1913-1914, and as president in 1915-1916, and rendered distinguished service. He was one of Denver's outstanding citizens and a leader in the civic affairs of the city. He was a graduate of Yale University and a lawyer by profession. He was a member of many social clubs and other organizations, and president of the University and Country clubs of Denver. He also held membership in well-known clubs outside of his city. He always had a keen interest in the better maintenance of golf links and was a member of the Green Section Committee from 1927 until his death. His passing away will be deeply regretted by every lover of the game of golf both in this country and in Canada and Great Britain.

Annual Report of the Green Section for 1930

A meeting of the executive committee of the United States Golf Association Green section was held in Washington on February 8, 1930. On account of Dr. Oakley's expected absence from Washington for an indefinite period it was decided to make some changes in the organization of the Green Section. Dr. K. F. Kellerman, associate chief of the bureau of plant industry, United States Department of Agriculture, kindly consented to serve as acting chairman of the research committee during Dr. Oakley's absence. Dr. A. J. Pieters, who is now acting in charge of the office of forage crops and diseases, bureau of plant industry, in the absence of Dr. Oakley, was also added to this committee.

The work of the Green Seection may be classified into three major divisions: research, education, and advisory service. The main research work of the Green Section during the year has been carried on at Washington, Chicago, and Madison, Wis. Contributions have been made for turf research work conducted by the New Jersey and Pennsylvania state agricultural experiment stations. Our educational work has been carried on through the mediums of various Green Section meetings and exhibits, publication of our Bulletin as well as material in certain private publications pertaining to golf, and numerous educational programs in which the Green Section staff has participated upon invitation of sectional organizations and officials of college short courses in greenkeeping. The advisory service is carried on chiefly through correspondence, but as much as can be handled by the limited staff of the Green Section is conducted by personal interviews either on golf courses or in the Green Section office or laboratories. By means of this service member clubs have their own special problems analyzed and scientific procedures are outlined. During the year a large proportion of the clubs which are members of the United States Golf Association have availed themselves of the opportunity to have the Green Section staff render reports on seed or soil analyses and give advice as to seeding, fertilizing, watering, mowing, and innumerable other problems confronting those who care for our golf courses. The different activities of the Green Section for the year are given below.

Arlington Turf Garden

The reorganization work which was begun in 1929 at the Arlington turf garden was completed during the spring and early summer of 1930. As now laid out, the turf garden is much better than here-

tofore and contains many more test plots than it has in the past. It now has a larger number of grasses and selections of special strains of grasses than ever before. Many of the old fertilizer plots which had already served their purpose have been discarded and new fertilizer tests have been started. A larger area has been set aside for turf disease studies and tests of various chemicals which may have some possibilities for controlling various diseases. A new section was established for testing the value of sand and various types of organic material in changing the physical condition of clay soils to make them more suitable for golf turf production and upkeep. In another new section fairway grasses were planted for the purpose of doing some work toward the solution of various fairway turf problems; these include tests with different combinations of fairway grasses, different fertilizers, and other experiments. The borders of the garden have been laid out in 64 plots for work on problems of maintaining good turf on the approaches to putting greens.

Preparing land for planting the shaded turf garden at Arlington

There have been established on the garden new demonstration plots, which are kept in putting condition and enable visitors to test the relative putting qualities of the different types of putting green grasses. There are 10 of these demonstration putting plots, each 20 by 24 feet, which provide ample space for making putting tests. Each plot is planted with a different grass; five of them (colonial bent, German mixed bent, seaside creeping bent, red fescue, and annual bluegrass) represent the common putting green grasses produced from seed; the other five plots (Metropolitan, Washington, Virginia, and Columbia creeping bents, and a new strain of velvet bent) are representatives of putting greens planted with the stolon method. One-third of each of these 10 plots has a 6 per cent grade, one-third a 3 per cent grade, and the remainder is on a 1 per cent slope. With this combination of grades one is able to observe accurately any effect the various putting green grasses may have on the

putting qualities of turf planted on greens with different degrees of slope. These various grades will enable the Green Section staff to make careful tests, with the aid of the Arnott mechanical putter, to determine accurately one of the questions that cause so many arguments around golf clubs, namely, whether one type of grass is more likely to affect the putting on undulating slopes of putting greens than are other types.

