

Clover control with sodium arsenite, used twice, dry method. Some clover in far plot treated once only. One of first plots established almost 20 years ago.

so it predominates. This can be done over a period of years without rebuilding, but in many cases rebuilding is the best method because it is the quick way.

Crab grass has become a more troublesome weed since Chlordane and related compounds replaced the lead arsenate for grub and worm control. Chlordane has earned a place for itself but lead arsenate is due for a comeback. Despite seemingly high cost, its use on golf greens can be justified. Those who use it in the spring, at about the time crab grass seeds begin to germinate, have little crab grass. They claim the lead arsenate checks poa annua in addition. Phenyl mercury acetate is useful also. To succeed with it, treatments must begin before or at the time crab grass starts growth. Potassium cyanate is excellent for killing more mature crab grass, but is rather drastic on the bent grasses and hence, not safe for use on greens. The same is true of sodium arsenite and arsenic acid.

Chemical treatment with lead arsenate and phenyl mercury acetate is justified on greens where crab grass has been bad over a period of years. An effort should be made to locate the original source of infestation. The seed may have come in the soil used in the top-dressing mixture. Then the top-dressing should be sterilized, or crab grass free soil secured.

A heavy crab grass infestation in the aprons or banks surrounding the green is another likely source. The crab grass in these areas should be killed by using lead arsenate and phenyl mercury acetate, but sodium arsenite or potassium cyanate used now would be cheaper and safe enough. By doing both these things for several years, lead arsenate alone may then keep crab grass in check.

Goose grass is causing some concern. Hand weeding is the only safe way to rid greens of this bad pest. When goose grass is bad on aprons or banks it can be killed with moderately heavy rates of sodium arsenite, especially in hot weather when mid-day temperatures are 85 degrees or higher. The sodium arsenite is rather rough on any bent grass. In Louisville, goose grass on aprons has been killed by drenching the plants with a mixture of PMAS and 2,4-D. They use 4½ ozs. PMAS



Joe Faringa at Kent CC points to clover in poa annua part of fairway and its absence in renovated and seeded part at right.



Jim Morrison's vertical mower for cutting crab grass seed heads. Morrison used old rotary hoe and cutters from plows.

and $1\frac{1}{2}$ ozs. 2,4-D (50% amine type) in 3 gals. of water. Re-seeding afterwards is necessary because the treatment kills most or all of the grass also.

Develop Good Turf

The clover and crab grass problem on fairways has one thing in common with greens. The best and most practical permanent solution is to develop a good body



of turf. Then the problem in future years becomes simple; but the acreage involved changes the picture with respect to method. It is necessary to rely upon less costly herbicides.

The Milwaukee CC started watering fairways in the late years of the decade starting in 1920. They made the mistake of cutting the grass too close and of not using fertilizer of any kind. By 1933 the bluegrass was so poor that clover and knotweed were bad. Generous fertilization was started then, and has been continued ever since. Bent grasses asserted themselves as a result of feed and water.

With the development of a good turf, the clover and knotweed problem solved itself. Chemical herbicides were unknown then. Their use might have brought good turf sooner, but would have had no other effect.

Until recently, the Los Angeles CC was plagued with crab grass in their fairways. Mr. C. C. Simpson and Wm. Beresford sought the answer to the cause and then adopted the right kind of program. Fennell covered large areas of the fairways in the winter. There was bare ground when it disappeared in the spring

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Remember—We quote golf clubs direct-from-factory prices. More savings! until crab grass provided cover. Their program was based on using sodium arsenite to check the fennel and crab grass, along with generous fertilization to induce the sparse stand of bermuda grass to spread and form a dense turf. This is how they produced all year good playing fairways.

Start This Fall

With the right kind of grass in the fairways, the control of clover is not difficult. The task should be started this fall to insure better fairways in 1954.

Some have used 2,4-D at light rates to keep clover in check and have been successful even on fairways with bent grass. Others have obtained excellent control with 2,4,5T or a mixture of 2,4,5T and 2,4-D.

