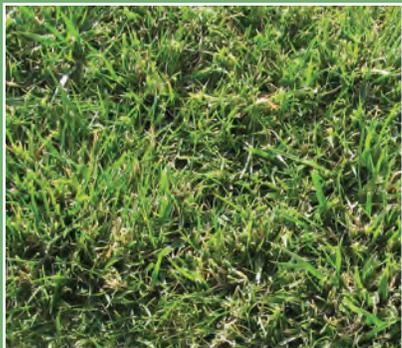
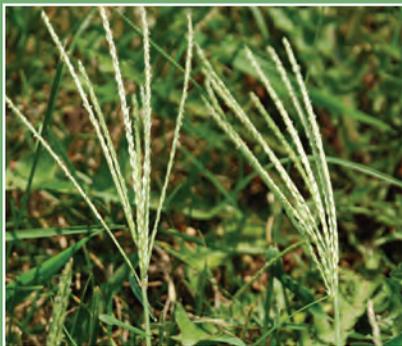


Managing Turf and Landscape Weeds

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Weeds are often the most visible landscape pests, and they are a major problem for homeowners and professional landscape managers. Weeds are a concern principally because they compete with desirable plants for space, light, water, and nutrients. They also detract from the appearance and function of landscapes.

Any plant can be considered a weed if it is growing where it is not

wanted (*Figure 1*). Weed seeds exist in the soil and can remain viable for many years. As a method of survival, many weeds can produce hundreds or thousands of seeds per year, which can be moved by wind, water, and animals for miles (*Figure 2*).

The presence of weeds in a landscape is often the result of poor site preparation, poor establishment, inappropriate plant selection, and/

or improper management. Weeds are opportunistic and readily become established in thin, weak turfgrass stands or landscape beds. Select and place plants that are adapted to the site conditions and will meet users' expectations and management requirements. If placed and managed properly, turfgrass and other landscape plants will cover and shade the ground, making weed germination and survival difficult.



Figure 1. Although tall fescue is a desirable turfgrass species, it may be considered a weed if it infests a finer textured Kentucky bluegrass lawn.



Figure 2. One crabgrass plant can produce 150,000 seeds per year. One year of not controlling crabgrass can result in many years of crabgrass problems due to the number of weed seeds available in the soil seedbank.



Figure 3. Weeds are good indicators of mismanagement. The left half of the photo shows a weed-free Kentucky bluegrass lawn managed with adequate nitrogen and water. The adjacent lawn, on the right, is managed with very little nitrogen and irrigation, and has a heavy infestation of yellow woodsorrel.



Figure 4. Certified seed will be labeled with a blue tag and will contain almost no weed seed, high germination (often greater than 90 percent), and quality seed cultivars for local conditions. Kentucky bluegrass blends should contain 3 to 4 cultivars. Tall fescue/Kentucky bluegrass mixes should contain 90 percent or more tall fescue and 10 percent or less Kentucky bluegrass.

Weed identification is important in developing a weed management strategy. Understanding the management practices and environmental conditions that weeds prefer can help in identifying weed species and in developing management strategies that can reduce the ability of weed populations to compete with desirable turfgrasses or landscape plants (Figure 3).

Integrated Weed Management

Integrated weed management uses a combination of proper management practices along with herbicides to reduce weed populations in landscapes. Common integrated weed management strategies for landscapes include:

- Eliminate existing vegetation when developing a new landscape

bed or preparing an area to be seeded or sodded. Tilling will control many annual weeds but may increase the number of perennial weeds. When perennial weeds are present, it is necessary to use a nonselective systemic herbicide (such as glyphosate) in combination with tilling to limit surviving rhizomes or stolons in the soil.

- Use high quality compost when improving the condition of soil in beds or lawns prior to establishment of plants, or as a topdressing in certain existing landscapes. When compost is prepared and heated correctly, most weed seeds are destroyed.
- Use high quality seed or vegetative material (sod, plugs, or sprigs) when establishing a lawn. Certified seed will cost more but will usually contain fewer weed seeds than a cheaper seed blend or mix,

and will contain better quality seed cultivars for local conditions (Figure 4). Avoid using seed mats or mixes that contain a high percentage of annual or Italian ryegrass. Italian ryegrass does not mix well with other turf species and produces a light green, clumpy turf that dies out quickly.

