

# WeedControl in North Dakota Turfgrasses

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Anyone attempting to establish a lawn in North Dakota from seed will find an earnest competitor for space -- weeds! Weeds can be of broadleaf types such as the common dandelion, or grass types like crabgrass, quackgrass or foxtails.

Once established and properly maintained, a healthy turfgrass will need little care to control weeds, because a dense, vigorous turfgrass competes well and will inhibit weed emergence. Besides during establishment, weed problems may be seen when the soil is disturbed from digging, mowing too closely, overuse of the dethatcher in the early spring, or from compaction. Anything that inhibits the growth of the turfgrass, such as misapplication of fertilizers and water or insect and disease damage, will encourage a weed invasion.

## Proper Cultural Practices

Selection of the correct grass species and cultivars for a particular site will go a long way in helping to keep weeds under control. Aggressive Kentucky bluegrass cultivars such as Kenblue, Park, Baron, Nassau, Touchdown and Rugby establish quickly and recover from injury, thus limiting the weed population.

Most of the grasses used in North Dakota are of the cool-season type (usually a mixture of bluegrasses, creeping fescue and perennial ryegrass) and tend to go into dormancy when the temperature remains above the mid 80s or rainfall is limited for an extended period of time. While long periods of consistently high temperatures occur rarely in North Dakota, extended intervals without precipitation are more common and are usually the cause for turfgrass dormancy. While dormancy itself won't cause a weed invasion, previous cultural practices will have an influence: deep infrequent watering, along with high mowing when needed and judicious use of fertilizers will keep the turf canopy dense and prevent weed seeds from germinating.

Mowing is the most consistent cultural practice applied to turfgrasses. Mower blades should be kept sharp. Mowing the turf at the high end of the recommendation (2.0 to 3.0 inches) is best for weed control and canopy density. The practice of mowing eliminates some initially troublesome weeds like common lambsquarters and redroot pigweed because of their upright growth characteristics.

Most North Dakota soils tend to compact with time. The normal foot traffic, mowing practices, watering and fertilization all tend to compress the turf soil, making water, air and nutrient penetration to the root system more difficult. When this happens, opportunistic weeds such as knotweed become established.

Thatch is another problem that can weaken a good turf. This accumulation of undecomposed matter, when greater than 1/2 inch thick can inhibit air, water and nutrient movement into the soil. Thatch develops in most lawns given minimum care and is actually beneficial when it stays in check. With overwatering and fertilizing too frequently, some grass cultivars will produce excess thatch buildup. Excess thatch can also harbor insect and disease problems, making management of these pests more difficult and costly.

Thatch and compaction can be controlled with dethatching and aeration equipment, but both of these operations tend to thin the turf. However, if done in the early fall rather than in the spring, the turfgrass will have a better chance of recovering with fewer weed problems. Dethatching operations should be timed carefully. Dethatching or aeration done too early in the spring before the grass has begun active growth could allow annual weeds to establish, in summer's heat dethatching or aeration could add stress to the lawn; too late in the fall could predispose the turfgrass to winter injury.

While giving dates such as "not before April 1 or after October 15" would provide a specific target to initiate action, it is not that simple. Dethatching timing must be a judgment call on the part of every homeowner. Turf which is wet, frozen or too actively growing can suffer damage from dethatching operations, which require the use of a power rake. Once the turf no longer leaves a wet footprint when step-ped upon and is still dormant, dethatching can be undertaken with minimal damage

and weed invasion.

With core aeration, plugs of soil 2 to 3 inches long are lifted and removed, which allows air, water and fertilizer to move to the root system. The best time for aeration is late summer or early fall. In North Dakota this can be interpreted to run from roughly August 20 to September 20. At least four weeks of mild (cool, moist, sunny) conditions for our grasses are needed either after an aeration or dethatching.

In place of a severe dethatching in the fall or spring, two aerations per year would prove to do a better job of thatch control, reduce weed invasion and cause less damage to the turf.

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## Chemical Weed Control

The development of selective herbicides has made an excellent contribution to improving turf quality. Research shows that herbicides properly applied to turf areas will not contaminate the water supply or harm the environment. Proper application involves identifying the problem weed or weeds, selecting a herbicide that will provide control, following the label directions for proper application techniques, and storing the excess herbicide or disposing of the container by triple rinsing and adding the rinsate to the spray solution. The container should then be disposed of according to label in-structions or state regulations.

