

Renovating Fairways with Strong Weed-free Turf

By O. J. NOER

Golf clubs started to become conscious of fairway weeds and were turf-minded before the war. Interest has been intensified by the publicity accorded the new hormone weed killer commonly called 2, 4-D. Weed eradication, turf improvement, and fairway renovation has become a very live topic. Many clubs have started to do something about it, and others expect to commence in 1947.

Some of the results obtained with 2, 4-D have been spectacular, but a few have been disappointing. The effect on dandelion, plantain, buckhorn, and chicory has been startling in many instances, but less certain with clover and chickweed. However, early summer spraying stopped clover bloom almost completely.

Kentucky blue grass and poa annua were not damaged by 2, 4-D except in spots which were flooded due to a sudden break in a hose connection, or from leakage when the sprayer stayed in one spot too long. Kill probably resulted from direct contact of 2, 4-D with the grass roots. Serious damage to bent grasses in fairways was rare, although discoloration was more common than with other grasses. Injury this spring was definitely less than occurred the fall before, despite isolated cases of heavy damage. Most grasses have a deeper and better root system in spring and early summer than in the fall, especially if the summer has been a difficult one. A well rooted turf should withstand shock better than one with shallow roots.

Severe injury occurred to the bent on the aprons alongside some greens which were sprayed by hand with a gun or tree nozzle. The volume of water used was necessarily large.

Bermuda grass was supposed to be fully tolerant of 2, 4-D. Damage occurred in Houston, Tex., on the sprayed portion of several Bermuda greens which were treated in midsummer. The Bermuda turf was weak and the root system was sparse and poor. The 2, 4-D rate was moderate, but the volume of water was large.

Some believe that large volumes of water accentuate damage or discoloration of the grass. This theory was tested on the practice green of Washington strain bent grass at Brynwood in Milwaukee. The 2, 4-D was used at $\frac{1}{2}$, 1, and 2 pounds per acre. Water at 50, 100, and 200 gallons per acre was

used with each rate. Initial discoloration was most pronounced with the larger volume of water in each instance, but permanent damage occurred only at the two pound rate applied with 50 gallons of water. The pressure used may be another factor. The belief that low pressures in the range of 50 to 100 pounds cause less injury to grass is gaining ground.

Failure Explanations Difficult

As yet it is impossible to explain every reason for failure to obtain a satisfactory kill of weeds. Spraying too early in the spring, when the weather is cold, and before the weeds are well developed, seems to be one cause. Yet the weeds on plots in Milwaukee sprayed at that time, with $3\frac{1}{2}$ pounds 2, 4-D per acre, were all killed. The weeds were hardly affected on plots where the customary rate of $1\frac{3}{4}$ pounds per acre was used. Soil moisture seems to be another factor. The kill has been disappointing when the soil has been dry, or on the dry side, at the time of spraying. The weeds are not growing then because of a moisture deficiency. The bad effect of a rank growth of grass was demonstrated on a polo field, which was not being used for play. One-third of the field had been mowed with the gang unit used for cutting the rough. Growth on the uncut part was high and rather rank. The kill on the mowed part was practically one hundred percent, and less than 25 percent on the other portion.

2, 4-D won its spurs during its first full year of large scale use, and is here to stay. It will be a very useful tool, especially for broadleaved weeds on fairways, but is not likely to supplant arsenic acid and sodium arsenite entirely. They have their place in the turf picture. Neither will 2, 4-D take the place of fertilizer. Instead, the use of both will speed the development of dense turf. The 2, 4-D will kill the weeds, and then the fertilizer will cause the grass to spread and occupy the voids left by the weeds.

The principle underlying turf improvement on fairways is quite simple. Essentially it is a matter of developing a dense turf, by the use of fertilizer, and lime, if needed, rather than by re-seeding only. Increased turf density is the secret of effective

tive weed control. It is easier to improve turf on unwatered courses than on fairways which have been over-watered. Re-seeding may be necessary on watered fairways, or where watering is contemplated, to introduce grasses better adapted to a watered environment.

