Prevention and Cure in Halting of Dollar Spot

By JOHN R. VAUGHN
Michigan State College

There are usually two ways to control diseases of man, animals or plants. One method is to cure the disease and the other is to prevent it before it occurs. In controlling diseases of fine turf, an ounce of spray chemical will often prevent disease that a pound of fungicide would not cure. In fact, an individual blade of grass can never be cured of a disease. A "curative" application kills the fungus and stops the disease and if the grass is not permanently damaged new growth replaces that which has been killed by the disease.

Recently there has been discussion on whether a curative spray or a protective spray is the best control practice for dollar spot on golf greens. Some golf course superintendents prefer to wait until they see dollar spot and then spray to cure while others spray at regular intervals throughout the season. In the areas where the summer season is usually cool and humid, regular spraying every 10 to 14 days is a common practice. Since dollar spot is favored by cool wet weather the curative spray is a risky practice under cool climate conditions. In other areas where the summers are hot and relatively dry, the curative spray program is commonly followed.

It is not possible to say which is the best practice to follow in most parts of the United States. If there is any doubt about the kind of weather expected, protective spraying should be done. Even if there is not a lot of dollar spot those few spots which always have occurred will be prevented. A few dollar spots may not be fatal to a well kept green, but if the few which do occur get in the path of a golfer's putt, the superintendent will be blamed. Protective spraying is like insurance against disease damage. The fungicide is there to protect against the disease if it starts. Since the fungus which causes the dollar spot disease is always present in practically all soils and lacks only the right weather to move into the succulent turf the insurance is worthwhile.

Test plots on fine turf in Michigan have shown for several years that regular spray applications of most common commercial turf fungicides will result in good control of dollar spot even in years when the unsprayed plots had five spots per sq. ft. of turf. Plots were sprayed every 12 days and the chemical was used at the minimum rate recommended by the maker of the material. Some materials, such as Cadminate, gave near perfect control, and nine out of 12 materials used in 1951 gave good practical control. Protective spraying pays off in disease-free golf greens. Fine turf is worth the insurance that protective spraying gives against dollar spot damage.

Grau Joins Murray in Grass Service Work

Fred V. Grau, who resigned earlier this year after 8 years as Director, USGA Green Section, has joined Frank Murray, in Grau-Murray Grass Service. The company's office is at Glen Road, Rte. 1, Rockville, Md. Telephone is Poplar 2-3378.

Prior to his Green Section work Grau for 10 years was extension agronomist in Pennsylvania.

Murray has been associated with golf course work for more than 15 years. He was green chmn., Congressional CC (Washington dist.) from 1937-39. He was on the construction of the Woodmont CC, Bethesda, Md., and at present is building the Patuxent, Md., course.

Grau-Murray Grass Service will grow and install sod of improved grasses and handle problems of improving grasses on existing grassed areas.

Causes of Trouble on Iowa Courses

At meetings during 1952 our members agreed that the most common troubles on greens were:

1. Over watering — leads to compaction, shallow roots, and tender grass which won't withstand hot, humid weather in mid summer.

2. Too fine material used in top-dressing — leads to compaction and shallow root growth.

3. Infrequent mowing — leads to matty condition which in turn makes grass more susceptible to diseases.

4. Inadequate fertilizer program — greens should be fed lightly, but more frequently to promote steady growth and maintain constant color.

5. Aerifier not used enough on compacted greens.

—BERYL S. TAYLOR
Pres., Iowa Greenkeepers' Assn.

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W. Seattle Grooms for Publinx

West Seattle (Wash.), newest of Seattle's three public courses, is determined to meet the high standard set for USGA championships by the 1952 National Amateur at Seattle GC, by presenting the best of the USGA public links championships when this tournament is played July 13-18. There's been an addition built to the clubhouse above, and the pro shop where pro-mgr. D. W. Ross holds forth will spread the welcome mat. P. M. Masterson, supt., of the West Seattle course and Paul V. Brown, supt. of Parks, say that the 6500 yd. course will be in as good condition as the Publinx players ever saw any course. USGA officials who have visited the West Seattle layout lately have been impressed that there's seldom been done more in preparing to be hosts to a championship than the Seattle people have planned and are doing.

