NAAS Rating
2012:1.3; 2013-16: 2.69
2017-2020: 3.98

IMPACT FACTOR
2019-20: 2.40

IPI Value
1.92

Received on:
11th April 2020
Revised on:
26th May 2020
Accepted on:
27th May 2020
Published on:
1st June 2020

Volume No.
Online & Print
124 (2020)

Page No.
20 to 25

Life Sciences Leaflets is an international open access print & e journal, peer reviewed, worldwide abstract listed, published every month with ISSN, RNI Free- membership, downloads and access.

DIVERSITY OF TRADITIONAL RICE VARIETIES AND THEIR MEDICINAL BENEFITS FOR HUMAN BENEFITS

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ABSTRACT:

Rice is one of the most important food crops in the world. Among all the Asian countries, India is the prominent rice-growing country accounting for about 1/4th of the world's rice production. It ranks third after wheat and maize in terms of worldwide production. Rice is also a good source of vitamins such as thiamin, riboflavin, niacin and dietary fibres, but it is unfortunate that rice does not supply the essential minerals adequately. It has to be made productive through several achievements in the rice breeding programme, especially in sustainable food grain production with quality concern. Rice exists in different colours such as white, purple, black, red and brown. Although white rice is the most widely consumed rice, pigmented rice is considered as enriched rice for taste and health benefits due to the presence of anthocyanins. Cereal grains play an important role in meeting the nutrient needs of the human population. The quality of cereal products is determined by a variety of characteristics that may be assigned different significance depending on the desired and use or type of product. Rice is undoubtedly the most important cereal of the world providing 21 percent of global human per capita energy and 15 percent of per capita protein. There is a future need to expand the genetic base of the rice crop by introgressing genes from diverse sources.

KEYWORDS: *Rice, Nutrition, Quality, Pigmentation, Germplasm, Human benefits.*

Importance of Rice germplasm in India:

Rice is also a good source of vitamins such as thiamin, riboflavin, niacin and dietary fibre. It also forms a combining part of cooking traditions of many different cultures, each of which has its own particular set of preferences regarding the texture, taste, colour and stickiness of the rice that they eat. It is unfortunate that rice does not supply the essential minerals adequately. Therefore, the improvement of the nutritional properties of rice is foremost important to the present and future food needs. The germplasm provides immense scope for wide variability. A genetic divergence is an efficient tool for an effective choice of parents for the hybridization programme. Such a study also selects the genetically divergent parents to obtain desirable combinations in the segregating generations. Information on the extent of genetic divergence would help the plant breeder in choosing the right parents for the breeding programme.

Diversity of traditional rice varieties and their importance:

Rice holding higher genetic diversity, with more than thousands of years and thousands of varieties grown in many parts of the world. Some of the rice varieties were reported 'bail chaudi' has 90 days duration which yields about 2500kg/ac.In India, among small and medium grain aromatic rice varieties, Kalanamak is one of the finest quality rice varieties. Till a decade ago Kalanamak was popular in Himalayan atria adjoining Nepal, particularly in districts Siddhartha Nagar, Sent Jabir Nagar, Gorakhpur, Maharajganj, Gonda and Basti of Uttar Pradesh and in small pockets at West Champran in Bihar (Singh *et al.*, 2005). Mettudayam is a traditional paddy variety cultivated in the southern region of India and traditional paddy variety cultivar (sarkar nellu) was famous among farmers of Gudiyatham village near to Vellore in Tamil Nadu even 30 years, also rice has one of the largest *ex situ* germplasm collection in the world (Jackson and Juggan, 1993). This accessible collection of diverse cultivated and wild rice germplasm has made great contribution to rice breeding. Genetic diversity in the available gene pool is the foundation or the raw material of all plant improvement programs. The availability of transgressive segregants in any breeding programs also depends upon the effective inclusion of parents. The selection of parents based on genetic divergence has been successfully utilized in different crop species (Das *et al*., 1992; Guar *et al.*, 1978; Murty and Anand, 1966).

Medicinal valuable rice landraces in ancient clues:

Rice is perceived not only as a commodity of food but also as a life saving 'Aushadh' – the medicine of all ages. In the great literature of Susruta Samhita is a representative work of

Ayurveda in India. Ancient Tamil literary works and scriptures incorporate the remarkable medicinal qualities of different traditional rice varieties of those days.

The Indian medicinal clues of 'Siddhas' inscribed in the palm leaves, which are available at Saraswathi Mahal Library of King Serfoji at Thanjavur have been transformed into printed forms. The several evidence is reported given below.

