



Heritage Rice: A Treasure Trove of Medicinal Compounds

**M. Shree Charan^{a++}, M. Jayanthi^{b#*}, V. Vijay Prabha^{b#}
and V. Narendhiran^{c†}**

^a KSAH, KARE, Krishnankoil, India.

^b Department of Agriculture, KSAH, KARE, Krishnankoil, India.

^c Department of Horticulture, Faculty of Agriculture, Annamalai University, Chidambaram, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/IJECC/2023/v13i92428

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/103143>

Mini-review Article

Received: 14/05/2023

Accepted: 16/07/2023

Published: 25/07/2023

ABSTRACT

Heritage rice refers to the traditional rice varieties that have been grown and consumed for centuries, often by indigenous communities. Based on the culinary need, flavour and availability, rice varieties were chosen by the people. These rice strains have adapted to local climates and environmental conditions, resulting in a wide range of genetic diversity. Recent studies have shown that heritage rice varieties contain a variety of medicinal compounds that can provide various health benefits. These include antioxidants, anti-inflammatory agents, antimicrobial agents, and anti-cancer compounds. The medicinal properties of heritage rice are attributed to their unique genetic makeup, as well as the growing conditions and cultural practices of the communities that cultivate them. Processing plays a major role adding nutrition to the rice because compared to ordinary polished rice, unpolished rice has additional biochemical components like polyphenols, phytochemicals, antioxidants, vitamins and minerals. This paper examines the nutritional and medicinal properties of heritage rice.

⁺⁺ IIIrd B.Sc. (Hons) Agriculture Student;

[#] Assistant Professor;

[†] PhD Scholar;

*Corresponding author: jayanthiuma@yahoo.co.in, m.jayanthi@klu.ac.in;

Keywords: *Heritage rice; traditional rice varieties; medicinal properties of heritage rice and nutritional properties of heritage rice.*

1. INTRODUCTION

Rice is an important food crop next to wheat and is a staple food for more than two third of the world's population. Among the rice species, Asian rice varieties (*Oryza sativa L.*) accounts about 80% of the world's total rice production. More than half of world's population relies on it as one of their main sources of energy, fibre, antioxidants, complex vitamins and minerals essential for life [1]. Rice is rich in genetic diversity with more than two lakh varieties in India until 1970s which was lost due to the arrival of modern high yielding varieties, hybrids and engineered rice developed after the green revolution [2,3]. In recent days, these traditional varieties are being revived for its nutritional values, medicinal values and unique aroma [4]. Traditional rice varieties are rich in nutrients like vitamin D, riboflavin, thiamine, glutamic acids, minerals like calcium, magnesium, phosphorous and high in fibre. The presence of oryzanol, a molecule that reduces fat production in the body and low sugar, fat and gluten content makes them a great diet for diabetics and hypertension people [5]. The medicinal properties of traditional rice can be attributed to their unique genetic makeup as well as the growing conditions and cultural practices of the communities that cultivate them. For example, some traditional rice varieties are grown using organic farming methods, resulting in lower pesticide residues and higher nutrient levels [6]. Additionally, the consumption of heritage rice is often accompanied by traditional cooking methods and spices, which further enhance their health benefits [7].

Traditional rice has been used for medicinal purposes in India for thousands of years and has been mentioned in various ancient texts. In the Charaka Samhita, one of the foundational texts of Ayurveda, black rice known as "Mahakar" is believed to have cooling properties that can help alleviate heat-related illnesses such as fever and diarrhea [5]. It is also believed to have anti-inflammatory properties that can help reduce inflammation in the body. The Sushruta Samhita, another important Ayurvedic text, red rice known as "Raktashali" is believed to have astringent properties that can help treat conditions such as diarrhea and dysentery. It is also believed to be beneficial for the liver and the eyes [8,9].

Although traditional rice has nutritional and medicinal properties, it has been easily replaced by high yielding varieties. The price of the traditional rice can be made more competitive vis-à-vis high yielding varieties by increasing the production of traditional rice in the long run. This necessitates the presence of a vibrant market for the traditional rice varieties. This paper seeks to facilitate this vibrant market by examining and emphasizing the nutrient and medicinal properties of these varieties.

