Plant Archives Vol. 15 No. 2, 2015 pp. 909-911 *ISSN 0972-5210*

DEVELOPMENT AND STANDARDIZATION OF SOUP MIX BASED ON BLACK RICE AND OKRA POWDER VALUE ADDED WITH BARLEY

Seema Sonkar, Tanu Shree Saha* and Alka Singh

Department of Food Science and Nutrition, College of Home Science, C.S.A.U.A. & T., Kanpur-208 002 (U.P.), India.

Abstract

Black rice is generally known as purple rice with high nutritional value, whereas it is a source of iron, vitamin E and antioxidants (more than blueberries). Black rice has a similar amount of fibre and a mild nutty taste as compared to the brown rice. The okra mucilage is a glycoprotein comprising of about 10% protein and 80% polymeric carbohydrates. The okra mucilage helps to stabilize blood sugar by curbing the rate at which sugar is absorbed from the intestinal tract. Barley is the most energy efficient food available in nature, having major implications for those who are concerned with maximizing longevity, increasing athletic performance and fighting obesity. It also stabilizes glucose level and good potential food for diabetic patients. For this study, okra powder has been prepared by drying method. The product soup mix has been prepared from the combination of black rice, okra powder & barley. The prepared product was evaluated with sensory evaluation and analyzed for chemical composition. According to sensory evaluation the ratio $\mathbf{T_2}$ was best. Among the other treatments, $\mathbf{T_1}$ was considered as better. On the basis of proximate chemical analysis, $\mathbf{T_1}$ was highest content of moisture, ash, protein, fat and iron followed by $\mathbf{T_2}$ & $\mathbf{T_3}$. This study was emphasised on evaluation of organolaptic acceptability and nutritive value of black rice, okra, and barley. It provides idea about how much black rice and other ingredients should be incorporated in convenient healthy food, which can be easily swallowed by patients, who cannot chew. It is also provide the information about nutrients of black rice and to make it familiar to the people.

Key words: Black rice, antioxidant, okra, barley, glycoprotein, polymeric, mucilage, obesity, diabetic, glucose, nutritional value.

Introduction

Black rice is known as purple rice and is a species (*Oryza sativa* L.) of rice. It was consumed from ancient time, but it was not so popular among Indian. Centuries ago black rice was known as 'Forbidden Rice' in ancient China because only nobles were allowed to eat it. Food scientist Dr ZaminXu (2010) said: 'Just a spoonful of black rice bran contains more health promoting anthocyanin antioxidants than are found in a spoonful of blueberries, but with less sugar and more fibre and vitamin E antioxidants. The bran hull (outermost layer) of black rice contains one of the highest levels of anthocyanin antioxidants found in food. Anthocyanins provide the dark colours of many fruits and vegetables, such as blueberries and red peppers. They are what make black rice 'black'. Research suggests that the dark plant antioxidants, which mop up harmful molecules, can help protect arteries and prevent the DNA damage that leads to cancer.

***Author for correspondence:** E-mail: tanusreecsa@gmail.com

Okra is valued for its edible delicious and nutritious vegetables as throughout the world. The mucilaginous material of this vegetable has several food and medicinal uses. The okra mucilage is a glycoprotein comprising of about 10% protein and 80% polymeric carbohydrates. It has large water binding properties due to hydroxyl group of sugar. The okra mucilage helps to stabilize blood sugar by curbing the rate at which sugar is absorbed from the intestinal tract.

Barley is the most energy, efficient food available in nature, having major implications for those who are concerned with maximizing longevity, increasing athletic performance and fighting obesity. Barley is much more than supplement found at local health food store, it is a complete food, which has been converted into super food through an all natural process, making it so powerful and functional that it can be used to nourish those who are struck by famine. Barley transforms into get in the GI track, slowing its passes through the body which in turn allows maximum nutrient absorption. It also stabilizes glucose level and is great for use by diabetics.

Table 1 : Sensory evaluation of prepared soup mix by using 9-point hedonic scale.

Characters	Control	T_1	T_2	T_3
Appearance	6.46	8.26	8.66	7.53
Taste	6.73	8.20	8.40	7.33
Flavour	6.26	8.20	9.00	7.40
Texture	6.56	7.60	8.20	6.60
Colour	6.80	7.20	8.40	7.60
Overall acceptability	6.00	8.08	8.93	7.00

Table 2 : Analysed chemical content of soup mix.

