Biological Forum – An International Journal 16(7): 266-268(2024)

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Prospecting the Proximate Content of a Black and Red Pigmented Rice Varieties

Mikhina M.S.[1*] and Abida P.S.[2]
[1]Deprtment of Plant Physiology,
College of Agriculture, Vellanikkara, Thrissur (Kerala), India.
[2]Department of Plant Biotechnology,
College of Agriculture, Vellanikkara, Thrissur (Kerala), India.

(Corresponding author: Mikhina M.S.)*
(Received: 14 April 2024; Revised: 21 May 2024; Accepted: 17 June 2024; Published: 15 July 2024)
(Published by Research Trend)

ABSTRACT: This present study was aimed to evaluate the proximate composition of two pigmented varieties such as Black jasmine (black) and Jyothi (red). We have evaluated the proximate composition of these varieties which was grown in the pots under net house at Kerala Agricultural University, Thrissur on June to September 2022. The proximate composition may include moisture content, ash content, fat content and protein content. These parameters were determined using standard AOAC methods. Proximate content could be an important trait regarding pigmented rice. Here, we tried to prospecting its proximate contents of two pigmented (black and red) rice varieties as whole grains. From the experiment, it is obtained that, black rice genotype had comparatively high content of protein, ash, fat except moisture content. Crude protein in black rice genotype was 15 % higher compared to Jyothi. Comparatively the crude fat content in black rice genotype had 60 % higher content and ash content was 50 % higher. In the meantime, Jyothi had 17% more moisture content than Black Jasmine. The content of proximal composition showed a substantial difference in the result. The findings imply that, in comparison to red rice genotype, black rice genotype offers a superior nutrition.

Keywords: Black & Red pigmented rice, Black jasmine, protein, proximate content.

INTRODUCTION

Since two thirds of the world's population consumes rice, it is one of the most extensively used food grains. People eat rice mostly because it is easily accessible, highly energy-dense, and healthy (Zhang *et al.,* 2023). While most rice grains are consumed in their cooked form, a tiny percentage is used as ingredients in foods and non-foods Colombo *et al.* (2023). Rice has high levels of fiber, energy, minerals, proteins, vitamins, antioxidants, and other biomolecules that may work together to promote health (Mapoung *et al.,* 2022). Rice is an important source of several different antioxidant molecules, which are essential for maintaining good health, according to Zhang *et al.* (2023). Antioxidant-rich foods and compounds can be consumed to help prevent or treat certain illnesses such as inflammation, oxidative stress, and neurodegenerative diseases in addition to metabolic, cardiovascular, and gastrointestinal problems (Ngo *et al.,* 2022). Since 1980s, when antioxidant molecules were originally identified as "miracle substances", research on these compounds has attracted a lot of attention". The general public is using antioxidant supplements more often on a daily basis as a result of their therapeutic benefits. Nevertheless, the outcomes of the randomized controlled trials showed conflicting results when the effects of antioxidant supplementation were looked at. Ongoing investigations and pre-clinical research, however, have demonstrated the potential advantages of antioxidant molecules in a range of acute and chronic illnesses (Mattosinhos *et al.,* 2022). Eating a healthy diet always benefits one's health, and food's antioxidant molecules play a critical role in this (Thuy *et al.*, 2021). Numerous studies are being conducted to determine the health benefits of rice and to identify strong bioactive phytomolecules, especially pigmented rice. Several studies from areas where eating colored rice is widespread have suggested that rice may be protective against oxidative stress-related illnesses (Le Thi Kim *et al.,* 2023). Traditional literature also discussed the nutritional and medicinal advantages of coloured rice. These rice varieties' co-products, which include husk, bran, and rice bran oil, contain a range of medicinal nutraceuticals with remarkable therapeutic and preventive effects on a variety of acute and chronic illnesses. Traditional medicine continues to use a number of rice varietals to treat a wide range of ailments. Traditional medicine continues to use a number of rice varietals to treat a wide range of ailments a comprehensive compilation of data about rice's phytochemicals, health benefits, and potential mechanisms of action for rice and rice biomolecules based on current research, along with pharmacological effects reports.

MATERIALS AND METHODS

A. Collection of Samples

One black rice cultivar (Black jasmine) and one red rice (Jyothi) were cultivated under net house at Kerala

Agricultural University, Thrissur. The rice grains were harvested when the moisture content was approximately 20% and submitted to cleaning and drying processes, until 13% moisture content was achieved. After that, paddy was dehulled on dehuskert o obtain brown rice.

B. Moisture Content (AOAC, 2004)

First, weigh an empty aluminium dish with a lid in order to estimate the moisture content of rice samples. Add 5 g of rice flour to the dish after that. Calculate the dish's total weight using the sample. Keep it in the hot air oven at 130°C for two hours by opening the lid. Place it in a desiccator after removing it from the oven. The sample's total dry weight was then measured using a dish.