The relationship between the wild and cultivated types:

The estimation of genetic diversity and their relationships among wild and cultivated rice germplasms are very practical for facilitating the resourceful germplasms collection and management. Several tools are available for the variability and relationships between cultivars including isozymes, storage protein study and molecular markers linked to particular traits. Moreover for the classification and estimation of the germplasm, morphological evaluation is a preliminary step for crop improvement (Smith and Smith, 1989). The identification of genetic variability in any character concerned with yield synthesis provides scope for improvement and breeding new rice cultivars with desirable traits. Keeping in view, the present study was established to estimate genetic diversity in rice cultivars using morpho-qualitative and numerical taxonomic techniques.

Nutritional qualities of pigmented rice:

Pigmented rice is getting more popular recently and is consumed as a functional food due to the usefulness to health. Black rice contains relatively high anthocyanin in the pericarp layer which gives the dark purple color. Anthocyanin pigment is effective to reduce cholesterol in the human body (Lee *et al.*, 2008). Black rice also contains higher levels of proteins, vitamins and minerals than common white rice (Suzuki *et al.*, 2004). Compared to white rice, black rice is relatively richer in mineral contents such as Fe, Zn, Mn and P and has higher variability in mineral content depended upon varieties and soil types of the planting area (Qiu *et al.*, 1993).

Consumer preference is the determining factor for grain quality:

Consumer preference is based on the evaluation of quality attributes, which is determined not only by chemical and physical properties of grains but also by aspects related to the appearance of the product after cooking, such as stickiness and texture (softness or fluffiness). The cooking and textural properties are largely dependent on the chemical composition of cultivars rather than on their physical characteristics (Bal, 2006). Amylose content has been considered one of the most important characteristics in cooking behavior (Mohapatra and Bal., 2006).

Rice protein-key factor for children health:

Protein is one of the most significant factors facing in developing world. Only twenty percent of the world people are affluent enough to have access to a nutritious diet. Protein-energy malnutrition (basic hunger or undernutrition) affects 850 million people worldwide. Most of people eat rice and rice-based products, so improvise the protein content in rice is the most important target. It is estimated that undernutrition is the cause of half of all the cases of child mortality. In India, over 50% of all children receive insufficient calories every day to meet their potential growth and development requirements (Mahendra *et al.*, 2004). Oko *et al.* (2012) reported that about eighty percent of all malnourished children in developing countries that boasted food surpluses. With more than seventy percent of the world's malnourished children, South Asia is expected to remain "Black Spots" of child malnutrition in 2020. A substantial decrease in the availability of legumes over three decades, from an average of 64.4 g during the Pre-Green Revolution decade to about 33.6 g per capita per day from 1996 to 2002 in our country has been largely responsible for protein malnutrition. The quality of a rice protein is always determined by its amino acid profile. Studies conducted in the 1950s and 1960s on children recovering from protein-energy malnutrition demonstrated that essential amino acids like lysine and tryptophan were important in improving nitrogen retention when cereals like wheat, rice or corn was the staple food (Pellett and Ghosh, 2004). Nowadays, the rice grain is usually further processed by additionally removing the bran layer from the endosperm to obtain milled rice. Riza *et al*. (2004) studied the precision of the study that showed that protein content of tested rice varieties ranged from 5.8 to 8.8 percent for parboiled rice and 5.5 to 7.5 percent for unparboiled rice and also found that protein variations from 6.30 to 9.10 percent in 438 rice cultivars, while rice germplasm lines of core collections had 5.00 to 9.50 percent variation for protein in milled grains. Deepa *et al.* (2008) reported that *Njavara*, a medicinal landrace of rice had higher protein when compared with Jyothi and IR64. They also stated that protein ranged from 4.30 to 18.20 percent in different polished white rice samples.

CONCLUSION:

Most of the Asiatic rice considers it inferior to white rice because of its shorter shelf-life, longer cooking time and unappealing taste and texture. Accordingly, strategies to encourage brown rice consumption over that of polished rice, to improve consumer health are unlikely to be successful at the population level, whereas a more effective approach may be to reduce the glycaemic impact of polished rice through the development and introduction of suitable low GI rice varieties and reduce the cardiovascular risk and improve the nutritional benefits.

REFERENCES:

Arumugasamy, S., N. Jayashankar, K. Subramanian, S. Sridhar and K. Vijayalakshmi. 2001. Indigenous RiceVarieties-1. Centre for Indian KnowledgeSystems, Chennai, India. 74 pp.