Golf Goods Almost 40 Per Cent 1952 Sports Sales

Athletic Goods Manufacturers' Assn. figures on 1952 sales of athletic and sporting goods sales, audited by Ernst and Ernst, show golf equipment at $39,511,870 in factory selling price, including excise tax. Total for the manufacturers who include all leading makers and by far the bulk of sports goods production, except hunting and fishing equipment, is $100,297,177.

Baseball and softball comes next to golf, with $20,494,320. In third place is inflated goods (footballs, basketballs, etc.) with $11,216,394. Then follow, in order: athletic shoes, miscellaneous items, athletic clothing, tennis equipment, helmets, pads, etc., and boxing gloves.

In 1952 there were 3,374,886 golf clubs sold, of which 2,319,512 were irons and 1,055,374 woods. Ball sales by factories were 2,113,629 doz. Bag sales were 491,697. In the ball department the highest grade balls accounted for almost 60 per cent of the entire volume. Highest grade irons accounted for almost 40 per cent of total iron sales. Top grade goods were about 31 per cent of all wood sales. The second highest price class in woods accounted for a little more than 34 per cent of the wood volume.

Course Operating Costs

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What makes the situation especially unreasonable is that every golfer realizes the great difference in courses. An 80 on one course would be far better scoring than a 68 on another course, yet the operating costs are compared on the same level. The course rating system has been extensively adopted as groundwork for fair handicapping but there's no consideration given to course rating in comparison of maintenance accounting, save in the Midwest Golf Course Supts.' survey and, as I've said, that is a long way from having received merited acceptance.

So my friend, the new chairman, can't get the help he wants from today's comparisons of course operating costs and by the time he gets a fairly clear idea of how these comparisons could be made he will be tired of his job as chairman and let his successor take up the search.

Endothal, 2, 4, 5-T Tests Show Effective Clover Control

By JOHN F. CORNMAN

The first article on clover control in turf with endothal appeared in the May-June, 1951 issue of the N. Y. State Turf Ass'n. Bulletin. General aspects of the clover problem in turf were reviewed and results of earlier experimental work with endothal were presented at that time.

We pointed out in the earlier article that before a satisfactory working knowledge of this new clover measure could be achieved, a considerable amount of research work remained to be done. Among other things, we mentioned the need for further studies to determine the optimum gallonage and rate of chemical and the relationship between these two factors. We indicated the need for compatibility tests with endothal and 2,4-D. The present article reports the investigation of these problems.

Gallonage and Rate of Chemical

Our earlier work indicated that it might be possible to reduce the rate of endothal below one pound per acre of active ingredient without sacrificing the degree of clover control and at the same time gain by a reduction in turf discoloration. Further tests were also needed of gallonages within the ten to fifty gallons per acre range. An experiment was set up in July, 1951 to study these aspects.

Procedure

In this study rates of endothal tested were 1/16, ¼, 1 and 4 pounds per acre in 10, 25, and 50 gallons of water per acre. The tests were established at Stewart Park in Ithaca, New York on a mixed Kentucky bluegrass-clover-bentgrass turf in excellent growing condition. The experimental design selected was a randomized block with three replicates. Plot size was 10 by 15 feet.

A single application was made on July 13, 1951 with the first analysis following a week later. The clover control analyses were made by estimating the amount of clover remaining after treatment and are reported here as percentage control when compared with the amount of clover in the untreated plots. For the first clover analysis square foot quadrats were used and three estimates were made per plot by each of two investigators. For the 1952 analyses the clover population of twelve square-foot quadrats per plot was estimated by one analyst. The turf injury analyses were made by estimating the relative degree of turf injury on a scale ranging from 0 to 10 in which increasing numerical order indicates increasing turf discoloration.

Results

The results appear in tabular form in Table 1. It will be noted that two sets of turf injury ratings are presented in Table 1. Maximum discoloration was evident seven days after treatment. The discoloration rating 14 days after treatment is included to show rate of recovery. Turf injury ratings over 3.0 in this test are considered to be objectionable.

General Trends

As in the previous tests, a general gallonage-rate of chemical relationship is evident. For a given rate of chemical, the greater gallonage the more severe the turf injury. At any particular gallonage, clover control increased with increasing rates of endothal until complete clover eradication resulted. Also, the greater the amount of endothal applied the greater the turf injury. Increased clover control was always accompanied by increased turf discoloration.

