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Roasting Process of Sesame Seeds Modelling Using Gene Expression Programming: A Comparative Analysis with Response Surface Methodology

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Abstract : Roasting process has the major importance to obtain desired aromatic taste of nuts. In this study, two kinds of roasting process were applied to hulled sesame seeds - vacuum oven and hot air roasting. Efficiency of Gene Expression Programming (GEP), a new soft computing technique of evolutionary algorithm that describes the cause and effect relationships in the data modelling system, and response surface methodology (RSM) were examined in the modelling of roasting processes over a range of temperature (120-180°C) for various times (30-60 min). Color attributes (L*, a*, b*, Browning Index (BI)), textural properties (hardness and fracturability) and moisture content were evaluated and modelled by RSM and GEP. The GEP-based formulations and RSM approach were compared with experimental results and evaluated according to correlation coefficients. The results showed that both GEP and RSM were found to be able to adequately learn the relation between roasting conditions and physical and textural parameters of roasted seeds. However, GEP had better prediction performance than the RSM with the high correlation coefficients (R2 >0.92) for the all quality parameters. This result indicates that the soft computing techniques have better capability for describing the physical changes occuring in sesame seeds during roasting process.