Correspondence pertaining to Green Section matters should be addressed to:
USGA Green Section, Room 331, Administration Building, Plant Industry Station, Beltsville, Md.

TURF RESEARCH AT THE SOUTHEASTERN TURF RESEARCH CENTER [1]

By B. P. ROBINSON AND GLENN W. BURTON [2]

Even though turf research in the Southeast is still in its infancy, much has been accomplished since the experimental plots were established at Tifton, Ga., in 1947. Originally, the program was sponsored by the United States Golf Association Green Section, Georgia Coastal Plain Experiment Station, U. S. Department of Agriculture, and several golf clubs in the Southeast.

Programs of research, extension, and teaching, however, have grown to a point where the Southern Golf Association has assumed the major task of financially supporting the Southeastern Turf Research Center. Golf continues to be the best supporting arm and the entire program is co-sponsored by the USGA Green Section, the University of Georgia, and the U. S. Department of Agriculture.

In order to cover the extensive field of turf production, research projects at Tifton have been diversified and may be thought of as covering the following experimental fields:

Breeding and Selection of Grasses for Special Purpose Turf

BERMUDAGRASS: During the past four years, more than 116 types of bermudagrass (*Cynodon dactylon*) have been tested for putting green, fairway, and lawn qualities. These include 74 selections from golf clubs in the Southeast, 40 selections developed at Tifton, and two selections from the USGA Green Section.

Many observations indicate that several selections superior to common seeded bermudagrass are available. Hybrids between a dwarf type, Tifton No. 12, and other disease resistant bermudas have been outstanding. One of these selections, Tifton No. 57, has been released by the Experiment Station as a general purpose turf bermudá and is receiving wide acclaim for its performance on putting greens, tees, and lawns. Extensive tests indicate that Tifton 57 and a few other selections will whip the ryegrass-bermuda transition, weed and crabgrass control, and disease control problems.

It is realized that Tifton 57 and most

[1] Cooperative investigations at Tifton, Ga., of the Division of Forage Crops and Diseases, U. S. Department of Agriculture; the Georgia Coastal Plain Experiment Station, the United States Golf Association Green Section, and a number of Southern golf associations.

[2] Turf Specialist, Georgia Coastal Plain Experiment Station, and Principal Geneticist, U. S. Department of Agriculture, Tifton, Ga.

of the outstanding selections from golf courses are not ideal for putting green purposes but are far superior to the present common seeded bermuda. With this in mind, hybridization of the best selections (*Cynodon dactylon*) with a fine-leafed bermudagrass (African bermuda — *Cynodon transvaalensis*) has been under way since 1948. These hybrids appear to be superior to either parent for putting green purposes. Hybridization in 1951 has involved crossing the original *Cynodon dactylon-C. transvaalensis* hybrids back to *C. transvaalensis*. With this procedure, it is hoped that a fine textured bermudagrass will be produced which will compare with the putting qualities of bent or ryegrass. Only time and trial can tell if this is possible.

CENTIPEDEGRASS: Two types of centipede exist which have value as turf grasses in the Southeast. Common or red centipede is very aggressive and produces a fine turf but turns a displeasing reddish brown in early fall. Another type is lighter green in color, not as aggressive as red centipede, but holds its color until heavy frost. By continuous breeding and selection, it may be possible to develop a plant which will combine the desirable characteristics of both grasses.

THE ZOYSIAS: Selections of *Zoysia matrella* and *Zoysia japonica* from various individuals in the Southeast, USGA Green Section, and U. S. Department of Agriculture are being established in the turf plots to determine their possible value for turf. It is the objective of the research center to establish a program with the zoysias comparable to the bermudagrass improvement studies. This program has been greatly facilitated by the transfer of Ian Forbes, Jr., from the Beltsville, Md., Station to Tifton. Forbes has done a lot of work in the breeding behavior, seed setting, and seed production in the zoysias and, with his experience to draw upon, the program on zoysias at Tifton can move much faster.