- Select weed-free plant material when purchasing trees, shrubs, and flowers. Check containers before purchasing to make sure weeds are not growing alongside the desirable plants (Figure 5).
- Avoid planting ornamental species that spread aggressively, such as mint, directly in the ground or adjacent to less aggressive species. Place them in containers or in an area with a physical barrier, such as a sidewalk or large mulch bed, between the spreading plants and other landscape or turfgrass areas.



Figure 5. Weeds brought into a landscape from containers can quickly multiply and become a problem throughout the landscape.

- Use mulches in landscape beds. Mulches conserve soil moisture, reduce weed populations, moderate soil temperatures, and enhance plant health.
- Use landscape management practices appropriate for each plant type. Apply the right amount of water with deep, infrequent irrigation; avoid foot traffic that can lead to compacted areas; and remove debris that can harbor weed seeds.
- Use recommended turfgrass management practices (mowing, watering, fertilizing, and cultivation). Practices such as mowing too low; light, frequent irrigation; or over-fertilizing can thin turfgrass stands and increase weed populations.
- Mow before weed species flower and produce seed. If seed heads develop, collecting the clippings may reduce the quantity of seed.

The seeds of many weeds can survive for several years in the soil until optimum conditions exist for germination.

- Keep mowing, edging, and aerification equipment clean between uses. Weed seeds or plant pieces (stems, rootstocks) can be transferred from one area of the landscape to another through soil cores or on the deck of a mower.
- Pull or hoe weeds. Be sure to remove as much of the root as possible. Minimize soil disturbance to avoid bringing weed seed to the surface where germination conditions may be ideal. Remove weed debris to prevent re-rooting. Pulling is usually most effective after a rainstorm or irrigation.
- Use a preemergence (PRE) herbicide for annual weeds such as crabgrass. In areas with large weed populations, PRE herbicides are

desirable because they can reduce the number of weeds that emerge, thereby limiting the competition between weeds and desirable plants. PRE herbicides also can control weeds that are difficult to selectively manage once they have emerged without causing damage to desirable plants. Examples include grassy weeds in turf or among ornamental grasses and broadleaf weeds in landscape beds. Commercial applicators have more options for selective control of weeds in turf and landscape beds than homeowners. Read the herbicide label and use caution when using a preemergence herbicide in areas that are to be seeded.

- Use postemergence (POST) herbicides for spot-control of weeds if hoeing or hand-pulling is not effective.

Life Cycles

Life cycle refers to the amount of time it takes a plant to go from seed germination to seed development. Proper herbicide application timing requires knowledge of the life cycle of each weed species.

- **Summer annuals** complete their life cycle in one year. They begin germinating in early to mid-spring, grow, and can produce seed until they are killed by the first hard frost in the fall. Examples of summer annuals include crabgrass, sandbur, puncturevine, and prostrate spurge.
- **Winter annuals** also complete their life cycle in one year. They germinate in the fall, go dormant during the winter, and then continue to grow and produce seed in the spring until they are killed by the heat of the summer. Examples include henbit, field pennycress, and chickweed.
- **Biennial weeds** require two years to complete their life cycle. They form a rosette the first year, go dormant during the winter, and then continue to grow and produce seed in the second year. There are few biennial turf weeds, but poison hemlock and thistles may be problems in landscape beds or native areas. Most biennials germinate in the spring, but some biennials will germinate throughout the growing season.
- **Perennials** grow for three or more years. They can grow from seed or from vegetative reproductive structures such as stolons, rhizomes, or tubers (Figure 6). Dandelions and white clover grow most vigorously in spring and fall and are considered cool-season perennials. Field bindweed re-grows from rootstocks in early to mid-summer, and is considered a warm-season perennial.



Figure 6. Weeds with stolons and rhizomes, such as ground ivy (a) and wild violet (b), are difficult to control via pulling because often the entire stem is not removed, allowing for regrowth. Additionally, wild violet is a prolific seeder. Weeds such as dandelion (c), with a deep taproot, need to be dug out 4 to 5 inches below the crown to prevent regrowth.

