



Better Turf for Better Golf

TURF MANAGEMENT

from the USGA Green Section

WEED CONTROL

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GOOD progress has been made in the past decade in the control of weeds in the fine turf field. Today's herbicides are more selective, more specific; and weed control is now more or less routine in every well rounded turf management program. *Poa annua* excepted, available herbicides control most weeds that are troublesome in our Northeastern states. Yet weed control is by no means a one treatment affair. There are many reasons why weeds are more or less a pesky and perpetual problem on golf courses.

1. Golf courses cover extensive acreages. Within the bounds of each golf course, a variety of conditions prevail, i.e. soil, drainage, topographic, and environmental conditions. A turf man's task is to attempt continuously to balance these factors through management to keep turf healthy and weeds at a minimum.
2. Millions of viable weed seeds infest normal soils, golf course soils are no exception; therefore, any injury or weakness to the turf cover exposes soil saturated with weed seeds. Foot, car, and cart traffic, divot and ball marks all contribute to weed troubles.
3. Extreme climate conditions accelerate weed problems. For example, the hurricane floods of '55 caused turf weaknesses, and therefore many

weeds; while the severe dry spell now being experienced in many parts of the Northeast has made conditions ideal for weed encroachment, especially knotweed.

4. Individual plants of many of our annual weeds produce thousands of seeds which remain viable in soils for many years.
5. Most annual weeds have the unusual faculty of being able to adjust to maintenance and management practices in order to complete their life cycles. Crabgrass, chickweed, *Poa annua*, and plantain notably adjust to height of cut, and therefore are troublesome in putting green surfaces as well as other turf areas. Anyone who has witnessed plantain curling its head beneath its basal leaves to escape the mower set at putting green height indeed has renewed respect for Mother Nature.
6. Weed seeds are wind-borne, or carried in by equipment, on shoes, by birds, or other animals. Seeds deposited in healthy turf apparently remain viable for many years to await the chance to germinate when or if some turf weakness develops.
7. Mechanical injury due to constant use of equipment over tight areas,

notably the bruising of aprons, and bruising of approach areas.

Weed control generally falls into two categories: the first is weed prevention, and the second is weed eradication. Under the heading of Weed Prevention several factors are worthy of consideration:

1. **CULTURAL PRACTICES**—A healthy turf is the first approach to weed prevention and proper cultural practices are of paramount importance on golf course turfs. These include the selection of the proper turf-grasses; proper mowing technique on each individual area; the correct amounts of lime and fertilizer; adequate drainage throughout; proper watering; good insect and disease practices; and all other requirements necessary to grow healthy turf.
2. **PRE-EMERGENCE HERBICIDES**—These are the newest types of herbicides for the most part, although one of the oldest, lead arsenate, has been used for many years as a crabgrass, chickweed, and *Poa annua* deterrent. The pre-emergence herbicides appear now to be the most interesting of the newer chemicals because of the bright prospect of killing weeds as they emerge, and before they ever get to the troublesome point. Several new pre-emergence herbicides are now available, but are being used with caution and presently on a rather small scale. With many herbicides of this general class, Experiment Station trial results varied widely from year to year with any given product, indicating that climatic conditions have much to do with their performance, and that we need to follow Experiment Station results carefully for answers to these puzzlers.
3. **SOIL STERILANTS**—In this general class, we have mainly three products used by golf course superintendents. They are Aero-Cyanamid (calcium cyanamid), Dowfume MC-2 (methyl bromide), and Vapam (sodium N-methyl dithiocarbamate). Each has been used to good advantage in soil

sterilization. Each of these chemicals kills most of the weed seeds in the soil, thus assuring a minimum of difficulty with new plantings. There is a required waiting period for each of the soil sterilants, and the manufacturer's recommendations on the label must be carefully followed.

A good program of weed control indeed should include sterilization of soils for critical areas. Soil sterilization eliminates most, not all, weed seeds. There are a few, notably hard clover, seeds which escape injury, but these few escape weeds normally pose no real problem. In putting green construction, the golden opportunity of soil sterilization often is erroneously bypassed. Secondly, in the preparation of top dressing soils for greens, the failure to sterilize this soil unquestionably causes future weed problems. Weeds introduced into putting greens through non-sterilized top dressing soils may not show up for several years, but assuredly they will, if turf weaknesses develop.

Weed Eradication

Since the advent of 2,4-D and, more recently, 2,4,5-T, broad-leaved weeds and clover are no longer difficult weeds to eradicate from fine turf areas. Each herbicide is selective, and when used at proper rates, damage to permanent grasses normally is negligible. On bentgrass and close cropped fairway turf, minimum rates are recommended. Important factors to consider in any herbicide treatment are: soil moisture, temperature, wind velocity, grass species, safe rate of application, height of cut of turf area, and the all important factor of timing.

At this writing (late July) many of our Eastern states are in the grip of the severest drought in some 70 years, according to authoritative sources. Many areas have not had rainfall since April. Because of the extreme dryness, knotweed has invaded unwatered fairways, while clover is most prominent on watered fairways. If the drought continues, any herbicide treatment is going to be a ticklish problem on unwatered areas. If there is any question of safety, it would be advisable to delay Fall treatments or defer to next Spring.