A number of new grasses at the garden attracted much attention during the summer on account of their resistance to disease or because of certain other characteristics which marked them as having much promise for putting green purposes. There has been much interest during the year in the 29 distinct strains of velvet bent grass growing in the garden. Some of these strains have outstanding merit but need to be tested much more carefully before they can be recommended to clubs for general use.

Some distinct advancements have been made in the study of diseases of putting greens, notably in the control of leaf-spot disease. This is the disease that causes so much damage to the Virginia strain of creeping bent and accounts for the browning of whole putting greens during the summer months. It also causes much damage to Kentucky bluegrass on fairways and tees. The result of this scientific work at the garden will be summarized in the Bulletin as soon as the data collected are sufficient to justify publication.

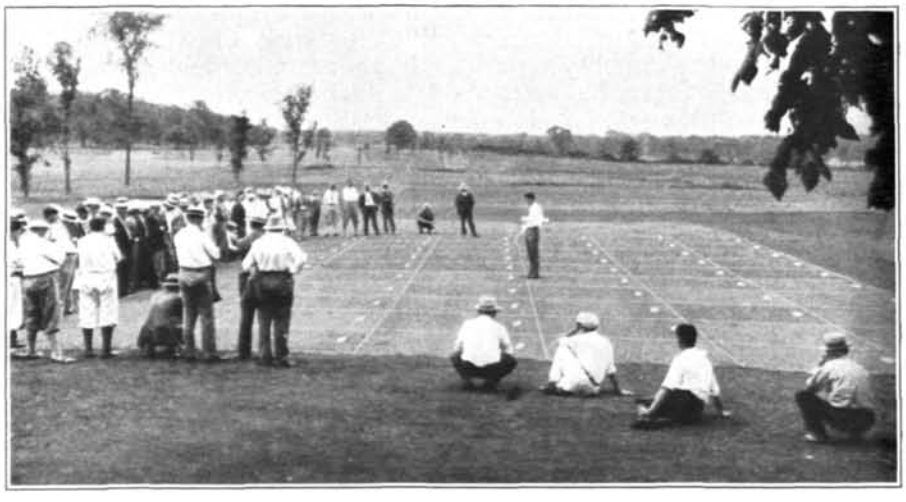
A new turf garden has been prepared at Arlington chiefly for the study of turf diseases. This is a small garden located a few yards from the Potomac River. It is only a few feet above the mean river level and is bordered on three sides by trees. It is therefore in a location which very closely resembles the low greens in air pockets on so many golf courses where great difficulty is experienced in maintaining turf.

In conjunction with the turf garden work a systematic study of the relationship of the acidity of soil to the growth of bent grass was conducted at the Arlington experimental farm. Much of this work was done in one of the greenhouses of the United States Department of Agriculture during the early spring months and was continued out-of-doors during the summer. This work will undoubtedly throw much light on the question of the degree of acidity that is most favorable or most injurious to the growth of bent grasses.

During the winter a new building near the turf garden was completed. This building serves as a combination tool, fertilizer, and soil shed and has greatly facilitated the work at the garden and has provided much more efficient utilization of the time of the greenkeeping force. During bad weather, soil for the garden was prepared and screened in the shed and stored in readiness for top-dressing whenever needed. Since the only soil available was found to be badly contaminated with weed seed, the entire season's supply of soil for top-dressing the garden was sterilized with steam during the winter. New compost piles and a new soil bed were prepared for the preparation of top-dressing material relatively free from weed seeds for use in the future. In the spring a new hard-surface road running alongside the turf garden and the Green Section buildings at Arlington was completed. This road has made it much more pleasant for the many visitors who call at the turf garden even during wet weather. It has also added greatly to the general appearance of the garden.

