Strategies for Turfgrass Weed Control with Preemergence Herbicides

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LAWN AND LANDSCAPE MAINTENANCE

Many turfgrass weeds can be effectively controlled with the use of herbicides. However, it is important for turfgrass managers to utilize herbicides as only one of the many weed management tools at their disposal. Many times, weeds in the lawn and landscape exist and thrive because the turfgrass is not properly managed. In these cases, herbicides should be utilized as a short-term approach to weed management. Promoting a vigorous and healthy turfgrass by correcting the underlying management problem(s) should be the long-term approach.

When weeds are found in the turf and landscape, turfgrass managers need to think about why the weeds are a problem. It is important to understand the term "weed competition" that is often discussed by weed scientists. Weeds (undesirable plants) compete with the turfgrass (desirable plants) for light, water, nutrients, and certain plant-essential gases. However, of these four, competition for light is often the most important. Where you have weakened or poor-growing turf, sunlight is free to penetrate directly to the soil surface. When this occurs, the door is open for weeds to invade (see picture).

Picture 1. Smooth crabgrass invading a thinned area of bermudagrass turf. Light penetrating the turfgrass canopy and striking the soil surface will lead to weed problems.

Once the weed species is established, it can spread to other areas in the turf and landscape. This can lead to weed problems for many years at this particular site and also sites nearby. Incorrect turfgrass management often encourages weed infestations in the landscape. Poor turfgrass management that leads to weed infestations can be characterized as anything that inhibits vigorous turf growth. Some of the most common forms of mismanagement include improper mowing height, poor fertilization/liming practices, and selection of poorly adapted turfgrass species.

By utilizing sound turfgrass management, weed problems will be less. Nonetheless, weeds, particularly some species, can exist and thrive in the lawn and landscape even where sound turfgrass management is followed. In these cases, the use of herbicides is often needed as an aid to weed management. Herbicides can be used as a preventative approach (preemergence) or remedially (postemergence). There are advantages and disadvantages to each approach. The following will discuss the basics of weed management with preemergence herbicides.

Preemergence herbicides are used to prevent weeds from becoming established. They are most useful in areas where a certain weed species is known to be a problem. A major advantage of preemergence herbicides for lawn care/grounds management is that they prevent the weed problem from occurring thereby reducing the number of complaints or call-backs, which can be expensive and time consuming to the manager. A major disadvantage of preemergence herbicides is they do not fit as well as postemergence herbicides into integrated pest management (IPM) strategies. Postemergence herbicides can be used on an "as-needed" basis which allows for spot-spraying or treating only where weeds are present. However, preemergence herbicides can be used more efficiently if weed scouting is done the previous season and weed maps are developed. With weed maps, these herbicides can be applied only where they are needed.

Preemergence herbicides control many weedy pests in turfgrasses. They are primarily used to control summer annual weedy grasses such crabgrass (large or smooth), goosegrass, foxtails and sandbur. It is absolutely necessary that the weed species be correctly identified because preemergence herbicides differ in their ability to provide control. For instance, the various preemergence herbicides may do a good job on the crabgrass species and goosegrass, but offer no control of dallisgrass (Paspalum dilatatum), thin paspalum (Paspalum setaceum), or field paspalum (Paspalum laeve) (both thin paspalum and field paspalum resemble dallisgrass). It is also important that turfgrass managers check to see if a particular weed species is controlled by a herbicide. Product labels usually state the weeds controlled. You may also find this list is divided by herbicide rate. Some weeds are only controlled by a higher rate whereas lower rates may only offer suppression (meaning only partially controlled). Effective rates may also vary with your geographical location. Other valuable sources of information include reference materials published by the Cooperative Extension Service in your state and county. Most of the time, research data on control of various weeds has been generated in your state. To obtain results from these trials, contact the county or state extension service representative in your area.

It is absolutely necessary that the tolerance of a particular turfgrass species is thoroughly understood prior to using a preemergence herbicide. There are many examples where a herbicide may be labeled for use on one turfgrass species but may severely injure or kill another species. This is of particular importance for turfgrass managers that operate in areas where both cool- and warm-season grasses are utilized as turfgrasses.

UNDERSTAND THE WEED

As previously mentioned, it is necessary to correctly identify the weeds needed to be controlled. If you have managed an area for several years, you should know the weeds to expect. Also, knowing the biology of the weed species in question aids in correctly timing your

preemergence herbicide application. Weed species germinate at different soil temperatures. Because preemergence herbicides are most effective when applied prior to weed germination, it is necessary to know when the weed species in question will germinate. Table 1 (below) lists the critical soil temperature for germination for some of the summer annual grassy weeds.

Table 1. Approximate Soil Temperatures for Germination of Various Turfgrass Weed Species

SPECIES	MINIMUM SOIL TEMPERATURE (F) *
Crabgrass (Large or Smooth)	55
Goosegrass	60
Barnyardgrass	60
Foxtail (Yellow or green)	65

*** Soil temperatures in the vicinity of seed germination which is usually in the upper half-inch of soil. (Taken from Managing Turfgrass Pests by Watschke et al).**

It is also beneficial to understand how the particular weed species may spread. Many annual species, such as those listed in table 1, spread only by seed whereas many perennial species may spread by movement of rhizomes, stolons, or sometimes even stem fragments. Preventing seedheads from developing is critical in preventing further weed infestations. It is also important to prevent weeds from producing seed in the vicinity of the managed area. It is easy to neglect areas in the periphery of the managed area. However, many weed problems originate by weed seed moving into the managed area from an unmanaged area.

