

# The Effect of Genotype and Environment on Pulse Flour Quality and Baking Performance

Bean variety, growing location and crop year can influence the quality and sensory characteristics of bread baked from bean flour.

**CONSUMER DEMAND FOR** healthier and more innovative bakery goods continues to grow. This represents a large market opportunity for the use of pulse flours in baking applications. Flours made from pulses not only enhance the nutritional properties of bread, but they also offer a range of functionality and flavour profiles.

Bean flours have been proven to function well in numerous baking applications, including bread. Understanding the effects of varieties and growing locations on the compositional, functional and flavour properties of pulse flours is critical for expanding the market for bean flours as alternative plant-based protein ingredients. This can also help minimize any lot-to-lot variation in pulse flour quality.

The objective of this research was to examine the effects of bean variety (i.e., genotype), growing location and crop year (i.e., environment) on the compositional and functional characteristics of flour milled from four market classes of beans – navy, pinto, black and cranberry. This study also examined the effect of variety and growing location on baking performance and flavour properties of bread.

Different bean varieties were grown at various locations in Manitoba from 2016 to 2017. The beans were milled into flour and analyzed for their protein and

*Bread made with 20% black bean flour and 80% wheat flour (left) compared to bread made with 100% wheat flour (right).*



starch contents, pasting properties, water absorption capacity and particle size properties. Pulse flours were blended with wheat flour (20:80/pulse:wheat) and baked into bread (pictured above). Bread quality parameters (e.g., colour, specific volume and C-cell properties) were measured and sensory characteristics (e.g., appearance, aroma, pulse flavour, sweetness, bitterness, after taste and overall acceptability) were analyzed using a trained sensory panel.

Results revealed that variety, growing location and crop year significantly affected the properties of pulse flour. Bread quality and sensory properties were also significantly affected by a combination of these three variables. These results are of practical importance to flour millers and bakers in selecting specific bean varieties

with the desired quality traits for bakery applications.

Knowledge gained from this research is beneficial to the entire pulse value-chain, including breeders, seed companies, producers, pulse ingredient processors and the food industry. These findings will allow breeders to target specific end-use quality characteristics as part of their breeding program, leading to variety development that meets marketplace demands. Pulse processors may also be able to control some of this variability by sourcing specific varieties from producers. ▶

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