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Medicinal uses of red rice in coastal Karnataka

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Abstract

Rice with a red bran layer due to the presence of polyphenols and anthocyanin are known as red rice. The red rice varieties with appealing red colour has more complex taste and contains more nutrition, fibre-filled bran, polyphenols, anthocyanin and possess antioxidant properties. Totally 36 rice landraces were collected, evaluated and documented the information of indigenous traditional knowledge on Medicinal and Nutritional use of red rice in various medications and therapies from the farmers. Red rice landraces *Athikaya*, *Athikaraya*, *Kayame* and *Rakthashali* were the native staple food of coastal Karnataka. The cooked red rice made by *Hallaga* won't spoil even after two days of cooking and it grows to a height of about 4.5-5 feet tall and contains more fibrous contents. *Kari kagga* is not only giving energy to work long hours, but also works as coolant. *Kalama* is highly tasty and is used in curing piles or haemorrhoids. *Athikarya* used for cure diarrhea and *Ghandasali* and *Gulwadi sanna* are aromatic rice used for payasa preparation. Red rice was found beneficial to health in terms of its nutritional significance and its applicability in various medications.

Keywords: Red rice landrace, Nutritional, Medicinal, Aromatic

Introduction

Red rice is traditional pigmented rice grown in Southeast Asia and is considered highly nutritive and medicinal as it possesses antioxidant properties and also has a higher content of important micronutrient like Fe and Zn (Desai Amruta S. 2012) [2]. Red rice is a nutritive food and an indispensable part of the festivities and rituals in India since historical era. From the Karnataka a major area of nearly 0.21 m ha of rice is covered by the coastal area with the productivity of 2.9 t/ha. Many varieties of the paddy crops especially red rice are grown abundantly in the coastal region as compared to other ecological regions.

Coastal Karnataka is endowed with speciality traditional red rice land races rich in nutritional values, cultural values, fine aroma and medicinal properties. In the past, many traditional red rice landraces with specific qualities were grown organically for use, as food and in medications. Apart from this landraces are grown for household consumption and exhibit wide range of peculiarities such as tolerance to drought, flood, pest, diseases, salinity and alkalinity the potential to yield well even under minimum management practices. Conservation of native landraces, a potential source of valuable genes that could benefit the farming community, needs immediate attention (Loresto *et al.*, 2000) [7].

In this context, an initial effort was made to collect the native red rice landraces of coastal Karnataka and at the same time, information on indigenous knowledge as given by the farmers was also recorded for several landraces like, nutritive, medicinal importance and special characters. The study also undertaken the standard method of DUS (Distinctiveness, Uniformity and Stability) test as described by Janet L. Colbert (1986) [4] and (Bioversity protocols: www.bioversity.org) were used for recording observation for some important character of thirty six red rice landraces and their special features presents here.

Materials and Methods

The present investigation was carried out during kharif 2016–2017 at Zonal Agricultural and Horticultural Research Station, Brahmavar, Udupi Dist. Karnataka, India, is located at latitude of 13° 25' North and longitude of 75° 45' East. The experimental material for the present investigation comprised of 36 red rice landraces were collected from farmer's field of Udupi and Mangalore Dist and adjoining areas of North Canara of coastal Karnataka (Table 1). Each

genotype was grown in one m² plot in two replications and observations of some important traits were recorded on five randomly selected plants in each replication.

Results and Discussion

Medicinal and nutritional uses of red rice

Partially boiled red raw rice (*Yedurubelhige*) was specifically used during lactation. Red, parboiled *ganjee* is recommended in all ailments as it is nourishing, easily digested and assimilated in the body. The rice gruel is an energizing drink and is a good diuretic. The raw red rice *manni* is used for promoting lactation and the water left after the washing of rice *Akkacchu* is used as a base in mixing of all the medicinal ingredients in medications. The paste of red rice is used for external applications (*lepa*) as in skin allergies and for detoxification of the body (Hegde S. *et al.*, 2013) [3]. Traditionally in coastal Karnataka Red rice is used for medicinal and nutritional purpose.

