



QUESTIONS FREQUENTLY ASKED BY SEED GROWERS

As a certified seed grower of specific varieties, how can I sell a blend of varieties?

Federal Seeds Regulations are being changed to permit the sale of pest tolerance management (PTM) varietal blends. These are blends of specific varieties to manage pest tolerance characteristic(s) of a variety.

How should midge tolerant wheat varietal blends be identified on tags and invoices?

To identify midge tolerant wheat varietal blends on pedigreed seed tags and invoices, the names of the tolerant variety and the refuge variety (from CSGA crop certificates), such as “UNITY-WASKADA” or “GOODEVE-INTREPID”, should be followed by the crop kind name, “WHEAT varietal blend”.

We seed growers promote certified seed varietal purity and now we are selling a blend? Why must these midge tolerant varieties be blended?

Blending a refuge variety with these midge tolerant varieties is the only method that wheat breeders and entomologists have recommended to maintain long term effectiveness of the midge tolerance gene. There have been no changes in any of the certified seed and crop purity standards which all still apply to these midge tolerant wheat varietal blends.

How do I receive a 2010 crop certificate for midge tolerant wheat?

GenServe Labs will accept samples from the 2010 crop beginning **October 1, 2010** and have advised distributors that your test results should be available within two weeks from the date that their lab receives your sample.

In order to receive a 2010 crop certificate, for EACH inspected field (*CSGA Crop Sequence Number*) of midge tolerant wheat:

- a) Submit a clean 500 gram (note this is increased from 250 grams last season) sample to GenServe Labs in Saskatoon along with the GenServe Lab Sample Submission Form available in the Media & Industry/Resources section of www.midgetolerantwheat.ca or on www.src.sk.ca. You can make copies as required. Refer to the procedures on the GenServe Labs Sample Submission form. To reduce retesting costs, please do not submit hand cleaned samples. Some of these have shown a great degree of variability from cleaning plant samples.



- b) Once you receive your midge refuge test results:
- i. If you have the correct % of refuge, based on the pedigreed class of seed and Acceptable Range on the *Refuge Declaration* (Form 182), complete and submit the *Refuge Declaration* to the CSGA office.
 - ii. If your sample does not have the correct % of refuge, you may have to demote to a lower pedigreed class or remediate the seed lot by blending to correct the refuge content. After remediation blending, re-submit a sample for a second test. Once that test result confirms that the refuge % is within an Acceptable Range, a *Refuge Declaration* should be completed and sent to CSGA for a crop certificate.

GenServe Labs 2010 Fee Schedule for Midge Tolerant Wheat Refuge Testing

| Class of Seed | Actual Number of Seeds Tested | Cost per Sample Submitted |
|---------------|-------------------------------|-----------------------------|
| Select | 940 | \$400 (\$440 including tax) |
| Foundation | 376 | \$175 (\$195 including tax) |
| Registered | 376 | \$175 (\$195 including tax) |
| Certified | 188 | \$100 (\$110 including tax) |

In 2009 the distributors invoiced seed growers for refuge testing. In 2010 GenServe Labs will invoice seed growers directly for this refuge testing.

Watch for more updates on midge tolerant wheat stewardship and testing from your variety distributor during the season. Contact your **midge tolerant wheat variety distributor** if you have more questions on refuge testing.

Where can I find the sample submission procedures and form for midge tolerant wheat refuge testing?

The GenServe Labs Sample Submission Procedures and Form is available in the Media & Industry/ Resources section of www.midgetolerantwheat.ca or on www.src.sk.ca.

Do all midge tolerant wheat varieties use the same form of tolerance?

Yes, all varieties contain the *Sm1* gene which provides midge tolerance.

How does the *Sm1* gene work?

When the insect begins to feed on the seed, the *Sm1* gene causes the level of phenolic compounds (naturally occurring organic acids in wheat kernels) to elevate more rapidly than in wheat kernels without the *Sm1* gene. The higher levels of phenolic acids cause the midge larvae to stop feeding and the larvae starve to death.



The mechanism that triggers the production of phenolic acids does not operate if midge larvae are not feeding on the seed, and in addition, these acids are gone by the time wheat reaches maturity – thus not affecting the quality or food value of the harvested grain.

Why is the *Sm1* gene likely to break down?