Herbicides

The best approach to weed management is to use an integrated system that uses all effective management practices including herbicides to reduce weed problems. Herbicides are a useful tool for controlling weeds; however, they often only provide a short-term solution. Care should be used when applying any herbicide. Improper use can result in poor weed control, turf injury, or injury to sensitive ornamental or garden plants. For information about pesticide safety, see the UNL Extension publication *Pesticide Safety in Landscapes*. Always read and follow label directions.

PRE herbicides are applied prior to weed seed germination. As the weed seed germinates, its emerging root and shoot absorbs the herbicide and cell division ceases. The seedling then dies. PRE herbicides, except those with the active ingredients of dithiopyr, mesotrione, and oxyfluorfen will not control visible seedlings and a postemergence herbicide application will be necessary. PRE herbicides are most effective against annual and biennial weeds because their major form of reproduction is via seed. There are eight common active ingredients found in PRE herbicides available to homeowners — pendimethalin, prodiamine, dithiopyr, siduron, oryzalin, trifluralin, isoxaben, and oxyfluorfen. Be sure to check label instructions to determine if they can be applied in turf and/or landscape beds. General tips for success when making PRE herbicide applications include:

- Water immediately after application with at least one-half inch of water. Watering will move the herbicide into the soil where the weed seed is germinating. It will also increase weed seed

germination and reduce herbicide degradation. Many PRE herbicides degrade very quickly if left exposed to the sunlight.

- Base application timing and product selection on planting plans for the season. Most products, except those with the active ingredients siduron or mesotrione, have activity against both weed species and desirable turfgrass and ornamental seedlings. Most PRE herbicides have residuals from 4 to 16 weeks, depending on environmental conditions and the rate in which the herbicide was applied. An application made at high rates in late spring may still be present at a concentration that could affect fall overseeding success. Applications made according to the label to landscape beds can affect root growth of newly planted transplants. Typically, once transplants have reached 3 inches in height or the plant has roots below the level of herbicide incorporation, an application can be made. See product labels for specific timing recommendations when using flower or vegetable transplants.
- Avoid applying PRE herbicides to new turfgrass seedlings and sod. Most PRE herbicides will inhibit the growth of seedling turfgrasses and root growth of newly-sodded turf. In addition, overapplication can stunt the root system of established turfgrasses, making them more prone to environmental stresses. Refer to the product label of the specific herbicide for specific information about application timing at, before, or after seeding.
- Though aerification after application of PRE herbicides does not affect crabgrass control, be sure to return aerification cores to the surface.

POST herbicide applications are made to emerged, actively growing weeds. They are the primary chemical control method used for perennial weeds, but also can be used on emerged annuals and biennials. Liquid and granular applications can both be effective as long as they stick to the leaf surface of the weed. The location of the weed — in turf or a landscape bed — is important in determining whether a selective or non-selective herbicide can be used.

- **Selective herbicides** can be applied over the top of a desirable plant without harming it, while controlling the weed species. Broadleaf weed control in lawns and grassy weed control in broadleaf landscape beds are the most common options for selective weed control. The herbicide label will list turfgrass and landscape species that are tolerant of the herbicide if label directions are followed. There are at least 10 different active ingredients currently available to homeowners for use in turf that will control broadleaf weeds — 2,4-D, MCP, MCPA, carfentrazone, dicamba, triclopyr, fluroxypyr, dichlorprop, sulfentrazone, and quinclorac. Quinclorac is the primary active ingredient used for POST control of grassy weeds in turf, although products containing dithiopyr or mesotrione also can be used for POST control. Homeowners have four active ingredients currently available for control of grassy weeds in broadleaf landscape beds — fluazifop-p, fenoxaprop, sethoxydim, and oxyfluorfen. Oxyfluorfen will also control some broadleaf weeds (e.g., pigweed and shepherd's purse) in landscape beds. Homeowners have two active ingredients currently available and labeled for POST yellow nutsedge control — sulfentrazone and halosulfuron.