New Fairway Grass Needed

The final objective of any program is to produce a turf which is satisfactory to the golfer. He wants a good lie for every shot from the fairway. The ball must rest on the turf, and not nestle down in it. Fescue comes nearest to being the ideal grass, but will not resist weed invasion under heavy play, or persist under the exacting conditions of today, especially on watered courses. The development of a suitable grass, one which will form dense turf, resist weeds, and have wiry leaves for the ball to rest upon is needed. Until it is created, some compromise may be necessary between what the golfer wants and what the turf requires. That is a matter of cutting height or character of growth.

Kentucky bluegrass usually predominates in the fairways of unwatered courses in the northern section of the United States. It is the safest choice for such conditions. Leaf spot is the worst enemy of bluegrass, and may cause more or less severe injury during cool wet spells of weather. There are no treatments for stopping or preventing this disease. Raising the height of cut to increase the amount

of leaf surface is about all that can be done. There is some fescue in the more northerly regions, especially on the lighter soils. In the places where fescue will survive and resist invasion by other grasses, including Kentucky bluegrass, it makes an excellent turf from the golfer's viewpoint. Neither bluegrass nor fescue thrive or survive under extreme close cutting. When they are the sole grasses in the fairway, continuous mowing at much less than an inch is questionable practice. Some clubs mow at about 1½ inches throughout the season, others cut at just under an inch during the spring and fall, and raise the height to a full 1½ inches in the summer.

Dandelion, plantain, and buckhorn are the principal weeds in unwatered fairways, and are the ones that arouse the ire of golfers. They can be killed with 2,4-D. Clover is bad sometimes, and crabgrass is a serious menace to turf in certain places. The use of 2,4-D checks, but does not kill clover, and is useless on crabgrass. Sodium arsenite, or arsenic acid is the best herbicide to use on them. Besides the major weeds, there may be others, but they are less troublesome and include chicory, false dandelion, wild carrot or Queen Anne's lace, chickweed, daisy, heal-all, knotweed, orange hawkweed, etc. They are controlled by 2,4-D excepting common chickweed and knotweed after it becomes stemmy.

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There's a lot of work been done on the PGA's National course at Dunedin (Fla.) course preparing it for expected heavy play of pros and their amateur associates this winter. This view of the 12th green at Dunedin was taken this spring.

—Trabant photo.



WORTHINGTON MOWER PLANS LARGE PRODUCTION IN 1947

During 1946 the Worthington Mower Co., Stroudsburg, Pa., in spite of the many complications and handicaps that faced all manufacturers in attaining a steady flow of materials, operated continuously on a basis of 2 shifts per day and was successful in turning out hundreds of Worthington Golf "Chief" tractors and many thousands of fairway cutting units and golf "Rough-Grass Blitzer" mowers that were so desperately needed by golf clubs. Since V-J Day the Worthington company has acquired many fine new production tools of the latest types that have enabled it to increase its production and to provide the finest quality mowers it has ever produced, says E. Ross Sawtelle, Worthington VP.

For 1947 the company plans to produce in large volume:—

1. The Worthington "Chief" Tractor equipped with a remarkably efficient Chrysler 6-cylinder engine, and to be available with either single or dual pneumatic wheel equipment, and with sickle bar attachment, if desired.

2. The Worthington Fairway Gang Mowers in 3, 5, and 7 unit combinations. Pneumatic wheel equipment for the cutting units will be available at a slight extra cost, and clubs can have a choice of a 5 or 6 blade fly knife reel at no extra charge.

