EVALUATION OF FUNCTIONALITY OF COMMERCIAL RESISTANT STARCHES IN FOOD SYSTEMS

A THESIS PRESENTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF TECHNOLOGY

By

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TO MY MOTHER

ABSTRACT

The objective of this study was (i) to investigate the functional properties of commercial resistant starches in a fluid model food system, (ii) to determine the level of resistant starch that could replace the regular thickener without affecting the sensory properties of the system and (iii) to verify the claims made by manufacturers of resistant starches.

In order to evaluate four commercially available resistant starches, a chicken soup model food system was developed. The choice of food system was based on the ease of rheological measurement along with relatively easy method of preparation. A representative soup formulation was chosen which contained industrial starch, wheat flour and xanthan gum as thickening agents. A suitable experimental plan was developed using fractional factorial and central composite designs for evaluation of the soup model. The viscosity of the soup model was determined using Paar Physica rheometer and the sensory analysis was done using acceptance and simple difference testing.

The rheological properties, i.e. the consistency index (K) and flow behavior index (n), derived from the power law model, for the soup model were analyzed using response surface methodology, which enabled an evaluation of the functionality of the model and visualization of correlation between various factors (ingredients) and resistant starch. Results revealed that all resistant starches lacked any starch like functionality as none of them was able to replace the waxy maize starch functionality to any significant extent. Hence, it was necessary to allow for the replacement of waxy maize starch by increasing the amount of xanthan gum in the formulations. Thus, regression models, built to predict the optimum regions of response, were used in replacing waxy maize starch in soup with resistant starch by increasing the amount of xanthan gum.

Comparative sensory responses obtained from paired sample testing determined that the optimum level at which resistant starch could be added to soup model was only 20%. At higher levels (40% and 60%), a difference in taste could be perceived.

The claims made by manufacturers regarding the thermal stability of resistant starches were validated and the *in vitro* assays showed no significant difference ($P>0.05$) in percent resistant starch (dry weight basis) level with the increase in holding time (5-20mins) at 95 °C while soup making.

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