



Agronomy Facts 5

Quackgrass Management: An Integrated Approach

- Quackgrass is a cool-season perennial grass species with the potential to cause major problems in many different cropping systems.
- Manage quackgrass using an integrated approach that includes preventive, cultural, mechanical, and chemical tactics.

Prevention

- Prevent quackgrass spread by controlling isolated patches in and around fields and by cleaning rhizomes and seedheads from tillage and harvesting equipment before leaving fields.

Cultural Control

- Encourage aggressive crop growth through good cultural practices such as maintaining adequate soil fertility, choosing appropriate high-yielding crop varieties, and regularly scouting for and managing pests.
- Include in the rotation crops that allow timely application (for example, fall treatments) of effective herbicides or mechanical control options.

Mechanical Control

- Mowing, plowing, and disking are some commonly used mechanical control methods in agronomic crops.
- Vigorous tillage before or after an effective herbicide treatment provides good control of quackgrass.

Chemical Control

- Herbicides are important for quackgrass management, but use them in combination with other control methods.
- Several pre- and postemergence herbicides provide good control of quackgrass in-crop. More herbicide options are available for use in soybean than in other crops.
- Timely glyphosate application(s) in Roundup Ready crops or “burndown” treatments during a fallow period in early spring or fall can provide effective control of quackgrass.

Quackgrass (*Elytrigia repens*) is a widespread, persistent, cool-season, grassy weed found in Pennsylvania row and forage crops. This competitive perennial grass can reduce crop yields up to 95 percent. It can be managed with a consistent integrated program combining preventive, cultural, mechanical, and chemical methods.

An extensive system of underground stems—or rhizomes—makes quackgrass difficult to control. Rhizomes store large energy reserves that enable the plant to over-winter and produce vigorous new shoots in the spring. Because severed rhizomes can produce new plants, mowing or tillage does not prevent resprouting. An aggressive rhizome system will spread into adjacent areas. Under good conditions, a small

patch of quackgrass can increase 6 feet in diameter during one growing season.

Two key features distinguish quackgrass from other grasses: (1) pointed, yellowish-white rhizomes that become brown and scaly as they mature; and (2) a pair of winged projections—or auricles—that clasp the stem like claws at the base of the leaf blade. Quackgrass stands erect and can have many tillers. It grows 1.5 to 3 feet in height. Its bluish green leaves can be smooth or hairy. The spike seed head resembles that of ryegrass.

An integrated management program combines control methods to reduce quackgrass competition with crops. The

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Seedhead

Claspings
auricles

Rhizome

methods may be preventive, cultural, mechanical, or chemical. The goal of an integrated program is to provide reliable and effective weed control, while minimizing environmental hazards.

PREVENTION

Once introduced into a field, quackgrass is nearly impossible to eradicate. Creeping rhizomes are responsible for most new infestations, but contaminated manure and crop seed can also introduce quackgrass into an area.

To prevent infestations from spreading, spot treat with an effective herbicide to control isolated patches of quackgrass in fields, along fencerows and roadsides, and in noncrop areas. Clean and remove rhizome fragments from plows, disks, and harrows to avoid introducing fragments or seeds into other areas. Harvest infested fields last. Do not spread manure containing quackgrass seed, and use only certified crop seed. Although preventing quackgrass infestations requires extra effort, keeping it out of a field is far less expensive and time consuming than controlling the weed once it becomes established.

GENERAL CULTURAL CONTROL

Competition from crops is an important factor in minimizing the spread of quackgrass. The following cultural practices help crops compete with weeds:

- Follow soil test recommendations for lime and fertilizer.
- Plant high-yielding varieties adapted to climate, soil, and field conditions.
- Plant when soil temperatures are optimal, using narrow row spacings and high plant populations.
- Scout fields regularly for diseases, insects, and weeds, and control them when necessary.
- Include crops in the rotation that provide early competition, such as alfalfa or small grains.

Corn for grain is more competitive than corn for silage, since the grain is not removed as early in the season. However, after silage harvest, a timely fall herbicide application to control quackgrass is more feasible.