The Mid-West Turf Garden

Our Mid-West turf garden, located at Everett, Ill., was partially planted in 1928. It was extended in 1929, and this year the entire property leased to the Green Section was in use as a turf garden. Some grading, tile drainage, and other additional work were necessary during the season, but the garden is now practically completed and in full operation. Many of the experimental plots using different fertilizers and different grasses are already showing interesting variations, which can be expected to be more marked as the garden becomes older. The large demonstration plots (like those at Arlington) planted with different grasses and maintained in putting condition for comparing the putting qualities of the grasses, are of special interest to the golfer. The large number of test plots where various chemicals and treatments are being compared over a period of years are naturally of chief interest to those who are concerned with caring for courses in addition to playing them.



Discussing the fertilizer treatments on the Mid-West turf garden, Everett, Ill., at the Green Section's summer meeting of July 8

During the year the Botany Department of the University of Chicago has been cooperating with the Green Section to the extent of making generous provision of laboratory and greenhouse facilities for one member of the Green Section's staff. The work being conducted at the University of Chicago has been a continuation of the work begun in 1928 on certain physiological studies of golf course grasses. Chief attention has been given to the study of various methods of cutting grasses and the influence of these methods on the growth and permanence of grass grown for turf purposes. There has been a great deal of discussion for a number of years as to the proper height for cutting grasses on both fairways and putting greens. This discussion has been based not only on the effects from the standpoint of playing the game but also from the standpoint of maintenance of the turf, economy of upkeep, disease resistance, and other problems. Discussion of these problems has seldom had even crude data with which to support the various arguments advanced. The work of the

Green Section in cooperation with the University of Chicago should definitely settle some phases of this discussion and undoubtedly will serve as a guide for the modification of certain faulty practices which are now in use on golf courses. The laboratory and greenhouse work at the university is being correlated with actual turf conditions by means of close connection with our Mid-West turf garden.

Contributions to Experiment Stations

During the year the Green Section contributed $1,000 to the turf work being conducted by the New Jersey Agricultural Experiment Station at New Brunswick. This was a continuation of the United States Golf Association's contributions toward turf work at the station which was started at New Brunswick upon the advice of Dr. Piper in 1925. During the past two years the work at the New Jersey station has been enlarged with state appropriations.

New experimental work on turf was begun this year by the Pennsylvania State College Experiment Station at State College, Pa. Sufficient funds were not available for starting this work, and the Green Section was glad to have the opportunity to assure its establishment by appropriating $1,000. It is planned that this work will be supported by state funds; the Green Section's part was only to enable those who are interested in the work to get it started.

In the fall of 1928 a small turf garden was established in California in cooperation with the Leland Stanford Junior University. It was hoped that this garden might be further expanded. However recent developments have made it seem desirable to abandon the garden.