- **Non-selective herbicides** will damage most actively growing plant species that they contact. Spray non-selective herbicides carefully around desirable plants, while spraying over the top of weeds. Non-selective herbicides are commonly used for undesirable grasses in lawns or broadleaf weeds in landscape beds. There are four different non-selective active ingredients currently available to homeowners for short-term control of many weeds in home landscape areas — glyphosate, diquat, pelargonic acid, and glufosinate-ammonium. There are many products available to homeowners that are available for brush and/or total vegetation control, including the active ingredients of prometon and imazapyr. These active ingredients have long soil residuals and should not be used where desirable plants are located or are to be planted.

General recommendations when making POST herbicide applications include:

- When multiple weed species are present, use a combination product. Combination products have more than one active ingredient and result in a broader spectrum of weed control. Some weeds with similar life cycles and growth types may be more susceptible to some herbicides than others. For example, dandelion is more susceptible to 2,4-D than MCPP, and white clover is more susceptible to MCPP than 2,4-D.
- Apply to small, healthy and actively growing weeds to achieve the best control. Weeds that are under drought or heat stress may not be effectively controlled and the application may injure desirable plants. Watering a day or two prior to application will

assure the weeds are healthy and actively growing.

- Avoid mowing for several days before and after the application. Mowing immediately before application reduces the amount of weed foliage available to absorb the chemical and causes stress, which reduces herbicide uptake. Mowing after application may remove the treated portion and prevent translocation of the herbicide to the roots.
- Avoid watering for at least a day after application. Watering can wash the herbicide off the plants. Check the local weather forecast to make sure rain is not expected within 24 hours after application.
- Spray when the wind is calm and the air temperature is between 50° and 85°F. Many broadleaf POST herbicides drift easily and may be volatile. As a result, they may injure sensitive plants in the area if applied when windy or at temperatures above 85°F. Temperatures below 50°F may not be warm enough for the herbicide to be translocated in the plant.
- When possible, apply POST herbicides in the fall to control dandelion, clover, henbit, violets, and many other weeds. Air temperatures are lower in fall and fewer ornamental plants are in susceptible stages of growth to cause off-target damage.
- Check the label to determine how soon an application can be made on newly seeded turf.
- Check the label for specific restrictions on using clippings for mulch in a vegetable garden. Herbicide residual activity may last for three or more weeks. Most herbicide-treated clippings should not be used around sensitive plants in the same season of

application, but check the label for specific recommendations.

- If an area has a uniform weed population, a blanket application over the entire area in the fall may reduce the weed population to a manageable level so spot-applications can be used in the future.

Control Strategies Using Herbicides

Herbicides, for the most part, are specific as to which weeds they control. For optimum control, weed type (grass, broadleaf, or sedge) and life cycle need to be known to select the most appropriate herbicide.

Preemergence:

- **Summer annual grasses** (e.g., crabgrass, sandbur, foxtails) **and broadleaves** (e.g., purslane, spurge, knotweed). Applications should be made in the spring when soil temperatures exceed 50°F. This usually occurs first in landscape beds, thinned turfgrass stands, and areas near pavement. Applications in these areas should be made around April 15 in eastern Nebraska and about 7 to 10 days later in western Nebraska. In turf areas applications are normally made May 1 in eastern Nebraska and 7 to 10 days later in western Nebraska. Turfgrass soils typically warm slower than soil in landscape beds due to the insulating effect of the leaves, thatch, and mat. A second application is recommended in thinner stands and areas exposed to excess summer stress to provide season-long control of summer annuals.
- **Winter annual grasses** (e.g., downy brome, annual bluegrass)

and broadleaves (e.g., henbit, field pennycress, chickweed). Applications for winter annuals should be made in early September.

Postemergence:

- **Perennial** (e.g., dandelion, white clover, bindweed), **winter annual, and biennial** (e.g., poison hemlock, thistles) **broadleaves**. Late August through October is the preferred time to control established perennial weeds and newly emerging winter annuals. As photosynthates are moved from the leaves down to the roots in the fall, the herbicide is more effectively translocated to the roots resulting in more effective control. Both root and top growth will be affected. Spring applications can be effective on cool-season perennials like dandelion if applied at flowering, although regrowth may occur. Weeds such as ground ivy, wild violet, and field bindweed can be extremely difficult to control and may require hiring a professional. Spring applications on winter annuals are usually not justified because these weeds are near the end of their life cycle.
- **Summer annual broadleaves**. Summer annuals germinating in the spring or early summer are difficult to control. They mature quickly and a single herbicide application will only control a few of them since others either have not germinated or have grown too large to be controlled. In addition, summer annuals may have a waxy layer on their leaves to prevent water loss, which will also limit herbicides from entering the

leaves. For most effective control, apply sequential applications of a POST herbicide throughout the summer. Most summer annual weeds are best controlled with a PRE herbicide application in early spring, and the most effective PRE herbicide for broadleaf weeds contains the active ingredient isoxaben.