The *Sm1* gene does not change or “break down”. However, the *Sm1* gene is single gene insect resistance, which has a history of becoming ineffective over time as insect populations change. Since a small number of midge carry a mutation allowing them to attack varieties carrying the *Sm1* gene and survive (referred to as virulent midge), these can mate with other virulent midge and quickly build up a large population that can feed on wheat varieties with the *Sm1* gene. The objective of the interspersed refuge is to slow down the potential shift in the midge population towards the virulent biotype.

What is an interspersed refuge system?

An interspersed refuge system means that refuge wheat varieties (such as AC[®] Waskada, AC Intrepid, or AC[®] Burnside), that are susceptible to midge feeding, are evenly distributed (inter-seeded) throughout the field. This is different to the *Bt* corn refuge management system where the refuge is grown as a block beside or within the same field.

How does the interspersed refuge system work?

In an interspersed refuge system, non-virulent midge survive on the 10% susceptible plants interspersed throughout the wheat field. The non-virulent midge inter-mate with virulent (resistant) midge. The progeny of this cross are non-virulent. This prevents a build up of virulent midge, and could extend the life of midge tolerance to 90 years or longer.

Could the refuge variety (10%) of the crop be really damaged by the pest?

Yes, under very heavy midge infestation, it is possible that the refuge variety could be severely damaged.

Has this midge tolerant system proven to be as effective as spraying Lorsban?

There is very little experience yet with field scale production of varieties carrying the *Sm1* gene and comparing it with field scale use of insecticides. However, field research suggests that the *Sm1* gene is very effective in protecting the crop from large scale losses in yield due to wheat midge. There may be some down-grading in varieties carrying the *Sm1* gene since midge larvae need to feed on wheat kernels before they die.



Why is it necessary that farmers limit the use of farm-saved seed to one generation past Certified Seed?

The varietal blend will change over time, especially under heavy insect pressure. For example, under extremely heavy midge infestation, the susceptible refuge variety could sustain up to 50 percent yield loss. To keep the refuge at the desired level of 10 percent of the plant population, the use of farm-saved seed beyond one year will be prohibited. At present, the test to measure the level of the refuge variety has not been validated to the point where it is commercially available. It is currently being used by seed growers to measure the level of refuge varieties in high generation pedigreed seed. This test should become more widely available in the future.

Based on what we know today, the best way to preserve the midge tolerance is to not use farm-saved seed beyond one generation from certified and to purchase certified seed at least every two years.

Who pays for the DNA test required to verify the recommended 90:10 ratio of tolerant:refuge varieties?

Seed growers pay for the DNA test to verify the refuge variety is present in the correct proportion before the certified seed is sold. As a general rule, whoever owns the certified seed pays for the seed testing to ensure the refuge is present.

Once a test is commercially available, farmers would be expected to pay the expense of testing farm-saved seed – this cost is offset by midge tolerance preservation benefits and reduced insecticide applications. Farm-saved seed that falls below the recommended refuge level should be sold as commercial grain.

Is there extra cost with midge tolerant wheat production?

Yes, there will be extra costs associated with producing a pedigreed blend of two wheat varieties. However, developers and distributors of midge tolerant wheat varieties are trying to keep the extra costs as low as possible so seed can be priced at a reasonable level. The federal government has also recognized the environmental and producer value of preserving this new technology and provided funding to help with various aspects of commercializing the midge tolerant wheat varieties (e.g. industry and producer education).



Is this a GMO?

No. The *Sm1* gene is a naturally occurring gene in wheat which was incorporated into CWRS through crossing with a winter wheat variety from the U.S. This crossing used traditional plant breeding techniques, not transgenic technology.

Why is it necessary for farmers to sign a stewardship agreement?

The stewardship agreement is necessary to make sure that the importance of the refuge is communicated to farmers and that refuge variety levels are maintained. We need to preserve midge tolerance so that farmers can continue to benefit from this technology. The agreement ensures that all farmers will maintain the interspersed refuge system in midge tolerant wheat. This is necessary to preserve midge tolerance because:

- The tolerance is based on a single gene, which has a history of becoming ineffective over time. An interspersed refuge system could extend the life of midge tolerance from as little as 10 years to 90 years or longer.
- It took researchers more than 15 years to move this single gene into spring wheat varieties.
- No other known source of midge tolerance has been identified so we all need to work together to maintain this valuable trait for today and for generations to come.