

CHEMICAL CONTROL

OF WEEDS

By JOHN MONTEITH, Jr.

IT IS well known that if soil and climatic conditions are most favorable and if the maintenance methods used are most favorable to the normal growth of grass, most weeds will have extreme difficulty competing successfully against grass. While it may be a simple matter to write and talk learnedly about these "most favorable" conditions it is usually quite a different matter to maintain them in practice. The greenkeeper is likely to start his round against "natural conditions" with a big handicap and it is often extremely difficult and costly to pick up many strokes in that game.

First, the majority of our courses are not situated on soil that is anywhere near ideal for grass growth. Second, the majority of our courses are not located in regions where climatic conditions are ideal for the grasses grown on them. Third, the mowing requirements on a golf course are not such that enable grasses to develop in the normal manner throughout the season. And so on one might enumerate a long list of factors that work against the natural growth habits of our common turf grasses when they are grown on golf courses.

It is therefore not surprising that grass on golf courses experiences many difficulties from season to season. On the other hand there are other plants that are able to grow exceedingly well under the conditions that are maintained on golf courses and these plants may successfully compete against the planted grasses and ultimately gain possession of much of the turfed areas. Even though it is impractical to provide conditions that can be considered ideal for grass on most golf courses it is possible by the use of good greenkeeping methods to overcome many of the handicaps and greatly increase the resistance of desirable grasses against the

IN THE October 1936 issue of *GOLFDOM*, various methods used to control weeds in golf course turf were reviewed. That review included a brief discussion of the advantages and disadvantages of several control methods, including hand weeding, clean soil and seed, fertilizers, soil acidity, chemicals, and other methods. This article discusses in greater detail the various methods of weed control with chemicals.

encroachment of weeds. Soil improvement in limited areas such as tees and putting greens, liberal use of fertilizers, and the judicious use of water are examples of methods that may increase the vigor of grass and reduce many weeds.

Wherever it is practical to permanently improve conditions in favor of grass to the disadvantage of weeds such methods should be used. Unfortunately there are many, many instances where such improvements can not be accomplished on a sufficiently effective scale at reasonable cost to make them practical. It was to take care of these cases that work with chemical weed killers was started by the Green Section several years ago and since continued as limited funds would permit.

Chemicals Must Kill Weeds, Leave Turf Alone

The purpose of chemical weed killers is to kill or so weaken plants that are classed as weeds that they will no longer crowd the desirable plants out. At the same time these chemicals must cause no permanent injury to the desired plants. This idea is by no means new. Agricultural workers long before golf course problems were thought of tried to find some materials that would destroy undesirable plants without injuring desirable plants. Much experimental work has been done in the last few decades in an effort to obtain some such chemical. There has been decided progress but there remains far more work to be done before completely satisfactory results can be obtained.

Desirable plants and weeds are so closely related that it is obvious nature has



Control of crab grass obtained by applying sodium chlorate before the seeds germinated as compared with the check plot at the upper right. Lower right, 1 lb.; lower left, 2 lbs.; upper left, 3 lbs. to the thousand sq. ft. Treatments made on bare soil.

made no sharp dividing lines which would simplify the task of applying a material that will be a deadly poison to one group and harmless to another. Furthermore a plant like Bermuda grass may be much desired in one case but be considered a serious weed in another. In spite of this and many other difficulties it has been found practical to use chemicals to destroy weeds without checking the growth of crop plants unduly. In much of the weed control work on farms the weeds are killed at a time when the crop plant is not growing. In the case of controlling turf weeds the problem is usually one of checking weeds and at the same time saving the permanent turf grasses.

Clover Control Through Burning

One of the most common cases of chemical control of weeds is that of burning clover with sulphate of ammonia applied as a spray or as a dry salt when the leaves are moist. This chemical burns clover leaves badly and also injures the grass. If properly applied and repeated it is possible by this means to kill the clover while the grass recovers from the light injury and soon takes complete possession of the treated area. This burning method is distinct from the fertilizing and soil acidifying effects of sulphate of ammonia which also have a decidedly retarding effect on clover.

Sulphate of iron many years ago was likewise found to be effective in controlling certain weeds without causing any permanent injury to turf grasses. Combinations of sulphate of ammonia and sulphate of iron were also found to be effective and in certain regions, notably South Africa, the combination of the two

chemicals proved to be far more effective than either used alone at comparable rates. The iron sulphate method, however, has been found to have decided limitations and is ineffective on many soils. It is no longer in general use on golf courses even though it is effective under certain conditions.

In the Green Section work many chemicals have been tested including sulphate of iron, sodium and potassium chlorates, calcium cyanamid, ammonium thiocyanate, kerosene, various compounds of arsenic and many others. For general turf purposes it has been found that of the above mentioned chemicals sodium chlorate, sodium arsenite and arsenic acid offer most promise.

Sodium chlorate has been found to be effective in checking crab grass and many other weeds. It has the disadvantage of discoloring the turf during the summer months when play is heaviest on most courses. It has been amply demonstrated, however, that this chemical has many possibilities as a weed killer for turf purposes.

Sodium Chlorate Rates Not Determined

The rates are still not definitely determined and this chemical should not be applied to turf except with the understanding that it may cause serious harm. If it is confined to limited experimental areas it may be applied at rates of 1 to 2 lbs. to the thousand sq. ft. It may be applied in liquid form or mixed with moist sand. It is necessary to repeat applications when weeds recover. Usually 2 or 3 treatments are sufficient to accomplish satisfactory control. This chemical offers a serious fire hazard and should therefore be used with due caution. It will not burn,

but when mixed with combustible materials it becomes dangerous.