MECHANICAL CONTROL

Mechanical control methods include handpulling, hoeing, mowing, plowing, disking, and cultivating. Handpulling and hoeing are useful for controlling quackgrass in gardens, but are too laborious to be economical on a large scale. While mowing prevents quackgrass seed production in pastures and noncrop areas, it is unsuitable for corn and soybean fields. Frequent mowing can deplete rhizome food reserves but will not eradicate the weed.

Moldboard plowing can significantly reduce quackgrass infestations. A timely disking or field cultivation following plowing will help reduce quackgrass regrowth. Chisel plowing is generally not as effective and often helps spread rhizomes throughout a field.

Disking chops quackgrass rhizomes into small pieces that are more susceptible to herbicides. When possible, disk to a 6- to 8-inch depth several times before planting and use an effective herbicide program. Be careful not to carry rhizomes into other fields when moving the disk.

Cultivating also forces quackgrass to use its food reserves to produce new growth. But unless done frequently or in combination with herbicide treatments, cultivation does not adequately control quackgrass and can even spread rhizomes, making the problem worse. Cultivation is most effective during periods with hot, dry days and warm nights, when the rhizomes are most likely to dry out.

CHEMICAL CONTROL

Herbicides are useful in a quackgrass management program when combined with preventive, cultural, and mechanical methods. To ensure that the herbicides you use are as safe, effective, and economical as possible, always:

- Select the appropriate herbicide for your weed problem and crop. Stage of weed and crop growth, temperature, soil moisture and pH can affect herbicide performance. For suggestions, refer to the *Penn State Agronomy Guide* or consult with your county extension agent.
- Read the label carefully and follow directions. The label provides important information on safe use, application, disposal, and storage.
- Apply herbicides at the proper time.
- Apply the recommended rate to avoid crop injury, soil residues, and poor control.
- Calibrate application equipment several times during the season to ensure that the correct amount of herbicide is applied.
- Wear proper protective clothing and equipment.
- Learn to predict weed problems. Scout fields regularly and record the types and locations of weeds present. Use records to plan an integrated control program.

Control in Field Corn

Several different herbicides may be used in a quackgrass management program for corn. A key to successful management is proper herbicide timing. Quackgrass is generally most vulnerable to an herbicide application during the late spring or fall, when it is actively growing. Applications too early in spring or during the heat of summer often are less effective. In-crop applications alone are not reliable for quackgrass control in no-till corn production. The quackgrass must first be suppressed with tillage or herbicides prior to corn planting.

Preplant or Preemergence Treatments

- **Glyphosate**—(Roundup Ultra Max 5L, Touchdown 4L, others) provides 85 to 95 percent control. Apply glyphosate at 1 to 2 pounds active ingredient per acre (about 1 to 2 quarts depending on the product) in the fall or spring prior to planting. For best results, quackgrass

should be 8 to 12 inches tall and actively growing. Make fall applications before October 1 in northern Pennsylvania, before October 15 in central Pennsylvania, and before October 30 in southwest Pennsylvania. Fall treatments applied after a light frost can be successful, as long as quackgrass is still green and temperatures are relatively warm at application time. Apply glyphosate in 5 to 10 gallons of water per acre. (Some glyphosate products require a nonionic surfactant to be included in the spray solution at 1 to 2 quarts per 100 gallons plus dry ammonium sulfate at 8.5 to 17 pounds per 100 gallons. Refer to product label for additional information.) Plowing 7 to 10 days after application or prior to planting will improve the level of control.

