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Effect of packaging materials, storage methods, and duration on functional qualities of red-hot pepper powder

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Abstract

Hot red peppers (*Capsicum annuum* L.) pungency, aroma, colour, and nutritional and medicinal qualities are highly prized. The stability of the functional qualities of red pepper is affected by variety, growing condition, maturity at harvest, drying technique, improper packaging, and storage duration and conditions. The current study aimed at selecting good packaging materials, storage methods, and durations that preserve the highest functional qualities at the end of the storage study. Low-density polyethylene (LDPE), high-density polyethylene (HDPE), aluminum pouch (AIP), and BLDPE (black-coloured low-density polyethylene) bags were heat-sealed. The samples were stored at ambient conditions for ten months. Data on moisture content (MC), total carotenoids (TCC), pungency index (PI), oleoresin content (OLEO), and total antioxidant capacities (TAOC) were collected at two-month interval. A significant ($p < 0.001$) interaction effect of packaging material and storage duration was observed in all studied response variables except for MC and pungency index. Storing red hot pepper powder under refrigerated and at room temperature for up to six months in all packaging materials is possible. However, aluminum foil is recommended for storage beyond six months under both storage temperatures, though HDPE can take the second rank. Black-coloured LDPE showed greater retention capacity, though the result was not significant compared to transparent LDPE bags. Compared to room temperature storage, refrigerated storage is preferable for better retention of functional quality of red hot pepper powder. Samples packed in aluminum pouches maintained high functional qualities at the end of the storage period which could be due to the lower permeability of aluminum pouches to water vapour and oxygen under both room and refrigerated storage methods. The findings suggest further studies on the effect of these packaging materials and storage duration on other nutritional variables and the product's safety.

Keywords: Oleoresin, pungency, red hot pepper, total carotenoids