Those who use 2,4,5T need not apply more than 1 lb. actual acid equivalent per acre. Some authorities claim the ester formulation gives better results than the amine type. On our plots, the end result was the same with either formulation. Quicker action by the ester type was the principal difference. It is usually a week to ten days before there is any visible effect on the clover. With us the 2,4-D had no additional effect on the clover, but its

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use is justified along with 2,4,5T to kill broad-leaf weeds if they are present. Under such circumstances, a mixture of 1 lb. 2,4,5T and $\frac{1}{2}$ lb. 2,4-D per acre is adequate.

Clover resists wetting so low gallonage sprayers do not give best results. The amount of water should be in the 50 to 100 gal. per acre range, and a small amount of wetting agent should be added.

The promiscuous fall use of 2,4-D especially, and possibly of 2,4,5T is unwise, especially on fairways where the turf is largely creeping bent, or where it is present in appreciable amounts. Injury to the bent may thin the turf and pave the way for invasion by poa annua. There is evidence to justify this statement about 2,4-D. The discoloration caused sometimes by 2,4,5T must act as a warning and justify caution in its use until more evidence is at hand.

Secret of Success

Sodium arsenite will control clover and is safer for fall use where fairways contain creeping bent. Chickweed is controlled also and sodium arsenite tends to reduce the amount of poa annua.

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senite is to spray three times at least, and preferably four. The soil moisture should be good and the sodium arsenite should be allowed to act for 24 to 48 hours before water is applied. There should be no rain for 12 hours after an application. The usual interval between sprays is 7 to 10 days, but formation of new leaves on the clover stems is a better guide. It is important to spray before the new leaves are fully developed. After weakening the clover winter kill completes the task.

Discoloration is greatest with the first spraying so the rate should be about one



Windburn damaged bent grass fairway in Spring. Injury aggravated by two fall applications of 2.4-D.

lb. the first time; then it can be increased to $1\frac{1}{2}$ to $1\frac{3}{4}$ lbs. per acre. The amount of water should be sufficient to wet the plants. Excessive pressures which produce fog should be avoided.

On fairways where the ground cover of grass is largely or entirely poa annua, the problem of clover control is difficult. When the poa thins next summer, clover reappears. Complete renovation accompanied by re-seeding is the best answer. Since this should start in July, details will be discussed later.

It would be well to spray these fairways four times this fall with sodium arsenite. Then there is bound to be less clover next year.

Those who rely upon sodium arsenite this fall will do more than kill clover, and will not harm the bent grass provided there is enough soil moisture to a 5 in. depth to sustain growth. Then any persistent surviving clover can be killed with a little 2,4,5T in May or June. The rate should be $\frac{3}{4}$ to 1 lb. per acre with 50 to 100 gals. of water. The 2,4,5T will check bloom immediately and the clover will dis-



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appear in three to four weeks.

Aside from the belt extending from Washington and Philadelphia through Cincinnati, Louisville and St. Louis to Kansas City, crab grass is not a serious problem provided fairways are covered with the right kind of grass, namely fescue, blue grass or a combination of this with Colonial bent on unwatered northern courses, and bent grass on the watered ones. In the South, a well maintained bermuda grass turf will resist crab grass invasion.

In the transition belt mentioned above, crab grass is a vexing problem. Clovernook and Camargo in Cincinnati are examples of unwatered courses with good fairways. The turf contains some bent. There is some crab grass each summer but turf comes back after the crab grass dies in the fall.

Prevent Seed Formation

In most instances, crab grass control is a matter of prevention of seed formation and checking its growth along with the introduction or encouragement of a good grass. Jim Morrison at Hershey, Pa. accomplished this with a homemade vertical cutter to shear off the seed heads. Others have used combs on mowers, sections of wire fence, or steel mats before mowing to raise the seed heads, so fairway mowers can cut them off.

Some watered courses in the New York to Chicago belt have been plagued with crab grass on watered fairways because the turf was mostly close cut blue grass. They are solving the problem by spraying with sodium arsenite at light rates during June, July and August; followed by re-seeding in early September to introduce Colonial bent which makes a tight turf and will stand close cutting. The choice of sodium arsenite over potassium cyanate or phenyl mercury is a matter of cost per acre, besides the fact that sodium arsenite also checks poa annua.