- Iron and Zinc content of red rice is 2–3 times higher than that of white rice (Ramaiah and Rao, 1953) [9]. It has more Vit B1, Vit B2, Vit C, N, P, K, S, Mg, Ca, and edible cellulose than achromatic rice (Jing *et al.*, 2000) [5].
- *Rakthashali* : It is written in Ayurveda that the red rice is the best for health, skin, eyesight, diuretic, improves voice and also fertility.
- Atikaraya and Kari bhatta: These landraces are used as tonics for milking animals and also for curing ‘Jaradi Hunnu’ or ‘Arasu Hunnu’ (skin infection as reported in the local Kannada newspaper (Shastri 2004) [11].
- Gandhasale and Rajakalame : Parched red rice (pori) made from these land races is taken in equal proportions and mixed with jiggery syrup and made into ladoos for special occasions like upanayana (Thread ceremony) and also given to girls who attain puberty as a therapeutic food
- *Athikarya*: used for cure diarrhea and red flaked rice is soaked in coconut water till it ferments well. It is then ground to a paste and applied on the foot during evening for an hour. This should be continued for 1-2 weeks. This relieves cracked sole and pain. For Asthma one spoon of latex of *Calotropis* is added to 200 gm of red raw rice soaked in water for 3 hrs. It is ground to a paste and made into roti by adding sesame oil. One roti a day for 3 days is recommended.
- *Kanwa*: is nutrient rich rice with high protein value and *Kalama*: is highly tasty and is used in curing piles or haemorrhoids. This variety can be stored for a longer period ‘for older the paddy more is its medicinal value.
- *Athikaraya and Kayame* is a specifically used in lactation and other medications like In pregnant mothers experiencing unusual pain during the 8th month powdered coriander is added to Akkacchu water mixed and strained and given one spoon frequently. This stabilizes the foetus and reduces the pain.
- *Karijaddu* grown is used to cure cure Herpes (*Sarpa sutu*). Also this rice is pound and mixed with jaggery and consumed as a tonic to keep the body cool. For any other skin problems a paste is prepared using flour of *Karijaddu* which is mixed with red soil and lemon juice and applied to the affected area.
- Hallaga the cooked rice won’t spoil even after two days of cooking. The fishermen venturing into the deep sea for fishing have the special preference for this variety for their food, as the cooking necessity won’t arise at the

middle of the sea. Further, the variety is believed to provide the extra vigor to the consumer since the fishing activities in the rough sea demands more strength. Apart from this the crop grows to a height of about 4.5-5 feet tall and contains more fibrous contents. Therefore the straw is used as a thatching material for the *kaccha* houses and in rope making purpose.

- The nutrients in the rice form a unique balance with those in the milk. The two notable amino acids, isoleucine and lysine in the milk are greatly strengthened by rice protein, thereby enabling them to form stronger body-building blocks. The naturally lactic acid in milk works with rice protein to aid in the absorption of iron. In this regimen, natural brown rice is used as the only solid food throughout the day.
- Kari kagga and Bili kagga is not only salt tolerant landrace of red rice grows in coastal Karnataka. It has longer internodes and especially stems elongation as and when water level rises in the field. It is not only giving energy to work long hours, but also works as coolant. The Kajji is also given to people suffering from diarrhoea and other digestive problems.
- Rice with a red bran layer due to the presence of polyphenols and anthocyanin are known as red rice. Proanthocyanidins contribute nutritional value, as they serve as great antioxidants that have been demonstrated to reduce atherosclerotic plaque formation, a risk factor associated with cardiovascular disease reported by Ling *et al.*, 2001 [6].
- Parboiled red rice releases glucose more slowly than raw red rice of same variety, parboiled white rice and raw milled white rice. It might be possible that on parboiling the protein anthocyanin complex migrate into starch gel by unknown mechanism that results in inhibition of enzymatic starch hydrolysis (Parera *et al.*, 2000) [8].
- Calcium in red rice, in particular, soothes and relaxes the nervous system and helps relieve the symptoms of high blood pressure. The B-complex vitamins, especially thiamine, riboflavin and niacin offered by natural red rice promote youthful energy and nourishment to skin and blood vessels. An abundance of minerals in natural red rice help to nourish the hormonal system, heal wounds and regulate blood pressure. Rice also offers iron to enrich the bloodstream and phosphorus and potassium to maintain internal water balance along with other nutrients. Rice thus helps restore internal harmony. Speciality of landraces and observation of some important plant traits are listed in *Table 2 and Table 3 respectively*

Table 1: Rice landraces used under study

Sl. No.	Rice Landraces	Sl. No.	Rice Landraces	Sl. No.	Rice Landraces
1	Atire	13	Bilehagga	25	Katamunda
2	Kayame	14	Atikaraya	26	Kandalakutti
3	Hallinga	15	Gandasale	27	Chikkasale
4	Halaga	16	Mesebattha	28	Giresale
5	Nattijaddu	17	Kajajaya	29	Karikagga
6	Peetasale	18	Gulavadi sanna	30	Bilikagga
7	Pingara	19	Nerambade	31	Jerigesanna
8	Hallaga	20	Kavalakannu	32	Jadagi
9	Rajakayame	21	Kalakedodru	33	Halaga-1
10	Chare	22	Moradda	34	Hanasu
11	Kalame	23	Suggikayame	35	Kiruvannu
12	Maskat	24	Atikaya	36	Masuli