2. NUTRITIONAL PROPERTIES

Traditional rice varieties retain its bran layer containing vitamins, minerals and fibres whereas white polished rice losses 8-10 % of its bran. Rice is the major source of carbohydrate which is broken down to glucose to provide energy for physical activities and fuel the brain. Traditional rice has a low glycemic index hence starch digestion takes place slowly. It prevents the body from building up cholesterol levels due to the presence of good amount of oryzanol content and lesser fat content. Apart from carbohydrates, proteins and fats, these are also good sources of minerals and vitamins such as niacin, riboflavin, thiamine, iron, calcium, vitamin D and high fibre content. Table 1 shows the Nutritional composition of traditional rice (per 100 g). Apart from providing essential nutrients, it has the capacity to strengthen the body by eliminating toxic metabolites, improving body elements, revitalizing energies and preventing premature ageing and skin diseases.

3. MEDICINAL PROPERTIES OF SPECIFIC VARIETIES

India is known for its rich and diverse rice varieties that are integral to its cuisine and culture but the exact number of traditional rice varieties is not clear and may vary based on different resources. In general, consuming traditional foods reduces health problems and diseases like arthritis, obesity, dehydration, *Diabetes mellitus*, food poisoning, dehydration, cardiac problem, etc. since traditional rice varieties are unpolished, they contain more bioactive compounds like flavonoids, polyphenols, and anthocyanins than polished rice, which has antioxidant, anticancer, anti-inflammatory, antidiabetic, and anti-aging properties [10]. In addition, they are used to treat

Table 1. Nutritional composition of traditional rice (per 100 g)

Traditional Rice Varieties	Energy (Kcal)	CHO (g)	Proteins (g)	Fats (g)	Minerals				
					Potassium (mg)	Iron (mg)	Calcium (mg)	Magnesium (mg)	Zinc (mg)
Garudan Samba	352.69	74.17	8.85	2.29	231.60	5.60	35.10	89.0	1.40
Illupaipoo Samba	362.53	77.00	9.47	1.85	86.60	3.40	22.10	28.60	1.80
Iraivaipandi	344.31	75.07	9.68	0.59	229.00	3.60	44.30	82.70	1.50
Karunkuruvai	348.35	74.57	8.22	1.91	249.70	7.60	37.70	94.70	2.80
Karuppu Kouni	332.58	71.01	8.94	1.42	254.60	6.50	36.90	112.80	1.60
Kattuyanam	349.40	74.88	8.51	1.76	335.00	7.30	40.10	154.50	2.20
Kuliyadichan	356.00	73.56	9.73	2.57	233.50	6.80	34.50	102.09	1.90
Mappillai Samba	349.00	74.45	7.91	2.18	299.90	6.90	43.60	117.90	1.90
Navara	354.00	74.28	8.97	2.36	320.50	8.60	35.10	123.20	2.50
Neelan Samba	351.00	75.06	7.22	2.47	242.40	1.80	28.70	117.40	1.90
Pal Kudaivazhai	357.00	76.39	7.51	2.39	148.00	3.10	20.30	61.10	1.50
Rasakadam	368.00	78.95	7.95	2.22	142.80	1.90	20.20	47.10	1.90
Seeraga Samba	352.00	78.53	7.69	0.79	223.00	4.80	37.90	111.30	1.90
Kavuni	338.00	71.95	7.07	2.47	228.90	8.00	31.20	115.40	1.80
Thanga Samba	351.00	74.38	8.27	2.23	203.70	3.30	42.70	99.40	1.70
Thooyamalli	361.00	77.11	8.07	2.23	98.10	2.30	21.30	32.30	1.60

Source: (Balasubramanian et al. 2019) [11]