- **Atrazine 4L** or **90DF** and/or
- **Simazine 4L** or **90DF** (Princep)—provide 70 to 80 percent control. Atrazine and/or simazine are effective on quackgrass, but higher rates (up to 2 pounds per acre) generally are needed. A split application gives the most consistent results, with the first treatment being applied as soon as fields are firm in the spring. Apply 1.6 to 2 quarts atrazine 4L (equivalent 90DF) and plow, if possible, prior to planting. On highly erodible ground with less than 30 percent residue, no more than 1.6 quarts atrazine may be applied. Apply 1 to 2 quarts simazine 4L (equivalent 90DF) preemergence or additional atrazine postemergence if needed, but do not exceed a total of 2.5 pounds atrazine per acre per season. Both atrazine and simazine can leave soil residues. If applying more than 1.5 to 2.0 pounds per acre of either chemical or in combination, rotation alternatives are severely limited. See the herbicide label for specific restrictions. Cultivation can be substituted for additional simazine or atrazine, but it is generally less effective. *Products containing atrazine are restricted-use pesticides, and both atrazine and simazine have groundwater advisories on their labels.*
- **Eradicane 6.7E** (EPTC)—provides 65 to 75 percent control. In conventional tillage systems, Eradicane may be applied preplant at 7.33 pints per acre. Incorporate immediately and include some atrazine in the mixture to increase the level of control.

Postemergence Treatments

- **Accent 75WDG** (nicosulfuron) or
- **Beacon 75WDG** (primisulfuron)—provides 80 to 95 percent control. Apply 0.67 ounce Accent 75WDG or 0.76 ounce Beacon 75WDG when quackgrass is 4 to 10 inches tall. Include in the mixture a nonionic surfactant at 1 quart per 100 gallons (0.25 percent v/v) or crop oil concentrate at 4 quarts per 100 gallons (1 percent v/v) per acre with or without nitrogen fertilizer solution (4 quarts per 100 gallons). Corn tolerance to either Accent or Beacon is greatest when the corn is less than 15 inches tall. Do not use or take precautions when using Accent or Beacon on corn that has been treated with organophosphate (OP) insecticides. Other premix products containing nicosulfuron or primisulfuron are also available

including, *Basis Gold 89.5WDG*, *Celebrity Plus 70WDG*, *NorthStar 47.7WDG*, and *Steadfast 75WDG*. Premixtures may require additional Accent or Beacon to be effective on quackgrass.

- **Glyphosate** (Roundup Ultra Max 5L, Touchdown 4L, others)—provides 85 to 95 percent control when applied postemergence on *Roundup Ready corn varieties only*. Apply glyphosate at 1 pound active ingredient per acre (about 1 quart depending on the product) in 10 to 20 gallons per acre from corn emergence to V8-stage (or 30 inches tall). For in-crop applications, do not apply more than 2 pounds active ingredient per acre per season. (Some glyphosate products require a nonionic surfactant to be included in the spray solution at 1 to 2 quarts per 100 gallons plus dry ammonium sulfate at 8.5 to 17 pounds per 100 gallons. Refer to product label for additional information.)

Preharvest/Harvest Aid Application

- **Glyphosate** (Roundup Ultra Max 5L, Touchdown 4L, others)—is labeled for use as a harvest aid in all varieties of field corn. Glyphosate can be applied at a rate of up to 3 pounds active ingredient per acre (about 1 to 3 quarts per acre of product) from a week or more prior to harvest to control quackgrass. Apply when grain has 35 percent or less moisture and after maximum kernel fill is complete and corn is physiologically mature. Do not apply to corn for seed. See product label for additional use information and restrictions.

Control in Soybean

More herbicide control options are available for quackgrass control in soybean than in corn. Since the introduction of aryloxyphenoxypropionate (or post-grass) herbicides and more recently glyphosate-resistant soybean varieties, controlling quackgrass in soybean is generally easier and less expensive than in corn and does not affect rotation flexibility. In crop applications alone are not reliable for quackgrass control in no-till soybean production. The quackgrass must first be suppressed with tillage or herbicides prior to soybean planting.

Preplant or Preemergence Treatment

- **Glyphosate** (Roundup Ultra Max 5L, Touchdown 4L, others)—provides 85 to 95 percent control. Refer to the corn section for application information.

Postemergence Treatments

- **Assure II 0.88EC** (quizalofop)—provides 85 to 95 percent control. Apply 10 fluid ounces per acre postemergence. Always include in the spray solution nonionic surfactant at 1 quart per 100 gallons (0.25 percent v/v) or crop oil concentrate at 1 gallon per 100 gallons (1 percent v/v). Apply to quackgrass that is 6 to 10 inches tall. May require a second application for complete control. Before tank-mixing with broadleaf herbicides, read the herbicide label to avoid reduced grass control.

