Methods and Materials That Develop Weed-free Turf

By J. A. DeFRANCE

Rhode Island Agricultural Experiment Station

In order to present the crabgrass and weed picture from different angles, preventive measures and cultural methods of control are mentioned, together with the new chemical methods of control. When preventive measures fail and where cultural methods of control, such as hand-weeding, are considered tedious or expensive, then employ the chemical methods.

A program of soil preparation and turf management to produce good, healthy, dense turf helps provide security from the invasion of crabgrass and other weeds. Following are eleven preventive measures against crabgrass and weed invasion. If these measures are neglected, the crabgrass and weed problem is quite apt to become serious.

1. Prepare the seedbed with soil of good structure but fairly coarse texture with ample organic matter to help withstand excessive compaction, and provide adequate aeration and drainage.

2. Provide suitable surface, internal, and sub-drainage by approved methods; avoid layers of any kind of material that might interfere with movement of water either up or down.

3. Provide good bond between topsoil and subsoil. Let uniformity of application and thorough mixing and incorporation of materials be keynotes in construction and thus prevent layering effects from use of any material alone such as peat, humus, and sand, in construction or topdressing that might cause a layer and produce adverse conditions for growth of roots. Also avoid any method in construction such as excessive rolling that would cause a layer and interfere with downward growth of roots.

4. Cultivate the seedbed before planting, or treat the seedbed with fertilizers or chemicals to provide weed-free topsoil a few weeks prior to planting if seeding is to be done in early fall. Give treatment in early fall if seeding is to be done the following springtime.

5. Use grass seed of high germination free of weed seed.

6. Use basic, permanent grasses that produce dense turf under good management practices. Certified Colonial bent, Kentucky bluegrass, Chewing's or selected strains of fescue, and improved selections of Velvet or creeping bent are suggested. Ryegrass, redtop, timothy and other filler grasses are not considered basic permanent turf grasses.

7. Use clean compost topdressing free of viable weed seeds. This may be accomplished by sterilizing the compost with heat such as steam or electricity, by using certain chemicals, or by treating with Granular Cyanamid, or some other nitrogenous fertilizer such as Milorganite or Agrinite.

8. Provide proper and ample fertilization and liming to develop and maintain a dense turf that will resist invasion of crabgrass.

9. Practice judicious watering to develop deep root systems, and avoid saturation of the soil which produces a stagnant condition and poor aeration.

10. Avoid excessive compaction on turf saturated with water from a recent rain or irrigation by restricting foot traffic and heavy rolling.

11. Prevent and control diseases which destroy or weaken turf grasses. Turf injured by diseases is easily invaded by crabgrass and other weeds.

Cultural Methods of Weed Control

If crabgrass and weeds have invaded turf areas, cultural methods of control such as the following are suggested:

1. Hand-weed the plants. Young plants are easily removed with the thumb and forefingers as they are shallow rooted. Older plants with deeper root systems need to be loosened with a knife.

2. The fact that crabgrass does not grow in the shade suggests a method of control. Let the lawn grasses grow fairly tall during the period when crabgrass naturally germinates; this provides shade for the soil and seedlings, when they come up. After they are up and reaching for sunlight, lower the height-of-cut of the mower to come down on the plants

and prevent seed formation. On golf courses, crabgrass is found in fairways where the grass is kept short but seldom in the rough where the grasses are allowed to grow tall.

3. Close cutting of the lawn will help prevent the plants from going to seed, but many seeds will be formed below the cut. It is advisable to rake up the grass in several directions before mowing it, being sure to lift the leaf blades, runners and seed heads that have the habit of lying on the ground. If allowed to mature, crabgrass scatters thousands of seeds over the lawn when cut with the mower. For this reason it will pay to start a drive on this pest when it first appears. Whenever crabgrass is in seed, the catchers should be attached to the mower.

4. The time of fertilization is a factor in controlling crabgrass. Fertilize in early spring before the crabgrass gets a start. This will stimulate the grass on the lawn and help produce a vigorous growth which will crowd out crabgrass. Fertilize again in the fall after the crabgrass has ceased growth or been killed by early frost. Use a fertilizer high in nitrogen such as 10-6-4, 8-6-4 or 8-6-2, at 10 to 15 lbs. per 1,000 sq. ft.

5. Keep the plants from going to seed, as control is largely a matter of the prevention of seed formation.

20 Years Research on Crabgrass

On the basis of 20 years' search and research for preventive and control measures of crabgrass, the best treatment to eliminate crabgrass in turf appears to be a water solution of a phenyl mercury acetate organic complex such as PMAS.