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Elaboration of Weed Control Chart

CRABGRASS—Smooth crabgrass is more predominant in the Northeastern states and fortunately is easier to control than hairy crabgrass. Since crabgrass germinates over a long period, several treatments are normally required for good control. If phenyl mercuric acetate (PMA) formulations are used, it is preferable to begin treatments early—before crabgrass emerges. This appears to be especially important on greens that are in part or entirely velvet bentgrass.

For fairway and rough treatments of crabgrass, sodium arsenite used properly is still one of the best and most economical herbicides to use. Critical factors in the safe use of sodium arsenite are soil moisture and temperature; therefore it is usually best to time treatments following rainfall or good watering when temperatures are below 85°.

SILVER CRABGRASS—This weed is one of the more difficult pests to eradicate. Silver crabgrass or goosegrass as it is sometimes called is more susceptible to herbicide treatment in the seedling stage. The PMA—2,4-D treatment suggested above was first given the author by Joe Valentine, eminent Superintendent of the Merion Golf Club, Ardmore, Pennsylvania. Where applied to *seedling* plants of silver crabgrass,

this combination of chemicals has done a satisfactory job of control. Since dimethyl sodium arsonate entered the picture, some progressive superintendents have tried the DMSA and 2,4-D combination also with reported good results.

CLOVER—If clover persists in any given area, it would be advisable first to check for soil compaction, or drainage or nitrogen deficiency. Before herbicide treatments are applied, the deficiency should be corrected, otherwise reinfestation will occur.

On fairway turf, minimum rates of 2,4, 5-T are recommended, as high rates sometimes injure permanent grasses. 2,4,5-T is a slow acting herbicide on clover sometimes taking three weeks for results to show.

KNOTWEED—This weed often makes its appearance just as dry weather approaches. Therefore it becomes a touchy problem of whether to risk treatment with sodium arsenite. Sometimes intervals between treatments on unwatered fairways must be delayed to coincide with rainfall to insure good soil moisture conditions. This may require more than three treatments.

CHICKWEED—Many superintendents prefer to plug chickweed out of greens, as treatment with arsenate of lead sometimes leaves the green pitted, and therefore a poor putting surface.

Where chickweed occurs in greens, it seems desirable to discourage it gradually with light treatments of lead arsenate, or a 50-50 mixture of lead arsenate and ammonium sulphate. Scuffing the chickweed plant with the sole of the shoe prior to dusting with herbicides suggested, seems to work best.

Several superintendents report good control of chickweed in greens with disodium methyl arsonate preparations used at rates recommended for crabgrass control.

POA ANNUA—This weed is conspicuous by absence from the chart presented and for very good reason. We simply have no sure-fire selective control for *Poa annua* at present. Experiment station tests with many herbicides look promising, but further testing is essential. Lead arsenate for the present seems to be the favorite stand-by of most superintendents for putting green applications.

GENERAL WEED CONTROL CHART

WEED	GREENS	FAIRWAYS	ROUGHES	REMARKS
Smooth and hairy crabgrass	PMA formulations applied prior to emergence or in seedling stage. DMSA formulations on seedling or later stages.	Phenyl mercuric acetate, or dimethyl sodium arsonate, or sodium arsenite, or potassium cyanate. Latter primarily on blue grass turf only.	Same as fairways.	Three to four treatments at weekly intervals required for smooth, additional treatments required for hairy crabgrass.
Silver crabgrass	HAND WEED	Normal rates of PMA or DMSA with 1/5 oz. 2,4-D amine in 5 gals. water per 1000 sq. ft. Three or more treatments at 7-10 day intervals.	Same as fairways.	Begin treatments when in 2-leaf stage. Correct soil compaction.
Clover	Spot treat with light rates of ammonium sulphate.	1/2 to 3/4 lb. 2,4,5-T to the acre.	1lb. 2,4,5-T to the acre.	Mid-spring or mid-fall best time.
Seedling and mature knotweed		Liquid sodium arsenite at 1 1/2 pints followed by 2 treatments at weekly intervals of 1 qt. to the acre.	Same as fairways.	Soil moisture must be good. Avoid using sodium arsenite when temperatures are above 85°.
Broad leaf weeds; i.e. dandelion, plantain, etc.	HAND WEED	1/2 to 3/4 lb. 2,4-D amine to the acre. One treatment mid-spring or early fall.	1 lb. 2,4-D per acre.	Yearly applications may be required until desired control attained.
Mixed clover and broad leaf weeds		1/2 to 3/4 lb. each 2,4-D amine and 2,4,5-T per acre. 1 treatment in mid-spring or mid-fall.	1lb. each 2,4-D and 2,4,5-T per acre.	Yearly applications may be required until desired control attained.
Chickweed	Dust with lead arsenate or 50-50 mixture of lead arsenate & ammonium sulphate.	Similar sodium arsenite treatments as for knotweed.	Same as fairways.	Follow usual precautions for use of sodium arsenite (see above).

Where no rates are given, follow recommendations on the label, as treatments are more or less standard. Some spreader-sticker, wetting agent, or detergent added to each tankful of spray material is helpful and desirable.