HOME CLUB PRO

(Continued from page 41)

stated. "The student must be convinced that the recommendations the instructor gives are the ones he is seeking for his specific case.

"It seems that everyone who knows how to knock a ball down a fairway seems to think that he is a magician. Some students receive recipes from all over and the instructor must convince them that most of the stuff they pick up is wrong.

"There are unlimited numbers of prescriptions for a golf swing and they vary on almost every golf course. That is a ridiculous situation. There is no other subject in which there are so many procedures to follow.

"Why?

"Because the unqualified golf instructor is not a technician but a guesser.

"Every instructor anticipates resistance on the part of most students. When you get a student to admit that he was doing something wrong, you have the battle won."

In his pro shop, Byrd handles all of the nationally known golf clubs and equipment. He specializes on personally-fitted irons and woods.

The Muncie pro believes that a golfer's ability is enhanced if he can be personally fitted to golf clubs that are related to his type of swing. This includes a large number of individual specifications.

Many Indiana golfers have so much confidence in Byrd's ability to order golf clubs to their particular specifications that they drive hundreds of miles to give their personal orders. Byrd is rightfully proud of this.

Public-Press Relations Best

The Minnetrista pro's relations with the public and the sports writers in the Indiana area are of the very best. In commenting on the fact that a middle-aged man walked in to speak with him during a rush period, Byrd said:

"That man used to caddie around here when he was a boy. He is a success in the business field now but he never forgot where he learned how to play golf. Whenever he is in town he never fails to come out here and pass the time of day with me."

Although he is proud of his achievements in giving Muncie a good municipal operation, Byrd would rather talk about the progress of his two sons, Don and Gordon.

Don, who competed in the recent National Open at Oakmont, is assistant pro at the Randolph GC, Tuscon, Ariz. He is presently the Arizona open champion. Don won the American Legion National Tourney in 1948; won the Indiana state legion title in 1947 and 1948 and for three years was a member of the Arizona University golf squad. He was captain during his senior year.

Gordon was runnerup in the Indiana Junior Tourney at the age of 14. At 15



Yes, two men may wear a size 9½ glove, but one will have long, slender fingers and the other will have short, stubby fingers. Leather stretches and one size glove will fit both men. Golf clubs, however, do not stretch.

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GRANT A. BARNETT 707 Main St., Buffalo 3, N. Y. he served as president of the Indiana Junior Golf Assn. and won the Muncie city golf title. At the present time, Gordon lives in Indianapolis where he is assistant office manager of the Banquet Dairy and Ice Cream Company. In addition, he is pro at the Western Electric golf range. The latter course was built by the company according to Gordon's ideas.

TURF DEVELOPMENT

(Continued from page 32) for sprigging and there shall be no pockets where water can stand.

In the final light tillage operation, after grading and smoothing, 100 lbs. of nitrogen per acre or 1000 lbs. of a grade 10-5-5 organic base fertilizer per acre shall be incorporated into the top 2 ins. of the fairway areas.

The roughs shall be treated in the same manner with the exception that 50 lbs. of nitrogen per acre or 500 lbs. of a grade



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Sprigs shall be healthy living rhizomes and attached roots of Bermuda grass that have been obtained from an approved source where sod is heavy and thickly matted and is free of any material that would be detrimental. Sprigs shall then be given proper care until they are planted. Only fresh, live viable sprigs shall be used.

Sprigging may be accomplished either by the row or broadcast method and shall be done only when there is sufficient soil moisture to insure plant growth. Sprigs should be thoroughly covered as soon as possible and the soil compacted and left at a suitable smoothness to facilitate maintenance with gang type mowers and there shall be no pockets where water will stand. The fairways shall be maintained, as near as possible, in accordance to watering in a manner that is conducive to plant growth after the installation of the fairway sprinkling system.

Headwalls for storm sewers shall have a 5 ft. strip of solid sod to prevent washing.