The following formula was used to determine the rice samples' moisture content: Content of moisture (g%) = $\mathbf{K}-BW$ × 100 where A is the crucible and sample's initial weight, B is the crucible and sample's final weight, and W is the sample's weight. Content of ash (g%) = $\mathbf{K}-BW$ × 100 where A is the crucible and sample's final weight, B is the crucible's empty weight, and W is the sample's weight.

C. Crude Protein (Micro Kjeldahl Method AOAC 2004)

The protein content was calculated using the AOAC (2004) methodology. The Kjeldahl digestion flask included two grams of sample, three grams of digestion mixture, and twenty-five milliliters of H_2SO_4. It was cooked in a Kjeldahl digestion and distillation device for four hours; the material was considered to have fully digested when its color turned pale yellow. After distillation, the recovered ammonia was titrated using a 0.1N HCl solution, and the titre value was noted. Using protein factor 5.7, the percentage of protein content in the sample was calculated as follows: % Nitrogen is equal to (TS-TB)× acid normalcy × meq. N_2 weight of sample × 100. The values of TS and TB are the sample and bank respectively, while the formula for N_2 is Meq. of N_2 = 0.014 % protein = % Nitrogen × 5.7.

D. Determination of fat content

By dissolving rice in an organic solvent with a Soxhlet apparatus and then evaporating the solvent to extract the fat, the amount of fat in the rice was determined. A wad of fat-free cotton was used to fill the top of the thimble after the dry waged (3 g) sample had been moved to it. A Soxhlet flask with a tube for extracting fat was inserted into the Thimble. Petroleum ether, at least 75 milliliters, was added to a flask. The condenser was connected to the top of the fat extraction tube. At 70–80^{o}C, the sample was extracted for at least 16 hours in a water bath. The thimble was taken out of the device and the majority of the ether was recovered at the conclusion of the extraction time. When the tube was almost full, the ether was drained off. The ether was poured through a small funnel with a cotton stopper when it reached a small volume and then into a small, dry beaker that had been previously weighed. Ether was used to thoroughly clean and filter the flask. After the ether was evaporated over a low heat steam bath, it was cooled, weighed, and dried for an hour at 100ºC. The substance in the sample that was ether soluble was determined by the weight differences. The following formula was used to determine the rice samples' crude fat percentage: Weight of soluble material times sample weight × 100 equals crude fat percentage.

E. Determination of ash content

The AOAC (2004) method was utilized to determine the ash content of the chosen sample. An empty, dry, and clean crucible was taken, and an electrical balance was used to weigh it. Each sample weighed out to three grams on polythene paper was then added to the crucible. For a full day, the crucible containing the samples was maintained at 105°C in an oven. The crucible was moved to the muffle furnace after drying, and it was lit for five hours at 600°C. Following the burning process, the crucible was taken out and allowed to cool in a desiccator before being weighed together with the ash.

RESULTS AND DISCUSSION

A comparative proximate composition was studied among the selected rice samples. Approximate chemical nutrient composition of these selected rice varieties obtained from this study is shown in Table 1.

A. Moisture Content

The moisture content of selected varieties were studied and represented in Table 1. Both the varieties had moisture content of below 14%. According to Champagne *et al.* (2004), grains might be stored safely at a moisture level of 14% to prevent damage and deterioration of seed quality. Black jasmine showed 10.12 % moisture content, while Jyothi exhibited 12.27% of moisture content (Table 1). The climate where the crop is grown and the variations in each genotype's genetic composition could be the cause of the moisture content discrepancy. According to Zheng and Lan (2007) report, moisture affects both the cooked rice's flavor and milling properties.

B. Crude Protein

Black jasmine had a protein content of 8.97% compared to jyothi (Table 1). It was discovered that black colored rice had an average crude protein level higher than the red pigmented rice. According to Simonelli *et al.* (2016) proteins are essential to the texture of cooked rice because they combine with starch to form a complex that limits the starch that affects rice's eating and nutritional qualities. A person's daily consumption of rice amounts to 207.9 g, or approximately 24.1% of the recommended daily protein intake.

Table 1: Proximate content of selected black and red pigmented varieties.

Variety	Moisture (%)	Protein (%)	Ash (%)	Fat (%)
Black Jasmine	10.12	8.97	2.58	2.96
Jyothi	12.27	7.56	1.30	1.16
CD (0.05)	0.023	0.026	0.019	0.023
CV	0.089	0.140	0.420	0.485

C. Crude Fat

The phrase "crude fat" describes the unrefined mixture of fat-soluble material found in a sample; it is also known as the "free lipid content" and can include phospholipids, steroids, fat-soluble vitamins, monoglycerides, diglycerides, triglycerides, carotene pigments, chlorophylls, and so on. Rice contains monoacyl lipids, which are fatty acids and lysophosphatides, complexed with amylose to form starch lipids (Choudhury and Juliano 1980). In the present investigation, the crude fat percentage was found to be 2.96 percent in black jasmine and 1.16 percent in Jyothi (Table 1). According to reports, lipid entities in the aleurone layer and bran of rice make up the majority of the lipids or fats in rice (20%, dry basis).

