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Crabgrass Management in North Dakota Lawns

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Crabgrasses (*Digitaria* spp.) are some of the most common annual grassy weeds in Midwestern lawns. In North Dakota, two species of crabgrass are common, smooth crabgrass (*D. ischaemum*) and large crabgrass (*D. sanguinalis*). Crabgrass is undesirable because it has a wider leaf blade and a yellowish-green color compared to the fine-textured leaf blades and deeper green color of traditional turfgrasses such as Kentucky bluegrass and the fine fescues. Additionally, crabgrass forms patches which crowd out desirable grasses, leaving bare patches when it dies in the fall.

Crabgrass can invade lawns that become thin and less competitive because of drought, disease, insects, low nitrogen fertility or improper cultural practices such as low mowing heights. Additionally, this weedy invader is prevalent near sidewalks, driveways and roadsides because the lawn is less dense in these areas due to soil compaction and other stresses.

Crabgrass is a warm-season annual grass that produces thousands of seeds per plant. Seeds will begin to germinate the following spring when the average temperature in the soil surface reaches 55 degrees Fahrenheit or higher for four to five consecutive days. Seeds will continue to germinate throughout the summer, but the majority will emerge when soil temperatures are between 60 and 70 degrees Fahrenheit. As a warm-season grass, crabgrass thrives during periods of hot weather and dry conditions. Unfortunately, summer heat causes cool-season turfgrasses to become less competitive because of reduced growth rates from heat and drought stress.

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IDENTIFICATION

To properly manage crabgrass, one must be able to correctly identify it. Crabgrass is so named because it grows low to the ground with stems that radiate from the center of the grass clump, resembling crab legs (Figure 1). The leaves grow upright when they first emerge but will grow parallel to the ground as they mature.

As a seedling, the first leaf varies in width and is about twice as long as it is wide (Figure 2). The first leaves resemble tiny corn seedlings when they emerge in mid-spring. Large crabgrass and smooth crabgrass seedlings are both light-green.

The two species can be differentiated by the presence or absence of hairs on the leaf blade and sheath. Smooth crabgrass will have few to no hairs (Figure 3a and 3b). If present, a few hairs may be found near the junction of the leaf blade and sheath. In contrast, large crabgrass has numerous

stiff hairs on the leaf sheath and blade (Figure 4a and 4b). Large crabgrass has a more upright growth habit and a larger seed head than smooth crabgrass.

Both crabgrass species have round stems with nodes and internodes. When the stems lay on the ground in contact with the soil, the nodes may grow roots that make the mature weed difficult to pull. However, reproduction for both species occurs primarily by seed.

Quackgrass (*Elymus repens*) and barnyardgrass (*Echinochloa crus-galli*) can both be mistaken for crabgrass by homeowners because of their wide leaf blades. Quackgrass is a perennial grass, identifiable by its clasping auricles and pearly white underground rhizomes, which are both lacking in crabgrass. Herbicides commonly used for crabgrass are not effective in controlling quackgrass, which spreads in lawns primarily by its underground rhizomes.



Figure 1. Crabgrass has a low growing, prostrate growth habit.
Photo by Yolanda Schmidt



Figure 2. Crabgrass seedlings. Photo by Yolanda Schmidt



Figure 3a. Smooth crabgrass leaf sheath and blade showing membranous ligule.
Photo by Esther McGinnis, NDSU



Figure 3b. Smooth crabgrass leaf sheath and blade – no hairs.
Photo by Esther McGinnis, NDSU



Figure 4a. Large crabgrass leaf sheath and blade showing fine hairs. Photo by Esther McGinnis, NDSU



Figure 4b. Large crabgrass leaf sheath and blade – fine hairs. Photo by Rebekah D. Wallace, University of Georgia, Bugwood.org

Barnyardgrass, a weed that is found in wet and compacted areas, is similar to crabgrass in that both are annual grasses that lack rhizomes. One way to differentiate the two grasses is to look at the leaf blades. The leaf blade in barnyardgrass has a distinctly white midvein which crabgrass lacks.