Catch basins shall be surrounded with a 20 ft. sq. area of solid sodded Bermuda. The finished sodded area shall be not less than 4 or more than 6 in. graduated down





to the catch basin below the surrounding grade. The outside edge of the solid sod shall be cut in and laid at the same grade as the surrounding area.

Before laying solid sod the area shall be fine graded and fertilized with 30 lbs. of a grade 10-5-5 organic base fertilizer and it shall be lightly raked into the surface. These areas shall then be maintained in accordance to watering in a manner that is conducive to plant growth.

If soil is borrowed from the fairways in construction or in any location that will affect play or any place that will cause serious erosion, unless re-vegetated, then the topsoil of those areas shall be pushed aside and stock piled. The needed soil shall then be taken from the subgrade and the areas re-covered with soil from the stock pile. In borrowing soil subsequent drainage of the areas where the soil is taken shall always be given consideration.

TEES

Tees may be moulded of the same material used in the base of the greens and should have adequate surface drainage. It would be advisable to finish off the tees with at least 4 in. of the most suitable topsoil available on the site of operation.

To insure a friable soil that will not become overly packed and to be conducive to plant growth on these important areas they should then be finished off with 4 in. of imported prepared topsoil consisting of 53.3% approved sand, 26.7% imported soil and 20% approved organic matter.

The areas shall then be smoothed and fertilized with 50 lbs. of a grade 10-5-5 organic base fertilizer and 50 lbs. of dolmite per 1000 sq. ft. which shall be incorporated into the soil to a depth of 1 to 2 in.

For the very best in tees, for this climatic area, they should then be sprigged with not less than 3 bushels of U-3 Bermuda grass per 1000 sq. ft. The tees should then be smoothed to a finished grade, and there shall be no pockets where water could stand. Tees are to be made in a condition suitable for maintenance with gang type mowers or multiple reel power mowers. The areas shall then be maintained at all times in accordance to watering in a manner that is conducive to plant growth.

If U-3 Bermuda is not available in sufficient quantities then consideration should be given to constructing the base of the tees as above and then covering the base with four (4) inches of friable soil taken on the site where there is a thick mat of Bermuda grass growing. The soil and roots should be spread evenly over the conconstructed base of the tees to a 4 in. depth and fertilized with 30 lbs. of a grade 10-5-5 organic base fertilizer per 1000 sq. ft. to be lightly incorporated into the top 1 in. The areas then to be fine graded and kept moist at all times in accordance to watering in a manner that is conducive to plant growth.

Before stripping the soil and roots for top soil planting of the tees, the area should be moved and raked so as no more tops will be moved to the planting site than absolutely necessary.

For a more desirable condition after the Bermuda has made good growth the tees should then be topdressed with 2 in. of a mixture or 53.3% approved sand, 26.7% imported topsoil and 20% approved organic matter. The topdressing shall be loosely spread, not compacted, over the tee areas.

After the Bermuda has made sufficient growth to emerge from the topdressing and make good coverage, the tees should again be fertilized with 20 lbs. of a grade 10-5-5 organic base fertilizer and 25 lbs. of dolomite per 1000 sq. ft. and the same procedure of topdressing repeated. The areas shall then be kept moist at all times in accordance to watering in a manner that is conducive to plant growth.

After Bermuda grass has emerged from the second topdressing there shall again be spread 25 lbs. of dolomite per 1000 sq. ft.

Both the architect and the contractional party, due to the expense involved in construction of greens and the desire to protect the hard-to-obtain stolons and for an early opening date, should give consideration to the placing of a protective vegetative mulch on the greens and any other areas that would be vulnerable to severe wash. The mulching material shall be native bluestem hay used at the rate of 3000 lbs. per acre and to be tied down.

It is urged that a competent golf course superintendent's services be acquired early in the construction and establishment period so he will be familiar with methods and materials used in construction and to supervise the maintenance of all planted areas.

It is further recommended that before any planting of greens is undertaken that a heavy duty power sprayer be purchased and on hand so that any necessary application of fungicides and other maintenance factors can be taken care of promptly. The power sprayer may also be used to facilitate watering in the unaccessible areas.