

What's Been Observed in the Tests of 2,4-D on Weeds

By FANNY-FERN DAVIS

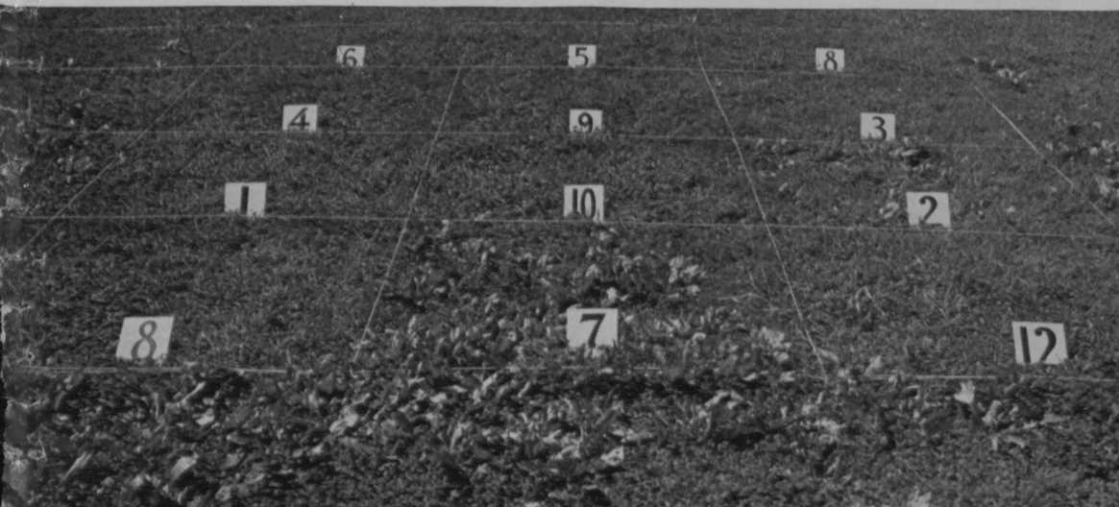
AS THE CHEERS and shouts of victory ring in our ears, greenkeepers and green-chairmen are challenged by the imminence of greatly increased interest in golf and the responsibilities which it places on them. Most clubs will have to face immediate, and in many cases drastic, rehabilitation measures in order to bring their courses back to prewar standards as promptly as possible. Competition will be keen. Problems which all must face will be many.

The first step almost inevitably will be the eradication of clover and weeds which have increased much on most courses through necessarily curtailed turf maintenance practices. To win this first battle as quickly and easily as possible, greenkeepers will do well to level their sights on the possibilities of 2,4-D. The striking resistance to it of most turf grasses combined with the remarkable sensitivity of such vicious turf weeds as dandelion and

buckhorn in the North and pennywort and dichondra in the South make it appear to be tailored for turf. At long last, perhaps, turf has had the breaks at a time and in a direction in which it is needed most.

There is nothing mysterious about 2,4-dichlorophenoxyacetic acid, which has been variously nicknamed in America 2,4-D or DCP and is referred to by the British (who also have been testing its weed killing potentialities) as chloroxone. It is a growth regulating compound which, when used at proper concentrations, will seriously affect the life of certain plants without injuring other types of vegetation. Fortunately for the greenkeeper, turf weeds of many botanical families have been found to be sensitive to it when as little as 1 ounce (and in some cases less) of 2,4-D is applied in spray to 1,500 square feet, whereas most of our common turf grasses both in the North and

Eradication of Broadleaf Plantain on the Mall in Washington with various formulations of 2,4-D. All formulations were applied in concentrations of 0.1 percent active ingredient at the rate of 5 gallons to 1,000 square feet on June 12 and this photograph taken on August 8. 1, 2,4-D in Carbowax; 2, Weedone supplied in September, 1944 (according to the manufacturer the active ingredient was TCP or 2,4,5-trichlorophenoxyacetic acid); 3, Weedicide tablets; 4, Dow 24; 5, Dupont IN 6065; 6, Dupont IN4311-A9; 7, Untreated check; 8, Weedone purchased in March 1945 (active ingredient 2,4-D; 9, Dow A-510; 10, Dow A-512; 12, Weedanole M-1. Also note untreated check in foreground.



the South are resistant to it. Unfortunately, however, most of the weedy grasses including crabgrass, goosegrass, bush muhly, Paspalum, Poa annua and Canada bluegrass are also resistant. This latter fact should be borne in mind in considering the most favorable time of year in which to use it.

