Nutgrass in Tifton 328 bermudagrass can safely be controlled with DSMA or AMA. Not so when nutgrass appears in red fescues and bents, which are easily injured by these chemicals. Below, author Callahan discusses safe use of many common herbicides.

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Select herbicides carefully . . .

Turfgrass Tolerances Do Differ

HOW IMPORTANT are herbicides in turf management? If used correctly, herbicides can play a very important role in a turf management program. However, an attempt should not be made to rely solely on herbicides as a substitute for any of the other practices important in managing turf. Greater emphasis should be placed on adequate and timely fertilization, correct watering, and frequent mowing at the proper cutting height.

Herbicide Function Should be Temporary

Many people believe that herbicides have to be applied year after year in order to keep a weed-free turf. This is entirely wrong. In fact, the repeated use of any herbicide can easily weaken the turfgrass, rendering it highly susceptible to disease attack. The use of herbicides should play only a small part in any turf management program. Their function should be temporary and only to give the turfgrass the advantage in competition with weeds, while at the same time eliminating the weeds or the bulk of the weed seeds in or at the soil surface.

Weeds most common in turfs can generally be separated into two groups: "broadleaf weeds" and "grassy weeds." Herbicides commonly used in the control of broadleaf weeds are shown in Table 1. The effects of these herbicides on some of our prominent turfgrasses are given in Table 2.

The herbicide injury ratings shown for the turfgrasses in these following tables are based on evaluations from turfgrass weed control research conducted throughout the country. It should be remembered that these are simply general ratings since the response of a turfgrass to an herbicide can fluctuate with changing climatic and soil influences.

Most turgrasses, except bentgrasses, are generally tolerant to the commonly recommended rates of 2,4-D and silvex for the control of broadleaf weeds. The lower rate of these chemicals can be used on bents during cool periods with only slight injury. However, the heavier rates should not be used at any time of the year.

Dicamba will control chickweeds effectively but can easily

Table 1. Postemergence herbicidal control of broadleaf weeds.

Weed	Herbicide	Rate lb. ai/A*	Time and Number of Applications
Dandelion Broadleaf Plantains Buckhorn Plantain	2,4-D (amines & esters) silvex (esters)	1-1½ ½-1	Late summer and fall (2-3 applications at 10-14 day intervals) and early spring (1-2 applications at 10-14 day intervals)
Mouseear and common chickweeds Henbit (Winter Mint)	silvex (esters) Dicamba (amines)	¾-1 ½-1	Fall to early winter (2-3 applications at 10-14 day intervals) and late winter to early spring (1-2 applications at 10-14 day intervals)
Wild Garlic Nutgrass	2,4-D (amines) + DSMA or AMA	1 2-4	October to December; February to early April. Treatments at 10-14 day intervals. Important to treat small shoots in November.

* lb. ai/A = pounds active ingredient per acre.

cause injury to Kentucky bluegrasses, red fescues, and bentgrasses.

Extreme care should be exercised in using 2,4-D, silvex, and dicamba around trees, shrubs, and flowers to avoid serious injury to these plants from spray drift.

The methylated arsenicals (DSMA and AMA) are generally safe on bermudagrasses and zoysiagrasses at low rates but should not be used on St. Augustine, centipede, carpet, or bahiagrass. Injury to bluegrasses can be prevented if low rates are used during the cooler periods of the year. Red fescues and bents can be easily injured. All of these grasses can be moderately to severely injured with higher rates. Tifgreen bermudagrass is particularly susceptible to these arsenicals. When DSMA or AMA is mixed with 2,4-D, the low rates of both should be used since retreatments are often needed.

Turf Tolerances To Grassy Weed Killers

Many herbicides now on the market will give excellent control of crabgrass, goosegrass, and annual bluegrass (*Poa annua*). A list of several preemergence herbicides, their rates, and general level of persistence is shown in Table 3. The general tolerance of turfgrasses to these herbicides is shown in Table 4.

For the most part, these herbicides need to be applied and well "watered in" before annual weedy grasses germinate, or their effectiveness can be greatly diminished. Injury to turfgrasses usually occurs as contact foliage burn or physiological injury following absorption through the roots.

Dacthal is a relatively short-lived herbicide generally safe to most turfgrasses but has caused injury to red fescues and creep-

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Healthy buckhorn plantain (above) fades rapidly when treated with 2,4-D. Knowing which herbicide to use and proper dosages can make the difference between dead weeds (below) and dead turf.

Table 2: General tolerance of turfgrasses to a few commonly used post-emergence herbicides.

Chemical	Rates lb. ai/A	Turfgrass Injury Ratings[1]				
		Bermuda	Emerald Zoysia	Kentucky Blue	Red Fescue	Bent Greens
2,4-D	¾-1½	1	1	1	1	1-3
Silvex (2,4,5-TP)	½-1	1	1	1-2	1-2	2-4
Dicamba (Banvel D)	½-1	1	1	1-2	1-3	2-4
DSMA	2-6	1-2	1-2	1-3	2-4	2-4
AMA	2-4	1-2	1-2	1-3	2-4	2-4

[1]Injury Ratings: 1 = no injury; 5= complete kill.