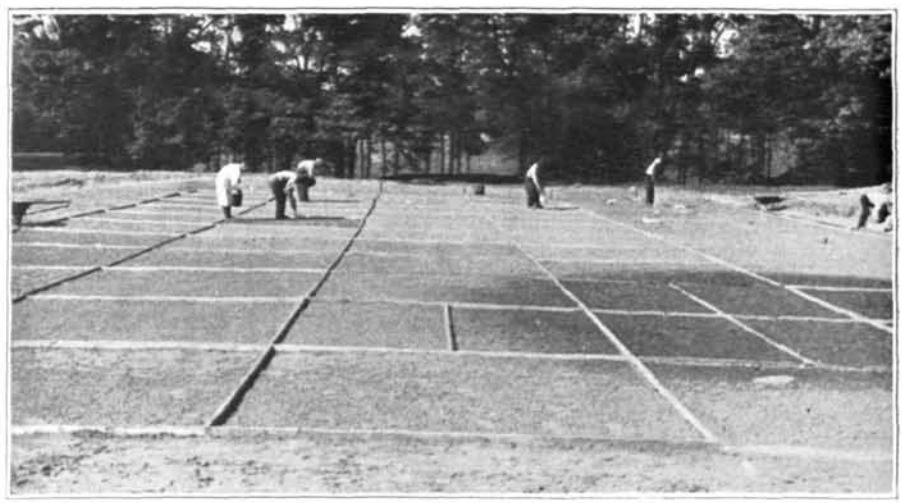
For a number of years the Green Section has been giving some financial support for the turf work conducted by the state agricultural experiment stations at Gainesville, Fla., Lincoln, Nebr., and Manhattan, Kans. The work in which the Green Section has been cooperating with these states has been of much assistance in the development of the Green Section program. During the year it was decided by officials of these state experiment stations and the Green Section that the work at these respective stations had served the purpose for which it was originally planned and it was thought best that it be discontinued or reorganized. It was decided that since the funds for the Green Section are limited it would be best, for the present at least, to discontinue the work being done at these three stations.

The Green Section wishes to acknowledge at this time its gratitude for the cordial cooperation it has had from state authorities during the years in which this cooperative work has been in progress.

Demonstration Gardens

In 1928 the Green Section established several small demonstration turf gardens on golf courses in several states. These were scattered in such a way as to provide small turf gardens where they would be readily accessible to member clubs under widely different soil and climatic conditions. Additional gardens were planted in 1929. During 1930 those gardens proved to be of even greater interest than in previous years. At the time they were planted it was of course recognized that some of them would not be cared for in a way that would

make them valuable as a part of the Green Section's system of turf garden organization. When one of the demonstration turf gardens is neglected or otherwise seems undesirable the Green Section plans to discontinue it. The results of the past two seasons have demonstrated that the cooperation from the clubs where these gardens are located is even more thorough and whole-hearted than was anticipated. As a result of the cooperation of those in charge of the gardens the Green Section has obtained very valuable reports on the progress of the various grasses and treatments throughout the season. These reports are consolidated at the end of each year and published in concise form in the Bulletin. The results obtained from these various gardens thus become available to clubs throughout the country. A great many visitors, singly or in groups, have examined these different gardens from time to time during the year and have found them useful in many ways.



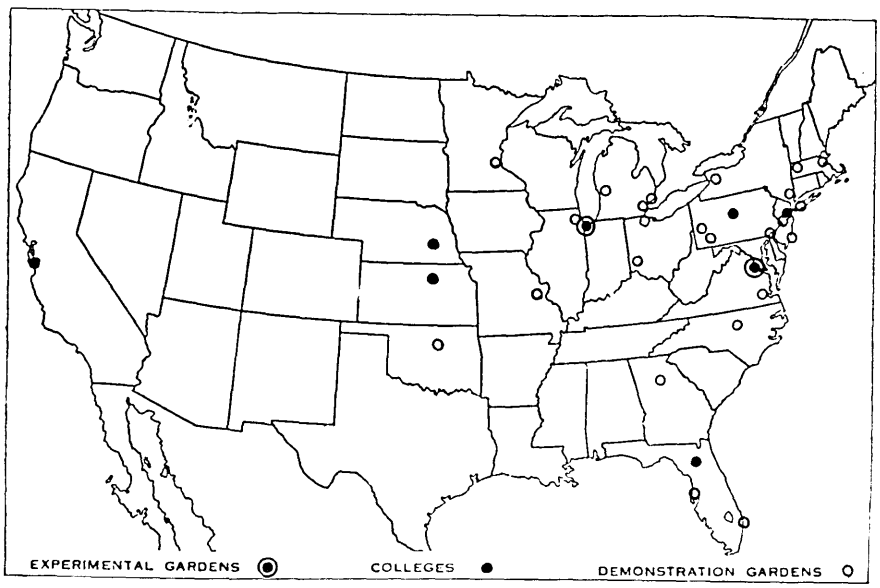
Planting the new demonstration turf garden at the Hyde Park Golf and Country Club, Cincinnati, Ohio

