Agronomic Responses of *Brassica carinata* in the Northern Great Plains

*Brassica carinata* seeds contain high erucic and linolenic acids that are desirable for biofuel and biopolymer products. However, little is known about how to maximize carinata productivity in the Northern Great Plains. A research team at Agriculture and Agri-Food Canada investigated key agronomic practices at nine site-years from 2014 to 2016, and their results are published in the November–December issue of *Crop Science*.

The researchers found that weed biomass with the herbicide-applied treatment was 245 kg dry weight ha$^{-1}$, significantly lower than 1,338 kg dry weight ha$^{-1}$ with the non-herbicide treatment, leading to 37% greater seed yield. In four of the nine site-years, N fertilizer at the medium (75–198 kg N ha$^{-1}$) and high (117–297 kg N ha$^{-1}$) rates increased seed yield by 29 and 45%, respectively, compared with the low (32–97 kg N ha$^{-1}$) N treatment, but N fertilizer did not affect seed yield in the remaining five site-years. Increasing seeding rates from 50 to 300 seeds m$^{-2}$ decreased weed biomass and increased seed yield significantly.

Seed oil and protein contents ranged from 37.2 to 48.5% and 22.6 to 36.3%, respectively, and these two traits had an inverse linear relationship.

The research team demonstrates that carinata can be well adapted to the Northern Great Plains as an alternative oilseed crop and that seed yield and quality responses to agronomic factors vary with environmental conditions.


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Trait Focus Is Important for Improving Corn Nitrogen Use

Maize (*Zea mays* L.) yield increases associated with better use of nitrogen fertilizer will require innovative breeding efforts. Typically, developing a maize hybrid involves several breeding cycles over many years. Selecting the best hybrids by examining desirable genomic traits may speed up the process for breeding programs targeting for improved nitrogen-use efficiency in maize. Breeders use a set of tested hybrids to build the genomic prediction model, referred to as a training population. However, for an efficient breeding program, knowledge of the optimal size and composition of the training population is necessary for the most accurate genomic prediction model.

A recent article in *Crop Science* highlights the interactions of training population sizes and compositions using a diverse set of germplasm previously used in the development of commercial hybrids in the U.S. Corn Belt. Genomic selection accuracy was greatest with larger training populations and when both parents of untested hybrids appeared in the training and validation sets and depended upon the nitrogen use trait.

Traits associated with plant nitrogen partitioning and redistribution to the grain were highly correlated to yield under low nitrogen fertilizer conditions while traits associated with the yield response to nitrogen fertilizer were correlated to yield under high soil nitrogen conditions. A corn breeder’s effectiveness in selecting hybrids for improved nitrogen use efficiency will first depend upon prioritizing the desired trait and defining the best training composition to the prediction model.

Adapted from Mastrodomenico, A.T., M.O. Bohn, A.E. Lipka, and F.E. Below. 2018. Genomic selection using maize ex-plant variety protection germplasm for the prediction of N-use traits. *Crop Sci.* 59. View the full open access article online at http://doi.org/10.2135/cropsci2018.06.0398

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