If there are any questions, contact the Pesticide Division of the North Dakota Department of Agriculture at (701) 224-4756 or the Waste Management and Special Studies Division of the North Dakota Department of Health at (701) 224-2366.

All herbicides are subject to breakdown by soil and thatch microbes, degradation by sunlight, metabolism by plants or other methods of inactivation or degradation in the outdoor environment.

Herbicides come in two basic classes: preemergence -- used to control weeds before they emerge, and postemergence -- used to control emerged weeds. Some herbicides only control grasses, some only control broadleaf plants, and some control both. Herbicides also have differing modes of action. Some like Roundup or Kleenup (glyphosate) and Weed-B-Gon (2,4-D + MCPP) are systemic herbicides which will translocate throughout the plant so that top, roots and rhizomes are killed. Materials like Roundup or Kleenup are non-selective and may kill any green plant. When properly applied, Weed-B-Gon and Weedone DPC are selective and will only have lethal effects on the target weeds or plants without harming the turfgrass.

Currently, some contact herbicides on the market are restricted use materials and require application by a licensed applicator only.

A new herbicide available to homeowners and commercial operators is Confront. Confront contains the active ingredients triclopyr and clopyralid, which are different than the active ingredients in the commonly used Trimec (2,4-D, MCPP and dicamba). Triclopyr is effective on many hard-to-control weeds, including wild violet, oxalis and ground ivy (creeping charlie). Clopyralid is effective on common weeds such as clover, dandelion, plantain and Canada thistle.

A benefit of Confront which contributes to environmental safety is its higher unit activity compared to other products, which means that less active ingredient per acre is needed for weed control. Caution should be used when applying Confront around ornamental trees and shrubs. However, Confront appears to be more safe when used near woody plants than products that contain dicamba. This is due to lower volatility and short residual activity in typical North Dakota soils. NDSU research has shown excellent control of Canada thistle, clover, rough cinquifol, ground ivy and violets from Confront.

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## Common Troublesome Weeds in North Dakota Lawns and Their Control

Broadleaf perennials like dandelion, broadleaf plantain and buckhorn plantain commonly are controlled by the amine forms of 2,4-D products. These would include brand named materials such as Weed-B-Gon and Weedone DPC. Tougher to control weeds like ground ivy (creeping charlie), mallow and white clover may require weed killers which are combinations of 2,4-D, MCPP and dicamba (Trimec and Super Weed-No-More). Products containing dicamba should be used with caution around trees and woody ornamentals as dicamba spray drift or dicamba moving into the root system can cause cosmetic or permanent damage. Dicamba should not be applied to turf areas which cover the roots of trees and other woody ornamentals. Other weeds controlled by combinations including dicamba are chickweed, spurge (spotted, prostrate or both), knotweed (erect and prostrate), Canada thistle, henbit, pigweed (redroot and prostrate), yellow wood sorrel and common purslane.

The **grassy weeds** like barnyardgrass, bromegrass, crabgrass, green and yellow foxtail, nimbleweed and quackgrass will quickly move into most disturbed areas. Selective control is possible only with the annual grasses (not quackgrass or bromegrass). Use of preemergence herbicides like Balan (benefin), Dacthall (DCPA), Pre-M (pendimethalin), and Ronstar

(oxadiazon) will provide effective control.

After emergence only two operations exist for grass weed control. While the grass weeds are still small, products which contain the active ingredients DSMA and MSMA can be used. Best results are obtained when a second application is made in seven to 10 days. Turfgrass may be temporarily discolored and/or stunted. The other option for postemergence grass weed control would be the use of Acclaim (fenoxaprop) herbicide. Acclaim provides excellent control of small, actively growing grassy weeds like crabgrass, foxtail and barnyardgrass. Acclaim will not prevent other flushes of grasses from germinating. Symptoms on grassy weeds will not become evident for four to 10 days and total control may take 21 days. Adequate soil moisture is necessary for herbicide activity. Avoid application under drought stress conditions.

Unfortunately, there are no available options for perennial grass weed control in turf. Only Roundup can be used for spot treatments, with the expectation that desirable grasses will also be killed. Reseeding is possible in five to seven days.

**Special weeds** like annual bluegrass, sandbur, violets and thistles need separate consideration. Annual bluegrass frequently shows up where the turf is mowed short. Seeds germinate in the cooler seasons of the year, spring and fall, giving the lawn a temporary thick but lighter green appearance. The homeowner often observes the seedheads forming and believes the desirable grasses are producing more seed. Unfortunately, when summer heat arrives, it dies back, leaving brown spots. Control is best achieved with high mowing and the use of a preemergent herbicide such as Dacthal (DCPA).

