The Woes of Feral/Volunteer rye in Small Grain Seed Production Fields

Kyle Gustafson – South Dakota Crop Improvement Association

What is the problem?

In recent years popularity in rye has grown. It is a cheap source for a winter-hardy plant that has high biomass production. Rye is a small grain and can be grown for purposes similar to other small grains such as winter wheat. Unfortunately, when rye grows in areas it wasn't intended for, it becomes volunteer/feral rye. In the table below from Washington State University, you can see some of the similarities and differences between rye and wheat.

Table 1. Physical characteristics differentiating winter wheat from feral rye.

Plant part	Wheat	Feral rye
Stem	Erect and freely branching at base, 24–40 inches tall.	Larger and longer than wheat.
Leaf	Blade 0.4–0.8 inches wide, usually dark green.	Coarser and more bluish than wheat.
Ligule*	Membranous and fringed with minute hairs.	Membranous.
Auricle**	Purple changing to white, sharply curved, and always present	White, narrow, and wither early.
Seed head	From 2 to 5 inches long, oblong or elliptical in shape.	Slender, longer than wheat, and somewhat nodding.
Seed	Roughly egg-shaped and light brown to darker shades of red.	Narrower than wheat and usually brownish-olive to yellow.

*An outgrowth from the top of the leaf sheath.
**A small ear-like projection from the base of the leaf.

Source: https://wagrains.org/wp-content/uploads/2020/03/Integrated-Management-of-Feral-Rye-in-Winter-Wheat.pdf

Certified seed (right) versus bin-run seed (left). Note the weed infestation on bin-run seed. (Photo: Neal Foster)

Unfortunately, one of the unintended consequences of introducing rye in many fields is the presence of volunteer/feral rye in the following years. This is especially problematic on certified small grain seed production fields. Rye in small grain certified fields is problematic because:

- Rye is very winter hardy and will usually grow faster than winter wheat.
- When rye is found in winter wheat grown for bread, the dockage will be higher because rye is undesirable due to reducing the baking quality and characteristics.
- Rye's fast growth in the spring makes it more difficult to control, especially in winter wheat where many herbicides limit the growth stages when they can be safely applied without injuring the winter wheat.
- Previous studies show less than 20% of feral rye is still viable 1 year after planting, and less than 5% is viable 2 years after planting (Stump and Westra, 2000). There can be over 1,000,000 plants in a bushel of rye, so even 5% viability 2 years later is still 50,000 seeds. If even 1% of the seed is still viable 5-10 years later, that is 10,000 plants per acre that can grow!
- Rye's seed size is similar to wheat, making it difficult to condition winter wheat and remove any rye in the wheat.
- Rye can have an allelopathic effect on corn (Reese, 2016). To learn more about this effect, click on the following link: https://www.nrcs.usda.gov/plantmaterials/mopmstn2825.pdf


Rye Growing in wheat fields. (Photos: Neal Foster and Kyle Gustafson)

As a result of complications with rye in small grains, the Association of Seed Certifying Agencies (AOSCA) sets tolerances for other crops such as rye in certified wheat, oats, and triticale. There is a zero tolerance policy for rye grown in winter wheat, and the maximum tolerance for rye in spring wheat, oat, and barley seed is 1 seed/pound in Foundation and Registered classes, and 3 seeds/pound in Certified classes of seed.

Where does the Rye Come From?

Rye contamination is very prevalent across many areas of the northern plains. It has many ways it gets transported. Some of the most popular ways include:

- Carryover from use in previous years' cover crop.
- Geese/waterfowl eat rye on fields where it is grown, then transport seed to nearby fields.
- Seed contamination from uncleaned/untested seed.
- Fertilizer contamination from trailers and/or railcars that have hauled rye, or from agronomy facilities that handle and blend both dry fertilizer as well as cover crop blends including rye and mix them in the same facilities.
- Equipment contamination.

So, what can I do to limit Rye contamination?

Unfortunately, eliminating rye from fields that currently have contamination is not a quick process. As mentioned earlier, rye can remain in a field for many years after it is initially planted or contaminated. A few things in your control that you can do to eliminate rye from fields over time include:

- ONLY planting certified seed that is rye free.

- Promoting neighbors to plant small grains other than rye, or plant cover crops containing grasses other than rye to minimize waterfowl contaminating your fields with rye.
- Proper chemical control of volunteer rye (note: controlling rye in early growth stages before it reaches jointing will result in better control versus trying to control rye when it is past jointing or headed out).
- Cleaning semi-trailers and railcars thoroughly after hauling rye grain, cover crops containing rye, or fertilizer that was blended in a facility where rye was also blended. Also, cleaning the blending facility will minimize rye contamination as well.
- Thoroughly clean out a combine after it has harvested rye (or after harvesting a rye contaminated field). Cleaning out other equipment such as tillage tools, or equipment wheels which transport dirt and seeds from one field to the next.
- Rouging rye out of fields (note: you need to completely remove the plant from the field, pulling the plant out of the ground and leaving it lay may still result in seed set and future rye contamination if the rye is mature).

One of the keys to stress is it takes time and diligence to remove rye from production fields. Using multiple methods outlined above over the course of multiple years will eventually reduce feral rye populations. Once feral rye populations have been reduced, remain diligent using the practices outlined above to keep the feral rye populations low in your fields.

Minnesota Guide: https://wcroc.cfans.umn.edu/research/agro-soil/winter-wheat-and-rye

Nebraska Guide: https://extensionpubs.unl.edu/publication/g1483/2007/pdf/view/g1483-2007.pdf

Washington Guide: https://wagrains.org/wp-content/uploads/2020/03/Integrated-Management-of-Feral-Rye-in-Winter-Wheat.pdf

NRCS Allelopathy and Cover Crops Information Sheet: https://www.nrcs.usda.gov/plantmaterials/mopmstn2825.pdf