Tropentag 2020

EFFECT OF INCORPORATING PEELED AND UNPEELED ORANGE - FLESHED SWEET POTATO FLOUR ON RHEOLOGICAL PROPERTIES OF DOUGH AND QUALITY CHARACTERISTICS OF BREAD

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INTRODUCTION

- Substitution of wheat flour with orange-fleshed sweet potato flour will help to improve the nutritional benefits of bakery products and minimize wheat flour importation in Sub-Saharan African countries.
- This study investigated the effect of replacing wheat flour with peeled and unpeeled OFSP flours on dough properties as well as the effects of flour proportion, baking temperature and time on bread quality characteristics using a response surface methodology.

MATERIALS & METHODS

- wheat flour (type 550), peeled and unpeeled OFSP flour (≤250µm particle size) were used in this study.
- I-optimal (combined) design of the Design-Expert software version 11 (Stat-Ease Inc., Minneapolis, United States) was used to create a total of 17 experimental runs.
- wheat flour was replaced with 10-60 % OFSP flour.
- Baking temperature of 150 - 200 °C and baking time of 15-25 min were used.
- The bread was prepared using the standard method 131 of International Association for Cereal Science and Technology.
- Dough and bread quality measurements were performed using standard equipment and procedures.
- Experimental data analysis was done using a response surface methodology of the Design-Expert software.

RESULTS AND DISCUSSION

- Farinograph optimum water absorption (OWA) decreased while dough development time (DDT) increased as the OFSP proportion increase.
- Dough stability time and degree of softening improved as OFSP levels exceeded 35 %.
- Baking loss, loaf volume, specific volume, crumb moisture content and water activity, decreased as OFSP flour, baking temperature and baking time increase.
- Bread crumb hardness and chewiness increased while cohesiveness, springiness, and resilience decreased as OFSP flour proportion increase.
- wheat flour substitution with OFSP flour decreased bread lightness (L*) but increased redness (a*) and yellowness (b*) of the bread.

(a) (b) (c)

Fig.2. Samples a, b, c represent 10, 35, 60 % OFSP flour-based breads baked at 150 °C/17min, 170 °C/19min, and 150 °C/21min respectively.

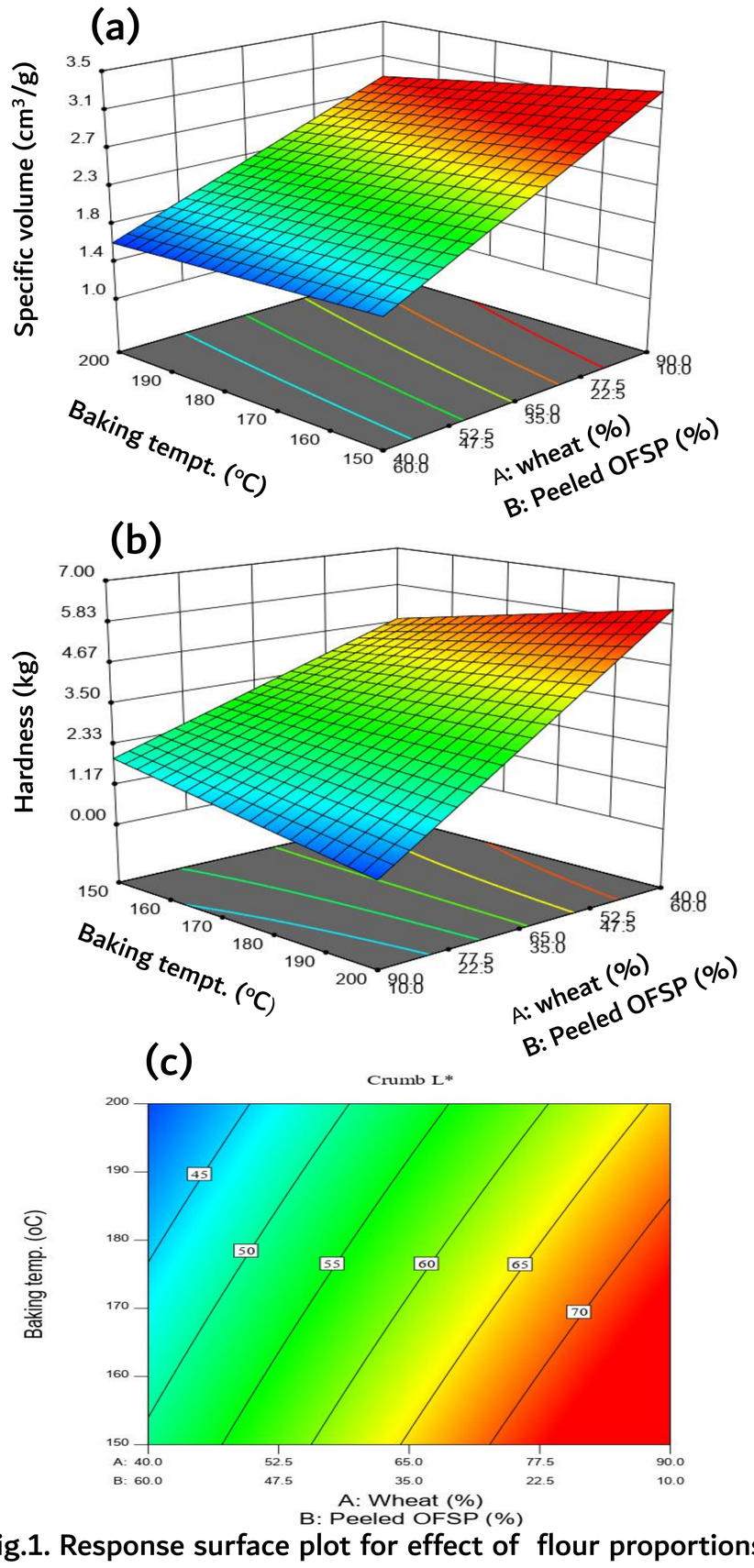

Fig.1. Response surface plot for effect of flour proportions and baking temperature at 20 min baking time on (Fig.1a) loaf specific volume; (Fig.1b) crumb hardiness; and (Fig 1c) crumb L*

CONCLUSION

- The degree of wheat flour substitution with OFSP flour, baking temperature, and baking time had a significant influence on all the quality properties of the composite bread.
- wheat-peeled OFSP composite bread had higher specific volume and hardness but lower moisture content than the wheat-unpeeled OFSP bread.
- Increasing substitution of wheat flour with OFSP flour increased moisture retention in bread and decreased crumb staling rate during storage.
- Replacing wheat flour with OFSP flour up to 35 % and baking at 160-180 °C for 15-17 min can be used to produce quality composite bread.

ACKNOWLEDGEMENT

The authors acknowledge the UPGRADE Plus (Project number: BLE – 2816PROC01) for the financial support for this work. UPGRADE Plus project is supported by funds of the German Federal Ministry of Food and Agriculture (BMEL) via the Federal Office for Agriculture and Food (BLE).