**Sandbur**, another troublesome annual, is a grassy-type weed which occurs in sandy soils in our region. As the name implies, the plant produces spiny burs which can be painful if stepped on with bare feet, or if picked up in a pet's coat. Dacthal (DCPA) is a good preemergent control to clear sandbur out of a thin lawn, to be followed 60 days later by reseeding with a desirable grass seed mixture. Other choices for preemergent control are Balan (benefin) and Pre-M (pendimethalin).

**Violets** may be beautiful flowers in a bed but are nearly impossible to control in lawns. Trimec (a compound of 2,4-D, MCPP and dicamba) may control the smaller and weaker plants. Some success in removing this pest from lawns has been reported with two or more applications of Confront (triclopyr and clopyralid) in research applications.

**Bull thistles** can be troublesome in establishing new lawns. Bull thistle is a biennial more commonly found in the eastern part of the state. The first year is spent as a rosette (mowing cannot eliminate it) with a large taproot. Attempting to pull it out usually results in only part of the root being removed, with the remainder regrowing and creating a problem plant in the future.

**Canada thistle** is common in the state. This perennial spreads by creeping root stalks and, like the bull thistle, is frequently a problem in newly established lawns. Their undesirable trait is the very spiny leaf margins, which are not pleasant to step on. Fortunately, a couple of applications of Trimec, Weed-B-Gon, or Confront herbicides will eliminate them.

**Field bindweed, sowthistle and poison ivy** will sometimes get established in poorly maintained lawns. When these persistent perennials are apparent, repeat applications of Trimec, Weed-B-Gon, or Confront will be necessary.

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## Spray Additives

Spray additives consist of oils, surfactants, and fertilizers. The most effective additive will vary with different herbicides and the need for an additive will vary with environment, weeds present, and herbicide. Additives should be used only when indicated on the herbicide label as they may increase injury to turf or reduce weed control. Oil additives function to increase herbicide absorption and spray retention. Surfactant rate depends on the amount of active ingredient in the surfactant and other factors. The main function of a surfactant is to increase wetting of plants by the spray. When a range of surfactant rates is given, the high rate is for use with low rates of the herbicide, drought stress, tolerant waxy weeds, or when the surfactant contains less than 50% percentage active ingredient. Fertilizers containing ammonium nitrogen occasionally have increased the effectiveness of Carbyne, Blazer, glyphosate, bentazon and Poast.

Ammonium sulfate at 17 pounds per 100 gallons spray volume has enhanced weed control with glyphosate. The enhancement is most pronounced when spray water contains relatively large quantities of certain ions, such as calcium, sodium, carbonates or bicarbonates. Diammonium sulfate may contain contaminants which may not dissolve and plug nozzles. Ammonium sulfate may need to be dissolved in a small amount of water and filtered to prevent nozzle plugging. Commercial solutions of ammonium sulfate are available. Ammonium sulfate also will overcome antagonism of Poast and 2,4-D amine by salts in water. Twenty-eight percent nitrogen also is effective in enhancing weed control from many postemergence herbicides and overcoming sodium, but not calcium, antagonism of glyphosate. Sodium bicarbonate antagonism of Poast is overcome by 28 percent N. Ammonium sulfate or 28 percent N does not overcome the need for a surfactant.

Many adjuvants are available to enhance herbicide action, but information on their effectiveness is limited. The precise salt concentration in water which causes antagonism is difficult to establish, because antagonism is also influenced by many

other factors. Comparisons of treatment without adjuvants should be made to determine the effectiveness of adjuvants for specific herbicides, sprays, water and weeds. Effective adjuvants may allow use of herbicides at reduced rates or provide consistent results with adverse conditions. However, use of rates below the direction label exempts herbicide manufacturers from liability for nonperformance.

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## Sprayer Carrier Water Quality

Minerals, clay, and organic matter in spray carrier water can reduce the effectiveness of herbicides. Clay inactivates Gramoxone Extra and glyphosate, organic matter inactivates many herbicides, and minerals of various types inactivate 2,4-D amine, MCPA amine, Poast, glyphosate, and Banvel.

Water in many parts of North Dakota is high in sodium bicarbonate, which reduces the effectiveness of 2,4-D and MCPA amines (not esters), Poast, glyphosate, and Banvel. Water samples with 1600 ppm sodium bicarbonate have been observed, but antagonism of the above herbicides is noticeable at only 300 ppm. The antagonism is related to the salt concentration. At low salt levels, loss in weed control may not be noticeable under normal environmental conditions. However, the antagonism from low salt levels will cause inadequate weed control when weed control is marginal because of drought or for marginally tolerant weeds.

