Impacts of Germination on the Physicochemical Properties, Nutritional Quality and Bread-Making Performance of Yellow Pea and Faba Bean Flours

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The overarching goal of this thesis research was to examine the impacts of germination on the chemical compositions, functionality and nutritional properties of pea and faba bean flours, as well as their application value in a model dough/bread system. The first study aimed to investigate the changes in the proximate compositions, functional properties and nutrition attributes of yellow pea and faba bean flours as a function of germination period (0, 24, 48 and 72 h). Alpha-amylase activity of the yellow pea and faba bean flours gradually increased during germination, while negligible changes were found in their chemical compositions. Soaking (0-h germination) and 24-h germination noticeably increased the pasting viscosities of the pulse flours, whereas longer germination times reduced the viscosities due to the increased endogenous alpha-amylase activity. Germination enhanced the emulsifying and foaming properties of both pulse flours. With respect to their nutritional value, improvements were observed in the \textit{in vitro} digestibility of starch and protein of the flours after germination; the treatment, however, did not improve the \textit{in vitro} protein digestibility corrected amino acid scores (IV-PDCAAS).

In the second study, raw and 72-h germinated yellow pea and faba bean flours were used to replace hard wheat flour at 10% and 20% levels for bread making. In comparison to the wheat flour control, the incorporation of germinated pulse flours at both levels substantially decreased the falling numbers and pasting viscosities. Farinograph and rheology results indicated that the doughs formed with the addition of raw/germinated pulse flours were less elastic and possessed a weaker gluten network. In accordance with the observed changes in the flour and dough properties, the breads baked from the composite flours displayed reduced loaf volumes, decreased slice areas, but increased firmness. The current research revealed the influence of short-term germination on the functional characteristics and nutritional profiles of pulse flours and showed the potential of using the modified pulse flours in bread and other bakery goods.

\textbf{Wednesday, September 4, 2019}
\textbf{1:30 pm}
\textbf{Room 1E80, Agriculture Building}
\textbf{Everyone Welcome}