Numerous well-attended gatherings of golf club officials and greenkeepers have been held at these gardens and the behavior of the different grasses, fertilizers, and other treatments has been discussed on the ground. At some of these meetings members of the Green Section staff have been present to explain the work. Discussions of turf problems are much more effective in such gatherings than they can possibly be indoors, for the demonstration of variations in the grasses or response to fertilizers can be much more effectively pointed out where the actual grass is available than is possible where one has only access to speech and lantern slides. Such meetings at the demonstration gardens and our larger experimental gardens called attention to the greater effectiveness of summer meetings and led the Green Section to believe that the formal winter meetings which have been held heretofore in connection with the annual meeting of the United States Golf Association could well be abandoned and that the money used for paying the expenses of our winter meeting might

be used to better advantage for the summer programs. The development of these gardens has also enabled the Green Section staff, in answering questions from the Washington office, to refer officials of distant member clubs to their local gardens for certain information that is difficult to convey in correspondence but easily conveyed by actual inspection of the gardens.

The demonstration turf gardens which have been in operation during the year are as follows:

	Address	Golfing District
Allegheny Country Club	Sewickley, Pa.	Pittsburgh
*Bay Shore Golf Club	Miami Beach, Fla.	Miami
Century Country Club	White Plains, N. Y.	Metropolitan
Charles River Country Club	Newton Centre, Mass.	Boston
Country Club of Atlantic City	Northfield, N. J.	Atlantic City
Country Club of Richmond	Richmond, Va.	Richmond
Detroit Golf Club	Detroit, Mich.	Detroit
Druid Hills Golf Club	Atlanta, Ga.	Atlanta
*Hyde Park Golf & Country Club	Cincinnati, Ohio	Cincinnati
Indian Trails Golf Course	Grand Rapids, Mich.	Grand Rapids
Interlachen Country Club	Hopkins, Minn.	Minneapolis-St. Paul
*Jungle Country Club	St. Petersburg, Fla.	St. Petersburg
Lachmoor Club	Grosse Pointe, Mich.	Detroit
Massachusetts Agr. Exp. Sta.	Amherst, Mass.	New England
Meadowbrook Country Club	Northville, Mich.	Detroit
Municipal Golf Course	Niagara Falls, N. Y.	Buffalo
Oakmont Country Club	Oakmont, Pa.	Pittsburgh
Olympia Fields Country Club	Matteson, Ill.	Chicago
*Philadelphia Country Club	Bala, Pa.	Philadelphia
*Sedgefield Country Club	Greensboro, N. C.	Greensboro
*Tulsa Country Club	Tulsa, Okla.	Tulsa
Upper Montclair Country Club	Upper Montclair, N. J.	Metropolitan
*Westwood Country Club	Clayton, Mo.	St. Louis
Wheatley Hills Golf Club	East Williston, L. I.	Metropolitan



Location of turf gardens mentioned in this report

* Gardens planted in 1930.

Green Section Meetings

The Green Section held an indoor meeting at the time of the United States Golf Association annual meeting at New York, January 10, 1930. This meeting embraced only a single session, at which several interesting and instructive papers were read. In conjunction with the formal meeting, the Green Section had an exhibit of seed, fertilizers, soil, and other materials of interest. The meeting was well attended, and those who were present undoubtedly obtained information of much value.

Two large summer meetings were held on the Green Section's experimental turf gardens, one at the Mid-West turf garden, Everett, Ill., on July 8, and the second at the Arlington turf garden, Arlington, Va., on September 22.

A group of greenkeepers and members of green committees attending the meeting at the Green Section's demonstration turf garden on the course of the Interlachen Country Club, Hopkins, Minn.