COOL-SEASON GRASSES: Since the use of cool-season grasses is a must with the turf producer in the South who desires to maintain a year-'round green turf, a program of management, adaptation, and growth compatibility has been in progress for several years. Such grasses as ryegrass, redtop, Kentucky bluegrass, tall fescue, red fescue, Astoria, Seaside, and Highland bents are being evaluated when used to overseed putting greens or lawns.

BENTS: Some of the best bentgrass strains produced in the United States are being established in experimental turf plots. Such strains as C-1, C-7, C-19, C-114, and C-115 may survive high temperatures and disease incidence and be of value in the production of year-'round putting green turf.

Management and Fertilization of Turf Grasses

A test to determine the rate of seeding, fertilization, and height of cut of common bermudagrass, Tifton No. 3 bermuda, lawn Bahia, centipede, St. Augustine, carpet, Kentucky 31 fescue, and *Zoysia matrella* has been in progress since 1947. Where seed was available each grass was seeded on the basis of an equal amount of seed per square foot. Otherwise, the grasses were sprigged on 12" centers. After establishment, the test has consisted mainly of two heights of cut — ¾ inch and 1½ inches — and fertilization.

Three growing seasons were required for *Zoysia matrella* to produce a complete cover. All other grasses were completely established in less than one season. *Zoysia matrella* produced its most satisfactory turf and was, apparently, better able to compete with weeds and other turf grasses when cut close. A complete cover of *Zoysia matrella* has not been obtained on

the plot cut at 1½ inches. This is apparently due to the competitive nature of co-existent bermudagrass and not the level of fertility.

Satisfactory turf of bermudagrass, centipede or carpet can be maintained at either height of low cut, whereas St. Augustine and Bahia grass should be cut higher. When cut at ¾ inch or 1½ inches, it apparently requires three to four pounds of actual nitrogen per 1,000 square feet per year to maintain good bermudagrass, St. Augustine or *Zoysia matrella* turf. Somewhat less is required for Bahia, centipede, and carpetgrass. Kentucky 31 fescue was planted in the fall but did not survive the summer.

Attention has been given the use of various nitrogen sources on bermuda and centipedegrass for the production of turf. The sharp differences observed in the response of grasses to organic and inorganic sources of nitrogen in the northern part of the United States are not as distinguishable in this area. Soil nitrification rates in the South are higher throughout the growing season, thus somewhat offsetting part of the benefit obtained from organic nitrogen sources in the North.

A determination of the lime and fertilizer requirements of southern turf grasses has been in progress since 1947. A marked response to lime applications up to a soil pH of 7 was observed in bermuda and St. Augustinegrass. *Zoysia matrella*, centipede, carpet, and Bahiagrass did not respond to lime applications which raised the soil pH above the normal 5.6. Carpetgrass, however, did show a marked response to applications of sulphur up to one ton per acre and a soil reaction of 4.0.

A study of the transition problem from bermuda to rye and rye to bermuda has been the object of another test. Rates and dates of seeding ryegrass, rates and time of nitrogen application, levels of phosphorus and potassium, and seedbed preparation for seeding of ryegrass have been involved.

Disease incidence on ryegrass was much higher where ryegrass was seeded at 100 pounds per 1,000 square feet as compared to 40 pounds per 1,000 square feet. Nitrogen (inorganic) applied at two pounds of actual nitrogen per 1,000 square feet one month before seeding or at the time of seeding ryegrass actually reduced the occurrence of dollarspot. Heavier applications of nitrogen appeared to increase the incidence of this disease.

