

Post-emergence weed control in *cool-season* turfgrasses

Site preparation is an important prologue to effective pre-emergence and post-emergence weed control.

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■ Weeds are plants...they just grow where they're not wanted.

A white clover plant may be considered an integral part of turf by some, but others view it as an undesirable weed.

Weeds are a major problem in turfgrass, and are usually the most visible pests. Weeds destroy aesthetic and functional aspects of turf and perhaps more importantly, compete with turfgrass for water, nutrients, light, carbon dioxide and space. Correct identification, knowledge of plant characteristics and lifecycle play an important role in preventing and controlling common weeds.

Proper management fosters a denser, more vigorous turf which is pleasing to the eye and also discouraging to invading weeds. The presence of weeds is often a sign of turf which has been neglected or improperly managed.

When weeds invade our turf, we often seek a quick solution by using a wide array of available herbicides. Many of these applications, although effective, cannot provide long-term control of many weeds which may be present.

Continued herbicide use, without correcting conditions leading to weed encroachment,



Yarrow

can lead to weed problems that are even more persistent and difficult to control. A well balanced approach, including proper identification of weeds as well as cultural, mechanical and chemical control, will minimize weed competition.

Cultural practices—One of the most common cultural mistakes that is made in poor turf and weedy turfgrass is selecting non-competitive turf cultivars. Adapted turfgrass cultivars are more tolerant of environmental stress and are less likely to be damaged by pests than non-adapted grasses.

Turfgrass selection should be based on species and cultivar evaluation conducted over a number of years and under varying conditions. University recommendations are mainly based on such regional trials. Use mixtures (two or more species) and blends (two or more cultivars rather than a single cultivar). This spreads adaptability as it will ensure a broad genetic base and adaptation to a wide range of growing conditions. Mixtures and blends will maintain better stand density and compete more readily against weed invasion than unadapted grasses.

Using adapted cultivars, proper mowing height and frequency, fertilization, irrigation, and proper drainage are all cultural practices which will promote a competitive turf.

Mechanical control—Tilling prior to turfgrass establishment can be considered one example of mechanical control. The seed bed should be prepared a few weeks before seeding. A final shallow till just prior to seeding should be done to destroy any weed seedlings that have germinated since the last tillage operation.

Soil coring or aeration can alleviate soil



Plantain

compaction, enhance rooting, increase water penetration, enhance nutrient uptake and minimize thatch build-up. Certain weeds, such as prostrate knotweed, are more competitive when soils are compacted. Soil aeration, when turf is actively growing improves turfgrass growth.

Mowing, another example of mechanical control, is basic to turfgrass culture. Unfortunately, most weeds which infest turfgrass areas can tolerate close mowing heights. The idea is to select a mowing height and frequency based on growth rate and environmental conditions. As a general rule, remove no more than one-third of the leaf area with any mowing. Keep mowing equipment sharp and in good operating condition. Continuous mowing with a dull mower blade weakens turf, making it prone to stress injury and weed invasion. Proper mowing practices help develop and maintain a dense, vigorous turf less subject to weed competition.

Although more commonly used for disease control, **sanitation** practices can help control weeds. Sanitation refers to the physical removal or avoidance of placing undesirable plants where they are not wanted. Violets, often planted in flower beds, can become established in turfgrass where they are a troublesome pest. Avoid planting species such as violets close to the edge of flower beds where they can readily invade the turf.

Mowing and edging equipment should be kept clean. A mower may pick up a sprig of zoysiagrass from an adjacent turf and move it



Curly dock

to a section of bluegrass turf. If conditions are favorable, the zoysiagrass can become established in the bluegrass.

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When establishing a turf stand, make sure to use nothing but the highest quality seed available. Low quality seed often contains weed seed. One way to ensure the seed you buy is high quality is to only buy certified seed, which indicates what percentage, if any, weed seed is present and guarantees the genetic purity of the seed bag.

Chemical control—Herbicides are an integral part of any weed control strategy. Herbicides provide an effective, convenient method of controlling weeds in turf, but should be considered as a supplement to proper cultural and mechanical control methods. For the most part, herbicides are specific as to which weeds they will control, and herbicide selection depends on which weeds are present.

Herbicide selection also depends on which turfgrass species are present. Always read and follow herbicide label directions. Double coverage at half rate in two directions assures a more even distribution than full rate applied in one direction. Do not apply granular formulations to wet turf.

The purpose of **pre-emergence** herbicides is to form a chemical barrier at the soil surface to control weeds during germination, before they emerge. **Post-emergence** herbicides are applied to target weeds that have already emerged from the soil. Post-emergence herbicides may be **selective** or **non-selective** and act as systemic or non-systemic (contact) types.

