**Food and therapeutic values of Indian pigmented rice varieties**

**Bakiya Lakshmi SV1, Kalaivani R2, Boominathan M3, Aarthi A4**

1,2,3Department of Biotechnology

Bon Secours College for Women, Thanjavur

Department of Botany

[Kunthavai Naacchiyar Govt Arts College for Women (Autonomous), Thanjavur](https://www.kngac.ac.in/)

Affiliated to Bharathidasan University, Tiruchirappalli

E.mail: bakiyalakshmi.sv@gmail.com, vanisri05bio@gmail.com, boomi\_26@yahoo.com

**Abstract**

Rice is an important crop used as a staple meal for extra than half of the population. India is an essential rice producer. Rice has a wealthy genetic range with hundreds of types worldwide and 6000 types in India.In the beginning, India had greater than one hundred ten,000 forms of rice till 1970, which have been lost at some stage in the inexperienced Revolution, with its emphasis on monoculture and hybrid vegetation. The kings of Tamilnadu especially in Chola’s periods there are a lot of rice varieties like *Ottan samba, Patchai Perumal, Attur Sambha and Kuruvai Kalanjiyam, karung kuruvai, Thuyamalli, Karuthakkar, Thanga Samba, Garudan Samba, Mappillai Samba, Poongaar, Kudavazhai, Pisini*, etc., were cultivated. The pigmented rice sorts contain the flavonoid compound anthocyanin that's liable for the shade of the rice. The traditional rice types possess unique bioactive compounds with medicinal properties like Antioxidant, Anticancer, Prevention of Sickle cell Anemia, Anticoronary, Anti inflammatory and Sexual Hormone production. This paper emphasized the rice variety will be an excellent genetic resource for developing rice cultivars with more advantageous stages of fitness-promoting compounds so that you can protect our health from devastating sicknesses and ends in a sustainable healthy lifestyles with high Nutraceutical capacity.

**Keywords:** Traditional rice, Nutrients, Bioactive compounds, Pharamacology, Nutraceuticals

**Introduction**

Rice consumption is high in growing countries and Asian countries. The place for rice cultivation in India contains about 43,388,000 hectares of land (Agricultural Statistics Division 2018 1), and rice contributes 780 and 689 kcal/capita/day to the food supply in Asia and India, respectively. Rice is rich in genetic diversity, with lots of varieties grown globally, and India is domestic to 6000 varieties. originally, India had greater than 110,000 kinds of rice until 1970, which had been misplaced during the Green Revolution, with its emphasis on monoculture and hybrid plants.

**Nutritional properties of Pigment rice**

The nutritional value of the rice varies depending on several elements, such as the stress or variety (i.e., white, brown, purple, and black/crimson), quality of the soil and post harvest processing. An examination of 230 rice types, the Indian rice possessed recommended Glycemic index.

Attur Sambha and Kuruvai Kalanjiyam comprise very small concentrations of amylose (13.6%) and (17.7%, respectively), while Thooyamalli carries very excessive quantities of amylose (26.24%), that is, a fivefold boom in this specific range. Amylose content ranged from 13.6% to 26.24% (Keerthivarman et al. 2019). Brown rice is a incredibly nutritious crop. It has low energy and a excessive quantity of fiber, excellent source of minerals and vitamins.The medicinal rice Kullakar and Karikalaveya have high thiamine, riboflavin, and niacin content (Isaac et al. 2012).

**Phytochemical compounds in rice varieties of Tamil Nadu**

The pigmented rice Mapillai samba showed the highest vitamin E content as compared to Iluppai poo samba rice, Kala namak rice, and Kuzhiyadichan (Rajendran et al. 2018). A few of the phenolic acids, ferulic and ρ-coumaric acids are ample in grains with light brown pericarps, whereas purple and black pericarp rice carries specially anthocyanins cyanidin-three-O-β-d-glucoside and peonidin-three-O-β-d-glucoside]. The higher Total phenolic content was found for Kalanamak followed by Mapillai samba, Iluppai poo samba and the lowest become with Poongar variety. Overall phenolic content was higher in pigmented varieties than the non-pigmented varieties, which includes Salem sanna, Seeragasambha, and Madumuzhungi.

The total anthocyanin content material was found in Mappillai samba and Kalanamak, Iluppai poo samba 28.27±0.26 mg/100 g and lowest anthocyanin content. Mappillai Samba, contains high quantity of total polyphenolic compounds and anthocyanin content as compared to the types from Sri Lanka, China red rice, and Manipur black rice. Phytochemicals, including cellular wall-sure phenolics and flavonoids, which activates the digestive enzymes and intestine microflora, which enable easily absorbed into the body (Chen et al. 2013).