- **Fusilade DX 2EC** (fluazifop)—provides 85 to 95 percent control. Apply 12 fluid ounces per acre postemergence when quackgrass is 6 to 10 inches tall. Always add crop oil concentrate to the spray solution at 1 gallon per 100 gallons (1 percent v/v). A higher rate of Fusilade or a second application may be required in sodded situations for complete control. Before tank-mixing with broadleaf herbicides, read the herbicide label to avoid reduced grass control.
- **Fusion 2.66EC** (fenoxaprop plus fluazifop)—provides 85 to 95 percent control. Apply 12 fluid ounces per acre with 1 gallon per 100 gallons (1 percent v/v) crop oil concentrate postemergence when quackgrass is 6 to 10 inches tall. May require a second application for complete control. Before tank-mixing with broadleaf herbicides, read the herbicide label to avoid reduced grass control.
- **Glyphosate** (Roundup Ultra Max 5L, Touchdown 4L, others)—provides 85 to 95 percent control when applied postemergence on *Roundup Ready soybean varieties only*. For best results, plant soybean in narrow rows and apply glyphosate at 1 to 2 pound active ingredient per acre (about 1 to 2 quarts depending on the product) in 5 to 20 gallons per acre from soybean emergence through flowering stage. Sequential applications may be necessary for better control. For in-crop applications, do not apply more than 2 pounds active ingredient per acre per season. (Some glyphosate products require a nonionic surfactant to be included in the spray solution at 1 to 2 quarts per 100 gallons plus dry ammonium sulfate at 8.5 to 17 pounds per 100 gallons. Refer to product label for additional information.) Other premix products containing glyphosate are also available, including *Backdraft 1.5L*, and *Extreme 2.17L*. Premixtures may require additional glyphosate to be effective on quackgrass.
- **Poast 1.5EC** or **Poast Plus 1EC** (sethoxydim)—provides 70 to 75 percent control. Apply 1.5 pints Poast or 36 fluid ounces Poast Plus per acre postemergence when quackgrass is 6 to 8 inches tall. Add to the spray solution 2 pints crop oil concentrate plus 1 gallon UAN or 2.5 pounds dry ammonium sulfate per acre. A second application may be needed for improved control. Before tank-mixing with broadleaf herbicides, read the herbicide label to avoid reduced grass control.
- **Select 2EC** (clethodim)—provides 80 to 85 percent control. Apply 8 to 16 fluid ounces per acre with 4 quarts per 100 gallons (1 percent v/v) crop oil concentrate plus 2.5 to 4 pounds per acre dry ammonium sulfate postemergence when quackgrass is 4 to 12 inches tall. Use the lower rate of Select under favorable soil moisture and high-humidity conditions. May require a second application for improved control. Before tank-mixing with broadleaf herbicides, read the herbicide label to avoid reduced grass control.

Preharvest/Harvest Aid Application

- **Glyphosate** (Roundup Ultra Max 5L, Touchdown 4L, others)—is labeled for use as a harvest aid in all varieties of soybean. Glyphosate can be applied at a rate of up to 4 pounds active ingredient per acre (about 1 to 4 quarts per acre of product) from a week or more prior to harvest to control quackgrass. Apply after pods have set and lost all green color (80–90 percent drop of leaves has occurred). Do not graze or harvest the treated crop for livestock feed within 25 days of application. Do not use on soybeans grown for seed. See product label for additional use information and restrictions.

