Optimization of extrusion process for the production of ready-to-eat extruded snacks based on maize, wheat and rice blends– A response surface methodology approach

AKANKSHA JAIN AND R.B. GREWAL

In the present study, process for preparation of extruded snacks from high quality protein maize, wheat and rice using twin screw extruder was standardized using response surface methodology (RSM). A five-level-three-factor central composite rotatable design (CCRD) was employed for optimizing the mixed flour grain formulation with feed rate (11-19 kg/hr) moisture (10-18 %) and feed composition (maize:wheat:rice) *viz.*, 100:0:0, 80:10:10, 60:20:20, 40:30:30 and 20:40:40 as independent variables. 20 different experimental combinations given by RSM design were used to investigate the effect of independent variables on product response variables *viz.*, bulk density (BD), expansion ratio, sectional expansion index (SEI), texture and overall acceptability of the developed extruded snacks. Significant regression models were generated, that explained the effects of different percentages of maize (20-100%), wheat (0-40%) and rice (0-40%) on all response variables of extrudates. The co-efficients of determination, R^2, of response variables were higher than 0.73 except, hardness. Results showed that product responses of extrudates were significantly affected by changes in maize, wheat and rice flour level, moisture content and feed rate. Increase in moisture, feed rate and wheat flour level resulted in higher bulk density and texture and lower expansion ratio, sectional expansion index (SEI) and overall acceptability. Mixed grain RTE snacks containing feed composition 80:10:10 (maize: wheat: rice) extruded at moisture content 12 per cent and feed rate 13 kg/hr were found most acceptable. Thus, maize, rice and wheat can be blended in an appropriate level and can be further utilized to prepare value added snacks by supplementation with sources having nutraceutical characteristics.

Key Words : : HQPM maize, Rice, Wheat, Response surface methodology, Ready-to-eat (RTE) extruded snack

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● MEMBERS OF RESEARCH FORUM ●

Author for correspondence :
AKANKSHA JAIN, Center of Food Science and Technology, C.C.S. Haryana Agricultural University, HISAR (HARYANA) INDIA
Email : akankshajain972@gmail.com

Associate Authors' :
R.B. GREWAL, C.C.S. Haryana Agricultural University, HISAR (HARYANA) INDIA
Email : grewalrb@gmail.com