Resistance of Turf Grasses to 2,4-D

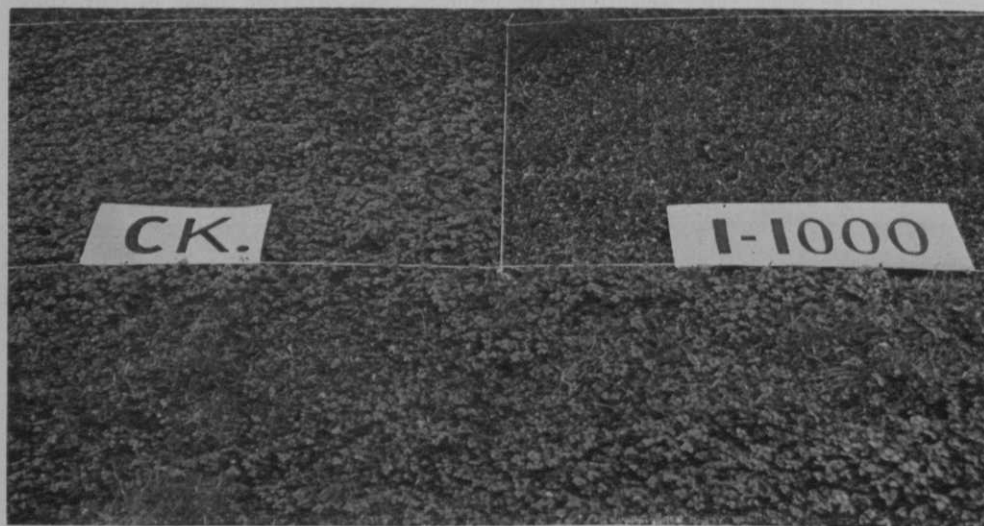
Turf grasses, with the exception of the bents maintained under putting green conditions, have not been seriously injured by any of the writer's applications of 2,4-D even when they were made in spring when the grass was at the height of its growing season. Kentucky bluegrass and Bermuda grass have withstood applications up to and including 6 times the rate recommended above without any apparent injury. Spring and fall applications have frequently resulted in an improved color to the grass,—a color improvement comparable to that resulting from a "shot" of nitrogen fertilizer. Therefore, so far as the established grass is concerned the 2,4-D can be applied at any time of the year.

Weeds Eradicated with 2,4-D

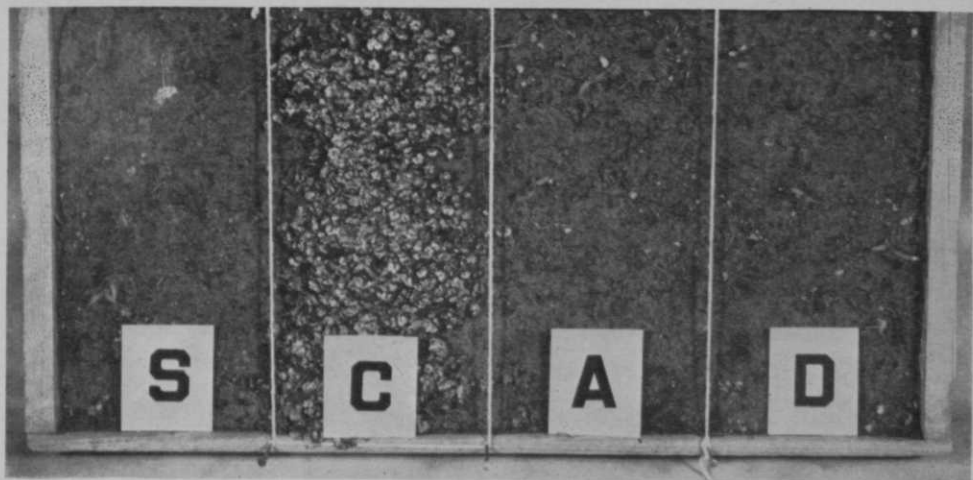
During the past 12 months the writer has tried 2,4-D on more than 50 common turf weeds in the Washington area. These tests have been made on turf maintained at fairway, lawn and rough heights of cut; in the sun and in the shade; in low, moist spots and on high, dry areas; and on various species of turf grasses. The weeds tested included dandelion, buckhorn plantain, broadleaf plantain, sheep sorrel, clover, henbit, chickweeds, several

