Control and Elimination of Wild Oats

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Website: extension.sdstate.edu
Phone: 605-688-4792
Email: sdsu.extension@sdstate.edu

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Wild Oats

Wild oats infests approximately 5 million acres of cropland in South Dakota. It decreases crop yield. The amount of decrease is dependent on the severity of infestation and the growing conditions. There are many cases where the grain harvested is half wild oats. In one case, when separated, 4 bushels of wheat and 7 bushels of wild oats per acre were harvested and threshed.

GROWTH HABITS

Wild oats is an annual weed with growth habits similar to those of small grain. It germinates and emerges at approximately the same time as small grain and matures somewhat earlier than most varieties. Some wild oats seeds shatter before harvest and fall to the ground, others are left on the ground by harvesting and threshing operations, and still others are harvested and threshed with the grain. The seeds go through an after-ripening period during the fall. Many wild oats seeds are ready to germinate the next spring.

Small Grain Starts Earlier

Small grain has a competitive advantage over wild oats early in the growing season. Under optimum soil conditions crop seeds germinate immediately and start to emerge in 5 or 6 days and are fully emerged 8 to 10 days after planting. Wild oats seeds on the other hand, germinate and emerge unevenly. Some plants come up in 7 or 8 days, but others emerge every day for 3 weeks. When soil moisture is scarce, small grain emergence is delayed 2 or 3 days. Under these conditions the first wild oats plants do not come up for 2 or 3 weeks and emergence may not be complete for 6 weeks.

Shortly after emergence, oats, wheat, and, especially, barley seedlings have larger root systems than wild oats. At this time a good, uniform stand of small grain has a competitive advantage over wild oats. However, the root system of a wild oat plant develops faster than that of a small grain plant. The wild oats root system is equal to that of some oats varieties in 3 weeks and catches up with other oats and wheat varieties in 4 or 5 weeks and with barley in 6 weeks. At this time wild oats has the competitive advantage and it maintains the advantage until maturity.

After-Ripening Period

The wild oats seeds left in the field must go through an after-ripening period before they will germinate. Many of them go through this period if left on the top of the soil until October and will germinate the next spring. However, they do not after-ripen if covered with soil by disking or plowing before October and do not germinate readily the next spring.

Once the seeds are covered, they apparently remain dormant for a long period. Research data indicate that wild oats seeds remain viable for 2 to 5 years. However, there are fields that have become infested with wild oats after being clean for as long as 10 years. Since no wild oats seeds were planted, it appears that seed in the soil had germinated after being dormant for 10 years or more.

CONTROL METHODS

The use of weed-free seed, proper seedbed preparation, good crop rotations, and sound soil management practices all help to prevent infestations by wild oats. However, once the weed becomes established, special practices such as delayed seeding, post-emergence tillage, use of crops with different growth habits, or selective chemicals are needed to control and eliminate the weed. The goal of an elimination program is to prevent weed seed production. If wild oats are not allowed to go to seed, the supply of seed in the soil will become exhausted in a few years, resulting in elimination of the weed.

Clean Seed

It is always safest to plant certified seed or other seed that is free of wild oats. Any other seed should be thoroughly cleaned before planting.

Wild oats seeds are some of the most difficult seed to remove from small grain. Many of them can be removed from barley or wheat by using a considerable amount of wind in the fanning mill or by use of a disc separator. They are much more diffi-
cult to remove from oats. Therefore, a special machine (figure 1) has been developed for use on oats. However, it is impossible to remove all the wild oats from any small grain seed.

Figure 1. A wild oats cleaner. The grain dribbles downward, but the awns of wild oats catch on the blanket, which rotates. The wild oats is brushed off when the blanket rotates over a wire underneath the machine. Seed is discharged at the center and wild oats at the left.

The important part of this wild oats cleaning machine is a wide blanket on rollers. The blanket is set at an angle of about 60 degrees from the horizontal and the seed enters the top so that it rolls down hill. As the seed rolls, the blanket rolls horizontally and the awns of wild oats catch in the blanket and are carried around with it. Wires underneath the blanket remove the wild oats seeds so that the blanket is clean and ready to collect more seeds on the next revolution. The seed oats is discharged at the bottom and center of the machine, the wild oats at the left side.

The grain should not receive excess handling prior to cleaning. Handling tends to break the awns of the wild oats. If they are broken they will not catch on the blanket and will not be separated from the crop seed.

This machine is inexpensive and practical for use on any farm where wild oats are a problem. The main disadvantage of this wild oats cleaner is that it has a low capacity. No more than 100 or 200 bushels can be thoroughly cleaned in a day.

Early Crop Competition

Tilling the seedbed immediately before planting kills many wild oats seedlings from seeds that germinated before planting the crop. Consequently, crop seeds and remaining weed seeds have an equal chance to produce plants. A firm seedbed enables the crop to emerge earlier and more uniformly than the weed. A thick stand of a fast growing crop will prevent growth of late emerging weeds.

