PASTING PROPERTIES OF WHEAT AND YEAST FERMENTED RICE BRAN FLOUR BLENDS

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Introduction

Rice bran is a by-product of rice milling obtained from outer layer of the brown rice kernel during milling. Rice bran is rich in protein, lipid, dietary fiber, vitamins, minerals and antioxidants such as polyphenols, tocopherols, tocotrienols and gamma-oryzanol [1]. Rice bran has great potential in food industry, especially in the development of functional foods such as functional bakery products [2].

The technological effects caused by the use of cereal bran in food systems, especially wheat-based products, have been improved through bioprocessing methods such as fermentation [3]. Yeast fermented rice bran flour is rich in bioactive ingredients [4]. The proximate composition and selected functional properties of wheat and yeast fermented rice bran flour blends have been studied [5]. Information on the pasting properties of wheat and yeast fermented rice bran flour blends is uncommon. The pasting properties of flour are important in the production of bread. Therefore, the objective of the study was to evaluate the effect of substitution of yeast fermented rice bran flour on the pasting properties of wheat flour.

Materials and Methods

Rice bran was obtained from a commercial rice milling plant in Minna, Niger State, Nigeria while wheat flour (Golden penny) and baker's yeast was procured from Minna, Central market, Minna, Nigeria. Yeast fermented rice bran flour was prepared at optimized conditions as reported by Chinma *et al.* [4]. Wheat and yeast fermented rice bran flour were blended at different proportions (100: 0; 90:10; 80:20 and 70: 30) where 100 % wheat flour served as control. Pasting properties of wheat and yeast fermented rice flour blends were determined using rapid visco analyzer (RVA) (Newport Scientific Pty Ltd., New South Wales, Australia) according to a standard method. Data obtained were subjected to analysis of variance (ANOVA).

Results and Discussion

The pasting properties of wheat and yeast fermented rice flour blends are presented in Table 1. Substitution of yeast fermented rice bran flour in wheat flour significantly ($P \leq 0.05$) increased The peak, breakdown, final and setback viscosities of wheat flour significantly ($P \leq 0.05$) increased with an increase in the substitution level of yeast fermented rice bran flour in the blends while pasting temperature and peak time decreased. The higher peak, breakdown, final and setback viscosities of composite blends compared to wheat flour could be attributed to higher dietary fiber content which led to increased water absorption capacity thereby increasing the viscosities of the blends. Fermented rice bran flour contained higher crude fiber (7.03 %) and water absorption capacity (4.82 %) compared to wheat flour (1.12 % crude fiber and 1.14 % water absorption capacity) [5].

Conclusion

Substitution of yeast fermented rice bran flour in wheat flour increased the viscosity of wheat dough while pasting temperature and peak time decreased.

Table 1: Pasting properties of wheat and yeast fermented rice bran flour blends

Parameter	100WF	90WF:10YFRBF	80WF:20YFRBF	70WF: 30YFRBF
Peak viscosity (RVU)	136.08±0.47^{d}	147.69±0.86^{c}	163.05±0.59^{b}	176.70±0.88^{a}
Trough (RVU)	88.20±0.91^{d}	90.92±0.42^{c}	94.60±0.42^{b}	101.42±0.70^{a}
Breakdown (RVU)	47.68±0.32^{d}	56.77±0.75^{c}	68.45±0.69^{b}	75.30±0.53^{a}
Final viscosity (RVU)	164.50±0.83^{d}	170.02±0.34^{c}	179.15±0.40^{b}	188.73±0.45^{a}
Setback (RVU)	76.30±0.67^{d}	79.10±0.52^{c}	84.55±0.75^{b}	87.31±0.92^{a}
Peak time (Minutes)	5.45±0.90^{a}	5.32±0.20^{a}	5.20±0.30^{a}	5.13±0.67^{a}
Pasting temperature (°C)	85.60±0.22^{a}	84.29±0.73^{b}	82.77±0.48^{c}	82.04±0.29^{d}

Values in the same row with different superscript are significantly ($P \leq 0.05$) different.
Values are mean and standard deviation of three determinations.
100WF = 100 % wheat flour
90WF:10YFRBF = 90 % wheat flour: 10 % Yeast fermented rice bran flour
80WF: 20YFRBF = 80 % wheat flour: 20 % Yeast fermented rice bran flour
70WF: 30YFRBF= 70 % wheat flour: 30 % Yeast fermented rice bran flour

References

1. Tuncel, N. B., Yılmaz, N., Kocabıyık, H. and Uygur, A. (2014). The effect of infrared stabilized rice bran substitution on physicochemical and sensory properties of pan breads: Part I. Journal of Cereal Science, 59(2), 155-161.
2. Hu, G., Huang, S., Cao, S. and Ma, Z.(2009). Effect of enrichment with hemicellulose from rice bran on chemical and functional properties of bread. Food Chemistry, 115(3), 839–842.
3. Chinma, C. E., Ramakrishnan, Y., Ilowefah, M., Hanis-Syazwani, M.,and Muhammad, K. (2015). Properties of cereal brans: a review. Cereal Chemistry, 92(1), 1-7.
4. Chinma, C. E., Ilowefah, M., Shammugasamy, B., Ramakrishnan, Y. and Muhammad, K. (2014). Chemical, antioxidant, functional and thermal properties of rice bran proteins after yeast and natural fermentations. International Journal of Food Science and Technology, 49(10), 2204-2213.
5. Chinma, C. E., Anuonye, J.C., Azeez, S.O, Shittu, S.O and Gbadamosi, O.F (2016). Proximate composition and functional properties of wheat and yeast fermented rice bran flour blends. In: Innovations and upgrades for food value chain competitiveness in Nhigeria. Proceedings of the 40th Nigerian Institute of Food Science and Conference held in Kano. Edited by Abu, J.O, Shittu, T.A, Yusuf, M.I, Olapade, A.A, Uvere, P.O and Uzomah, A. Pp 17-18.