3. The Worthington Golf "Rough-Grass Blitzer" in 3, 5, and 7 unit combinations. This new type gang mower is a modification of the Worthington Airfield "Grass Blitzer" which was produced during the war period for the military requirements of the government and lend-lease. Since V-J Day, when the Golf "Rough-Grass Blitzer" was first introduced, hundreds of machines have been delivered to golf courses. "The reports we have received," says Sawtelle, "clearly indicate that at last the most satisfactory answer to the rough mowing problem has been found in this new type of gang mower. The number of labor hours required for rough mowing is now, on a per acre basis, reduced to a par with fairway mowing. With this new, efficient, and economical method it is now possible to maintain the rough properly and to cut as frequently as desired to maintain the highest standard of playing conditions. Reports indicate that this frequent mowing has greatly improved the turf in the rough area. Thicker turf of better grasses has developed, resulting in the crowding out of weeds and rank growth and the less desirable types of grasses.

"We feel that in 1947 many clubs who have already solved their most immediate and pressing fairway mowing problems will want to make a careful study of rough mowing costs and methods, and investigate the Rough-Grass Blitzer."

Sawtelle adds: "At present it is a little too early for our company to make a definite commitment in regard to resuming production of the Worthington Overgreen. The many clubs throughout the

country who are anxiously awaiting this machine can be assured that every consideration is being given to their requirements, not only for the greens but for the extra tee mower attachments."



L. B. BEAMS WITH HIS BUSY BEES

L. B. Icely, Wilson Sporting Goods Co. pres., shares with Sam Snead and Lloyd Mangrum of his staff, the joy of winning three of golf's top tournament trophies. Sam Snead (left) holds his British open trophy, to which prize he'd just added as this picture was taken, the May \$10,000 All-Star bowl. Lloyd (right), first of the war's combat veterans to win a major sports championship, holds the U.S. open trophy he won last June.

Renovating Fairways

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The program of weed eradication and turf improvement can start in the spring, provided there is no danger of increasing the crabgrass population. The best plan is to fertilize first, and use lime, if needed, applying them about the time turf growth starts. Then use 2, 4-D after the weather becomes warm; when weeds have good sized leaves and are growing rapidly. This is usually from mid-May until late June, depending upon latitude.

Late summer and early fall are the logical times to start turf improvement where crabgrass is apt to be bad. The 2, 4-D can be used in August, and the fertilizer applied afterwards, or the order can be reversed. The herbicide should not be used unless the soil has enough moisture to support growth of weeds and grass.

Enough nitrogen should be used to insure good growth. Then the grass will spread and make a dense turf which will cover the voids left by the weeds. A hundred pounds, or more, of actual nitrogen per acre is not too much to use on depleted soils of light

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color. About the same amount of phosphoric acid should be applied once, if the soil supply of available phosphorus is low by a dependable method of testing. After the first application, or when the soil contains a moderate amount, or more, of available phosphorus, an application of 30 to 50 pounds per acre of actual phosphoric acid is ample.

This procedure may not be effective on watered courses. The difference is not in fertilization. It lies in the necessity for re-seeding, and in the method of weed control.

Watered Fairway Program

Many clubs plan to install a fairway water system and use water for the first time. The fairways may have plenty of broadleaved weeds and a fair stand of bluegrass, or fescue, with little clover or poa annua. Re-seeding with some Colonial bent grass seed may be the only variation from the program outlined above for unwatered fairways. Re-seeding is imperative if there is a high proportion of fescue in the present turf. It does not withstand constant watering, and will gradually disappear. Clover, poa annua, and knotweed will replace the fescue unless bent grass is introduced by seeding.

The plant population on most watered courses has changed. Bent grasses have taken possession on some of them, but clover, knotweed and poa annua predominate on many others. This occurs where there was not enough bent to take possession after bluegrass and fescue were eliminated by overwatering and close cutting.

Water affects the type of weed growth, as well as the kind of grass. Creeping weeds, such as chickweed, are encouraged, and once they become established on watered fairways, no amount of fertilizer will eradicate them. Watering aggravates crabgrass and knotweed.