During 1946, a cooperative disease-control study with Dr. F. L. Howard and Dr. H. W. Keil was conducted on putting-green turf (two-year-old sod). Charles H. Allen, Jr., turf foreman, observed that PMAS appeared to control crabgrass. Preliminary tests on lawn turf substantiated the effectiveness of PMAS as a crabgrass killer. Additional work was needed to ascertain effective dosages and opportune timing of treatments. The experiments conducted during 1947 definitely proved water solutions of certain phenyl mercury organic complexes were satisfactory.

Several hundred tests with various chemicals, including 2, 4-D preparations and sodium arsenite, were conducted in the greenhouse during the winter of 1946-47 and in the field during 1947-48 to determine, (a) concentrations of the materials that would prevent seed germination, (b) inhibition and control of crabgrass without injury to permanent turf, (c) the most effective time of application and (d) the number of treatments for complete kill of crabgrass.

In general, treatments applied early in the season, on turf composed of Kentucky bluegrass, fescue and Colonial bent, killed germinating seed and all young plants in the two- and three-leaf stages. As the season progressed, however, more crabgrass germinated and necessitated additional treatments. One treatment of any material used did not provide complete control of crabgrass.

(Continued on page 56)

O. J. Noer, photo

GREENBRIER IS BACK IN BUSINESS

Here's first hole (430 yds.) of the Old White course at Greenbrier which was put back in play, after wartime shutdown, by the widely publicized pro-amateur tournament. Business is great at the re-opened course at Greenbrier. That's why contract of Sam Snead, pro now at the place where he learned golf as a caddy, sharply limits his tournament appearances.

Group attending Turf Field Day at New Jersey Agri. Exp. Station, Rutgers Univ. are shown portion of 500 experimental, demonstration and test plots devoted to crabgrass control. Others show results of seeding various grass strains, effects of fertilizer and disease and weed control. Attendance at Rutgers is indicative of interest all over the country in Field Day events and tests devoted to the study and development of fine turf.

N.J. GSA Sets Up Fund for Study of Tropical Earthworm

More than 65 greenkeepers and others interested in turf culture from Garden State golf courses, Westchester Co., N.Y. and Conn. attended the combined Turf Field Day and business meeting of the New Jersey GSA at the N.J. Agri. Experiment Sta., Rutgers Univ., New Brunswick ment Sta., Rutgers Univ., New Brunswick, for discussion and study of turf renovation, crabgrass and weed control.

Some 500 experimental, demonstration and test plots showing results of seeding of various grass strains, effects of fertilizer and disease controls and weed controls were inspected. More than 50 materials are being tested on weed control plots alone. Scoring of results is being made according to dosage rates, effectiveness, discoloration, ease of application and cost.

Discussions brought to the attention of those attending a new threat to turf, especially greens turf, in the form of damage by the Tropical Earthworm, commonly called the "Stinkworm" which has not yet been brought under control in the northern New Jersey, Westchester Co. and Conn. areas. A research fund of $2,000 has been established for the study and control of this pest which throws up casts on some courses with such frequency that greens must be poled between rounds of play by caddies or attendants. Traces of the worm have been in evidence on some greens since 1934.

Speakers who appeared on the program arranged by Carlton E. Treat, Montclair GC, included Wm. Zimmerman, O E. Linck Co.; John Anderson, grnkpr., Essex Co GC, West Orange; Dr. Ralph Engel and Dr. Gilbert Ahlgren of the N.J. Experiment Sta.

Pa. GSA Holds Tourney With Summer Field Meeting

The First Annual Tournament of the Pa. GSA will be held on the Penn State GC, Sept. 20 and 21 in conjunction with the Annual Summer Field Meeting on Turf Experiments. The tourney is sponsored by the six local Assns. in the state. The program has been arranged to cover a two-day period to provide ample time for both golf and inspection of the plot work. Invitations have been extended by the Pa. group to greenkeepers in other states to attend the Penn State meeting and participate in the tournament.

Michigan Golfers to Celebrate Hagen Day, Sept. 8

Michigan PGA and state's amateurs and sports writers will hold a tournament and dinner Sept. 8 at Blythefield CC, Grand Rapids, Mich., honoring Walter Hagen. Last year's celebration at Detroit drew a large attendance to pay tribute to the merry gent who instituted a new era of fiscal and social rating for professional athletes.

This year's affair promises to be even larger with pros and veteran amateurs from central states having expressed eagerness to attend an "old settlers' reunion" and see if they can't coax the "Haig" out of retirement and again slash the ball around the pastures.

