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SISTEMAS ALIMENTARES E ALIMENTOS SEGUROS



## PERFORMANCE OF MULTI-TYPE RESISTANT STARCH, XANTHAN AND GUAR GUM IN THE PRODUCTION OF GLUTEN-FREE CREAM CRACKERS

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### RESUMO

One of the biggest challenges in the bakery industry and pasta and noodles is producing gluten-free products with adequate technological and sensory characteristics. In this work, a Simplex Centroid Mixture Design (SCMD) was applied to obtain gluten-free cream crackers based on rice flour. SCMD independent variables were:  $x_1$  multi-type resistant starch (types 3, 4 and 5) (MTRS) obtained by corn starch extrusion cooking and complexation with butyric and stearic acids (0 to 20 %) obtained in a prior study by our research group;  $x_2$  xanthan (0 to 1 %);  $x_3$  agar gum (0 to 1 %). Dependent variables evaluated were the specific volume (SV), hardness, fracturability and instrumental color variation ( $\Delta E$ ) of the samples, and the results were subjected to statistical analysis by Response Surface Methodology ( $P \leq 0.10$  and  $R^2 \geq 0.70$ ). Carbohydrates as pseudocomponents increased the SV of crackers, with resistant starch as the most important ( $\beta_1 = 1.03$ ). The values obtained ranged from  $0.75 \pm 0.03$  and  $1.03 \pm 0.03 \text{g.cm}^{-3}$  ( $P = 0.048$ ,  $R^2 = 70.66\%$ ). The fracturability had lower values with agar ( $\beta_3 = 3.26$ ), and the values ranged from  $3.34 \pm 0.72$  and  $24.99 \pm 5.09 \text{ N}$  ( $P < 0.001$ ;  $R^2 = 88.28\%$ ). The hardness of the crackers ranged from  $3.76 \pm 0.68$  and  $31.78 \pm 4.29 \text{ N}$  ( $P < 0.001$ ;  $R^2 = 92.95\%$ ), and the lowest values were obtained with the combined use between the MTRS and the guar gum ( $\beta_{13} = 0.46$ ). Increased SV is directly related to the production of crackers with greater crispness, and hydrocolloids showed positive effects on the fracturability and hardness of the product. In addition, lower  $\Delta E$  was obtained by the interaction between MTRS and xanthan ( $\beta_{12} = -7.31$ ).  $\Delta E$  of the crackers ranged from  $1.22 \pm 0.56$  to  $4.71 \pm 0.48$  ( $P < 0.001$ ;  $R^2 = 91.64\%$ ). Most trials obtained in this research are fit as very distinct ( $\Delta E > 3.0$ ). The beneficial effect of the MTRS is because pre-gelatinization of starches is promoted during thermoplastic extrusion, resulting in more extensible doughs and better capacity for water evaporation during the baking step. Acknowledgments to CAPES, FAPEMIG and CNPq.

**PALAVRAS-CHAVE:** Hydrocolloids, Starch, Extrusion, Complex amylose-lipids

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