Fairways which are mostly poa annua, clover, chickweed, and knotweed, and have little permanent grass in them, should be re-seeded. The weeds, clover, and poa annua need to be killed by treatment with chemical before seeding, otherwise the poa annua and chickweed will retard or prevent the young grass from becoming established. This is true even when most of the poa annua disappears during midsummer. It will come back with a rush in late summer and affect the growth of the new seeding. Sodium arsenite or arsenic acid are the best herbicides to use on such fairways. Either one will kill the major portion of the poa annua and do a better job on chickweed and clover than 2, 4-D. Furthermore, 2, 4-D cannot be used immediately before or right after seeding. The use within three

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weeks of seeding is not safe for the new grass. The applications of sodium arsenite or arsenic acid should start in July, because 3 or 4 treatments are needed. An interval of 2 to 3 weeks should elapse between each one. Arsenic acid is a liquid, so it must be used as a spray, but sodium arsenite can be used either way; as a spray or dry. Customary rates of application are 5 to 12 pounds per acre, or 2 to 5 ounces per 1,000 square feet, depending upon the type of weeds and method of application. The arsenicals help control grubs and suppress worm casts. Seeding can be done immediately before the last application of arsenical and 2 weeks of growing weather gained in that way. The seed can be drilled with an alfalfa and grass disc seeder, but when there is little or no good grass, broadcast seeding is best. A seed bed must be prepared first with a fairway spiker. Thorough spiking several times is required to produce a suitable seed bed, otherwise a good stand of grass will not be secured.

Treatment with 2, 4-D in addition to the arsenical is advisable when broadleaved weeds are bad, besides those mentioned previously. The 2, 4-D can be used before the arsenicals, that is, during early summer, or in June. Otherwise the use of 2, 4-D should be delayed until the following year, after the new grass becomes well established.

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Most of the seed mixtures used in the past on watered fairways consisted of about 70 percent Kentucky bluegrass, 5 to 10 percent Colonial bent, usually the Astoria strain. The balance was fancy Red Top. Seeding was at 75 to 125 pounds per acre. A few used Colonial bent seed only, and seeded at about 25 pounds per acre. Some mixed fancy red top with the bent for bulk and increased the seeding rate accordingly.

The Kentucky bluegrass seed crop is exceedingly short this year because it was impossible to recruit enough labor to harvest the crop. The price is \$1 or more per pound. The wisdom of using Kentucky bluegrass at this price for re-seeding watered fairways is questionable. Seeding with Colonial bent seed only, or a mixture with fancy Red Top to provide bulk, would seem wiser. There are 6,000,000 or more seeds in a pound of bent grass seed, and about 2,500,000 in a pound of bluegrass seed. Volunteer bluegrass will appear and take possession of spots adapted to it, even though seed is not used.

Southern Treatment

Crabgrass is the major weed on many of the Bermuda fairways in the South, and its eradication is a major problem. Sodium arsenite or arsenic acid is the best herbicide to use because crabgrass is not affected by 2, 4-D. Fortunately, Bermuda grass is quite tolerant of arsenicals and withstands heavy doses of it. The Bermuda is discolored by it, but recovers.

The arsenicals chosen should be used when the seed heads begin to emerge from the crabgrass, because that is when this plant is most easily killed. Two and possibly 3 treatments with the arsenical may be necessary to kill all the crabgrass. The fairways should be fertilized liberally so the Bermuda grass will spread and produce a dense turf. The necessity for fertilizing Bermuda generously is not always recognized in the South. Bermuda grass is said to grow anywhere. That is partly true, but no grass responds better to generous fertilization and good treatment than Bermuda grass.

The use of 100 to 150 pounds per acre of actual nitrogen during a single growing season is not excessive. Late summer or early fall is the best time to make the first heavy application of fertilizer on crabgrass infested fairways. It can be done earlier on watered fairways. The fertilizer should be applied right after the crabgrass has been killed and then the fairways should be watered generously. By fertilizing then, or in early fall, the Bermuda will be encouraged to spread and produce a dense turf which will resist crabgrass invasion the following year.

Fall, 1946

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