The two arsenical compounds that seem at the present to offer greatest possibilities as turf weed killers are sodium arsenite and arsenic acid. These two chemicals give similar results when applied at equal rates. They both are obtainable as pure chemicals and as such are rather expensive. They may be obtained as crude chemicals at a comparatively low cost. Sodium arsenite is sold as a powder. Arsenic acid in the crude unpurified form is sold as a liquid in carboys by large chemical companies. Since the methods of application and the results obtained are so similar they will be considered together. In the following discussion wherever one of them is mentioned it may be understood the other may be substituted.

Not for Use Over Large Areas

These two chemicals are still in the experimental stage and far more work is needed before general recommendations can be made. Rates and other suggestions are therefore given not as recommendations but as suggestions for those who wish to try them in rather limited areas until they become familiar with the possibilities of these chemicals for their own local conditions. When data that are now being collected can be assembled and analyzed it is hoped that some recommendations may be made, but for the present season at least it should be sufficient to limit their use to small areas.

Arsenic acid or sodium arsenite may be applied in the dry form with sand or fertilizers, or in liquid form as a spray. Sodium arsenite is preferable for the dry method although the liquid arsenic acid can be readily mixed with dry sand. The rates vary from 2 to 8 oz. when applied as a spray and from 8 to 24 oz. to the thousand sq. ft. when applied dry.

The lightest rates cause least damage to grass but must be repeated more often than is required with the heavier rates. In areas where a serious burn will not be objectionable it is well to use the heavier rates, but in areas where the discoloration of turf must be held to a minimum the lowest rates must be used. It has been found that by repeating the lighter applications as soon and as often as the weeds show signs of recovery it is possible to remove certain weeds from turf without killing grass.

The weeds that seem most susceptible to arsenic acid include such common turf pests as chickweed, plantain, clover, ground ivy and others of that type. Dandelions and similar deep-rooted plants are injured but require persistent treatment in most cases. Crab grass and other weeds of the grass family are not readily controlled with this chemical.

Arsenic Best in Spring and Fall

The best time to use arsenic acid on turf seems to be during the fall and spring months. During those periods injuries to grass are not as objectionable as during the summer months and the control of weeds is as complete as during the summer. In unusually hot weather arsenic acid may destroy much of the grass when applied even at the lighter rates suggested above. On the other hand when the weather conditions are most favorable the heaviest rate suggested will cause little discoloration of the grass while destroying practically all of the more susceptible types of weeds.

If the turf is in need of fertilizer it is well to apply some in order to speed the covering of the weedy areas with new grass. If the turf has been well fertilized there need be no additional applications of fertilizer. Where weeds are scattered through turf the chemical will remove



Dandelion control on the left treated with arsenical compounds. Area to the right of line received no treatment.

THERE ARE SEVERAL IN EVERY CLUB

This drunk has more crust than a pan of Aunt Minnie's biscuits. Thinking rules were made for everyone but himself, he keeps his guests long after club hours, necessitating the costly expense of waiter's over-time wages, kitchen help, electric light bills, attendants, and a dozen other items which swell the operating cost of a golf club.

No employee dare ask him to leave, but it's a shame these kind of members, who are always the ones to squawk the loudest about expenses, can't be tapped gently over the head with a brick and shown the light of day.



WELL, JIM, IT'S GETTING PRETTY LATE. I GUESS WE'D BETTER BE ROLLING ALONG

YEAH, THAT'S RIGHT, JIM - AND BESIDES, THAT SIGN SAYS YOUR CLUB IS SUPPOSED TO CLOSE AT 11:00 O'CLOCK AND IT'S 2:15 ALREADY. EVERYONE ELSE HAS GONE!

DON'T WORRY ABOUT THAT, FELLOW'SH.. YOU'SH MY GUESTS AN' WE CAN STAY ASH LONG ASH WE WANT! THOSE RULES DONT MEAN ME! I GUESS I GOT A LITTLE DRAG AROUND HERE. LES'H POLISH OFF ANOTHER ROUND AN' I'LL TELL YOU 'BOUT THE TIME I BEAT JACK AN' FRANK'S BEST BALL--

YOU SEE, IT WASH LAST SUMMER...ETC ETC...

them and grass will gradually take possession.

In cases where weeds have taken over large areas of the turf and there is only a scattering of grass (where they are removed) it has been found possible to obtain remarkably good results by combining the arsenic acid treatments with seeding and fertilizing. This is best done in early fall. Seed and fertilizer may be distributed in the usual manner. If broadcast on the surface the seed and fertilizer can be worked into the soil by light spiking. The area can then be treated with a medium or heavy application of arsenic acid. All of these operations may be done the same day.

The poison will kill the weeds but not the seed. By the time the grass seed germinates the fertilizer will encourage a rapid growth and overcome any possible harmful effect of any remaining arsenic acid in the soil. Some extremely weedy areas have been covered with a dense growth of grass by this means at a reasonable cost. The results have been quite comparable to those obtained by plowing and reseeding. It has the advantage over the latter in not leaving a soft muddy

area and in not destroying what permanent grass remains in the turf. Results obtained to date fully justify more extensive testing of this method.

In spite of favorable results obtained it must again be warned that these chemicals as yet can not be considered as established materials for general use. It should also be remembered that sodium arsenite and arsenic acid, like arsenic of lead and the mercury compounds, are extremely poisonous and should be handled with due care.

THE Detroit District's "Big Day," a tournament originated by Mrs. Charles H. Booth, veteran women's golf official of the sector, had a record entry of 225 this year despite inclement weather. Other districts might pick up the "Big Day" idea to good advantage.

This event had among other competitions, a team match in which each team was composed of the pro, assistant, women's champion and men's champion of the district clubs. Managers, greenkeepers and reporters also compete in this event, along with many of the district's women players.