	Control product	T_1	T_2	T_3
Ash	1.65	1.74	1.72	1.70
Protein	0.40	9.04	8.55	8.08
Fat	0.7	1.79	1.70	1.68
Iron	1.05	2.45	2.37	2.27

Materials and Methods

The present investigation was carried out in the Department of Food Science & Nutrition, College of Home Science, Chandra Shekhar Azad University of Agriculture & Technology, Kanpur (U.P.), India. For preparation of soup mix Black rice (*Oryza sativa* L.) were collected from Manipur; whereas okra and barley were procured from university farm.

Preparation of okra powder

Wash and cutokra into pieces and keep for sun drying for 1-2 hours. Now dry the okra pieces in hot air oven at about 55 to 65^{0}C for 7-8 hours per day till become crispy and grind it into powder form.

Preparation of barley flour

Roast for half an hour. Then grind it and sieve to get fine powder.

Preparation of soup mix

Mix the powder of black rice, okra and barley at three different level *i.e.* T_1 (50:10:40), T_2 (50:15:35) and T_3 (50:20:30), respectively. Roast for 10-15 mins and add sufficient water and salt. Cook for sometimes to get desirable thickness.

Sensory evaluation

The product soup mix was evaluated by 5 panel members according to the flavour, texture, taste, appearance and colour on the basis of Hedonic rating scale.

Chemical analysis

Proximate analysis was done by AOAC method (A.O.A.C., 1980). Protein was estimated through Kjeldahl method, whereas fat was estimated through soxhlet method. Iron was estimated by Spectrophotometric method.

Statistical study

The experiment was laid out in Completely Randomized Design (CRD). Means and standard deviations of experiment were calculated. ANOVA was performed at < 0.05.

Results and Discussion

The results the study obtained from the interpretation and observation of the datas, which are procured through sensory evaluation and chemical composition of value added product soup mix developed from black rice and okra powder along with barley together.

Sensory evaluation

The sensory evaluation of the product soup mix by 5 panelists is shown in table 1.

Themean result of sensory evaluation of soup mix in table 1 has shown that T_2 (black rice : okra powder : barley; 50:15:35) is best among the treatments. According to the appearance, taste, flavour, texture, colour and overall acceptability T_2 received a score of 8.66, 8.40, 9.00, 8.20, 8.40 and 8.93, respectively. On the basis of overall acceptability, the score revealed that T_2 is rated as 'like very much'.

In the comparison with control products, T_2 got highest scores than the control products. So, it has been shown that T_2 is best due to its high score than other three treatments.

Chemical analysis

Chemical evaluation of soup mix is shown in table 2.

The comparable results of soup mix has shown in the table 2, the ash of control sample of soup mix is found less *i.e.* 1.65%, whereas different treatment of T_1, T_2 & T_3 revealed ash 1.74%, 1.72% and 1.70% mean value, respectively. T_1 content high ash *i.e.* 1.74%. It is observed that the percentage of ash has been decreased with the decreased of barley percentage.

The protein of control sample of soup mix was found less *i.e.* 0.40%, whereas different treatment of T_1, T_2 & T_3 revealed protein 9.04%, 8.55% and 8.08% mean value, respectively. T_1 content high protein *i.e.* 9.04%. It has been observed, if the percentage of barley in product decreases, the protein content of the product alsodecreases.

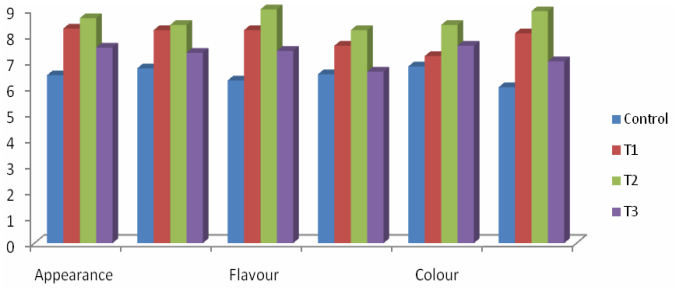

Chart 1 : A comparison of different characteristics of sensory evaluation of soup mix.

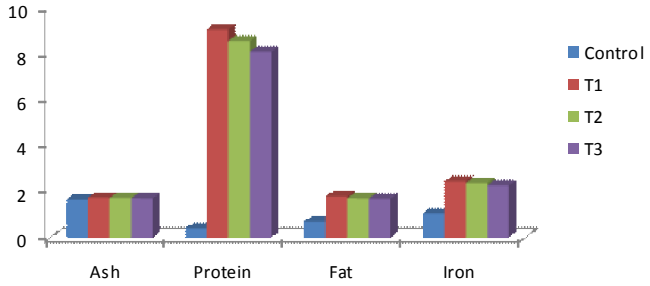

Chart 2 : A comparison of analysed chemical content of soup mix.

