Wheat Ovary Size Depends on Cell Number

Wheat productivity can be increased by increasing kernel size, which is related to ovary size. It is not known whether environmental factors that affect kernel size may also affect ovary size, thus maintaining the kernel size-ovary size correlation. Additionally, it is not known whether variations in ovary size in wheat depend on cell size, cell number, or both.

In an article recently published in *Crop Science*, researchers measured ovary size and the cell size and number of the equatorial cross-sectional areas of the ovary wall in two wheat cultivars with very different kernel size (Bora, large kernels, and Bologna, small kernels). Plants were grown at low and high nitrogen availability (0 and 240 kg ha$^{-1}$) and at low and high plant density (200 and 650 seeds m$^{-2}$).

The variation in ovary wall size across all data pooled came out related to cell number and not to the cell size, which did not vary significantly with cultivar and field practices. Cell size in the ovary wall showed an upper limit across all treatments, which decreased with increasing cell number. These findings may be useful for breeding programs and field practices aimed at increasing kernel size and yield.


Deployed Resistance to Common Blight Not a Drag

Many crops may rely upon wild germplasm and related species to provide novel genes for improving disease resistance. Such genes are transferred from the exotic sources into commercial lines using backcross breeding, recurrent selection, or other means. Such resistance genes, when introduced into a commercial background, often result in reduced yield and quality, due to linkage drag effects.

Common bacterial blight is a severe seedborne disease that limits dry bean production worldwide. The genes conferring the highest levels of resistance to common blight in dry bean derive from tepary bean, a related cultivated species from the tertiary gene pool.

In an article recently published in *Crop Science*, researchers documented the effect that two well-known tepary-derived genes for quantitative resistance (QTL) to bacterial blight had on yield and quality traits when transferred into a popular commercial dry bean cultivar. Six backcrosses to the recurrent commercial parent were used to incorporate the genes. Advanced backcross inbred lines with and without the genes were compared across five environments. One gene had a slightly negative impact on canning quality. But the genes protected yield in diseased plots as expected and, even more importantly, did not drag down yield nor seed size in clean plots.

This work provides another example of novel genes from exotic sources having enormous importance in breeding disease-resistant cultivars for current and future generations.

Adapted from Miklas, P.N., D. Fourie, B. Chaves, and C. Chirembe. 2017. Common bacterial blight resistance QTL BC420 and SU91 effect on seed yield, seed weight, and canning quality in dry bean. *Crop Sci.* 57. View the open access article online at http://dx.doi.org/doi:10.2135/cropsci2016.06.0557

Ovary semi-thin cross-sections for the small-grain cultivar Bora (A) and the large-grain cultivar Bologna (B) of wheat. The dark line indicates the position where ovary wall cell size was detected. ow, ovary wall; es, embryo sac.

Common bacterial blight of beans. Source: Howard F. Schwartz, Colorado State University, Bugwood.org.