Control in Alfalfa

The best approach to managing quackgrass in alfalfa is prevention prior to crop establishment. Plan ahead by using a tillage and herbicide program that effectively reduces or eliminates quackgrass the year before alfalfa is established. The following herbicides can be used to manage quackgrass in alfalfa:

- **Glyphosate** (Roundup Ultra Max 5L, Touchdown 4L, others)—provides 85 to 95 percent control. Prior to spring establishment of alfalfa, quackgrass often is too small for effective glyphosate application. For spring seedings, apply 1 to 2 pounds glyphosate (about 1 to 2 quarts depending on the product) in 5 to 10 gallons per acre the previous fall. (Refer to the corn section for application information.) For late summer seedings, apply 7 to 10 days prior to planting and till, if possible, after one week. (Some glyphosate products require a nonionic surfactant to be included in the spray solution at 1 to 2 quarts per 100 gallons plus dry ammonium sulfate at 8.5 to 17 pounds per 100 gallons. Refer to product label for additional information.) Do not graze or harvest alfalfa for 56 days following a preplant application of glyphosate.

Preharvest application: Glyphosate is also labeled for use as a preharvest application on declining alfalfa stands prior to crop rotation. Apply before last cutting in fall or spring to control quackgrass. Apply glyphosate at a rate of 1 pound active ingredient per acre (about 1 quart per acre of product) and harvest alfalfa 3 to 7 days after application. Fall glyphosate applications and/or deep tillage after harvest improve control of quackgrass. See product label for additional use information and restrictions.

- **Kerb 50W** (pronamide)—provides 75 to 85 percent control. Kerb may be used in seedling or established alfalfa, birdsfoot trefoil, clovers, and crownvetch that are not seeded with forage grasses. Apply 2 to 3 pounds of Kerb 50W in the fall or early winter before the soil freezes. Apply after soil temperatures have dropped below 50°F. Kerb also is effective on chickweed and winter annual grasses. Do not graze or harvest hay for 120 days following application.

- **Poast Plus IEC** (sethoxydim)—provides 70 to 75 percent control. It may be used on both seedling or established alfalfa. Apply 36 fluid ounces per acre when quackgrass is 6 to 8 inches tall. Add to the spray solution 2 pints crop oil concentrate plus 0.5 to 1 gallon UAN or 2.5 pounds dry ammonium sulfate per acre. A second application may be required for improved control. May be tank-mixed with 2, 4-DB to broaden the weed control spectrum. Do not forage within 7 days or harvest for hay within 20 days following application.
- **Select 2EC** (clethodim)—provides 80 to 85 percent control. Apply 8 to 16 fluid ounces per acre with 4 quarts per 100 gallons (1 percent v/v) crop oil concentrate plus 2.5 to 4 pounds per acre dry ammonium sulfate postemergence when quackgrass is 4 to 12 inches tall. Use the lower rate of Select under favorable soil moisture and high humidity conditions. May require additional application for improved control. Before tank-mixing with broadleaf herbicides, read the herbicide label to avoid reduced grass control.
- **Others.** Prior to alfalfa planting, Eptam 7E can be used to suppress quackgrass. In established alfalfa, other herbicides at higher rates, including Sinbar 80WP (2 to 3 pounds per acre) and Velpar 75WDG (1.33 to 2 pounds per acre), will provide some suppression of quackgrass. See a current herbicide label for specific rate, timing, and application information.

SMALL GRAINS IN ROTATION

There are essentially no herbicides that effectively control quackgrass in small grains. However, rotating to a small grain crop in a cropping sequence provides an excellent opportunity to control quackgrass (and other perennial weeds) once the crop is removed. Once the small grain is harvested, allow the quackgrass to regrow and apply an effective herbicide, such as glyphosate. In Pennsylvania, generally, the best time to apply glyphosate for effective control of quackgrass is from late-September (northern Pennsylvania) through late-October (southern Pennsylvania).

SPOT TREATMENTS AND NONSELECTIVE CONTROL

Use glyphosate (Roundup Ultra Max 5L, Touchdown 4L, others) to kill isolated patches of quackgrass or to clean up a field prior to planting. Glyphosate is nonselective and will injure or kill any plant it touches. Several environmental factors affect glyphosate performance. It is most effective when applied at air temperatures between 50 and 68°F (10 to 20°C). Fall treatments work best after the first light frost. Rainfall within six hours of application will decrease effectiveness. Because glyphosate leaves no soil residue, it will not control weeds that germinate after treatment. See the corn section for rate and timing information.

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