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Producers Control Longevity of Wheat Midge Tolerance

Producers will need to take some special steps to maintain the wheat midge tolerance in new wheat varieties – varieties that were developed with producer funding through the Western Grains Research Foundation.

Seed from the new varieties will continue to be increased in 2008. Some limited quantities may be commercially available in 2009. The new varieties should result in large savings across a broad region of the Prairies where the orange blossom wheat midge often causes substantial losses.

Producers currently try to control wheat midge fly with insecticides, but it's difficult to assess which fields need spraying and the window for effective application is short. Insecticides also destroy beneficial parasitoids of midge. With the new wheat midge tolerant varieties, there should be a significant drop in the use of costly insecticides

The tolerance originates from the Sm1 gene that came from old American soft red winter wheat varieties. It took more than 15 years for researchers at Agriculture and Agri-Food Canada in Swift Current and Winnipeg to move the trait into spring wheat varieties that also boast superior yield and agronomic traits.

"The wheat midge tolerance is produced by the early induction of two naturally occurring compounds within the wheat kernels," explains Ron DePauw, a long-time wheat breeder with Agriculture and Agri-Food Canada at Swift Current. "Due to these compounds, wheat midge larvae are not able to develop when feeding on immature kernels. These compounds dissipate by the time the crop has matured."

This is the only known gene that confers tolerance to wheat midge. Unfortunately, tolerance based on a single gene has a history of breaking down. That's why producers will be asked to take special measures when using the new varieties.

An interspersed refuge system, using blends of a midge tolerant variety with a susceptible variety will be used to prolong the life of the tolerance.

If a midge tolerant variety were grown as a pure stand, the only midge surviving in the field would carry a mutation that allows survival despite the presence of the Sm 1 gene. The virulent midge would mate with other virulent midge and quickly build up a large virulent population.

The interspersed refuge will involve blending 90 per cent of a midge tolerant variety with 10 per cent of a susceptible variety. Non-virulent midge will survive on the 10 per cent susceptible plants and inter-mate with any virulent midge. The progeny of this cross will be non-virulent.

"This could extend the effective life of midge tolerance from as little as 10 years to 90 years or longer," notes DePauw.

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Over a period of years, the 10 per cent susceptible portion of the seed blend sold to producers is likely to decrease due to wheat midge damage.

“Producers funded the research with their check-off dollars to help develop these tolerant varieties,” explains Lanette Kuchenski, executive director with the Western Grains Research Foundation. “Now it will require the responsible actions of producers to preserve the midge tolerance into the future.”

Producers will need to test their farm saved seed to make sure the 10 per cent refuge is being maintained and/or they will need to repurchase certified seed every two or three years. Specific recommendations will be developed before the seed is released commercially.

Three of the varieties registered in February of 2007 are Canada Western Red Spring (CWRS) wheat. Two of these will be distributed by SeCan and one will be distributed by FarmPure Seeds. The other registered variety is Canada Western Extra Strong (CWES) wheat and will be distributed by Fauschou Farms.

Estimates generated by Agriculture and Agri-Food Canada put the western Canadian loss from wheat midge in 2006 at over \$40 million. Roughly half that amount was from yield reduction with the other half coming from the grade loss due to midge-damaged kernels.

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