

# Evaluation of Nutritional, Physico-Chemical and Cooking Quality Traits in Manitoba-Grown Dry Beans for Breeding Use

Quality traits were affected by interactions between cultivar, location and year, but cultivar accounted the most variability in all traits except for phytic acid content.

**RELEASES OF CULTIVARS** with high yield, disease resistance and marketable quality attributes are crucial to sustain dry bean production. While much attention is given to yield gains and disease resistance, quality and food value breeding have been largely limited to visual screening. Quality attributes of dry beans for human consumption include, but are not limited to: chemical composition (protein, moisture, ash, starch, phytic acid content), cooking quality (cooking time, firmness of cooked beans) and physical characteristics (seed weight, water hydration capacity). The quality of dry beans depends on many factors including cultivar, growing location and year. However, there is little information available on the effects of these factors and their interactions on dry beans grown in Manitoba. The quality traits in the breeding materials needed to be

fully characterized to assist breeders with improving quality of beans in their breeding programs.

Twenty dry bean breeding lines, which are frequently used in crossing in the AAFC Morden Dry Bean Breeding Program, were evaluated for genetic variation in quality traits. These lines were grown at both Morden and Portage la Prairie in Manitoba in 2013 and 2014 to quantify the variability in quality across environment, as well.

Cultivar, growing location and year all had a significant effect on seed weight, water hydration capacity, cooking time, protein, starch and phytic acid content. Most of the traits were also significantly affected by various levels of interactions between cultivar, location and year. Cultivar accounted for most of the variability in all quality characteristics except for phytic acid content (see below).

Seed weight was negatively correlated with protein and ash content, but it positively correlated with starch content. Cooking time was negatively correlated with protein, ash and phytic acid content, but it positively correlated with firmness. Phytic acid level in beans was positively correlated with ash content.

Knowledge gained from this study will help bean breeders to select parental lines for crossing and cultivar development for desirable traits within various market classes. The Canadian Grain Commission recently initiated a complementary study, investigating the effect of cultivar and growing location on dietary fibre (soluble, insoluble and total fibre) and anti-nutritional factors (trypsin inhibitor activity, oligosaccharides), which rounds out the comprehensive assessment of important quality attributes. ▶

Contributions to variance of quality traits of beans grown in Manitoba at two locations in 2013 and 2014. SW = seed weight; WHC = water hydration capacity; T = cooking time; FIRM = firmness of cooked seed; and PA = phytic acid.