Smaller but well-attended meetings were also held on our demonstration turf gardens as follows: June 30, Detroit Golf Club, Detroit, Mich.; July 1, Indian Trails Golf Course, Grand Rapids, Mich.; July 2, Niagara Falls Municipal Course, Niagara, Falls, N. Y.; July 9, Interlachen Country Club, Minneapolis, Minn.; July 14, Allegheny Country Club, Sewickley, Pa.

Several hundred visitors attended these gatherings and the Green Section staff felt much encouraged at their apparent interest in the work. Undoubtedly these summer meetings are becoming more and more valuable in carrying the Green Section work out to our member clubs where it can be applied to the general betterment of playing conditions.

In addition to the above meetings, sponsored by the Green Section, the staff of the Green Section was present at various gatherings of chairmen of green committees and greenkeepers at the following places: Baltimore, Md.; Boston, Mass.; Chicago, Ill.; Cincinnati, Ohio; Louisville, Ky.; Madison, Wis.; New Brunswick, N. J.; Oklahoma City, Okla.; Philadelphia, Pa.; Pittsburgh, Pa.; St. Louis, Mo.; Toledo, Ohio; Tulsa, Okla.; Washington, D. C.

GREENKEEPERS' SHORT COURSES

Last year the Green Section staff was invited by the officials of the Pennsylvania State College, State College, Pa., and the University of Wisconsin, Madison, Wis., to take part in the programs of the greenkeepers' short courses which were conducted by these two institutions. The Green Section was glad to cooperate with these educational programs by providing speakers.

CORRESPONDENCE AND SERVICE TO MEMBER CLUBS

During the year the Green Section office in Washington has conducted the usual large amount of correspondence and service to member clubs. During the latter part of the season there was an excessive amount of inquiries from clubs in the regions affected by the drought. An exceptionally large number of letters was received this year also from clubs whose courses were infested with cutworms of various kinds, army worms, or closely related insects. This was probably due to the excessively dry ground and parched fields, forcing the insects to congregate on putting greens to deposit their eggs where food would be available for the young grubs. A great many soil and seed samples were examined and reports rendered to member clubs. The Green Section staff visited a large number of courses on request and gave advice on numerous turf problems. Due to the limited staff of the Green Section a good many requests for personal visits to courses could not be arranged. In an attempt to give as much of this service as possible an effort was made to set aside requests in one district until others accumulated in order that several courses could be visited on one trip. This method, although occasionally causing some delay in giving advice, at least made it possible for a larger number of courses to be visited. During 1930 members of our technical staff visited courses located in Connecticut, District of Columbia, Florida, Georgia, Illinois, Indiana, Kansas, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oklahoma, Ontario, Pennsylvania, South Carolina, Virginia, West Virginia, and Wisconsin.

GREEN SECTION BULLETIN

During the year the publication of the monthly Bulletin of the Green Section fell behind its regular schedule because of a combination of illness in the editorial staff and the rush of more important work. The Bulletin does not pretend to be a news publication, but rather a publication devoted primarily to material that is of more or less permanent value. Publications of this character naturally do not lose in value because of delayed appearance. On the other hand, most of the experimental work and the demands for immediate service from member clubs can not be neglected for a time without causing much loss of valuable experiments, or great inconvenience and frequently loss of funds to our member clubs who depend on Green Section service. However the publication is rapidly being brought up to schedule, and it is hoped that next year, with additional help in the Washington office, all phases of the Green Section work may be carried on without undue delays. The plan of the publication this year has been the same as in the past two years; that is, the group-

ing of related material in individual issues. This enables a subject to be covered from various angles both from the scientific and practical viewpoints. In this work the Green Section has had the ready cooperation of various scientists in the United States Department of Agriculture and state experiment stations as well as some of the country's best greenkeepers and golf course superintendents. This system of grouping articles on related subjects makes the Bulletin much more convenient for ready reference at later times for readers who wish to look up material in back numbers. It also facilitates the work of the Washington office in answering correspondence, for when some one belonging to a club which is not a member of the United States Golf Association writes for information on a subject such as fairway fertilizers, watering systems, golf course construction, and the like, he can be furnished with a copy of the Bulletin which contains a very thorough discussion of the subjects both by practical and scientific men.