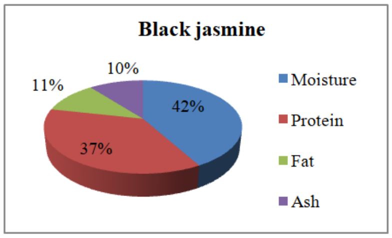

Fig. 1. Showing % contribution of proximate content of Black jasmine.

D. Ash content

In Jyothi, the ash content was noted 1.30%, while it was 2.58% in black jasmine (Table 1). Red rice had the least quantity of ash, followed by black rice.

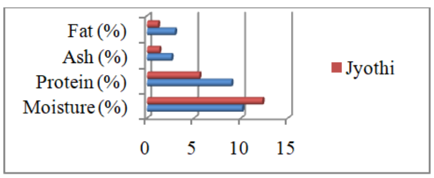

Fig. 2. Comparison of proximate content of selected varieties.

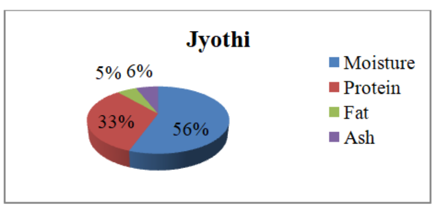

Fig. 3. Showing proximate content of Jyothi.

CONCLUSIONS

Determining the proximate composition of whole grain in two varieties of colored rice was the primary objective of this investigation. In the present study, the results pointing that, black jasmine (medicinal) is the best variety compared to Jyothi (non-medicinal). All the proximate components, except moisture content was observed high in black jasmine. Further detailed studies on other nutrients and nutraceutical aspects on these varieties is needful.

Acknowledgement. This study was supported by Kerala Agriculture University, Thrissur.

REFERENCES

AOAC (2004). Official Methods of Analysis (15th edition). Association of official analytical chemists, Washington, D. C., U.S.A.

Champagne, E. T., Thompson, J. F., Bett-Garber, K. L., Mutters, R., Miller, J. A. and Tan, E. (2004). Impact of storage of freshly harvested paddy rice on milled white rice flavor. *Cereal chemistry*, *81*(4), 444-449.

Choudhury, N. H. and Juliano, B. O. (1980). Effect of amylose content on the lipids of mature rice grain. *Phytochemistry*, *19*(7), 385-1389.

Colombo, F., Cappa, C., Bani, C., Magni, M., Biella, S., Restani, P. and Di Lorenzo, C. (2023). Characterization of color, phenolic profile, and antioxidant activity of Italian pigmented rice varieties after different technological treatments. *Food Bioscience*, *53*, p.102674.

Le Thi Kim, L. O. A. N., Thuy, N. M. and Van TAI, N. (2023). Mathematical and artificial neural network modeling of hot air drying kinetics of instant "Cẩm" brown rice. *Food Science and Technology*, *43*.

Mapoung, S., Semmarath, W., Arjsri, P., Thippraphan, P., Srisawad, K., Umsumarng, S., Phromnoi, K., Jamjod, S., Prom-u-Thai, C. and Dejkriengkraikul, P. (2023). Comparative analysis of bioactive-phytochemical characteristics, antioxidants activities, and anti-inflammatory properties of selected black rice germ and bran (*Oryza sativa* L.) varieties. *European Food Research and Technology*, *249*(2), 451-464.

Mattosinhos, P. D. S., Sarandy, M. M., Novaes, R. D., Esposito, D. and Goncalves, R. V. (2022). Anti-inflammatory, antioxidant, and skin regenerative potential of secondary metabolites from plants of the Brassicaceae family: A systematic review of in vitro and in vivo preclinical evidence (biological activities Brassicaceae skin diseases). *Antioxidants*, *11*(7), p 1346.

Ngo, T. V., Kusumawardani, S., Kunyanee, K. and Luangsakul, N. (2022). Polyphenol-modified starches and their applications in the food industry: recent updates and future directions. *Foods*, *11*(21), p 3384.

Simonelli, C., Abbiati, A. and Cormegna, M. (2016). Physicochemical Characterization of some Italian rice varieties. *The Journal of Food Science and Nutrition*, *45*(1), 9-23.

Thuy, N. M., Ngan, H. T. and Tai, N. V. (2021). Optimization of carrot fermentation conditions in rice bran bed using Lactobacillus plantarum. *Acta Scientiarum Polonorum Technologia Alimentaria*, *20*(4), 449-457.

Zhang, L., Cui, D., Ma, X., Han, B. and Han, L. (2023). Comparative analysis of rice reveals insights into the mechanism of colored rice via widely targeted metabolomics. *Food chemistry*, *399*, p.133926.

Zheng, X. and Lan, Y. (2007). Effects of drying temperature and moisture content on rice taste quality. In *The Proceedings of the 5th Asia-Pacific Drying Conference: (In 2 Volumes)* (pp. 1112-1117).

How to cite this article: Mikhina M.S. and Abida P.S. (2024). Prospecting the Proximate Content of a Black and Red Pigmented Rice Varieties. *Biological Forum – An International Journal, 16*(7): 266-268.