- **Summer annual grasses**. Though PRE herbicides are the most effective chemical option for summer annual grassy weeds, POST herbicides may be needed to rescue breakthroughs from PRE herbicides or on lawns that did not receive a PRE herbicide in the spring. Summer annuals will start to decline with decreasing daylight hours and cooling temperatures in late August, and will die with the first frost, thus making late-season control less practical. Though most of the POST herbicides can control young summer annual grasses with a single application, control will improve with a second application applied two weeks after the first. The second application will improve control on larger grassy plants as well as controlling plants that have germinated since the initial application.
- **Perennial bunch-type grasses** (tall fescue, perennial ryegrass, orchardgrass). Bunch-type grasses can be cut out with a shovel if there are just a few weedy patches. Cut down 3 to 4 inches into the soil to get all of the stems. The holes should be refilled with representative soil and reseeded or sodded immediately. If the area has a large number of plants, spot apply a non-selective systemic herbicide. For even larger

infestations, the entire area may need to be sprayed out with a non-selective herbicide and renovated.

- **Perennial spreading grasses** (smooth brome, creeping bentgrass, nimblewill, zoysiagrass, quackgrass). Perennial spreading grassy weeds are difficult to identify and once identified, are extremely difficult to control in many cases. Few effective selective herbicides are available to homeowners to remove perennial spreading grasses from grassy areas, and multiple applications per year with either selective or non-selective POST herbicides are needed for control. Repeat applications should be made after the weed starts to regrow. The large number of stolons or rhizomes and extended dormancy of these structures may allow the grassy weed to reappear in future years. Controlling warm-season grasses (zoysia and nimblewill) should be initiated shortly after green-up in the summer, whereas control of cool-season grasses (smooth brome, quackgrass, creeping bentgrass) can be started in spring, summer, or early fall. In many cases, perennial weedy grasses should simply be tolerated in a turf because they are too difficult or impossible to control effectively. Removing perennial spreading grasses in landscape beds is most cost-effective with a non-selective systemic herbicide.
- **Yellow nutsedge** is a complex plant spreading by tubers and rhizomes and is the exception to fall application for perennial plants. Hand weeding and applications for yellow nutsedge should be made prior to the longest day of the year, June 21, because tubers for the next

generation start forming shortly thereafter. If herbicides are used, multiple applications will improve control of nutsedge germinating later from rhizomes and/or nutsedge not completely controlled with the initial application. Contact products such as sulfentrazone do not appear to release the dormancy of the daughter tubers. These tubers may germinate the following season. There are usually many tubers lying dormant in the soil in a yellow nutsedge infestation, so many years of dedicated control will likely be needed.

Summary

Weeds succeed in landscapes that are designed or managed inappropriately. The best way to minimize competition from weeds is to use management practices that promote the healthy growth of desirable plants and to remove weeds and weed parts in a timely manner using mechanical and chemical means that reduce spread and seed development.

Herbicides are an important tool for controlling weeds but may be a short-term fix without correcting the underlying problem. Understanding why a weed has become established in a landscape is important for reducing future weed infestations. Herbicides should be selected based on the weed species present. Applying herbicides at the correct time relative to the weed life cycle is critical for successful management. *Table 1* and the accompanying photos give detailed information about common weeds found in Nebraska landscapes.