The easiest way to differentiate these weedy grasses from crabgrass is to observe the seedhead. The crabgrass seedhead is fingerlike and composed of two to five or more spikes that originate from the same spot (Figure 5a). In contrast, quackgrass develops a seedhead that is a single spike (Figure 5b). A barnyardgrass seedhead has many side branches (Figure 5c).

In a turf setting, weed identification is more difficult because frequent mowing may remove seedheads. In that situation, one must look closely at two small features on the collar, the region where the leaf blade and sheath come together. The first feature is the presence/absence of a ligule. If present, a ligule is a thin papery membrane or fringe of hairs that occurs on the interior side of the collar and is visible when the blade is pulled down. The auricle is a short appendage that wraps around the front of the collar. See Figures 6 and 7 for a diagram and definitions.

Both crabgrass species have membranous ligules at the base of the blade but no auricles. In contrast, quackgrass has a conspicuous clasping auricle on the front of its collar (Figure 7). Barnyardgrass has neither ligules nor auricles. See Table 1 for more distinguishing characteristics.



Figure 5a. The crabgrass seedhead is fingerlike. Photo by Esther McGinnis, NDSU



Figure 5b. The quackgrass seedhead is a single spike. Photo by Dr. Lynn Clark and Anna Gardner, Iowa State University, Bugwood.org



Figure 5c. The barnyardgrass seedhead has side branches. Photo by Charles T. Bryson, USDA Agricultural Research Service, Bugwood.org

Figure 6. Leaf blade, sheath and ligule. Photo by Joseph M. DiTomaso, University of California-Davis, Bugwood.org

Ligule – a thin papery membrane or fringe of hairs at the base of the leaf blade. The ligule is another key feature used in grass identification.

Ligules can be membranous (as with crabgrass), a fringe of hairs or absent

Note: Pull back the blade to reveal the ligule.

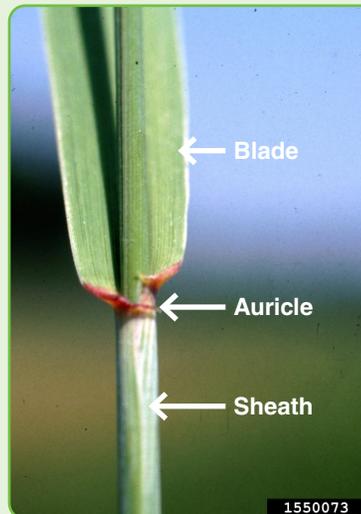
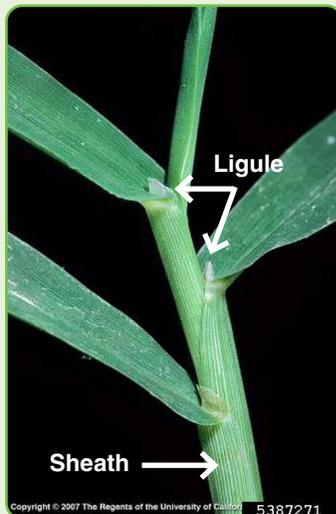


Figure 7. Leaf blade, sheath and auricle. Photo by Ohio State Weed Lab, The Ohio State University, Bugwood.org

Auricle – a small claw/ear-like projection at the junction of the blade and sheath that is a key feature used in grass identification. It is found at the point where the grass blade wraps around the stem. They can be “clasping” as with quackgrass; in some grasses they are short or absent.

Note: Be sure to look at two to three leaves when determining auricle type; auricle length and structure can vary between leaves on the same plant.

Table 1. Crabgrass and Quackgrass Distinguishing Characteristics

	Crabgrass	Quackgrass
Life cycle	Annual	Perennial
Season	Warm season	Cool season
Leaf blade/sheath junction	No auricles	Clasping auricles
Growth habit	Prostrate	Upright
Roots	Shallow, fibrous bunching; Plant will pull out easily.	Deep and long horizontal rhizomes; Plant will not pull out easily.