veronicas, shepherds-purse, peppergrass, various other members of the mustard family, pennywort, knotweed, milk purslane, cinquefoil, false strawberry, heal-all, ground ivy, moneywort, weedy grasses, sedges and many others. These varied and comprehensive tests were conducted by the Green Section in cooperation with the National Capital Parks of the U. S. Department of Interior and have been summarized in the July and August issues of *Timely Turf Topics*.

It may be said, however, in brief review here that most of these weeds, except for the weedy grasses and sedges, have been successfully eradicated at the rate of 1½ pounds of 2,4-D in 200 gallons of water to the acre (as recommended in the November 1944 issue of *Timely Turf Topics*). This is the same rate as 5 gallons of a .1 percent solution (one containing 1,000 parts per million) to 1,000 square feet, or 1 ounce of 2,4-D to 1,500 square feet. For some weeds such as sheep sorrel and yarrow it has been necessary to use 4 and 5 times as much 2,4-D to obtain effective control, whereas other weeds such as dandelion have been fairly well eradicated at one-half this rate. However, since many of the sensitive weeds can be killed by the use of only 1 ounce of 2,4-D to 1,500 square feet, the writer believes this is a reasonable rate at which to initiate tests under any particular set of conditions. If the kill of the particular weed or weeds concerned is not satisfactory after 3 weeks have passed, a second application can be made, and another year perhaps a higher rate used where that particular weed is concerned.



Eradiation of False Strawberry. Left plot, untreated control; Right plot, sprayed with a 0.1 percent solution of 2,4-D in Carbowax at the rate of 5 gallons to 1,000 square feet on March 13. Photograph taken one week after treatment. Bluegrass seed which was sown prior to treatment came up later equally well in both plots and a weed free stand of bluegrass was established and maintained throughout the summer in the plot on the right. Note untreated check in the foreground.



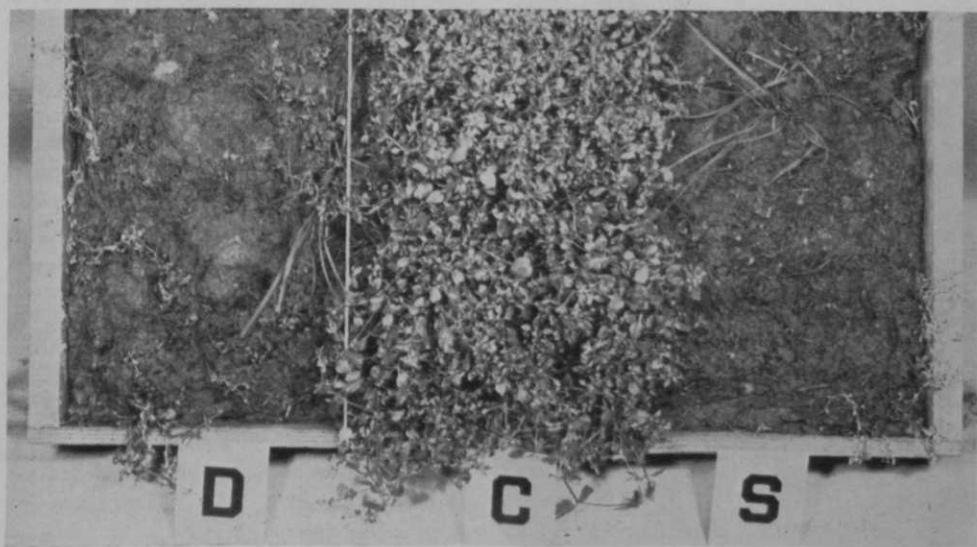
Pennywort control. The flat was uniformly covered with pennywort and located in a 65° greenhouse when the application was made. S, sodium salt of 2,4-D; C, untreated control section; A, ammonium salt of 2,4-D; and D, 2,4-D. All applications were made at the rate of 5 gallons of 0.1 percent solution to 1,000 square feet. No effect was evident in the 65° greenhouse for 10 days after treatment, at which time the flat was moved into a greenhouse maintained at 80°. The effect of 2,4-D became evident within a few hours and eradication was complete within 5 days.

