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CHANGES IN TECHNO-FUNCTIONAL PROPERTIES OF MAIZE FLOURS INDUCED BY DRY-HEAT TREATMENT

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Thermal treatments have numerous applications as a valuable tool for extending the shelf-life of the flours by reducing the enzyme activity and moisture content. Besides the biological effects, the dry-heat process has a significant impact on the techno-functional and nutritional properties of flours. Hence, the effects of the dry heat treatment at different temperatures: 100, 125, 135, 150, and 165°C, on the technological and functional properties, as well as antioxidant capacity of maize flours were investigated. The experimental material consisted of two maize hybrids with different colors and kernel types (white-standard and blue-popping). Maize samples were ground on a lab mill to a fine powder (<500µm) and flour samples evenly spread on a glass plate and thermally treated for 1 h in a ventilation oven Memmert UF55. Results showed that dry heat treatment increased the insoluble dietary fibre and free phenolic compounds of the investigated maize flours, while the bound phenolic compounds, anthocyanins, and pasting properties decreased with the rising of the applied temperature. The antioxidant capacity ranged from 10.05 to 13.32 mmol Trolox Eq/kg and 20.51 to 24.03 mmol Trolox Eq/kg in white and blue maize flour, respectively. The water absorption index showed an increase to a temperature of 135°C after which it began to decrease and reached a minimum at a temperature of 165°C. Meanwhile, the solubility index increased with an increase of temperature, and doubled its value after a temperature of 135°C. The dry-heat treatments largely modulated pasting properties of maize flours. The untreated maize flour samples showed a higher peak viscosity than the treated samples. Especially, white and blue maize flour samples at 165°C reached the lowest viscosity value of all samples and the result was attributed to the structural changes in flour. Dry-heat treatment had a significant effect on the maize flour color parameters and the results of the parameters L^* , a^* and b^* indicated that the flour showed darkening and browning effect as the dry heat treatment temperature increased. Browning also indicates the formation of melanoidins as the end-product of the Maillard reaction, which confirms the maximum value of antioxidant capacity at a temperature of 165°C. All results showed that a temperature of 135°C had favorable impact on the techno-functionality of maize flours. However, due to the different kernel structures of the used maize genotypes and inter-relations between chemical compounds within the food matrix, the overall impact of dry-heat treatments was not completely elucidated.

Keywords: Dry-heat treatment, Maize flour, Technological properties, Functional properties, Antioxidant capacity.

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