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Table 1. Common weeds found in Nebraska landscapes

Common Name	Scientific Name	Life Cycle*	Grass, Broadleaf or Sedge	Preferred Control	Typical Sites Found
black medic	<i>Medicago lupulina</i>	SA	BL	Post	low nitrogen fertility, low moisture
blackseed plantain	<i>Plantago rugelii</i>	P	BL	Post in Fall	compacted soils, high pH
buckhorn plantain	<i>Plantago lanceolata</i>	P	BL	Post in Fall	thinned turf
carpetweed	<i>Mullugo verticillata</i>	SA	BL	Post	low nitrogen fertility, landscape beds
catchweed bedstraw	<i>Galium aparine</i>	SA	BL	Post	excessive moisture, shade, landscape beds
chickweed, common	<i>Stellaria media</i>	WA	BL	Pre	low mowing, excessive moisture, compacted soils, shade
lambsquarters, common	<i>Chenopodium album</i>	SA	BL	Post	landscape beds
purslane, common	<i>Portulaca oleracea</i>	SA	BL	Post	high nitrogen fertility, low moisture
ragweed, common	<i>Ambrosia artemisiifolia</i>	SA	BL	Post	thinned turf
crabgrass	<i>Digitaria</i> sp.	SA	G	Pre	low mowing, high fertility, excessive moisture, compacted soils
curly dock	<i>Rumex crispus</i>	P	BL	Post in Fall	low moisture
dandelion	<i>Taraxacum officinale</i>	P	BL	Post in Fall	thinned turf
field bindweed	<i>Convolvulus arvensis</i>	P	BL	Post in Fall	turf and landscape beds
field pennycress	<i>Thlaspi arvense</i>	WA	BL	Post	new seedings
field sandbur	<i>Cenchrus pauciflorus</i>	SA	G	Pre	low nitrogen fertility, low moisture
field speedwell	<i>Veronica agrestis</i>	WA	BL	Pre	low mowing, low moisture
goosegrass	<i>Eleusine indica</i>	SA	G	Pre	compacted soils, low moisture
ground ivy	<i>Glechoma hederacea</i>	P	BL	Post in Fall	low nitrogen fertility, shade
henbit	<i>Lamium amplexicaule</i>	WA	BL	Pre	thinned areas
mallow	<i>Malva neglecta</i>	SA/B	BL	Post	low nitrogen fertility, high mowing
nimblewill	<i>Muhlenbergia schreberi</i>	P	G	Post	shade
prostrate knotweed	<i>Polygonum aviculare</i>	SA	BL	Post	compacted soils
prostrate spurge	<i>Euphorbia supina</i>	SA	BL	Pre	low moisture, compacted soils
puncturevine	<i>Tribulus terrestris</i>	SA	BL	Post	sandy soils, compacted soils, low nitrogen fertility
quackgrass	<i>Agropyron repens</i>	P	G	Post	low nitrogen fertility, low moisture, thinned turf
white clover	<i>Trifolium repens</i>	P	BL	Post in Fall	high or infrequent mowing, low nitrogen fertility
wild violet	<i>Viola</i> sp.	P	BL	Post in Fall	excessive moisture, shade
windmillgrass	<i>Chloris verticillata</i>	P	G	Post	thinned turf
yarrow, common	<i>Achillea millefolium</i>	P	BL	Post in Fall	low nitrogen fertility, low moisture
yellow foxtail	<i>Setaria glauca</i>	SA	G	Pre	excessive moisture, new seedings
yellow nutsedge	<i>Cyperus esculentus</i>	P	S	Post	poor drainage
yellow woodsorrel	<i>Oxalis stricta</i>	P	BL	Pre	low moisture, thinned turf areas, low nitrogen fertility

* SA-summer annual, WA-winter annual, P-perennial, B-biennial



Black Medic



Blackseed Plantain



Buckhorn Plantain



Carpetweed



Catchweed Bedstraw



Common Chickweed



Common Lambsquarters



Common Purslane



Common Ragweed



Crabgrass



Curly Dock



Dandelion



Field Bindweed



Field Pennycress



Field Sandbur



Field Speedwell



Goosegrass



Ground Ivy



Henbit



Mallow



Nimblewill



Prostrate Knotweed



Prostrate Spurge



Puncturevine



Quackgrass



White Clover



Wild Violet



Windmillgrass



Yarrow



Yellow Foxtail



Yellow Nutsedge



Yellow Woodsorrel