PRO1621: Growing the Market for Pulse Flours: Creating innovative bakery products and a pulse database for the food industry

The overall goal of this research was to improve the knowledge about pulse flours used as food ingredients, specifically on functionality and flavour, and share this information with the food industry. Organizations that collaborated on this project included Cigi, Warburtons, University of Manitoba, University of Saskatchewan, Crop Development Centre, Agriculture and Agri-Food Canada (Morden), Camden BRI, Avena Foods, and InfraReady Products.

This project investigated the effects of genotype and environment, particle size, pre-milling (micronization, pre-germination, roasting, Revtech) and post-milling treatments (Revtech), pre-ferment technology, and storage of pulse flours on the functionality and flavour of various pulse flours when used in bread. The use of faba beans and the modification of a gluten-free baking formulation with pulse ingredients were also investigated. A database was also developed to provide those in the food industry with access to research findings related to the use of pulses in food products. Research conducted at the University of Saskatchewan, on the effect of short-term germination of pulse functionality, and University of Manitoba, identification of flavour and aroma compounds has also added to the knowledge of pulse ingredients and their use in food products.

All activities found that pulse flour functionality and bread quality was affected by the various factors studied in this project including G and E, pre- and post-milling treatments, storage, particle size, and fermentation. For all pulse types, both G, E and their interaction affected pulse flour quality and functionality. Pulse millers need to consider both G and E when sourcing their pulses to ensure flour consistency. Plant breeders need to consider end traits in the development of new pulse varieties for value-added applications. The use of various pre-milling treatments of pulses and post-milling treatments of pulse flours were able to reduce the undesirable aromas and flavours associated with the use of pulse flours without negatively affecting functionality or end-product quality. Split yellow pea flours that had undergone post-milling treatment were found to have more acceptable flavour properties in both consumer and trained sensory panels. Pulse flours with a finer particle size were found to have increased bread quality (scores) but were firmer and did not affect the sensory properties of the bread. Pulse flour quality was affected by storage. Flour milled from whole pulses was more affected by storage than flour milled from dehulled pulses. Optimum storage (ambient conditions) for pulse flour was determined to be between 9-12 months. This research also found that acceptable bread, with a mild flavour, can be produced from faba beans as well as from fermented split yellow pea flour when specific fermentation conditions are used. Two pulse ingredients showed potential to replace non-pulse ingredients in a commercial gluten-free bread formulation based on their RVA properties. Baking trials will need to be conducted in the future to confirm these results. Short-term germination of pulses was found to improve functionality and digestibility and offers potential as a value-added processing step for processors.

Overall, this research has answered many questions concerning pulse flour functionality and the use of pulse flours in bread which formed the basis of this project.