Environment & Ecology 35 (4A) : 2917—2921, October—December 2017
Website: environmentandecology.com ISSN 0970-0420

Traditional Rice Varieties in Farming System of Hill Zone of Karnataka, India

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Received 14 January 2017; Accepted 17 February 2017, Published online 8 March 2017

Abstract Rice is the staple food crop of Asian region including India. India being center of origin of rice, can boast of large number of local varieties and land races. According to an estimate, we have more than 50,000 varieties of rice. But unfortunately, most of those varieties are fast disappearing because of faulty agricultural practices. Farmers now lured by high yielding varies have confined themselves to merely fifteen such races and have stopped cultivating local varieties. Needless to mention, these varieties are of immense value in agriculture as they are treasure house of innumerable important genes as they have evolved in particular environment science millions of years. Further, HYVs are highly susceptible to diseases. Developments of disease resistant varieties are possible only with help of such genes which are available in land races only. In Karnataka rice is grown under a variety of soils and wide range of rainfall and temperature. Eleven rare and traditional varieties of rice viz., Padma Rekha, Masale Puttabatta, Halugidda Sele, Purnendo, BKB, Bolumallige, Krishnaleela, Urala Chipiga, Mundoni, Kirwana and Suvarna have been documented and is being tried to be propagated on small farm areas in malnad zone of Karnataka. The paper deals with botanical features of these varieties and attempts being taken to conserve them.

Keywords Rice, Diversity, Hill zone .

Introduction

Rice is one of the most important food crops of Asia, including India and is feeding more than 3 billion people. The cultivated rice, *Oryza sativa* originated in South East Asia in humid tropical climate and under influence of local environment and farmers need have evolved into 88,681 different variety, out of that 55,615 are land races, 1,171 are wild races and 32,895 are other varieties. Green revolution is considerably held to improve production of food grains in our country and its role in achieving status of self sufficiency in food grain is beyond any doubt. But high yielding varieties, which are the back bone of green revolution have indirectly stimulated erosion of land races and wild varieties of rice. Presently more than 70% of

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Table 1. Characteristics of eleven traditional varieties of rice grown in hilly zone of Karnataka.

Name of landrace	Days to 50% flowering	Days to maturity	Plant height (cm)	Panicles per plant	Panicle length (cm)	1000 grain weight (g)	Grain yield (q/ha)	Decorticated grain color	Special features
Padma Rekha	102	137.00	129	7.50	26.25	20.40	30.00	White	Blast and drought tolerant
Masale Puttabatta	99	138.00	141	7.75	25.00	18.30	25.00	White	Blast and drought tolerant, susceptible to stem borer
Halugidda sele	100	139.00	127	9.75	25.50	18.80	28.00	White	Blast tolerant
Purnendo	94	130.00	113	6.75	26.50	20.30	30.00	White	Blast tolerant
BKB	103	139.00	114	8.50	24.50	22.70	33.00	Red	High protein content, blast and drought tolerant
Bolumallige	108	146.00	116	8.50	24.00	24.60	36.00	Red	Blast and drought tolerant, lodging type
Krishnaleela	116	152.00	126	6.75	20.50	23.00	29.00	Red	Blast tolerant
Urala Chipiga	90	129.00	125	6.25	21.50	21.80	28.00	Red	lodging type
Mundoni	105	141.00	109	8.00	25.50	16.80	25.00	Red	High nitrogen uptake capacity
Kirwana	115	158.00	115	8.25	24.75	15.90	25.00	Red	Blast tolerant
Suvarna	103	141.00	107	9.75	23.00	19.10	31.00	Red	Blast tolerant

rice cultivation is being done using high yielding variety (HYV) only. Obviously land race are disappeared fast. Importance of landraces is larges than life in agriculture system, because improvement in existing variety depends upon desirable gene which are possibly present in land races and wild varieties only. Beside food, rice played key role in religion, culture and rituals in South Asia.