Table 2. Medicinal properties of few familiar traditional varieties

S.No.	Variety name	Medicinal use	Reference
1	Rakthashali	Pacify body humor; good for ulcer and fever; improve eyesight, voice, skin, and health; increases fertility; act as a spermatophytic, diuretic, tonic, and cosmetic.	Ahuja et al. [12] Bhat & Rair [5] Priya et al. [13]
2	Sali	Treat fractures and burns.	Balasubramanian et al. [11]
3	Navara	Treat paralysis, cervical spondylitis, psoriasis, rheumatoid arthritis, skin lesions, neuromuscular disorder; weaning food for underweight babies; reduce stomach ulcer, snakebite, and backache	(Deepa et al. 2008)
4	Kafala	Used to treat abortion complications and leucorrhea.	Balasubramanian et al. [11]
5	Kalanamak	Phytoconstituents and free radical scavenging ability, productively control tumour growth and breast cancer, improves eye health, improves body weight and reduces chronic inflammation.	Banerjee et al. [14]
6	Kichili samba and Seeraga samba	Antimicrobial, antifungal and antiretroviral properties, anti-inflammatory for peptic ulcers, antidiabetics, boosts the immune system and strengthens muscles.	Bakun et al. [15]
7	Kattuyanam	Treat anaemia, neurodevelopment	Pushpam et al. [16]
8	Karunguruvai	Treat leprosy, chickenpox, elephantiasis, cholera, venomous bites.	Ortansa et al. [17]
9	Mapillai samba	treat gastrointestinal tract disorders like irritable bowel syndrome, ulcerative colitis, and radiation proctitis.	Ashokkumar et al. [10], Załęski et al. [18]
10	Kavuni	Treat anemia, diabetes, mellitus, stress disorder, osteoporosis and many biological functions like antioxidant, antiviral, antifungal, and antibacterial activity.	Meera et al. [19], Valarmathi et al. [20]

Table 3. Medicinal properties of few unfamiliar traditional varieties

S. No.	Variety name	Properties
1	Annamazhgi	Wards off all diseases and regulates deranged pitta.
2	Irkku samba	Good for offering prayer and to feed the noble.
3	Kalundai samba	Enhance physical strength and stamina.
4	Kaadai samba	Strengthen the body and cures urinary tract infections like burning micturition.
5	Kaalaan samba	Wards off diseases caused by derangement of vaatha.
6	Gundu samba	Suppresses pitta
7	Kodai samba	Regulates all three doshas
8	Korai samba	Provides a cool feel and controls Pitta, it cures urinary tract diseases and controls pruritis.
9	Seetha bogam	Provides strength, complexion and improves spermatogenesis
10	Chensamba	Controls excessive appetite, cures itching, pyoderma and wounds.
11	Puzhugu samba	Ability to quench thirst and hunger and strengthens the body, removes fatigue and provides a pleasant feel.
12	Manakathai	Controls skin diseases, helps in poison bites, and heals ulcers if one takes this variety regularly.
13	Malligai samba	Nourishment, strength and growth, and prevents dermatitis.
14	Milagu samba	Improves appetite, regulates thirst, gives a pleasant feel, wards of many diseases.
15	Maisamba	Regulates deranged vaatha and Pitta, Cures fever, vomiting, ingested toxins and removes ageusia, anorexia.
16	Kundumanisamba	Regulates deranged vaatha and alleviates a lot of diseases.
17	Vaalaanarici	Suppress anorexia –loss of taste but improves complexion, adds weight. But in order to get proper nourishment and improve spermatogenesis use judiciously.

Source: (Balasubramanian et al. 2019) [11]

many ailments like leukorrhoea, gastrointestinal disorders, hypertension, stroke and rheumatism and also increase milk secretion in lactating mothers [6]. Table 2 shows the medicinal properties of few familiar traditional varieties. Table 3 shows the properties of some unfamiliar traditional rice varieties mentioned in ayurvedha.

4. CONCLUSION

Traditional rice varieties in India are found to have several medicinal properties due to their high nutritional content and phytochemicals. It is also a part of India's cultural heritage. These varieties had been on the verge of extension due to a lack of awareness and insufficient availability of scientific data. However, there are early science of reversal that is evidenced in the revival of heritage rice cultivation and awareness among sections of the public. This paper has sought to aid this revival.

5. FUTURE SCOPE

Documented evidence suggest that India was home to at least 2 lakh varieties of heritage rice. However, modern science has not yet recognised and researched this vast main of knowledge. This calls for more focus and dedicated exploration into this field. Special attention is need from agricultural economists in analyzing the cost and benefits to the farmers and the society at large.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