High salt levels can cause reduced weed control in nearly all situations. Calcium and, to a lesser degree, magnesium are antagonistic to 2,4-D and MCPA amine, Banvel, and glyphosate. Calcium antagonism may become noticeable at 150 ppm. Sulfate ions in the solution have reduced the antagonism from calcium and magnesium, but the sulfate concentration must be three times the calcium concentration to overcome antagonism. So, for practical purposes, the sulfate that occurs naturally in water can be disregarded.

An analysis of spray sources will provide a guide for determining possible effects on herbicide effectiveness. Water with more than 150 ppm calcium or 300 ppm sodium or magnesium may inhibit herbicide phytotoxicity. Iron also is antagonistic to many herbicides but usually is not abundant in North Dakota water.

Water often contains a combination of sodium, calcium, and magnesium, and these cations generally are additive in the antagonism of herbicides. Many adjuvants are marketed to modify spray water pH, but low pH does not appear essential to the action of most herbicides.

Ammonium sulfate, granular or liquid, and 28 percent liquid nitrogen fertilizer help overcome antagonistic salts in spray carrier water. Ammonium sulfate at 2 percent (17 lb/100 gallons spray) will overcome the antagonism from the highest calcium and/or sodium concentrations in North Dakota waters for glyphosate, Poast, 2,4-D amine, MCPA amine, and Banvel. Ammonium sulfate at 1 percent is effective with most North Dakota waters.

The 28 percent nitrogen fertilizer overcomes mineral antagonism of most herbicides, but not glyphosate. Research results with amounts of 28 percent nitrogen fertilizer is limited, but four gallons/100 gallons of spray has generally been adequate. The ammonium sulfate and 28 percent nitrogen adjuvants have enhanced herbicide control of certain weeds even in water without salts. This is especially true for glyphosate, sulfonylureas (Harmony Extra, Express, Ally, Pinnacle), Blazer, and bentazone. However, ammonium sulfate, 28 percent nitrogen, or other adjuvants should be used with caution as their benefit often is limited to specific herbicides or weeds and may be antagonistic to other herbicides or weeds.

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## Timing

In life and with weed control in lawns, timing is important. Weeds are most easily controlled when they are young and actively growing. Early spring and fall applications are most effective. Applying herbicides in mid-summer or late fall generally is wasteful because control of target weeds often is poor and herbicide stress on turf may be excessive. When temperatures are above 50 degrees Fahrenheit and below 85 F, herbicides will give the best weed control and be least injurious to the turf. Avoid applying on windy days and apply in the early morning or early evening hours when the wind speed is reduced and the temperatures are low enough that drift or injury need not be a concern.

Applications of herbicides to turf areas one day prior to mowing is best. The objective here is to get optimal plant growth by the weeds prior to herbicide applications. Results from the application are not seen immediately. Generally, two to four weeks are necessary for a complete kill. Since newly seeded lawns may be invaded by many new weed seedlings, wait until at least two to three mowings before making the first herbicide application. Liquid materials applied with pressure sprayers that provide a flat pattern with medium to coarse spray droplets are best. Spot spray the visible weeds; broadcast spray only preemergent materials. Weed and feed combinations are discouraged because the tendency is to handle them like fertilizer and not like a pesticide. The dry-applied formulations depend on dew or foliage dampness to dissolve and distribute the herbicide. Also, more chemical is needed in the dry granular form, an unnecessary addition to the

environment.

Make sure the application is uniform and at the recommended rate. Practice application techniques with plain water may be necessary.

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## Summary and Conclusions

Generally, good management practices along with a dose of patience will yield healthy, vigorous, relatively weed-free lawns. A good weed control strategy for small areas would be: a) hand pull and dig young weeds as soon as they become evident; b) mow, water and fertilize correctly; and c) use the proper grass species and cultivar for your location. In the eastern part of the state, the bluegrass, ryegrass and fescue mixes generally are good choices, but in western North Dakota, the fescues, natives and adapted drought/salt tolerant grasses may be the best species to select.

Occasional weed infestations generally can be controlled by cultural practices. If cultural practices are not successful, then select a herbicide or herbicide combination recommended for the weed problem and follow label directions precisely. The label is not just suggested guidelines to follow, it is the law!

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