



The potential of pigmented rice varieties in health

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Rice is India's pre-eminent crop and is staple food of the people of eastern and southern states of India. Rice is rich in genetic diversity, with thousands of varieties grown throughout the world. India had more than 110,000 varieties of rice until 1970, and currently has 6000 varieties grown all over the country. However, consumers prefer to consume polished white rice, despite the fact that coloured rice contains valuable nutrients and bioactive components, which are very healthy.

Paddy and rice comes in many different colours, including brown, red, purple and black colours. Based on the pigments contained in rice, pigmented-rice is classified into brown rice, red rice, black rice and white rice, all of which belong to genus *Oryza*. Historical evidence states that Asian nations like India, China, Thailand, Korea and Japan consumed pigmented rice varieties, which were exclusively cultivated for the kings, royal families and other elite individuals during the imperial period. Common people were not permitted to store, cultivate, or consume pigmented rice without permission from the authorities, hence were called forbidden rice. The pigmented rice was exclusively used to improve fertility, lactation or any other specific health conditions, during which

they were cultivated/provided pigmented rice for consumption.

Over a period of time these pigmented rice varieties were forgotten, but some of these germplasm were preserved and are currently cultivated sporadically in few areas, which are slowly catching up the attention of health conscious consumer. Today, the spotlight is on the increased production of these traditional pigmented rice varieties, promoting the consumption among the younger generation and production of nutritious and novel value-added products from coloured rice.

In this context, MFPI – Quality Control Laboratory of Professor Jayashankar Telangana State Agricultural University, procured pigmented rice varieties (Red and Black Rice varieties) from farmers of Telangana and Tamilnadu states and the same were analyzed for nutrient composition, anti-nutrient factors and bioactive components using standardized and validated methods. The rice varieties evaluated were Narayanakamini, Bahurupi, Mysore mallika and Rajamudi among the brown rice varieties; Navara, Rakthashali, Kulakar and Poongar among red rice varieties; Karupu Kamini, Manipur Black Rice, Thai Black Rice and Kalabathi among the black rice varieties.

The results of nutrient composition indicated that ash content in all the rice varieties ranged between 0.58 to 1.45%; protein content ranged between 5.86 to 10.68%; crude fiber content ranged between 1.00 and 1.91%; carbohydrates content ranged between 74.74 to 79.79% and energy content ranged between 354.62 to 365.01 Kcal/100gms. The rice varieties were good sources of minerals and crude fiber as per the results obtained.



The results of bioactive components indicated that coloured rice varieties like Navara, Kalabathi, Rakthashali, Karupu Kamini, Manipur Black Rice, Thai Black Rice and Kalabathi were excellent sources of antioxidants, total phenols and total flavanoids, indicating their significance in contributing to good health upon consumption. Total Aox activity was highest in Rakthshali with 350µg/100g content, while total phenols were highest in Navara (132.15 mg GAE/100gm), followed by Kalabathi (66.44 mg GAE/100gm) and Rakthashali (62.29 mg GAE/100gm). Total flavanoids content was highest in Rakthshali, Navara and Kalabathi.

Anti-nutrients like phytate content was high in all rice varieties (17.53 to 35.25mg/100gms), followed by oxalates (3.38 to 4.50mg/100gms), saponins in small quantities (0.20 to 1.90%), while tannins were present in negligible amount (0.04 to 1.15 mg TAE/100gms). However, since all the rice varieties will be cooked before consumption, the antinutrients will be significantly decreased due to high heat temperatures, as recorded in many scientific studies.

Brown rice, red rice and black rice are great sources of fibre, B vitamins, calcium, zinc and iron, manganese, selenium, magnesium and other nutrients. The red and black rice varieties get their colour from a group of phytochemicals called anthocyanins, which possess high anti-cancer, anti-viral, antioxidant and anti-bacterial potentials.

Every pigmented rice variety is unique in its properties, and are used differently for treating ailments because of their different characteristics. Ayurvedic treatises mention that red and black rice varieties can be consumed as a nutritive food and medicine that are capable of providing energy, nourishment and satiety for a whole day.

They are known to strengthen, revitalise and energise the body by removing toxic metabolites; regulating blood pressure; and preventing skin diseases and premature ageing. As per various research data, pigmented rice present promising positive effects against constipation, carcinogenesis, tumor, coronary heart disease, atherosclerosis, inflammations, nephrological disorders, type 2 diabetes, anemia, hyperglycemia, hypertension, obesity etc.

Traditionally, pigmented rice varieties are used in product preparations like khichidi, pongal, puttu, idli, dosa, upma, appam, idiyappam, adai, adirasam, kozhukattai, modakam, payasam, semiya, uppuma, flaked rice, puffed rice, etc. Apart from above traditional products, the pigmented rice can also be used for preparation of weaning mixes, porridge mixes, health mixes in combination with other ingredients. The pigmented rice can also be used in product formulations like baked products, extruded products like vermicelli, pasta, noodles etc due to their functional properties.

Although India is home to a variety of pigmented rice varieties, their use has been limited to practitioners of traditional medicine and communities as part of their cultural heritage. The reasons for low usage of the pigmented rice is also due to ignorance among majority of the population, regarding the beneficial properties of these varieties; low consumption of the pigmented rice due to non availability of the pigmented rice in regular market and high cost of the available varieties. So, to leverage the health benefits of pigmented rice varieties, extensive cultivation and promotion about the native pigmented rice varieties by the stakeholders needs to be improved, so that



they are available to consumers as a part of the daily diet.

Brown Rice Varieties



Narayanakamini



Bahurupi



Mysore Mallika



Rajamudi

Red Rice varieties



Navara



Rakthashali



Kulakar



Poongar

Black Rice varieties



Karupu kamini



Manipuri black



Thai black



Kalabatti