- Savitha P, Usha Kumari R. Indegeneous knowledge of traditional landraces in rice (*Oryza sativa* L.) in-situ conservation of Tamil Nadu, India. *Indian Journal of Traditional Knowledge*. 2016;15(2): 321-329.
- Richaria RH, Govindaswami S. *Rices of India*. Academy of Development Sciences, Maharashtra; 1990.
- Ashraf AM, Lokanadan S. A review of rice landraces in India and its inherent medicinal values. The nutritive food values for future. *International Journal of Current Microbiology and Applied Sciences*. 2017;6(12):348-354. DOI:https://doi.org/10.20546/ijcmas.2017.6.12.042
- Verma J. (n.d). Farmers turn saviours of traditional rice varieties. Department of Science and Technology. Available:https://dst.gov.in/farmers-turn-saviours-traditional-rice-varieties
- Bhat FM, Riar CS. Health benefits of traditional rice varieties of temperate regions. *Medicinal and Aromatic Plants*. 2015;4(3):198.
- Hegde 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*. 2013;12(3):506-511
- Adi AC, Rifqi MA, Adriani M, Farapti F, Haryana NR, Astina J. Effect of cooking methods and rice variety on the sensory quality and consumer acceptance. *Media Gizi Indonesia*. 2020;15(3):159–166. DOI:https://doi.org/10.20473/mgi.v15i3.
- Bhat FM, Sommano SR, Riar CS, Seesuriyachan P, Chaiyaso T, Prom-u-thai C. Status of bioactive compounds from bran of pigmented traditional rice varieties and their scope in production of medicinal food with nutraceutical importance. *Agronomy*. 2020;10(11). DOI:https://doi.org/10.3390/agronomy10111817
- Kowsalya P, Sharanyakanth PS, Mahendran R. Traditional rice varieties: A comprehensive review on its nutritional, medicinal, therapeutic and health benefit potential, *Journal of Food Composition and Analysis*. 2022;114. DOI:https://doi.org/10.1016/j.jfca.2022.104742
- Ashokkumar K, Govindaraj M, Vellaikumar S, Shobhana VG, Karthikeyan A, Akilan M, Sathishkumar J. Comparative profiling of volatile compounds in popular south Indian traditional and modern rice varieties by gas chromatographymass spectrometry analysis. *Frontiers in Nutrition*. 2020;7: 1–13.
- Balasubramanian AV, Vijayalakshmi K, Parimala K, Sridhar S, Subramanian K, Manikandan R. *Traditional rice varieties of Tamil Nadu: A source book*. Centre for Indian Knowledge Systems; 2019.
- Ahuja U, Ahuja SC, Thakrar R, Singh RK. Rice—a nutraceutical. *Asian Agric-Hist*. 2008;12(2):93–108.
- Priya TR, Nelson ARLE, Ravichandran K, Antony U. Nutritional and functional

- properties of coloured rice varieties of South India: A review. *Journal of Ethnic Foods*. 2019;6(1):1–11.
14. Banerjee R, Chakraborty A, Chowdhury S., Ganguly S. Medico-nutritional value and profitability of black rice - the new black gold of Indian agriculture. *Sci. Agric. Allied Sect.* 2019;3(6):11–16.
 15. Bakun P, Goslinski BC-GT, Lijewski S. In vitro and in vivo biological activities of azulene derivatives with potential applications in medicine. *Med. Chem. Res.* 2021;30(4):834–846.
 16. Pushpam R, Mythili SR, Nikitha TC. Medicinal rice and its medicinal values. *International Journal of Current Microbiological Applied Science*. 2019; 8(10):2090–2095.
 17. Ortansa C, Ionela S, Elena R, Vassu T, Corbu V. Antimicrobial and antiadhesion activity of biosurfactants from *Rhodotorula glutinis* grown on n-dodecane. *Revista de Chimie*. 2020;71(5):99–105.
 18. Załęski A, Banaszkiwicz A, Walkowiak J. Butyric acid in irritable bowel syndrome. *Prz. Gastroenterol.* 2013;8(6):351–353.
 19. Meera K, Smita M, Haripriya S, Sen S. Varietal influence on antioxidant properties and glycemic index of pigmented and non-pigmented rice. *Journal of Cereal Science*. 2019;87: 202–208. DOI:<https://doi.org/10.1016/j.jcs.2019.03.005>.
 20. Valarmathi R, Raveendran M, Robin S, Senthil N. Unraveling the nutritional and therapeutic properties of 'Kavuni' a traditional rice variety of Tamil Nadu. *Journal of Plant Biochemistry and Biotechnology*. 2014;24:305–315.

© 2023 Charan et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:
<https://www.sdiarticle5.com/review-history/103143>