METHODS AND MATERIALS

(Continued from page 31)

PMAS and PMAS-AA, applied July 14 and 21, at 1:3,000 and 1:4,000, gave practically 100% check without permanent

turf injury. It was thought that complete continuous control did not occur because a few seeds germinated after July 21. In August, when two treatments of PMAS and PMAS-AA at 1:3,000 and three treatments at 1:4,000 and 1:5,000 were applied at weekly intervals, complete continuous control was recorded on plots of dense turf. Four treatments at weekly intervals with PMAS-AA at 1:6,000 were 100% effective. Light concentrations (1:6,000 and 1:9,000) of the phenyl mercury materials, when applied four and five times, gave excellent control of crabgrass with little or no discoloration of the permanent grasses and also inhibited weeds other than crabgrass. Heavier concentrations (1:3,000 and 1:4,000) requiring two or three treatments produced light temporary turf injury.

Factors Determining Dosage

The higher the grass, the stronger concentration can be used. For example, turf cut at lawn height (1 in. or more), under favorable soil moisture conditions, can stand a 1:3,000 solution of PMAS or PMAS-AA at the 10-gal. rate. Turf cut at putting-green height (approximately ¼ in.) appears to stand a concentration of not more than 1:8,000 without injury.

The kind of grass to be treated is a factor in weed control. Kentucky bluegrass was injured less than Chewing's fescue or Colonial bent. Velvet bent appeared more susceptible than the other grasses to turf injury; consequently, less chemical should be used when treating velvet bent.

Seedling turf and new turf with shallow root systems can not stand the same concentration of chemical as will older and more mature turf. Therefore, judgment should be exercised and the concentration reduced to about ½ the amount suggested for mature turf; apply light concentrations to retard crabgrass and more treatments, if necessary, for complete control.

In the tests, good coverage and distribution of the chemicals was obtained by spraying with 10 gal. of solution per 1,000 sq. ft., with the ordinary cone-type spray nozzle. However, good crabgrass control resulted from a preliminary test with a Rollosprayer having a flat fan spray nozzle that would uniformly cover 1,000 sq. ft. with only 1 gal. of water.

If a turf is mostly crabgrass, treatment with chemicals will naturally produce a brown discoloration of the crabgrass plants. In turf that is not over 10% crabgrass, however, little discoloration will be noticed, as the plants wither and soon disappear. Dormant crabgrass seed appeared very difficult to kill and it is doubtful if it can be killed, except when germinating or maturing, with solutions that do not harm lawn grasses. The best time for treatment with a minimum number of applications appeared to be in July and August.

Applications of PMAS or PMAS-AA at the rates of 1:4,000 or 1:5,000 (1 part of the active ingredient to 5,000 parts of water with actual toxicant calculated on the basis of 10 gal. of solution to 1,000 sq. ft.) used three times at weekly intervals gave 100% control of crabgrass on lawns composed of Kentucky bluegrass, Chewing's fescue and Colonial bent. Such treatment appeared to be the most practical method of eradicating crabgrass without injuring the permanent turf grasses. Complete control of weeds, including common and fall dandelion, narrow and broad plantain, chickweed and crabgrass, with no permanent injury to the turf, was obtained by three treatments at weekly intervals in August with a mixture of PMAS 1:6,000 and 2, 4-D butyl ester 1:4,000, applied at the rate of 10 gal. to 1,000 sq. ft.

2, 4-D sodium and 2, 4-D butyl ester alone appeared ineffective against crabgrass except during periods of germination and young stages.

Phenyl mercury formulations such as PMAS, PMAS-AA and Puratized 641 have also given good control of some turf diseases, especially dollarspot. As a preventive against crabgrass and certain diseases of putting-green turf, it may be advisable to apply the chemicals at 1:8,000, or even 1:10,000, every two or three weeks from June through September. Therefore, in the maintenance of putting greens and other fine turf areas, these chemicals have a dual use, controlling both diseases and weeds.

PMAS is sold as Tat-C-Lect Crabgrass Killer for lawns and as Soilicide for putting-green turf. Directions are given on the container. The chemical is produced by the W. A. Cleary Corp., New Brunswick, N.J., and marketed by the O. E. Linck Co., Clifton, N.J. It is probable that PMAS will be sold under other trade names.

It is very doubtful if pets, animals or children will be harmed by contact with the diluted material when sprayed on lawns. The concentrated material, however, is poisonous and care should be exercised in handling it.

In view of the new chemical methods for crabgrass and weed control, there appears to be no good excuse for weeds in greens, fairways, lawns or other turf areas. The dream of a weed-free turf is now realized, provided the fundamentals of good construction and maintenance are followed.