BROADLEAF WEED CONTROL--WHAT'S NEW

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Much has been written about turfgrass weed control over the years. Early information emphasized cultural control which combined best management practices and mechanical techniques to provide the desired species with a competitive advantage. As the chemical age developed, turfgrass weed control took on another dimension--the use of herbicides. Initially, chemicals used in turfgrass weed control were nonselective, mostly acidic compounds that did little to advance the state of the art of chemical weed control. After the introduction of 2,4-D in 1944, chemical control quickly became the dominating force in turfgrass weed control programs. Over the past 40 years, many herbicides have been commercialized for use in turfgrass. Chemical weed control utilizes materials that are used for preemergence, postemergence, or total vegetation control. There are contact, systemic, selective, nonselective and various combinations of chemicals available for use. Successful weed control programs, however, are those that integrate the cultural and management approaches (many of which were developed before herbicides) with the extraordinarily powerful chemical resources that are currently available.

Any definition of turfgrass management should include, "the creation of environmental conditions that favor the competitive nature of desired species over all others," as a fundamental part of the definition. Through this favored competition, weeds of all types have a reduced ability to influence the composition and quality of a turfgrass sward. Inevitably, weeds become part of the managed ecosystem and controlling competition from them becomes a combination of cultural and herbicide programs.

The need to control weeds may often arise from stand losses resulting from other pests (diseases, insects, nematodes, etc.). Weeds have long been recognized as indicators of unfavorable environmental conditions. For example, compaction, poor drainage, pH effects, poor soil structure, shade, and others allow weeds to encroach. From a cultural standpoint, improper mower height, irrigation mismanagement, inappropriate fertilizer rates and timings, poor disease and insect control, poorly timed cultivation, and misapplication of pesticides, fertilizers, and lime can all lead to weed encroachment.

The growth rate of turfgrasses has a strong influence on competitive ability. As a result, the importance of nitrogen fertilization in the control of weeds has long been recognized. Early research with preemergence herbicides showed that chemical effectiveness was strongly influenced by turf composition, density, quality, and mowing practices. As much as 70 percent of the control from effective preemergence herbicide programs has been attributed to natural competition resulting from properly timed nitrogen fertilization. A positive correlation for increased control of broadleaf weeds like dandelion has resulted from increased nitrogen fertility. Increasing phosphorus fertility is known to decrease crabgrass and dandelion encroachment into Kentucky bluegrass, while limed turf tends to favor dandelion encroachment. The substitution of fertilizers for herbicides to increased competitiveness

will decrease weed encroachment. This scheme is only applicable when the lack of turf density is related to fertility status.

For chemical control, weeds can be divided into three functional categories; annual grasses, broadleaf weeds, and perennial grasses. The standard herbicide approach to annual grass control is preemergence. When preemergence is not successful, postemergence controls are utilized, although they are generally not as consistent or effective as preemergence materials. Although some annual broadleaf weeds can be controlled preemergence, broadleaf weeds are most often controlled postemergence.

Summer annual broadleaf weeds germinate from early spring to mid-summer depending on the species. Most species are frost sensitive and are therefore later germinating. Regardless of germination date, summer annual broadleaf weeds are most competitive with turf during the summer months when they are in the vegetative stage of growth. Toward late summer, flowering and seed set occur and the seeds ripen and shatter before the first killing frost. Many species are killed by frost and, in some years, early frosts can reduce seed set.

Most summer annuals can be avoided in the northern United States by establishing cool season grasses in the fall. Late spring and summer establishment of cool season grasses sometimes fails due to competition from broadleaf summer annuals. Since many summer annual broadleaf weeds germinate during early to mid-summer, any loss of density to the turfgrass stand affords these weeds the opportunity to establish. Summer diseases and insect problems that thin turf often lead to invasion by summer annual broadleaf weeds. Preemergence herbicides are effective for controlling some broadleaf summer annuals, but timing of application is critical. Since the effective preemergence herbicides are commonly used for crabgrass, a second application for later germinating summer annuals may not be appropriate. Consequently, most summer annual broadleaf weeds are controlled using postemergence herbicides.

Winter annual broadleaf weeds are not particularly competitive with cool season grasses except during establishment. The preferred time for the establishment of cool season grasses is late summer through early fall partially to avoid competition from summer annuals. However, several winter annuals which are widely dispersed can become significant weed problems in the seedbed.

In southern latitudes winter annuals are significant problems because they germinate and become established into dormant warm season grasses. They also can compete with cool season grasses that have been overseeded into warm season grasses for winter turf.

Control of broadleaf winter annuals in seedings of cool season grasses can be accomplished through postemergence herbicide applications when the weeds are in the seedling stage (if competition is severe) or after the stand has begun to mature (after three or four mowings).

A newly developed preemergence broadleaf herbicide Isoxaben (Gallery) has shown considerable potential for the control of winter annual broadleaf weeds. Control has been shown to be particularly effective in new seedings

after the desired species has germinated.

Perennial broadleaf weeds are usually controlled with selective, systemic, postemergence herbicides. These materials are usually applied as spray applications, are taken up through the foliage, and translocated throughout the plant. They are very effective when applied to actively growing weeds. Some species continue to be particularly difficult to control (certain speedwells, wild violets, and ground ivy). However, sequential applications of herbicide combinations are usually effective in reducing their competitiveness. The table below contains several effective broadleaf herbicides labeled for selective broadleaf weed control in cool season turfgrass.

Material	Comments
2,4-D	Controls about half of the broadleaf weed problems
MCPP	Safe on bentgrasses, better on legumes and chickweeds than 2,4-D
Dicamba	Controls weeds that 2,4-D is weak on, must not be applied within the dripline of ornamentals
2,4-D + Dicamba	Synergistic response allowing for dicamba to be used at half the rate used alone and the spectrum of control expanded
2,4-D + MCPP + Dicamba	This combination controls the majority of broadleaf weeds in turf
2,4-D + Dichlorprop	This combination controls the majority of broad leaf weeds in turf
2,4-D + Dichlorprop + Dicamba	Spectrum of control expanded slight, particularly effective on harder to control species.
2,4-D + Triclopyr	Effective on broad spectrum of species and is less mobile in soil than dicamba containing combinations
2,4-D + MCPP + Dichlorprop	Effective on broad spectrum of species and is less mobile in soil than dicamba containing combinations.