Seasonal Variations in Response of Weeds

Reports have already come in from some localities giving conflicting evidence concerning the effectiveness of 2,4-D on certain weeds. This is not surprising. It may well be due to the fact that some weeds respond differently to this growth regulator at different times of the year, at different stages of growth, and under differing environmental conditions. For instance, broadleaf plantain was only

slightly curled last fall on plots in which buckhorn, dandelion, knotweed and clover were completely eradicated by the 2,4-D. June and July applications this summer, however, repeatedly and consistently resulted in complete eradication of this weed in both sunshine and shade.

Clover, on the other hand, was completely removed from bluegrass turf by single applications at the rate of 1 ounce of 2,4-D to 1,500 square feet. Careful



Chickweed control. The flat was uniformly covered with chickweed and growing in a greenhouse maintained at approximately 65° F at the time of application of 2,4-D on the section marked D and the sodium salt of 2,4-D on the section marked S. Note the untreated section in the center marked C. Complete eradication was accomplished at 65°.

washing of the soil from plugs cut with hole-cutters revealed no living stolons in spite of the fact that the plots contained 70 to 80 percent of clover at the time of application in mid-September. In May of this year the plots were still free of clover. Comparable eradication was attained with March and April applications this year. Midsummer applications, however, have shown the clover to be much more resistant. Although seriously curled a few weeks after application, there has been considerable recovery. This would indicate that, in the Washington area at least, clover is most easily killed in spring or fall. Therefore, the home owner or park superintendent who would like to kill dandelions and plantain and yet save his clover may find it to his advantage to spray in midsummer.

Another weed which has shown striking seasonal differences in response is wild garlic. On the plots last fall it apparently was not affected. In March and April of this year, however, when it was treated at the same rate as last fall, the tops promptly curled decidedly, developed a striking purple color and lay prostrate. When this growth was removed by cutting, colorless shoots appeared and in turn disappeared while the garlic in the adjoining untreated areas continued to grow vigorously. The answer to whether bulbs were killed will be told when the garlic reinitiates growth on the untreated areas this fall and again next spring.

Other weeds such as dandelion, buckhorn plantain, shepherds purse, false strawberry, ground ivy, etc., have been killed with equal ease at practically any time of year in which tested. The seeding habits of such weeds, however, may determine which is the most favorable time of year at which to treat with 2,4-D. Plots on the National Capital Parks which were treated late in April when the dandelions were in flower but had not yet gone to seed are still as free of dandelions as they were 6 weeks after treatment at which time it was still possible to run a pencil down into the space which the dandelion root originally occupied. A series established on similar turf in late June, after the dandelions had gone to seed, was entirely free of dandelions for a few weeks, but is now developing new seedlings,—apparently from seeds produced before the plants were killed.

These variations in response of certain weeds indicate the importance of being cautious in drawing conclusions concerning the behavior of weeds toward 2,4-D from tests made at one time of year or under one set of conditions—particularly when those tests give negative results. Try it again on the same weed at another season. To get the most from your applications it is necessary to become acquainted with



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it by using it through several successive seasons.

Commercial Availability

Numerous herbicides are now on the market which contain 2,4-D as their active ingredient. These vary widely in 2,4-D content (which is always given on the label), in price, and in form. Some are liquids, the 2,4-D which is soluble in water being dissolved in some liquid oil or wax which in turn will disperse it in water. Others are solid or semi-solid waxes in which the 2,4-D is dissolved (similar to the 2,4-D Carbowax mixture with which the Green Section first began its cooperative tests with Doctors Mitchell and Warth of the U. S. Department of Agriculture). Still others are dry products which are formulated on the basis of the fact that the salts of 2,4 dichlorophenoxyacetic acid are water soluble.

A large number of these different products have been compared experimentally on the turf in the National Capital Parks this season in cooperation with Mr. Horace Wester of the Division of Horticulture and Maintenance of the National Capital Parks. They were all applied at a rate which would furnish 1 ounce of 2,4-D to 1,500 square feet, regardless of the rate recommended by the manufacturers. In most cases comparable results were obtained as shown in the photograph of broadleaf plantain control. All were applied in enough water to give 5 gallons to 1,000 square feet.