Table 1 shows what one experiment indicates the use of fertilizer placed with barley seed at the normal date of planting will sometimes do to wild oats stands. In this case the fertilizer caused early emergence, rapid growth, and profuse tillering, which produced a thick stand of barley before many wild oats plants had emerged. Crop competition prevented over half of the wild oats plants from developing.

Fall planted crops of winter wheat or rye also produce early, thick crop growth which prevents development of late emerging wild oats plants.

Table 1. Effect of Spring Tillage and Delayed Seeding on Wild Oats Control and Barley Yield With and Without Fertilizer

<table>
<thead>
<tr>
<th>Date of Seeding</th>
<th>Fertilizer</th>
<th>% Wild Oats Killed</th>
<th>Barley bu./A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>none</td>
<td>0</td>
<td>36.3</td>
</tr>
<tr>
<td>Normal</td>
<td>50 lb. 11-48-0</td>
<td>56</td>
<td>39.4</td>
</tr>
<tr>
<td>4 wks. late</td>
<td>none</td>
<td>86</td>
<td>30.3</td>
</tr>
<tr>
<td>4 wks. late</td>
<td>50 lb. 11-48-0</td>
<td>84</td>
<td>29.4</td>
</tr>
</tbody>
</table>

Delayed Seeding

Spring tillage before planting a crop late in May kills many wild oats seedlings. Harrow and pack the area early in the spring to form a firm seedbed and induce early germination of wild oats. After the wild oats emerge, kill them with cultivation before the crop is seeded.

Seeding of small grain is delayed, because wild oats do not come up early enough to be killed before the normal date for seeding grain. The late seeding generally results in lower than normal crop yield. This disadvantage can be partially overcome by using early maturing varieties.

Late seeded crops, such as corn, soybeans, sorghum, sudangrass, or millet, can be seeded at the normal seeding date after wild oats have been killed with spring tillage.

Results from one experiment in table 1 show that spring tillage before seeding barley, 4 weeks later than normal, killed about 85% of the wild oats. Late seeding resulted in a reduced crop yield.

Crop Rotation

Since wild oats and small grain have similar growth habits, most cultural practices essential for producing a good small grain crop are also conducive to the production of wild oats. Therefore, it is essential to grow crops that do not have the same life cycle as the weed in order to eliminate the weed or to prevent initial infestation.
Table 2. Percentage of Wild Oats in Harvested Grain from Each of Two Rotations After They Had Been in Use for 30 Years

<table>
<thead>
<tr>
<th>Crop</th>
<th>% wild oats in harvested grain</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4-year rotation</strong></td>
<td></td>
</tr>
<tr>
<td>Fallow</td>
<td>1.8</td>
</tr>
<tr>
<td>Wheat</td>
<td>6.5</td>
</tr>
<tr>
<td>Oats</td>
<td>10.3</td>
</tr>
<tr>
<td><strong>6-year rotation</strong></td>
<td></td>
</tr>
<tr>
<td>Fallow</td>
<td>0</td>
</tr>
<tr>
<td>Grass-legume</td>
<td>0</td>
</tr>
<tr>
<td>Grass-legume</td>
<td>0</td>
</tr>
<tr>
<td>Wheat</td>
<td>0</td>
</tr>
<tr>
<td>Oats</td>
<td>0</td>
</tr>
</tbody>
</table>

Perennial forage crops, row crops, and fall-seeded crops do not have the same life cycle as wild oats and are useful in preventing infestation and for eliminating the weed. Frequent cutting or grazing of hay or pasture crops prevent wild oats from going to seed. Likewise, thorough cultivation of row crops kills the wild oats plants before they produce seed.

The data in Table 2 show that, after 30 years of a 4-year (summer fallow, wheat, wheat, oats) rotation, wild oats is still a serious problem. The weed became thicker each year that small grain was raised. The first wheat crop after a summer of fallow contained almost 2%; wild oats in the threshed grain. The next wheat crop contained 6.5%; wild oats, and the third crop was 90% oats and 10% wild oats.

A similar rotation that was expanded to a 6-year rotation by growing a grass-legume mixture for 2 years between the two wheat crops had eliminated the weed. During 3 of the 6 years, wild oats were not allowed to go to seed and the seed supply in the soil was exhausted. A grass-legume mixture frequently causes wild oats seed to remain dormant and go through an after-ripening process. Many seeds will germinate and produce a thick stand of wild oats after the sod is plowed. Therefore, better wild oats control is usually obtained if a cultivated row crop is planted the first year after plowing a mixture. The row crop may not be needed after two or three cycles of the rotation.

Fall-seeded crops, such as winter wheat or rye, are also useful in a rotation. They start growth ahead of the weed in the spring. This early start enables them to compete more strongly then later emerging spring-seeded crops.