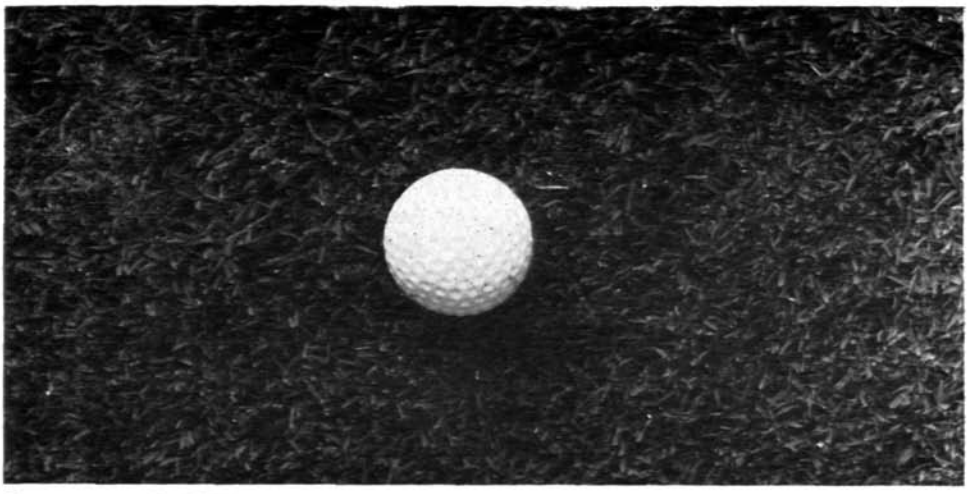
The levels of phosphorus and potassium had no visible effect on disease incidence or growth of ryegrass. This was probably due to an adequate supply of phosphorus and potassium existing in the non-fertilized check plots. The best stand of ryegrass and the best putting surface were obtained where the bermudagrass was cut back to 3/16 inch before seeding ryegrass and where the bermuda turf was not disturbed.

Another management study has been the introduction of improved strains of bermudagrass into existing turf. Where it is desired to remove all of the existing vegetative growth on putting greens and replant within at least two days, methyl bromide continues to be the best chemical for such a job. As little as one pound of methyl bromide per 225 square feet has given satisfactory results. This product is also very effective for the control of nutgrass and sterilization of topdressing materials.

The fertility requirements of most grasses for pasture production are fairly well known. On the other hand, the nutritional requirements of closely cut turf grasses have not been thoroughly investigated. During 1951 test plots were established in order to determine the levels of nitrogen, phosphorus, potassium, and calcium necessary for the production of good bermuda and ryegrass putting green turf. Periodic soil tests, yields of grass clippings, and chemical analysis of the clippings have been made. It is too early to report on this study.

Studies on the production of centipedegrass seed were begun in 1946. It was found that adequate supplies of phosphorus and potassium plus heavy applications of nitrogen at least two to three months before the formation of seed heads produced as high as 200 pounds of clean seed per acre. This type of management was not effective, however, unless the

Bermuda — and Bermuda



Two-year turf of Tifton 57 bermuda maintained at putting green height at Tifton, Ga.

Two-year-old turf of common bermuda established from seed and maintained in the same manner as Tifton 57 at putting green height.

grass was mowed until the appearance of the first seed heads. Centipede seed is now being produced commercially by this system of management.

The Production and Use of Topdressing Materials

The lack of a good, cheap source of organic matter for making topdressing materials has been one limiting factor in the production of satisfactory putting green turf.

A partial answer to this problem has been found in a material produced by thoroughly mixing one part of sewage sludge, three parts old pine sawdust, six parts loamy sand soil and calcium cyanamid at 15 pounds per cubic yard. After composting for one year, the material was in good condition for use. The cyanamid not only killed the weed seeds in the mixture but also added nitrogen.

Since the mixture appeared to be satisfactory for turf purposes, the composted

sawdust-sewage sludge needed to be tested against a proven organic material for making topdressing mixtures. Thus, in 1951, composted sawdust-sewage sludge, fresh sawdust, and peat moss were included in a greenhouse test to determine the effect of these materials on the growth of Tifton 57 bermuda. The materials were mixed with washed builder's sand and loamy sand and grown under two systems of fertilization and water management. Complete results of the test will be published later, but indications are that the composted sawdust-sewage sludge mixture is as satisfactory as peat moss.

Crabgrass and Weed Control

Annual crabgrass and weed control tests have been conducted since 1947. Several herbicides have been applied to weed-infested turf at Tifton and outlying golf courses. The most promising of these have been the phenyl mercury acetate compounds, sodium arsenite, Milarsenite, potassium cyanate, and lead arsenate.