Key Identifying Factors of Quackgrass are:

- Clasping auricles
- Upright growth habit
- Smooth rhizomes with long internodes

MANAGEMENT

A healthy, dense and vigorous lawn is the best defense against weeds. Cultural practices that promote a healthy lawn include selecting the correct turfgrass species for your environment, mowing at a higher height, proper watering and fertilizer application techniques, and reducing soil compaction and thatch.

■ CULTURAL CONTROL PRACTICES

Turfgrass Selection

Selecting a turfgrass that is adapted to local growing conditions, sun exposure and foot traffic will help produce a vigorous lawn. Opting for a seed mix or blend that complements each other rather than using a single species will result in a more genetically diverse lawn that may be more drought, insect and disease resistant. A seed mixture is comprised of two or more species, while a blend contains two or more cultivars of one species. A common turfgrass seed mix available for predominantly sunny exposures usually contains Kentucky bluegrass with smaller amounts of creeping red fescue (grows well in the shade of trees) and perennial ryegrass. For mostly shaded areas, turf-type tall fescue or fine fescues (a mix of hard, chewings and creeping red) work well. An advantage of some fine fescue cultivars is that they are allelopathic, which means they are able to produce and release biochemicals that inhibit the growth of other plants (i.e., weeds). To discuss turfgrass mixes and blends appropriate for specific conditions, homeowners should contact their local NDSU Extension agent. To find the NDSU Extension office closest to you, visit <https://www.ndsu.edu/agriculture/extension/county-extension-offices>. You can also visit www.ntep.org to determine the best turfgrass species and cultivars for regions throughout the U.S.

Mowing Height and Frequency

Mowing lawns too short weakens the turf and makes it more susceptible to weed germination, drought and heat damage. Tall mowing heights (3 inches for Kentucky bluegrass and 3.5 inches for tall fescue) promote deep root growth, shade the soil and lower soil temperatures, reduce water loss, and reduce weed seed germination and growth.

Remove no more than one-third of the turfgrass blade when mowing. Mowing frequency will depend on how fast the lawn grows. Most healthy turfgrass species will grow $\frac{1}{4}$ inch per day. During the spring when the grass is actively growing, more frequent mowing will be necessary than in the summer heat.

Proper Watering

Lawns should be watered deeply but infrequently. To maintain a green and actively growing lawn, apply 1.0 to 1.5 inches of water (from a combination of rain and irrigation) in one or two applications each week. One inch of water will infiltrate 6 to 8 inches into the soil. Deep watering promotes deep rooting even after the soil surface dries out. A deep root system increases turfgrass resistance to drought and heat. When lawns are watered lightly every day, the roots remain close to the hydrated soil, usually in the top two inches or less. Shallow, frequent watering also creates an ideal environment for weed seed germination and establishment because the soil surface receives water while the deeper soil region remains dry, preventing deep turfgrass rooting. As a result, the turf canopy weakens and thins, allowing the weed seedlings to become established.

Fertilization

Fertilizing your lawn can increase turfgrass density and vigor. Since crabgrass seed requires light for germination, a dense and healthy lawn will reduce weed seed germination and subsequent establishment. The best time to fertilize is when the turf is actively growing. Most lawns in the Midwest are comprised of cool-season grasses, which grow best in the spring and fall. During the hottest times of year, these grasses may grow very slowly or even go dormant. Therefore, fertilization is best done in spring (late May around Memorial Day) and early fall (around Labor Day). The fall fertilizer application is the most important because this is when turfgrasses recover from the hot summer months and rejuvenate their root systems before a long winter. For higher-maintenance lawns that are well-irrigated, a summer fertilizer application may be made around the Fourth of July if the air temperature does not exceed 80 degrees Fahrenheit. Additionally, apply fertilizer that is low in phosphorus unless the soil test shows a deficiency. A fertilizer high in phosphorus favors crabgrass and other weed species.