Cultivation of rice in Karnataka state it as old as its cultivation in the country. There were many varieties grown in different parts of the state under varied agro-ecological situations. In Karnataka, traditional rice varieties are being grown in very few selected regions. The major area of these varieties can be seen in hilly and coastal tracts in Shimoga, Hassan, Coorg, Udupi and South Kanara districts. Hilly zone is also called as malnad zone having district agro-climatic features with rolling topography of mountains and deep valleys. It has a geographical area of 22.89 lakh hectares covering 22 taluks of Uttar Kannada, Shimoga, Chikmagalur, Hassan, Coorg and Dharwad districts. This zone receives maximum rainfall of about 3695 mm annually. A total of 0.26 m ha is under rice with the productivity of 1.98 t/ha.

Most popular traditional rice varieties cultivated in these area include Padma Rekha, Masale Puttabatta, Halugidda Sele, Purnendo, BKB, Bolumallige, Krishna-leela, Urala Chipiga, Mundoni, Kirwana and Suvarna. These varieties suite very well for the cropping system of Malnad tract of Karnataka.

Materials and Methods

Extensive survey was conducted in villages of Malnad region of Karnataka and farmers were consulted about the local varieties they have and they plant in their field. Seeds of local landraces were collected

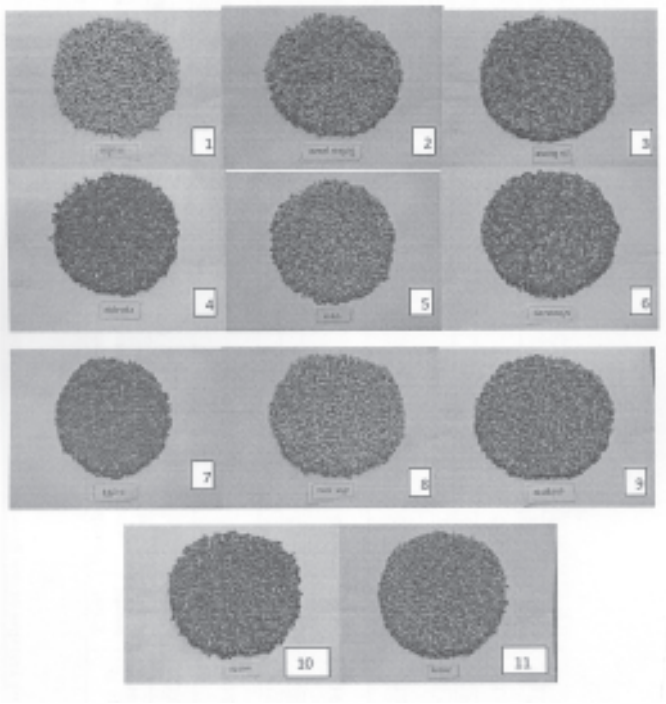

Fig. 1. Seeds of traditional rice varieties of hilly zone of Karnataka. 1 Padma Rekha, 2 Masale Puttabatta, 3 Halugidda sele, 4 Purnendo, 5 BKB, 6 Bolumallige, 7 Krishnaleela, 8 Urala Chipiga, 9 Mundoni, 10 Kirwana and 11 Suvarna.

and were planted on small study plots with suitable and uniform spacing in between two plants (20 cm in a row and 25 cm in a colum) in control condition. Measurements of different morphological and agronomic characteristics of these collected landraces at different stages of growth were recorded following National guidelines for the conduct of Test for Distinctness, Uniformity and Stability of Rice (*Oryza sativa* L.). Morphological and agronomic characteristics of landraces characters like days to 50% flowering, days to maturity, plant height (cm), panicles per plant, panicle length (cm), 1000 grain weight (g), grain yield (q/ha) and decorticated grain color (brown rice) were recorded.

Results and Discussion

The collected traditional rice varieties in the present study exhibited distinct variations in their morphological characteristics including the panicle shape, size and seed color (Fig. 1). The diversity of traditional varieties is still maintained by the farmers because of their agromorphological characteristics and traditional ecological knowledge base. The farmers main criteria for selection of traditional rice varieties are yield, grain quality, pest and disease resistance, as well as their adaptation to local farming conditions.