The phenyl mercury acetate compounds are expensive but have given good crabgrass and weed control when properly applied, with little or no injury to the associated turf. Sodium arsenite and Milarsenite give excellent weed control but cause temporary injury. Most southern turf grasses, however, recover rapidly from this type of damage. Potassium cyanate is also very good for general weed control and ranks between the arsenites and phenyl mercury acetate in injury produced to turf.

Insect Control

Army worms have been effectively controlled by the use of 20% toxaphene dust, calcium arsenate dust, and a new insecticide dust composed of 2% aldrin, 5% DDT, and 20% sulphur. Ten to twenty pounds of lead arsenate per 1,000 square feet has been effective in reducing the number of earthworm casts observable in turf areas. Chlordane applied at only one pound per acre and washed into the soil has given good control of mole crickets. Longer residual control was obtained, however, by using 10 pounds of lead arsenate per 1,000 square feet.

Related Fields

A two-year course in turf management is being offered cooperatively by the Research Center and the Abraham Baldwin Agricultural College, Tifton, Ga. Even though the course does not involve turf research, it will lead to the improvement of southern turf. It is hoped that golf courses in the Southeast which are in need of better-trained personnel will support the two-year course. Young men interested in turf management can gain valuable experience on the research plots while attending the college on a turf fellowship sponsored by a golf club.

Several golf clubs in most of the southeastern states have been visited by personnel of the Southeastern Turf Research Center. This was made possible during the 1950 annual Southeastern Turf Conference by the action of the Turf Advisory Committee.

This Committee decided that the services of a turf specialist should be made available on call, provided consultation services did not interfere with the research program being conducted at Tifton, Ga. The Committee also decided that organizations visited should pay a small consultation fee plus traveling expenses.

Rendering these services has supplemented very nicely the turf program at Tifton in that research personnel have been kept in close contact with the current practical problems of the turf producer and have been able to judge the effectiveness of applied experimental data.

— • —

Turf Book Praised

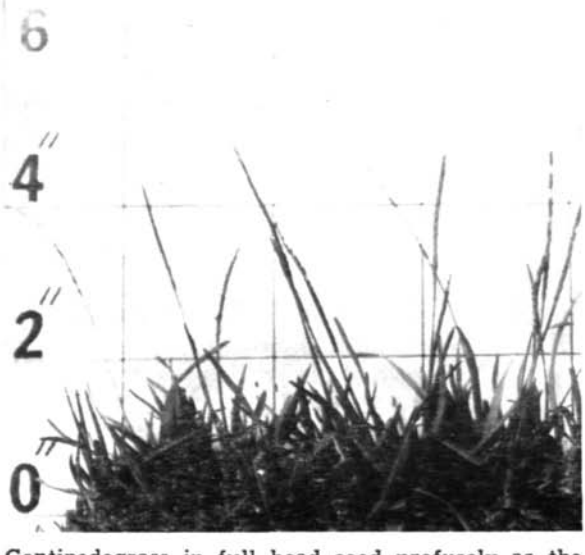
TO THE USGA:

I am the possessor of a copy of TURF MANAGEMENT, having bought it through a local book store, and it is a fine book. The USGA deserves to be proud of its sponsorship of this publication.

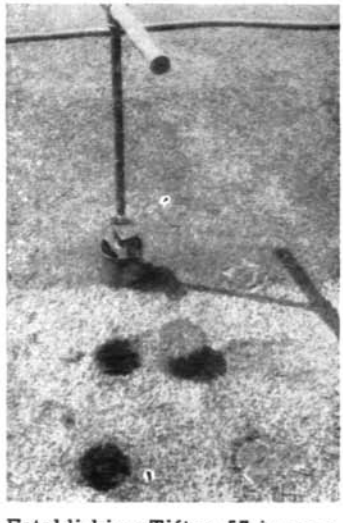
LANE FULENWIDER
Jacksonville, Fla.

Projects at Tifton, Ga.

Plots of bermudagrass on the left and *Zoysia japonica* and *Zoysia matrella* on the right. Photographed 30 days after they were set, 1951.



Centipedegrass in full head seed profusely as the result of proper fertilization and management.



Establishing Tifton 57 in common bermuda turf by planting plugs cut with cup-cutter tool.