The comparable results has shown that the control sample of soup mix was found 0.7% fat, whereas different treatment of T_1, T_2 & T_3 revealed fat 1.79%, 1.70%, and 1.68% mean value, respectively. T_1 contains high fat *i.e.* 1.79% among all other treatment. It can say that if the percentage of barley in product decreases, the fat content of the product also decreases.

In the table 2, it has been shown that the control sample of soup mix was found less iron *i.e.* 1.05 compare to other treatment, whereas different treatment of T_1, T_2 & T_3 revealed iron 2.45%, 2.37% and 2.27% mean value, respectively. T_1 contains high amount of iron *i.e.* 2.45% among all other treatment. It can say that if the percentage of barley in product decreases, the iron content of the product also decreases.

So, we can suggest that T_2 is best ratio according to sensory evaluation and T_1 is considered as best on the basis of nutritive value.

Conclusion

This value added product is convenient and nutritious. It can be easily swallowed by patients, who cannot chew. As Black rice is rich in anthocyanin antioxidant it should include in regular diet to keep human health away from any kind of inflammatory condition like allergies, cancer, asthma, atherosclerosis and arthritis.

References

Altan, A., K. L. McCarthy and M. Maskan (2009). Effect of Extrusion Cooking on Functional Properties and *in vitro* Starch Digestibility of Barley-Based Extrudates from Fruit and Vegetable By-Products. *Journal of Food Science*, **74(2)** : E77–E86.

Chittapalo, T. and P. Songsanandr (2014). Study On Extraction And Organoleptic Evaluation Of Okra And Hybiscus Mucilage Incorporated Products. *International Journal of Food And Nutritional Sciences*, **3(1)** : 2320 –7876.

Dayal, Bishambar, Vineela Reddy, Ajay Yannamreddy, P. Singh, Michael Lea and Norman H. Ertel (2012). Bioactive Compounds from Okra Seeds : Potential Inhibitors of Advanced Glycation End Products. *Emerging Trends in Dietary Components for Preventing and Combating Disease,* **16** : 287–302.

Izydorczyk, M. S., S. S. Miller and A. D. Beattie (2014). Milling Food Barley : Production of functional fractions enriched with ß-glucans and other dietary fiber components. *Cereal Foods World*, **59(6)** : 277-285.

Jae Kwang Kim, Si Young Lee, Sang Mi Chu, Sun Hyung Lim, Seok-CheolSuh, Young-Tack Lee, Hyun Suk Cho, and Sun-Hwa Ha (2010). Variation and Correlation Analysis of Flavonoids and Carotenoids in Korean Pigmented Rice (*Oryza sativa* L.) Cultivars. *J. Agric. Food Chem.*, **58(24)** : 12804–12809.

Ming Wei Zhang, RuiFeng Zhang, Fang Xuan Zhang and Rui Hai Liu (2010). Phenolic Profiles and Antioxidant Activity of Black Rice Bran of Different Commercially Available Varieties. *J. Agric. Food Chem.*, **58(13)** : 7580–7587.

Nazni, P. and P. Vigneshwar (2014). Product development of black glutinous rice cracker with Panangflavor and its quality changes. *International Food Research Journal*, **21(5)** : 2025-2029.

Pradeep, P. M., Usha Dharmaraj, B. V. Sathyendra Rao, Amudha Senthil, N. S. Vijayalakshmi, N. G. Malleshi and Vasudeva Singh (2013). Formulation and nutritional evaluation of multigrain ready-to-eat snack mix from minor cereals. *J. Food SciTechnol*, **51(12)** : 3812–3820.

Taofik Akinyemi Shittu and Ololade Funke Olaitan (2011). Functional effects of dried okra powder on reconstituted dried yam flake and sensory properties of *ojojo*—a fried yam (*Dioscorea alata* L.) snack. *J. Food Sci. Technol.*, **51(2)** : 359–364.

Widiastuti Setyaningsih, Irfan Estiono Saputro, Gerardo Fernández Barbero, Miguel Palma and Carmelo García Barroso (2015). Determination of Melatonin in Rice (*Oryza sativa*) Grains by Pressurized Liquid Extraction. *J. Agric. Food Chem.*, **63(4)** : 1107–1115.