Fertilizer and Seed Should Accompany 2,4-D

As is true with any herbicide, the treatments with 2,4-D should be made if possible when the grasses can be most easily encouraged to fill in the bare areas left after the removal of the weeds. Not much is gained if dandelions are removed and annual weeds such as crabgrass take their place before the turf grasses can

take over. Since the death of the weeds is a gradual one rather than a sudden burn, it is possible to encourage the grass to crowd into the areas occupied by the weeds as they die and completely disintegrate over a period of several weeks.

It is essential, therefore, in order to follow through to complete victory over the weeds that application of 2,4-D be accompanied by an adequate fertilizing program and, if necessary, a reseeding job. Seed can be spiked or disced into the turf and the fertilizer applied before the 2,4-D is used. If this is done at a time of year favorable to the growth of grass the turf grasses will take over the area coincident with the surrender of the weeds, and a prompt improvement in the turf is inevitable.

Several important cautions should be observed in the application of 2,4-D. Many ornamental plants such as roses and many vegetables are very sensitive to it. Therefore great care should be observed that mist from the spray does not escape onto plants adjacent to the turf area being treated. Also, if the spray equipment is to be used on any plants other than turf at a later date extreme caution should be observed in cleaning all parts of the spray equipment that are in contact with the solution. Mere traces of the 2,4-D when taken up by other spray solutions used at a later date may be sufficient to seriously injure or even kill roses, tomatoes and many other garden plants.

Collects Range Balls By Machine

★ WITH THE GOLF BALL situation exceedingly tight practice range operators are compelled to make quick collection of balls used at their tees. Patterned somewhat after a collecting device used at a Pacific Coast practice fairway is the device illustrated. It was made and is used by Jerry Claps, Crescent Golf Practice Fairways, Newark, N. J.

Towed by a motor scooter, the machine resembles a farmer's harrow. It is composed of 52 wooden disks, 17 inches in diameter, spaced a little less than the width of a golf ball apart and set on an axle which revolves on two small pneumatic tires. As the machine rolls over the fairways the balls become wedged between the disks and are carried forward. Steel fingers, projecting between the spaces at the front end, loosen the balls and roll them into metal trays.

"Without the machine I wouldn't have been able to open the range this year," Claps explained. "In normal times I had 15,000 balls compared to the approximately 3,000 in use today. It would have been impossible to retrieve the balls fast enough to keep the customers supplied

by the old method, with boys picking them up in pails. Anyway, you can't find any boys to do the work today."



A wire screen fits over the driver's seat on the scooter, which protects him from flying balls. More than 1,500 balls can be picked up on one trip, Claps said.

Crutch-Borne G. I. Golfers Thrill Buddies By Play

The most outstanding feat of the Golf Field Day sponsored by the Tilton General Hospital Rehabilitation Service was turned in by modest Pfc. Peter Caiello of Syracuse, N. Y., (said Sgt. Joe Masick in Ft. Dix, N. J. Post).

Pete, an ex-parachute infantryman, was one of the 92 entrants in the nine-hole handicap tournament. With the aid of a pair of crutches, he toured the Post links in 53 strokes.

In posting this amazing score, the 23-year old wounded veteran of the Belgium campaign executed a variety of golf shots that would make the average physically fit golfer blush with shame.

After a somewhat shaky start, which saw him take a seven on each of the first four holes, Pete unloosed some mighty expert shotmaking to register a par-4 on the fifth hole.

Hardly satisfied with matching par, Caiello hobbled over to the next tee where he discarded his crutches just long enough to nail a 5-iron shot to the green. He climaxed his campaign of the 115-yard sixth hole by dropping a twenty-foot putt for a birdie 2.

Pete then followed with one over par on the 7th and 8th.

On the final hole, he spliced a quartet of wood shots to get within chipping distance of the cup. However, at this point, he succumbed to a severe case of jitters and it took him four strokes to hole out for an 8.

Playing with Caiello, was another lad on crutches, Pfc. Louis Pengk, of Bethlehem, Pa., who served with the 30th Infantry Division and was wounded during a battle north of Anzio. Pengk posted a score of 68 for the nine holes.