Rates of Endothal

Complete clover control (as observed one week after treatment) was not achieved with 1/16 pound of endothal at any gallonage tested. The ¼ pound per acre rate gave from 94.4% to 100% clover control depending upon the gallonage. Turf discoloration was not severe at these rates but it was serious where the higher rates of chemical (1 and 4 pounds per acre) were applied.

Persistence of Control

The figures in column 4, table 1, indicate a striking persistence of clover control. Wherever plots gave evidence in one week of complete or nearly complete clover control they had only trivial amounts of clover present 11 months later. This was in spite of expected new individuals arising from the current year's seed crop and possibly from occasional hard seeds brought up by earthworms. Where too little chemical or inadequate coverage produced much less than complete control at the end of one week (as with 1/16 pound per acre at all gallonages, and with ¼ pound in 10 gallons of water per acre) there was an appreciable amount of recovery or regrowth within 11 months. Thus it appears that, if results obtained

TABLE I
CLOVER CONTROL IN TURF WITH ENDOTHAL

Effects of gallonage-rate combinations on clover control and turf injury

Gallons per acre	Endothal pounds per acre	% Clover Control After 7 days	% Clover Control After 11 months	Turf discoloration After 1 week	Turf discoloration After 2 weeks
10	1/16	80.4	58.6	1.10	0.92
10	¼	94.4	75.7	1.92	1.41
10	1	100.0	99.0	2.67	2.00
10	4	100.0	99.7	4.00*	3.17*
25	1/16	88.8	70.3	1.17	1.00
25	¼	97.2	95.0	2.33	2.00
25	1	100.0	99.7	4.17*	3.67*
25	4	100.0	99.7	5.33*	4.50*
50	1/16	92.4	76.3	1.50	1.50
50	¼	100.0	95.0	2.67	1.67
50	1	100.0	99.7	5.67*	5.17*
50	4	100.0	99.3	6.83*	5.50*
LSD_{05}			7.39		
LSD_{01}			10.01		

Application date: July 13, 1951.
Clover control: Reported as percent control of amount of clover in untreated plots. Analysis dates: July 20, 1951 and June 6, 1952.
Turf injury scale: 0.0 = no injury, 10.0 = severe to complete kill. Starred values indicate injury considered to be of an objectionable degree. Analysis dates: July 20 and July 27, 1951.

under our circumstances occur consistently under other circumstances, the clover situation for at least a year can be judged within a week or two after endothal is applied.

Practical Conclusions

In this experiment we reduced the rate of endothal to a point where good and persistent clover control was not achieved Contrary to our practical hopes, turf discoloration accompanied even the lowest applications. It appears, then, that with the formulation used in these experiments rates in the vicinity of ¼ pound of endothal in 25 gallons of water per acre hold the greatest promise of adequate clover control with minimum turf discoloration.

Compatibility With 2,4-D

Because endothal is a very specific herbicide at selective concentrations, killing legumes but causing relatively little harm to other broad leaf turf pests, it does not do away with the need for 2,4-D. Endothal and 2,4-D are alike in that each is effective in a single low gallonage, low rate of chemical application and they can be applied most appropriately with the same type of equipment at approximately the same time of year. The ability to apply these materials in a single operation would result in considerable savings of labor where large scale applications are contemplated. In August 1951 an experiment was set up to determine if endothal and 2,4-D used together would act independently or whether the presence of one would increase or decrease effect of the other on weeds and turf.

As sometimes happens, variabilities other than planned applications so influenced the results of the treatments that our data shows nothing of significanee in the statistical sense and are not presented here. On the other hand, it is worth noting here that when endothal was used at rates sufficient to control clover, the addition of 2,4-D (amine salt at the rate of one pound per acre of acid equivalent) te the same spray solution produced little difference in results. Clover was controlled to about the same degree as when endothal was used without 2,4-D and apparently the 2,4-D was as active in killing dandelions and plantain as though the endothal were not present. Repetition of this experiment under more favorable circumstances may show that endothal and 2,4-D do interact to a certain extent but our first trials strongly suggest that any such interactions are not large and are probably of no great significance. These initial trials also indicate that when endothal and 2,4-D are applied in the same solution at ordinary rates, there is no reason to fear disaster to the turf.
vfcT-b dnw

The worst thing about low wages for golf course labor is that they have men working with a "get by" feeling instead of getting and holding the right kind of men who take an interest in their work and want to make their results show that they are stars on the job.

— Lee Bowman
Supt., Cedar Crest GC,
Dallas, Tex.