Chemical Control Pre-emergence

A chemical sold under the brand name of “Avadex” normally reduces the stand of wild oats 75 to 100% in flax, barley, wheat, or sugar beets at a cost of $3.50 to $4 per acre for the chemical. Apply at the rate of 1 1/2 pounds of active ingredient (1 1/2 qts.) per acre in flax or sugar beets and 1 1/4 pounds (1 1/4 qts.) in barley or wheat. Spray on a smooth soil surface just before planting or just afterwards. Incorporate the herbicide into the soil with a harrow so that it can be absorbed by young wild oats seedlings before they emerge.

Preliminary research data indicate that “Avadex” is absorbed by shoots of wild oats and by the roots of wheat. Therefore, a layer of chemical must be above the planted grain, where the shoots of wild oats must grow through it, but above the area where crop roots will come in contact with it.

“Avadex” seldom injures flax or sugar beets, but does occasionally damage wheat and barley, especially when incorporated too deeply. In fields where wild oats are not a problem every year, the cost of the chemical may be more than is practical to spend for wild oats control before knowing that wild oats will be a problem that year.

This chemical is not effective when a deep-furrow drill is used for seeding the crop. Chemical applied before planting is moved out of the row by the drill. Chemical applied after planting cannot be applied to a smooth soil surface. The harrowing required for incorporation fills the furrows, nullifying some of the advantages gained from the use of this implement.

Data obtained in 1961 indicate that crops were not damaged by a pre-emergence application of “Avadex” for wild oats control and later treatment with 2,4-D or MCPA for broad-leaved annual weed control in wheat or barley. Likewise, there appeared to be no damage to flax with a pre-emergence application of “Avadex” and later treatment with 2,4-D, MCPA, or dalapon for broad-leaved annual weed and foxtail control.

Chemical Control—Post Emergence

Barban is a chemical that is sold under the brand name of “Carbyne” and is useful for the control of wild oats in wheat, barley, flax, and sugar beets at a cost of about $12 a pound of active ingredient for chemical.

Spray barban on the crop when wild oats is in the 2-leaf stage of growth (figure 2) at the rate of ¼ pound active ingredient (1 qt.) per acre in flax, ½ pound (¼ gal.) in wheat or barley, and ¾ pound (3 qts.) in sugar beets. Use a fine spray (50 pounds pressure and 5 gallons or less of spray per acre) to get the chemical on the leaf axil of each wild oat plant.

Be sure the sprayer is calibrated correctly. Too little chemical will not kill the weeds and too much may damage the crop.

Be sure the wild oats are in the 2-leaf stage. As much as 95% control can be obtained in this stage, whereas, only 70-75% control can be expected if the
Proper timing of Carbyne application is important.

Figure 2. Control of wild oats with barban (Carbyne) is most effective when application is made during the 2-leaf stage. The 2-leaf stage is from the time the second leaf appears to the time the third leaf appears.

Weed is in 1-leaf or 3-leaf stage (figure 2). Wild oats is in the 2-leaf stage for 3 days, starting 8 to 10 days after emergence in a normal year and 10 to 20 days after emergence during a dry year. Count the leaves on all the wild oats on a square foot of land. When 60 to 70% of the plants have two leaves, it is time to spray. Many times this will be before or during corn planting time.

The use of barban in conjunction with other chemicals (2,4-D, MCPA, and dalapon) for control of wild oats, foxtail, and broad-leaved weeds may be possible. In normal years wild oats will be ready to spray before foxtail or broad-leaved weeds are ready. Usually barban will be applied a couple of weeks before 2,4-D, MCPA, or dalapon are applied to control broad-leaved weeds in small grain or flax or foxtail in flax. However, once in awhile the wild oats may not be ready before the other weeds are up. In a few such cases, it may be possible to spray with a solution of barban and 2,4-D or MCPA and dalapon at one time.

A limited amount of data obtained in 1961 indicate that yields of wheat and barley were not reduced by applying barban mixed with 2,4-D or MCPA in one application or by applying the barban alone and the 2,4-D or MCPA about 2 weeks later. The split application with 2,4-D or MCPA or a mixture of 2,4-D or MCPA and dalapon being applied about 2 weeks after treatment with barban in flax appeared to cause some damage to flax, but a single treatment including two or three chemicals did not injure flax.

Also a limited amount of data indicate that barban will not be effective when mixed with 2,4-D or MCPA if the mixture contains more 2,4-D than barban.

Crop competition seems to be essential for effective control with barban. It kills many wild oats plants, but only stunts the growth of others. Competition from the crop prevents development of the stunted plants or those that emerge after spraying. Consequently, more chemical is needed in row crops and poor results are sometimes obtained in thin stands of small grain or grain suffering from lack of fertility. Good seedbed preparation, use of high germinating seed, and placement of fertilizer with the seed all aid in increasing the crop's competitive ability. Poor weed control is quite common when exceptionally heavy stands of wild oats are sprayed. Good spray coverage on leaf axils is not obtained and there is a lack of crop competition.

Barban seldom damages wheat, barley, or sugar beets, but is more injurious to flax than is "Avadex."

Crops sprayed with barban should not be fed to livestock for at least 8 weeks after spraying.


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