Systemic herbicides are absorbed and moved within the plant system. They are commonly used to control perennial weeds, since they are translocated to underground plant parts and eliminate regrowth from these structures. **Contact** herbicides kill only those plant parts which are sprayed and are not translocated within the plant. They are most effective on annual weeds. Uniform coverage is essential for effective weed control using a contact herbicide.

Pre-emergence application tips—Pre-emergence herbicides are used primarily to control annual grasses, but may control annual broadleaf weeds as well. For these products to be effective, they should be applied a few weeks prior to the germination of the weeds controlled. A second application is sometimes needed to provide season-long control.

• **Prepare the site.** Pre-emergence herbicides must reach the soil where weed seeds germinate. To maximize the amount of product which reaches the site, the turfgrass must be prepared properly. Rake and remove trash, thatch, leaves and excess dead grass from the turfgrass. This allows the soil surface to warm

quickly in the spring and enhance turf growth.

• **Mow the grass.** It is helpful to mow the turfgrass prior to herbicide application to reduce herbicide interception. Research conducted at the University of Nebraska has shown that up to 95 percent of applied pre-emergence herbicide can be retained on the turfgrass leaves and never reach the soil. By mowing prior to the treatment, less material is intercepted by the turf and more gets to the soil surface.

• **Irrigate.** It is critical to water pre-emergence herbicides into the turfgrass as soon as possible. Usually, between one-half to one inch of water is sufficient for many of the pre-emergence herbicides to be moved into the soil and activated. Without irrigation or rainfall soon after application, the product stays on the turf and can be degraded by sunlight, which greatly reduces efficacy.

Post-emergence application tips—Regardless of the type of weed, there are several factors that influence the effectiveness of postemergence applications.

• **Apply when weeds are small.** For annual weeds, or the seedlings of perennials, control is easiest to achieve when the weeds are small. As the weeds age, changes in leaf surface characteristics, such as growth habit and physiological function occur. These changes result in reduced herbicide uptake and translocation. The larger the weed, the more difficult it is to control. Larger weeds may require higher rates or repeat applications, which can increase injury to existing turf.

• **Apply to healthy weeds.** Weeds are more susceptible to herbicides if they are actively growing at the time of the application. Any stress that reduces the vigor of the weed often results in less herbicide uptake and translocation, the end result being erratic control. Good soil moisture and moderate air temperatures should be present when making applications. If soil moisture is lacking, water the turfgrass a few days prior to the intended spray date. Applications made early in the morning or late in the afternoon are also helpful. At these times, air temperature is low and water stress is at a minimum.

• **Avoid irrigation and rainfall.** Post-emergence herbicides must be retained on the leaf surface of the weed so the material can be absorbed and translocated within the weed. Although these herbicides have some soil activity, most of the weed control benefits are from foliar activity. If irrigation or rainfall occurs shortly after herbicide application, significant amounts of the herbicide can be washed off the weed, resulting in reduced control. Generally, there needs to be an eight-hour, rain-free period after an applica-

tion has been made.

• **Do not pre-mow.** The target weeds must have enough leaf area to intercept a lethal dose of the herbicide. To ensure adequate leaf surface, don't mow the area prior to spraying for weeds.

Ideally, the area should not be mowed for two to three days before treatment. After treatment, allow another three to four days to pass before mowing the area. This allows enough time for the herbicide to be thoroughly translocated within the weed.

For more specific information, consult your local or state turfgrass specialist or other experts.

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Identify the problem

■ From a control standpoint, determining the lifecycle of the weeds—whether they are annuals, biennials or perennials—is essential for management purposes.

Annuals require one year or less to complete their lifecycle. They germinate from seed, mature and produce seed for the next generation in less than 12 months. Winter annuals such as sheperdspurse and henbit are most visible in the spring after bolting (stalk elongation). After bolting has occurred, the chances of achieving satisfactory control by any form decreases. Summer annuals such as crabgrass and prostrate knotweed are most easily controlled in the early spring before they germinate, or when small and actively growing.

Biennials complete their lifecycle in two years. They form a rosette during the first year, maintain the rosette during the dormancy of the winter, then continue vegetative growth with flowering and seed development the following year. They are most easily controlled in the fall or early spring when the plants are still in the rosette stage. Members of the thistle family, such as musk and plumeless, are classic examples in turf.

Perennials are plants that live for more than two years, and may live indefinitely. Many perennials grow from seed, but may arise from reproductive structures such as tubers, roots, stolons and rhizomes. Dandelions, white clover, quackgrass and ground ivy are examples of perennial weeds. Best control is achieved by fall application of an appropriate herbicide.

—Dr. McNamara