Maintenance Problems of Heavier Play

By RAY GERBER
Supt., Glen Oak CC, Glen Ellyn, Ill.

Many problems face today's golf course superintendents, but the labor situation tops the list.

Salaries and wages use up nearly two-thirds of the budget, leaving only one-third for other items essential to maintaining a golf course in the condition required by today's players. But this high labor percentage isn't attracting workers. With the exception of three or four men the crew consists of school-age boys who only work about ten weeks. Consequently, little manpower is available for improving irrigation and drainage systems, rebuilding greens, and making other capital improvements during spring and fall. Few men have been looking for employment on golf courses in recent years because nearby factories have more to offer in pensions, sick benefits, hospital insurance, vacations, and overtime pay.

The increasing number of golfers has boosted labor costs even higher. Early morning golf is becoming quite a factor in the time required to do some of the jobs that can only be performed in the morning. And the increase in afternoon play has also affected the cost of maintenance jobs that must be done in the afternoon. Members in private clubs do not realize their interference and expect a great deal more courtesy than players at public fee courses.

During the 1952 season a nagging problem was the wilting of grass. No doubt the cause was warm temperatures and high humidity during the early part of the season. The grass did not have a chance to establish a root system deep enough to keep the grass alive through the hot summer months.

Light frequent watering during the day when the grass begins to show signs of wilting was the only solution to this problem. Of course this solution requires the superintendent to be on the job seven days a week and constantly on the move from green to green. But a little water

at the proper time has saved many greens and probably many superintendent's job, even though golfers criticized the superintendent for watering during play.

When discussing grass during summer months, poa annua always receives much comment. Keeping poa annua out of watered fairways is always a headache. But if we had a reasonably-priced liquid fertilizer that could be used in a power sprayer during the summer and a fairway sprinkling system that permitted a light and more frequent watering we might be able to hold the poa annua through the hot summer. Since this method works on greens it should be satisfactory on fairways.

Research and experimentation have solved many equipment problems, but power putting green mowers, one of the most essential articles, can stand improvement. Some putting green mowers may do a good job on level greens but not on contoured greens. Others may do a fair job on the contours but fail to cut short and smooth. To overcome this defect the casters or rollers supporting the front end should be styled and placed to allow the mower to cut equally as well on soft, contoured greens at 3/16 in. as on hard, flat greens at a greater height. Furthermore the number of blades in the reel and the speed of the reel should be great enough so that the green is not left washboarded. The design engineers should also eliminate warping in the center of the bedknives.

Good Stand of Grass

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range of pH are the basis of these tests.

The amount of lime to apply depends upon the degree of acidity, the kind of soil, and the kind of grass. Sometimes the soil supply of available magnesium is low. This can be determined quickly by making a soil test. Then a dolomitic lime of high magnesium content should be used to correct soil acidity, because it supplies magnesium also, which plants need for normal growth. The figures in the foregoing tables can be used as a rough guide to decide upon the amount of lime to use.

Apply Phosphate Generously

Phosphate should be applied generously before seeding because this is the one time when it can be incorporated into the soil by cultivation. Phosphates are fixed in the soil and do not move freely. The rate of application for 20 per cent grade superphosphate should be 500 to 1,000 lbs. per acre. The half-ton rate is not excessive where a test shows the soil to be low in available phosphorus. When mixed fertilizers, such as 5-10-5 are used to supply phosphorus and nitrogen, the rate should be such that from 100 to 200 lbs. of actual phosphoric acid are applied per acre.

Some frown upon the use of nitrogen before seeding, in favor of making the application after growth starts. This may be sound practice in Southern regions because of the possibility of damping off, but nowhere else. It is extremely important to use enough nitrogen to get the seedlings off to a good start so there is a dense stand of deeply rooted grass before growth stops in the fall. Mixed fertilizers should be used at the rates suggested above for phosphoric acid. Where superphosphate is used along with a natural organic, the rate for the organic should be such as to furnish 80 to 150 lbs. actual nitrogen per acre, and the phosphate should supply 100 to 200 lbs. of actual phosphoric acid.

Distribution of Seed

There are a number of ways to distribute seed. Uniform coverage is important. The best plan is to scatter half the seed in one direction and the other half in a crosswise direction. This is wise to eliminate any streaks due to failure of the operator to overlap. On large areas the wheelbarrow type seeder is good. The new Gandy spreader applies seed from one