BIG LOSSES COME IN SMALL PACKAGES

PREPARED FOR SASKSEED

The orange blossom wheat midge might be difficult to see but the economic losses it causes are hard to ignore.

A few years ago, it was estimated that economic losses caused by the tiny insect — which measures three millimetres from front to rear — cost western Canada's wheat farmers nearly $40 million.

Midge damage occurs when midge larvae feed on developing wheat kernels. Affected kernels are shrunken and deformed, leading to reduced yields and grade-related losses.

Work on developing midge tolerant wheat varieties began in 1996 when genetic resistance to the midge was detected in some soft winter wheat varieties.

By 2002, scientists in Winnipeg had isolated the single gene that confers resistance. That gene is known as Sm1.

By 2010, the first midge tolerant varietal blends of certified CWRS wheat seed were being commercially grown by Western Canadian grain producers.

When the midge begins to feed on midge tolerant seed, the Sm1 gene causes naturally occurring organic acids in wheat kernels to rise more quickly than they would in plants that do not contain the Sm1 gene.

The higher acid levels cause the midge larvae to stop feeding, eventually resulting in starvation.

Basing tolerance on a single gene is a precarious strategy.

To preserve the efficacy of the Sm1 gene, plant breeders employed a strategy known as an interspersed refuge system.

To prolong tolerance, the wheat seeds that contain the Sm1 gene are sold as part of a varietal blend or VB, which contains roughly 90 percent midge tolerant seeds and 10 percent midge susceptible seeds.

Midge susceptible seeds are known as the refuge variety.

If the midge-tolerant or Sm1 seeds were grown in a pure stand without a refuge variety, the vast majority of midge would perish but a small number of naturally occurring virulent or resistant midge would survive.

The surviving midge population would mate, multiply and eventually build up a large virulent population.

But in varietal blends containing midge tolerant and midge susceptible seeds, a small number of non-virulent midge — those that feed on the refuge — would also survive.

The survival of both virulent and non-virulent midge would result in mating between virulent and non-virulent insect types and the offspring will be non-virulent.

To protect the midge tolerant technology, the seed industry drafted a unique stewardship agreement that must be honoured by all commercial growers who buy the seed.

Farmers who buy midge tolerant wheat seed from a pedigreed seed producer are required to sign a midge tolerant wheat stewardship agreement.

By signing the agreement, producers agree to limit the use of farm-saved seed to one generation past certified.

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