Table 2: Special uses of rice landraces of Coastal Karnataka

Sl. No.	Specialty uses	Landraces
1	Medicinal value	Kalame, Atikaraya Kayame, Raktasali and Kari bhatta
2	Boiled rice	Rajakayame,alyande,Hallangi, peetasale and kayame
3	Pyasa preparation	Ghanda sale, Gulvaadi sanna and peetasale(Aroma)
4	Excellent cooking and eating quality	Halaga and Kanwa
5	Soft Idli preparation and Neer dosa	Gulvadi sanna
6	Salinity tolerance	Kare kagga, and Bele Kagga
7	Water submergence and flood	Kari bhatta
8	Kajj preparation(Minimally polished)	Moradda, Mesebhatta,Suugii Karidadi kayame, athikaya and kutti kayame
9	Protein content	Kanwa
10	Promoting lactation	Athikaya, Athikaraya and Kayame
11	Respiratory problem	Athikaraya
12	Cure diarrhea	Athikaraya Raktasali and kayame
13	Resistant to pest and disease	Kutti kayame Kalame and suggikayame
14	Kaccha house and rope making purpose	Hallaga
15	Skin allergies	Kayame
16	dosa - preparation	Masuri

Table 3: Phenotypical characterization of rice landraces of Coastal Karnataka

Variety name	Duration (days)	Plant height (cm)	Panicle length (cm)	Bran colour	Legule shape	Grain type	1000 seed weight (gm)
Atire	130	73	22	brown	Split	Msl	23.1
Kayame	145	103	22	brown	Split	Msl	24.2
Hallinga	140	91	22	dark barown	Split	Sb	27.4
Halaga	145	87	22	white	Split	Msl	25
Nattijaddu	130	124.5	24.5	white	Split	E	26.4
Peetasale	135	92.5	27.5	brown	Split	Ms	20.9
Pingara	130	82.5	20	white	Split	Ms	20.7
Hallaga	140	113.5	22	Brown	Split	Sb	22.3
Rajakayame	150	82	21.5	white	Split	Sb	18.3
Chare	130	99	20.5	white	Split	Sl	27.8
Kalame	130	85.5	22	white	Split	Msl	14.8
Maskat	120	110.5	16	brown	Split	Ls	22.6
Bilehagga	140	101	24.5	white	Split	Sl	19.7
Atikaraya	135	114.5	28.5	dark barown	Split	Sl	27.4
Gandasale	145-180	116	28.5	white	Split	MI	10.2
Mesebattha	120	105	25.5	light brown	Split	Sb	22.6
Kajajaya	125	62.5	23	light brown	Split	Sl	29.4
Gulavadi sanna	115	97.5	23.5	light brown	Split	Sl	21.2
Nerambade	125	110.5	25.5	light brown	Split	Ms	24.2
Kavalakannu	130	104.5	21.5	light brown	Split	Sb	23.4
Kalakedodru	140	73	17	light brown	Split	Ms	20.4
Moradda	90	72.5	20.5	light brown	Split	Sb	24.2
Suggikayame	130	82	23.5	light brown	Split	MI	20.3
Atikaya	135	113.5	23.5	light brown	Split	MI	20.3
Katamunda	130	60.5	23.5	light brown	Split	MI	24.01
Kandalakutti	123	70.5	23	light brown	Split	MI	20.6
Chikkasale	130	114.5	26.5	white	Split	Sb	22.7
Giresale	125	113.5	31.5	red	Split	Ms	35.4
Karikagga	135	103.5	38.5	brown	Split	Ls	15.7
Bilikagga	135	99	32.5	brown	Split	Ms	31.2
Jerigesanna	120	111.5	30.5	light brown	Split	Ms	22.5
Jadagi	135	30.5	20.5	white	Split	Ms	16.2
Halaga-1	135	86.5	22.5	brown	Split	Sb	25.5
Hanasu	130	30	40.5	white	Split	Sl	15.5
Kiruvannu	135	87.5	24.5	white	Split	Ms	19.7
Masuli	175	90.5	45.5	white	Split	Ms	15.6

* Msl- Medium Short Slender Sl -Short Slender E- Elongated Sb- Short Bold Ls – Long Slender Ms- Medium Slender

Conclusion

Red rice has many significant implications on the human health not only in terms of food but also exhibit wide range of peculiarities such as tolerance to drought, flood, pest, diseases, salinity and alkalinity and potential to yield well even under minimum management practices. In past few decades, increase in share of high yielding varieties and shrinkage in the area of local varieties have been reported in

India (Rana *et al.*, 2009) ^[10] as well as in several other countries. There is an urgent need to broaden the genetic base of the important crop by introgressing genes from diverse sources. Thus, there is a need to collect, exploit and evaluate the untapped germplasm.

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