■ CHEMICAL CONTROL

Herbicides are an important component of a weed management program in conjunction with good cultural practices. Two herbicide control strategies exist, preemergence and postemergence applications. Preemergence herbicides are applied to lawns *before* weed seeds germinate. The word “preemergence” is misleading. The seed actually germinates but is killed when the radicle (first root to emerge from the seed) absorbs the herbicide from the treated soil surface. In contrast, postemergence herbicides are applied directly to weeds *after* they have emerged and only control weeds that are actively growing at the time of application.

Preemergence Herbicide Applications

Preemergence herbicide applications are the most commonly used and preferred chemical management method for crabgrass. These herbicides are generally more cost effective and less likely to cause turfgrass injury than postemergence applications. Preemergence herbicides come in granular or liquid formulations which are best applied approximately one week **before** the soil reaches an average temperature of 55 degrees Fahrenheit at the 4-inch depth. In North Dakota, this is usually mid-April to mid-May, depending upon the weather. Timing is very important. Depending upon the product, applications that are made too early in the spring may be less effective during peak summer crabgrass germination. Alternatively, late applications will not control the earliest germinating seedlings. To ensure optimum timing, monitor the soil temperature with a soil thermometer and apply when soil temperatures reach 50 degrees at a 4-inch depth. Remember, soil will warm up faster on south facing slopes and along concrete surfaces. Turf soil temperatures at the 4-inch depth for your area can also be found by visiting the North Dakota Agricultural Weather Network (NDAWN) website at <https://ndawn.ndsu.nodak.edu/>.

The effectiveness and turfgrass tolerance of preemergence herbicides are influenced by many factors, including grass species, turf maturity, application rate and rainfall following application. Generally, Kentucky bluegrass and perennial ryegrass can tolerate most preemergence herbicides, whereas fine fescue may be injured by some herbicides such as mesotrione. Always check the herbicide label for the list of tolerant turfgrass species as well as any species-specific rate information. Most preemergence herbicides should only be applied to well-established, mature turfgrass and not to seedlings or areas that will be seeded in the near future. Examine the label to determine whether application can be made to newly seeded turf areas because preemergence herbicides can remain effective in the soil for several months

and will kill desirable turfgrass as it germinates. These herbicides cannot differentiate between crabgrass and most turfgrass seeds (the active ingredients siduron and mesotrione are exceptions). Many common preemergence herbicides cannot be applied to new turf until it is mature enough to have been mowed several times. See the next section for suggestions for crabgrass management in newly seeded turf.

A common mistake that can also influence effectiveness is using less than the labeled application rate. Know the size of your lawn and carefully follow the label instructions for the application rate of the product. Most preemergence products require rainfall or watering within two to seven days after application to activate the product. However, too much water can wash away or leach the product too deeply into the soil to be effective.

Preemergence herbicides that are most effective for crabgrass control in established residential lawns include active ingredients such as pendimethalin, prodiamine and dithiopyr. Pendimethalin is one of the most common and economical active ingredients available to homeowners. However, this chemical stains hard surfaces yellow. Careful application is needed to prevent staining that can persist for long periods. Prodiamine and dithiopyr tend to be used more by turf professionals, but products containing the active ingredients are becoming more readily available for homeowners. Of these three preemergence herbicides, dithiopyr is the only one that also has early postemergence activity. Dithiopyr can control crabgrass seedlings that are in the leaf stage (pre-tiller) if you missed the window for pre-emergent applications. Crabgrass control products are commonly found in most garden centers and retail stores, but because brand names change frequently, be sure to read the active ingredient list on the product label. The active ingredients listed above can be found under various brand names; for a partial list, see Table 2.

Table 2. Preemergence Herbicides for Crabgrass Control

Active Ingredient	Brand Names	Comments
Pendimethalin	Pendulum, Scotts	Up to three to five months of control; will not control emerged crabgrass
Prodiamine	Barricade	Up to eight months of control; will not control emerged crabgrass
Dithiopyr	Dimension, Lesco, Vigoro, Menards, Greenview	Up to three to four months of control; also provides postemergence control of crabgrass seedlings prior to tillering

Preemergence Herbicides for Newly Seeded and Renovated Lawns

For years, the product containing the active ingredient, siduron, (brand name Tupersan) has been the only product for reducing crabgrass germination in newly seeded lawns. Siduron production was recently discontinued by the manufacturer. In recent years, research has shown the active ingredient mesotrione to be more effective than siduron. Mesotrione provides preemergence crabgrass control up to four weeks and may also provide some broadleaf weed control.