Various morphological and agronomic study performed on eleven traditional varieties are presented in Table 1. One of the important maturity character in deciding earliness of the genotype is days to 50% flowering. The variation for days to 50% flowering ranged from 90 Days (Urala Chipiga) to 116 days (Krishnaleela) depending upon different landraces. Minimum maturity was noted in the variety Urala Chipiga which matured in 129 days where as, the va-

riety Krishnaleela took 152 days for maturity. Except Urala Chipiga, all were medium and long duration varieties.

Plant height was ranged from 107 cm to 141 cm. Minimum height of 107 cm was recorded for Suvarna verity, whereas maximum height of 141 cm was recorded for Masale puttabatta verity. Plant height of Padma Rekha, Halugidda Sele, Purnendo, BKB, Bolumallige, Krishnaleela, Urala Chipiga, Mundoni and Kirwana varity were 129, 127, 113, 114, 116, 126, 125, 109 and 115 cm, respectively. Number of panicles per plant was also observed, highest number of panicles per plant 9.75 was noticed in Halugidda sele variety and lowest of 6.25 in Urala Chipiga variety.

Krishnaleela variety recorded lowest panicle length of 20.50 cm, however highest panicle length of 26.50 cm was observed in Purnendo variety. In Padma Rekha, Masale Puttabatta, Halugidda Sele, BKB, Bolumallige, Urala Chipiga, Mundoni, Kirwana and Suvarna variety the panicle length was 26.25, 25.00, 25.50, 24.50, 24.00, 21.50, 25.50, 24.75 ans 23.00 cm, respectively. Panicle length is one of the important yield attributing traits because increase in panicle length is of utmost important in improvement of grain yield.

The lowest 1000 weight seed of 16.80 g was noticed in Mundoni variety where as, highest of 24.60 g was recorded in Bolumallige variety. Ultimate grain yield of a plant depends mainly on 10000-grain weight through various other component characters. The study of 100-grain weight deserves much attention because grain yield is product of interaction of various grain components so improvement will be quite easier and study will help in understanding the complex trait and grain yield.

For grain yield per hectare, the varieties had variation from 25.00 (Masale Puttabatta, Mundoni and Kirwana) to 36.00 quintals per hectare (Bolumallige). Grain yield is a complex quantitative character which is influenced by other ancillary and secondary characters. Hence all the changes in the secondary traits would not be expressed as changes in the yield but all the changes in yield would accomplished by changes in one or more secondary traits. Similarly, traditional rice cultivars of Thane district of Maharashtra were screened to explore and document the existence of such indigenous rice varieties and there probable cause of extinction [1].

Decorticated grain color of different variety was observed as red and white color. Varieties viz., Padma Rekha, Masale Puttabatta, Halugidda Sele and Purnendo had white color kernels, where as the varieties viz., BKB, Bolumallige, Krishnaleela, Urala Chipiga, Mundoni, Kirwana and Suvarna had red color kernels. Similar kind of viability in ancient indigenous paddy varieties were noticed in Malda and neighbourning districts of West Bengal [2] and Kumaon district of Uttarakhand [3].

Farmers were found to have a higher preference for traditional varieties due to agronomic, dietary and cultural reasons. The rice landraces mentioned in the study exhibit many interesting characteristics. Most of these local varieties are blast tolerant and the varieties viz., Padma Rekha, Masale Puttabatta, BKB and Bolumallige, were drought tolerant, where as the varieties BKB and Mundoni have high protein content and high nitrogen uptake capacity, respectively. These genotypes can be useful in mitigating the negative impact of climate change and can be useful for developing stress tolerant varieties. Study carried out using various local varieties of West Bengal stressed upon need of conservation of traditional varieties [4, 5, 6].

The increasing propaganda for high yielding varieties has led to the extinction of some important rice landraces in the area and there is an urgent need for careful purification and encouraging the farming community to grow traditional varieties which could help in the *in-situ* on-farm conservation of important landraces that are presently being grown in the area. There is a need for proper documentation of the landraces and strengthening the traditional gene banks such as farmers seed bank for effective conservation of the depleting traditional rice varieties. The landraces are specific to ecological niches with potential sources of valuable and rare genes and there is a great scope for transferring these genes among and across the species.

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