R-15), Salva bhat (R-17) Masala bhat (R-20) and Chimansal (R-28) are scented varieties. But the yield is less as investigated from the number of grains per panicle. It is only 63 for Suganta, 112 for Masala bhat, 120 for Salva bhat and 130 for Chimansal. Chimansal is thus better yielding scented variety.

Traditional cultivation of rice is still in practice in tribal area of Thane district. Comparatively more numbers of accession of land races got from the Jawar and Mokhada talukas. Reason for conservation in this region is specific agro ecosystem having hilly region with no facility of irrigation. Cultivation of landraces is gradually decreasing in other part of district under pressure of urbanization and industrialization. Rice land race grown in this region are highly valuable as they possess important morphogenetic and agronomic characters. Low carbohydrate and high protein content and their drought tolerance, short crop duration, long and scented grain quality make these land races an important germplasm collection for further rice breeding programme. It is an urgent need to take necessary steps to conserve these cultivars of rice.

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