Table 3. Average rates and general persistence of several preemergence herbicides used for the control of crabgrass (*Digitaria sanguinalis* and *D. ischaemum*) in turfgrasses.

Chemical	Av. lb. ai/1,000 sq. ft.	Av. lb. ai/ acre	Seasonal Persistence	Rate to Apply Next Season
Dacthal	0.25	11	None	Full Rate
Trifluralin	0.03	1½	None	Full
Benefin	0.04	2	None	Full
Tupersan	0.46	20	None	Full
Betasan	0.34	15	None	Full
Calcium Propyl Arsenate	1.0	45	None	Full
Azak	0.23	10	None	Full
Zytron	0.34	15	50%	Half Rate
Bandane	1.0	45	50%	Half
Chlordane	2.0	85	50%	Half
Calcium Arsenate	10.3	450	80%	One-fourth
Lead Arsenate	5.0	220	80%	One-fourth

Table 4. General tolerance of turfgrasses to a few commonly used pre-emergence herbicides.

Chemical	Rates lb. ai/A	Turfgrass Injury Ratings[1]				
		Bermuda	Zoysia	Blue	Fescue	Greens
			Emerald	Kentucky	Red	Bent
Dacthal (DCPA)	10-20	1	1	1	1-3	1-3
Trifluralin (analog: Benefin)	1-4	1-2	1-3	2-4	2-4	2-4
Tupersan (Siduron)	16-24	1-3	1-2	1	1	1-3
Betasan (R-4461) (Pre-San)	10-15	1-3	1-3	1	1	1-2
Zytron DMPA	10-20	1	1	1	1-3	1-3
Azak (H-9573)	10-15	1	1-3	1-2	1-2	1-2
Bandane	40-60	1	1	1	1	1
Chlordane	60-90	1	1	1-2	1-2	1-2
Calcium Arsenate	350-550	1	1	1-3	1-3	1-3
Lead Arsenate	200-250	1	1	1-3	1-3	1-2

[1]Injury Ratings: 1 = no injury; 5= complete kill.

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ing bentgrasses, particularly at the higher rates.

The use of trifluralin is declining since injury to all types of turfgrasses has been reported often enough to question its safety. It also has a very narrow safety margin for application. However, a recent analog of trifluralin, benefin, offers promise for improved safety on turfgrasses while at the same time giving good control of annual weedy grasses.

Herbicide Selectivity Calls for Careful Usage

Some herbicides exhibit considerable selectivity. Tupersan is one of these. It exhibits a high degree of safety on some grasses but causes serious injury to others. This chemical has appeared safe on newly seeded bluegrass, perennial ryegrass, and creeping bentgrasses, such as Penncross, Seaside, C-1, C-7, C-19, and Highland and Astoria colonial bentgrasses. Mature turfs of red fescue, Kentucky bluegrass and a few creeping bentgrasses show good tolerance, yet warm season grasses such as the bermudagrasses have been severely injured. This chemical has not yet been recommended for use on golf putting greens.

Another herbicide which has caused injury on bermudagrasses and zoysiagrasses is Betasan. This chemical, like tupersan, tends to be safer on cool season turfgrasses. Betasan gives excellent control of annual bluegrass in bent greens with little or no serious injury to the bentgrass. Treatments for annual bluegrass in bentgrass greens should be made in late summer to early fall and again in early spring.

Two excellent herbicides for general turfs are Zytron and Azak. At recommended rates these chemicals are safe on most turfgrasses but can cause some injury to bentgrasses. They are not normally recommended for use on bentgrass greens.

Bandane and chlordane are two herbicides which are usually safe on turfgrasses. Due to their tendency to persist and build up to toxic levels under droughty conditions, the turf should be adequately irrigated throughout the season following their use.

Two preemergence arsenical herbicides which have been available for several years are calcium arsenate and lead arsenate. Although bermudagrasses show good tolerance to these herbicides, cool season grasses can be easily injured. These inorganic arsenicals are not recommended for use on St. Augustine or around ornamental plants with shallow roots. They are good herbicides and give a high level of persistence for a second year's control of annual weedy grasses. They give good control of annual bluegrass. Lead arsenate is still favored by many golf course superintendents for the control of annual bluegrass and crabgrass in golf greens.

The important fact to remember in using any herbicide is to apply it at the correct rate at the proper time. Use an herbicide only on a turfgrass known to be tolerant to it and read the label and follow the directions precisely.

Friend Announces TracTank Sprayer

The TracTank Sprayer, a new compact sprayer for herbicide application, was recently introduced by Friend Mfg. Corp. It can be used with 2- or 3-point hitch tractors and is effective for weed and brush control, while a specially designed tree boom provides swath or individual tree base herbicide application, the company reports. Available with 2- or 4-cylinder plunger-type pump, the sprayer features a mechanical agitator for its 100-gal. epoxy-lined tank, and is said to have the easiest pickup and dropoff operation in its field.

Specifications and more information on the TracTank Sprayer will be sent WTT readers who ask for them from Friend Manufacturing Corp., Prospect St. & East Ave., Gasport, N. Y. 14067.