Pigmented rice bran carries anthocyanins that has antidiabetic property (Yawadio et al. 2007). Reductase inhibitors own anti-androgen consequences and are used within the remedy of benign prostatic hyperplasia and decrease urinary tract symptoms. β-Sitosterol, found in Maappillai Samba, has a hypocholesterolemic effect, improves fertility, and ameliorates colon cancer. furthermore, stigmasterol, also found which is used for the manufacturing of semisynthetic progesterone (Sulochana et al. 2015). Garudan Samba incorporates 9, 12-octadecadienoic acid (Z, Z) (Linoleic acid), which has the potential to act as a hypocholesterolemic, anti-arthritic, hepatoprotective, five-alpha-reductase inhibitor, anti-histaminic, anti-coronary, and anti-androgenic agent (Sulochana et al. 2016).

Three-Cyclohexene-1-methanol and α, α, 4-trimethyl- present in red Kavuni possessed antimicrobial activity, and three-hydroxy-four methoxy benzoic acid became used as a precursor for the synthesis of morphine. In addition to those compounds, fatty acid esters and fatty acids, inclusive of lauric acid ester, and octadecanoic acid, are present which increase the low-density lipoprotein cholesterol levels (Sulochana et al. 2016). Likewise, n-hexanoic acid, n-dodecanoic acid, n-octadecanoic acid, and n-eicosanoic acid were determined in the traditional rice Seeraga samba.

The compounds 9, 12, 15-octadecatrienoic acid-2, three-dihydroxy propyl ester, sitosterol, squalene, and ethyl iso-allocholate have been found in kavuni rice have antimicrobial hobby. similarly, different phytochemicals along with tetradecanoic acid, hexadecanoic acid, cis-vaccenic acid, eicosanoic acid, and tocopherol are also found in Karungkavuni rice (Malathi et al. 2016). Brown rice consists of 8 phenols, protocatechuic acid, p-coumaric acid, caffeic acid, ferulic acid, sinapic acid, vanillic acid, methoxycinnamic acid, and tricin, and decreased colony formation in SW 480 colon and MDA MB 468 breast cells (Hudson et al. 2000).

**Medicinal uses of pigmented rice**

In line with Ayurveda, rice balances the humor of the body. Rakthasali is ideal for pyrexia, peptic ulcer, improves imagination, protects the skin, and increases fertility (Bhat et al., 2015; Kumar, 1999). Ayurveda, Sali, Sashtika, and Nivara rice are used to treat bleeding from hemorrhoids (piles). Sali rice is used to deal with bone fractures; Nivara rice is used to deal with cervical spondylitis, paralysis, rheumatoid arthritis, neuromuscular issues, psoriasis, skin lesions, reduce backache, stomach ulcers, and snakebites, and is likewise used within the preparation of weaning meals for underweight infants (Bhat et al., 2015; Kumar, 1999).

In addition to control illnesses, consisting of vaginal and seminal discharges, diarrhea, constipation, and dysentery (Bhat et al., 2015). Red rice as remedy of diarrhea, vomiting, fever, hemorrhage, chest pain, wounds, and burns (Hedge et al. 2013). Matali and Lal Dhan are used to cure fever in Himachal Pradesh (Ahuja et al. 2005). Neelam Samba has been increasing the lactation (Arumugasamy et al. 2005). Raktasali is a great treatment for fevers and peptic ulcers, improves eyesight and spermatophytic (Kumar 1999, Bhat et al., 2015).

**Food formula from traditional rice sorts**

Koliyal and Garudan Samba (Kaadai Kazhuthaan) from Tamil Nadu were used to put together a specialty dish called puttu (Sulochana et al. 2016). Arun (2019) formulated a meals recipe inclusive of Mapillai samba rice kheer, black kavuni rice pan cake, bamboo rice kolukattai (modak), Navara rice laddoo, and Rose matta rice kesari, which possess rich vitamins together with calcium, phosphorous, iron, and protein, and are used to deal with anxious problems and excessive glycemic index (Mattoo 2019), which reduces the accumulation of hepatic fats and facilitates to get better liver harm (Jang et al. 2012). Black rice is wealthy in antioxidants that help combat most cancers and cardiovascular diseases. Likewise, the nutraceutical dosa blend turned into prepared using Navara rice, that is rich in vitamins and bioactive compounds which can be used to treat cancer, arthritics, and cardiac-associated illnesses (Sulochana and Bakiyalakshmi 2011). Kalaivani et al. (2018) prepared nutraceutical-formulated products from karung kavuni rice owning antioxidant, hepatoprotective, anti inflammatory, most cancers-preventive, and antimicrobial compounds. nowadays, the spotlight is at the expanded production of these conventional sorts, selling intake a number of the more youthful era and the manufacturing of nutritious and novel cost-brought products from pigmented rice.

**Perspective**

The medicinal properties of traditional rice varieties and their functional outcomes and health benefits in terms of contemporary medical methods are very few. Due to the inadequate availability of statistical data, the medicinal properties of those sorts stay unknown to most people of the population. The scientific studies on varieties will be examined. It’s our prime responsibility to conserve and domesticate conventional medicinal rice so as to guard our health against devastating illnesses and result in a sustainable healthy life with high Nutraceutical capability.