UNDERSTAND THE HERBICIDE

Understanding how the various preemergence herbicides work is necessary if optimum weed control is to be obtained. One of the most commonly used family of preemergence herbicides is the dinitroanilines (sometimes referred to as DNAs). Individual herbicides in this family include Barricade, Team, pendimethalin (various trade names including Pendulum, Pre-M, and Weedgrass Control), Surflan, and Balan. Dimension herbicide does not belong to the DNA family although its mechanism of action is very similar. These herbicides are widely used for preemergence annual grass control in established turfgrasses. Generally, they provide good weed control if applied correctly. By understanding how this family of herbicides provide weed control, it becomes more clear as to how they should be utilized.

First of all, DNAs do not prevent weed seed germination. As the seedling germinates, the herbicide is absorbed by young roots and emerging shoots and cell division is inhibited causing plant death in susceptible species. Therefore, for optimum control, it is necessary to apply these herbicides prior to expected weed germination. After application, these herbicides need rainfall/irrigation for activation. This causes a chemical herbicide barrier at the soil surface. As weeds begin to germinate, they encounter this herbicide barrier, absorb the herbicide and fail to emerge. Because this family of herbicides is not very water soluble and readily binds to soil particles, they tend to remain near the soil surface and do not leach through the soil profile. Therefore, this chemical barrier remains intact until soil microorganisms and other factors degrade the herbicide over time.

Another herbicide used for preemergence control of annual grasses in many turfgrass species is Ronstar (oxadiazon). Ronstar is not registered for use in home lawns but can be used in commercial turf by professional applicators. Ronstar does not belong to the DNAs and the

mechanism of action is completely different. Ronstar is absorbed by shoots of the young weed species as the emerge through the herbicide treated zone and plant death in sensitive species occurs soon thereafter. Little to no root absorption occurs; therefore rooting of the turfgrass is not adversely affected. The timing of Ronstar application should be 10 to 14 days prior to expected weed germination followed by irrigation/rainfall. Ronstar will not control most emerged weeds.

Improper timing (application after weed emergence) is a major cause of poor control with these herbicides. While very small crabgrass plants (generally in the one-leaf stage for some of the DNAs and two to three leaf stage for Dimension) can be controlled with these products, much better control is obtained when application and irrigation/rainfall occurs prior to germination. For lawn care/grounds care operators, it is important to prioritize your preemergence application for customers. This should be based on several factors. Soil temperatures can vary even in a particular neighborhood. South facing slopes that receive full sun in the spring warm-up more quickly. Coarse-textured soils (sandy soils) also warm more quickly than fine-textured soils. Either of these areas should receive a priority for a preemergence application for control of summer annual grasses such as crabgrass, goosegrass, etc. Another important aspect of establishing a priority is whether or not the site can be irrigated. Remember, establishing a chemical barrier is necessary for proper control. If a customer does not utilize irrigation and must depend on rainfall, it would be wise to apply these products well in advance of expected germination whereas a site with irrigation can establish the chemical barrier immediately after application.

Applying these products well in advance of expected germination is acceptable. Many lawn care operators express concern over the herbicide degrading more quickly (therefore a breakdown in control) if they are applied several weeks prior to expected germination. Because these herbicides are primarily degraded by soil microbes, and because soil microbes are less active in cooler soils, degradation does not proceed at the same rate when the soil temperature is 45 degrees versus 70 degrees.

It is also important that these herbicides be properly applied and at the correct rate to prevent turfgrass injury. Remember, these herbicides are absorbed by roots and inhibit root growth. Therefore, improperly calibrated applicators, excessive overlap, etc can cause significant harm to the turfgrass.

Picture 2. An excessive rate of a dinitroaniline (DNA) herbicide that was applied to bermudagrass because of an incorrectly calibrated sprayer. The high herbicide rate significantly inhibited the ability of the turfgrass to root properly.

Many broadleaf weeds are controlled by the above-mentioned herbicides. These are listed on the product label. Another herbicide that can be utilized for preemergence broadleaf weed control in turfgrasses is Gallery (isoxaben). Gallery controls a wide spectrum of winter annual, summer annual, and perennial weeds. It can be applied to established turfgrasses with the exception of golf course putting greens and tees. Gallery belongs to the benzamide herbicide family and the mechanism of action is completely different from the DNAs. However, it must be applied prior to expected germination of broadleaf weeds. For activation, it must also receive a single rainfall or irrigation of at least 0.5 inches within 21 days of application. If weeds have already emerged, they should be controlled with postemergence herbicides prior to application of Gallery.

Preemergence herbicides are a valuable tool for turfgrass managers but should be used only as part of an overall weed management program. By understanding some of the pertinent biology of the weed to be controlled, and by understanding how preemergence herbicides work, turfgrass managers can utilize the products to their full potential.
