STUDIES ON IMPROVEMENT OF FRIED AND BAKED FOOD PRODUCT QUALITY AND PREFERENCE USING ELECTRONIC NOSE TECHNOLOGY

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ABSTRACT

The thesis focusses on frying and baking operations, associated with the manufacture of fried potato crisps and bread, respectively. In case of frying, a low linoleic acid frying oil viz. deodorizedvirgin coconut oil (DVCO) was employed as an alternate frying medium to avert formation of 2,4-decadienal, a potent toxin in fried potato crisps.Prior to the frying operation using DVCO, use of fuzzy logic analysis successfully validated that 4.2 kGy dose of gamma irradiation of VCO and successive storage of the irradiated oil for 28 days could completely remove its characteristic obnoxiousodor. Acrylamide (AA)toxin in fried potato crisps was also mitigated by adopting hurdle technology comprising of aqueous pre-treatment, 2% L-proline treatment, drying and modified deep frying. The outcome of the study was introduction of DVCO as a new healthier frying oil. During storage, oxidative rancidity of DVCO-dried crisps (DFC) had comparatively low hexanal vis-à-vis those fried at conventional deep frying temperature (SFC).Detection of onset of rancidity was successfully accomplished by use of e-nose technology,post-screening of sensors using linear SVM which allowed development of 'spoilage indices' for DFC and SFC sets using Mahalanobis distance.The correlations of the indices with concentrations of hexanal in the same by regression modeling yielded good model fit equations which allowed accurate assessment of the rancidity molecular marker in the crispsforgoing GC analysis.

Bread is characterized with its sweet 'popcorn-like aroma", contributed by 2-AP. The challenge lies in retention of this KFO in bread which cannot be sensorially perceived 3-4 h post baking. A methodology for enhancement of KFO in bread was developed by enriching the dough with its precursor molecule (viz. L-proline). Concomitantly, hurdle technology was applied viz. combination of- addition of antimicrobial agents to the L-proline enriched bread dough, -use of suitable flexible packaging laminate and MAP to retain freshness-aroma of bread up to day 13 of storage. 'Freshness indices' obtained by e-nose data analysis was correlated with the 2-AP

contents and the developed regression models can be used for prediction of freshness status of bread, forging GC analysis. Finally, ANN-based BP-MLP was developed to render the e-nose technology SMART to aid in automation of quality assurance of commercial bread.

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