Reference

1. Agricultural Statistics Division, Third advance estimates of production of food grains for 2016-17, Department of Agriculture, Cooperation and Farmers Welfare, India. 3rd\_ Adv\_Estimates2016-17\_Eng.pdf. Accessed 2018.
2. Keerthivarman , S. Juliet Hepziba , R.P. Gnanamalar and J. Ramalingam. Characterization of rice (Oryza sativa L.) landraces based on agromorphological traits. Electronic Journal of Plant Breeding, 10 (2): 627-635 (2019).
3. Isaac, R.S.R.; Nair, A.S.; Varghese, E.; Chavali, M. Phytochemical, antioxidant and nutrient analysis of medicinal rice (*Oryza sativa L*.) varieties found in south India. Adv. Sci. Lett. 11, 86–90 (2012).
4. Chen C-H, Yang J-C, Uang Y-S, Lin C-J. Improved dissolution rate and oral bioavailability of lovastatin in red yeast rice products. Int J Pharm. 444(1-2):18–24 (2013).
5. Yawadio R, Tanimori S, Morita N. Identification of phenolic compounds isolated from pigmented rices and their aldose reductase inhibitory activities. Food Chemistry. 101(4):1616–25 (2007).
6. Sulochana S, Meyyappan RM, Singaravadivel K. Phytochemical screening and GC-MS analysis of Garudan Samba traditional rice variety. Int J Environ Agri Res. 2(4):44–7 (2016).
7. Sulochana S, Singaravadivel K. A study on phytochemical evaluation of traditional rice variety of Tamil Nadu -'Maappillai Samba' by GC-MS. International Journal of Pharma and Biosciences.6(3):606–11 (2015).
8. Malathi K, Anand Anbarasu and Sudha Ramaiah. Ethyl Iso-allocholate from a Medicinal Rice Karungkavuni Inhibits Dihydropteroate Synthase in Escherichia coli: A Molecular Docking and Dynamics Study. Indian J Pharm Sci;78(6):780-788 (2016).
9. [Hudson](https://pubmed.ncbi.nlm.nih.gov/?term=Hudson+EA&cauthor_id=11097223), [P A Dinh](https://pubmed.ncbi.nlm.nih.gov/?term=Dinh+PA&cauthor_id=11097223), [T Kokubun](https://pubmed.ncbi.nlm.nih.gov/?term=Kokubun+T&cauthor_id=11097223), [M S Simmonds](https://pubmed.ncbi.nlm.nih.gov/?term=Simmonds+MS&cauthor_id=11097223), [A Gescher](https://pubmed.ncbi.nlm.nih.gov/?term=Gescher+A&cauthor_id=11097223). Characterization of potentially chemopreventive phenols in extracts of brown rice that inhibit the growth of human breast and colon cancer cells. Cancer Epidemiol Biomarkers Prev. (11):1163-70 (2000).
10. Bhat FM, Riar CS. Health benefits of traditional rice varieties of temperate regions. Med. Aromat. Plants. 4:198 (2015).
11. Kumar TT. History of rice in India. Delhi, India: Gian Publishers; (1999).
12. Hedge S, Yenagi NB, Kasturiba B. Indigenous knowledge of the traditional and qualified Ayurveda practitioners on the nutritional significance and use of red rice in medications. Indian journal of traditional knowledge.12:506–11 (2013).
13. Ahuja U, Ahuja SC, Chaudhary N, Thakrar R. Red rices-past, present, and future. Asian Agri-History. 11(4):291–304 (2005).
14. Arumugasamy S, Jayashankar N, Subramanian K, Sridhar S, Vijayalakshmi K. Indigenous rice varieties. Centre for Indian Knowledge System (CIKS), Chennai: Tamil Nadu India; 66 (2001).
15. Ahuja U, Ahuja SC, Thakrar R, Singh RK. Rice- a nutraceutical. Asian Agri-History. 12(2):93–108 (2008).
16. Arun. Formulation and Nutritional Assessment of Recipes En Route for Awareness of Coarse Rice. Protecting Rice Grains in the Post-Genomic Era. [8562](http://dx.doi.org/10.5772/intechopen.8562). 1- 13 (2019).
17. Mattoo S. Black Rice Is the Latest Super Food. Here's Why! Updated on January 05 [Internet] Cited on 2019 January 03. Available from: <https://timesofindia.indiatimes.com/> life-style/health-fitness/diet/Black-rice-is-the-latest-superfood-Heres-why/ rticleshow/50439583.cms (2016).
18. Jang H-H, Park M-Y, Kim H-W*.* Black rice (*Oryza sativaL*.) extract attenuates hepatic steatosis in C57BL/6 J mice fed a high-fat diet via fatty acid oxidation. Nutrition and Metabolism.;9(1):1 (2012).
19. Kalaivani,R, Arulmozhi P, S. V. Bakiyalakshmi . A Study on Medicinal Properties of Traditional Rice Karung Kavuni and Neutraceutical Formulation. Int J Food Nutr Sci 5(1): 86- 90 (2018).
20. Sulochana, S. Bakiyalakshmi, S.V. Effect of Neutraceutical Dosa on Antimicrobial Activity. Inter J Environ Sci 1(5): 727-735 (2011).