Das, R.K., M.A. Islam, M. Howlader, S.M. Ibrahim, H.U. Ahmed, N.M. Miah. 1992. Variability and genetic association in upland rice. *Bangladesh J. Plant Breed. Genet*. 5: 51-59

Debal, D. 2000. Folk Rice Varieties of West Bengal:Agronomic and Morphological Characteristics.Vrihi/Research Foundation for Science Technology& Ecology, New Delhi, India. 77 pp.

Deepa, G., K. Vasudeva Singh and N. Akhilender. 2008. Nutrient composition and physicochemical properties of Indian medicinal rice – Njavara. *Food che.*, 106: 165-171.

Guar, P.C., P.K. Gupta and H. Hishor. 1978. Studies on genetic divergence in potato. *Euphytica*. 27: 361-368

Jackson, M.T., and R. Juggan, R. 1993. Sharing the diversity of rice to feed the world. *Diversity*. 9:22–25.

Lee, J.C., J.D. Kim, F.H.Hsieh and J.B. Eun . 2008. Production of black rice cake using ground black rice and medium-grain brown rice. *International Journal of Food Science and Technology*. 43(6): 1078-1082.

Mahendra, S., C. Ravi, B. Viswanathan, A. Gulati and S. Ramchander. 2004. Economic liberalization, programs and household food security: A case study of India IFPRI. Markets, Trade and Industry (MTI) Discussion, paper No.68.

Mohapatra, D. and S. Bal. 2006. Cooking quality and instrumental textural attributes of cooked rice for different milling fractions. *Journal of Food Engineering*, 253-259.

Murty, B.R, and V.Anand. 1966. Combining ability and genetic diversity in some varieties of Linumusitatissimum. *Indian J. Genet.* 26: 21-36.

Oko, A.O., B.E. Ubi, A.A. Efisue and N. Dambaba. 2012. Comparative analysis of the chemical nutrient composition of selected local and newly introduced rice varieties grown in Ebonyi state of Nigeria. *Int. J. Agric. For.*, 2 (2): 16-23.

Pellet, P.L. and S. Ghosh. 2004. Lysine Fortification: Past Present and Future. *Food and Nutrition Bulletin*, 25: 2

Qiu, L. C., J. Pan and B.W. Dan, B. 1993. The mineral nutrient component and characteristics of color and white brown rice. *Chinese J. Rice Sci.* 7(2): 95-100.

Riza, G., A.Ramos, R.V. Manaois, S.S. Escubio, G.D. Garcia, E.C. Arocena and L.S. Sebastian. 2004. Grain quality and iron density of Philippine rice cultivars. 4thInternational Crop Science Congress.pp.527-531.

Singh, U. S., N. Singh, H.N. Singh, O.P. Singh and R.K. Singh. 2005. Rediscovering scented rice cultivar Kalanamak. *Asian Agri-History* 9: 211–219.

Smith, J.S.C. and Smith, O. S. 1989. The description and assessment of distances between inbred lines of maize: The utility of morphological, biochemical and genetic descriptors and a scheme for the testing of distinctiveness between inbred lines. *Maydica*, 34: 151-161.

Sourirajan, M. 2000. *Pathartha Gunapadam– Palporul vilakkam* (in Tamil). Saraswati Mahal Press, Thanjavur, Tamil Nadu, India.pp. 322–328.

Table 1. Landraces and medicinal values

Land races	Livehood and Medicinal values	References
Lohitaka Sali Kalama Kardamaka Panduka Sugandhaka Shakunahrita Pushpandaka Pundarika Mahasali Shita-bhiruka RodhraPushpaka Dirghashuka Kanchanaka Mahishn-mastaka Hayanka Dushaka Mahadushaka	Pitham Vayu Kabam Potencial regeneration Diuretic	Arumugasamy *et al.*(2001) Sourirajan (2000) Debal (2000)
Shastika Kanguka Mukundaka Peetaka Promodaka Kakalaka AsanaPushpaka Maha-Shastika Chumaka Kuravaka Kedaraka	Improve the strength and sturdiness to the body	
Kappakar	Increases the milk secretion for women	
Kullakar	Roofing material	
Seeraga samba	Aromatic briyani rice	
Kar arisi	Improves the body strength	
Karunguruvai	Antidiuretic agent	
Puzhugu samba	Quenches intense thirst	
Vaikarai samba	Increases the appetite	
Senchamba	Increases the appetite	