Mesotrione should be applied prior to or at the time of turfgrass seeding. Application after turfgrass seed germination may bleach or harm the seedlings. This active ingredient may be applied before seeding Kentucky bluegrass mixes as long as the fine fescue component is less than 20% by weight. Mesotrione can also be used when renovating or overseeding existing lawns.

Postemergence Herbicide Applications

When cultural and preemergence control measures fail, postemergence herbicides can be used. Several herbicides are available for application on young crabgrass plants. Postemergence control is most effective when the crabgrass plant is in the seedling stage and before it has produced numerous tillers. Tillering is the production of new shoots on the side stems in grass plants (Figure 8).



Figure 8. Crabgrass with seven tillers. Photo by Doug Doohan, Ohio State University/ OARDC, Bugwood.org

Postemergence herbicides available to homeowners that are most effective for crabgrass control in established lawns include active ingredients such as dithiopyr, fenoxaprop and quinclorac. Of these three herbicides, dithiopyr can provide effective preemergence control of crabgrass in addition to providing early postemergence control of crabgrass. Dithiopyr can provide postemergence control of crabgrass in the seedling stage before tillering. Fenoxaprop can control crabgrass up to the 5-tiller stage but may cause temporary stunting or yellowing of Kentucky bluegrass, especially when turf is drought stressed or applications are made at higher summer temperatures. Quinclorac provides the best control of crabgrass in the seedling and one-tiller stage and can be safely applied to recently seeded areas to eliminate weed competition four weeks after turfgrass seedlings have emerged. Additionally, this herbicide is effective on crabgrass plants with five or six tillers. During the 2- to 4-tiller stages, quinclorac applications may not provide complete control. Quinclorac also provides control of some broadleaf weeds. The active ingredients listed above can be found under various brand names; for a partial list, see Table 3.

As crabgrass matures, postemergence control becomes more challenging and will likely require a repeat application. These herbicides can cause injury to turfgrasses and should only be used to treat areas where summer annual grassy weeds such as crabgrass have emerged. In addition, herbicide applications made when the air temperature is 85 degrees Fahrenheit or higher can also increase the likelihood of turfgrass injury. Environmental conditions such as adequate soil moisture and moderate temperatures also play an important role in the effectiveness of postemergence herbicides. Drought-stressed and dormant weeds are less susceptible to herbicides. Therefore, the application of post-emergence herbicides for crabgrass control should be made prior to mid-July.

Postemergence herbicides can provide effective crabgrass control but must be combined with proper cultural practices. Always read the product label very carefully before applying any herbicide or pesticide products to your lawn. The label will list which turfgrass species the product can be applied to, how to apply the product for best weed control and safety precautions for use around people and pets.

As a warm-season summer annual, crabgrass dies at the first killing frost. Given that crabgrass plants large in size may require two postemergence herbicide applications, it may be more economical and sustainable to not attempt chemical control and instead let cold temperatures do the work when it gets late in the growing season. Plan on using a preemergent herbicide on affected areas the next year if reseeding is not planned.

Table 3. Postemergence Herbicides for Crabgrass Control

Active Ingredient	Brand Names	Comments
Dithiopyr	Dimension, Lesco, Vigoro, Menards, Greenview	Effective when applied at seedling stage through leaf stage/ prior to tillering
Fenoxaprop	Acclaim Extra	Can provide control after tillering but effectiveness decreases as plant size increases
Quinclorac	Drive, Ortho, Bonide, Ferti-Lome	Effective when plants are <2 tiller or >4 tiller; as crabgrass matures multiple applications may be necessary.

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