Two copies of the Bulletin were, as heretofore, sent to each member club of the United States Golf Association. In addition it was also sent to the following classes of subscribers:

Privately owned or daily-fee golf courses	25
Canadian clubs	177
Miscellaneous domestic	377
Foreign (Argentina, Austria, Australia, Bermuda, Chile, England, Federated Malay States, France, Germany, Italy, Japan, New Zealand, Scotland, Sweden, Union of South Africa, Uruguay)	70
Public links (complimentary)	110
Correspondents (complimentary)	185

Plans for the Future

It is planned during next year to continue most of the work as outlined above. The assistance previously given to a number of the experiment stations was discontinued during the year and it is not expected that similar work will be undertaken at present at other state experiment stations. The two main turf gardens near Chicago and Washington are strategically located for the experimental work applicable to a large section of the country. The enlarged system of coordinated demonstration gardens scattered throughout the country is expected to continue to serve as effective outposts of the Green Section's experimental work. It is hoped that new demonstration gardens can be established in the vicinity of certain golf centers not already covered, where there is sufficient demand by local organizations for such gardens. At present the organization of the Green Section is inadequate to meet all the demands made upon it. Experimental work in any field is a long, tedious procedure, and the work on any one problem is greatly hampered, if not nullified, if the workers must be constantly switched around to work on new unrelated problems from time to time.

It seems there are two problems at present causing the greatest concern to golf courses in various parts of the country which are now not being adequately studied by the Green Section or other organizations equipped to do experimental work. These are problems related to the control of various insect pests and to fairway improvement.

Turf Insect Control

Insects continue to be the greatest source of trouble on many golf courses. Since the work done at Riverton, N. J., which was partially supported by the Green Section, was discontinued, there has been no systematic experimental work done on controlling golf course insects. The mole cricket remains one of the most important problems on southern golf courses. There are several so-called remedies for ants that are occasionally effective, but as yet we have no standard remedy which can be relied on to give even 50 per cent control. Grubs, cutworms, army worms, grass webworms, and many other insect pests cause much damage on courses every year; clubs are spending large sums of money each year to check them, and a large part of this is undoubtedly wasted because of inadequate information. An entomologist working full time on controlling golf course insects might undertake the mole cricket problem part of the year and for the remainder of the year could work on the control of ants and grubs. Many possible insect poisons have not been thoroughly tested on golf course turf. If some of the cheaper insecticides are found to be as effective against some turf insects as is arsenate of lead, the saving in money to a single club might easily support research work on insect control for several years.

Fairway Improvement

In recent years there has been evident a decided increase in interest in fairway improvement throughout the country. Clubs are no doubt wasting many thousands of dollars due to the absence of definite tests to indicate the best procedures to follow. Our few demonstration gardens have helped a little on these problems but are altogether inadequate. The large increase in the number of courses which are using fertilizers freely on fairways, installing elaborate sprinkling systems, and otherwise attempting to nurse along fairway turf indicates that the golf clubs of the country are determined to have better fairways regardless of new problems that such improvements always bring up. Some of the fairway problems which we or others are not equipped to answer definitely are best methods of preparing, fertilizing and seeding soils for fairway purposes; fertilizing programs, including source of material, time of application, and rotation of various fertilizers; best seed mixtures for various soils and climatic conditions; best use of water; best height to cut; control of weeds (particularly clover); the renovation of poor weedy turf; the perpetuation of good Bermuda turf; the place of carpet grass in southern fairways; the propagation of centipede grass in the South; and the treatment best suited to bring about recovery from emergencies such as the drought of 1930. A systematic study of such problems would undoubtedly save the clubs many times the cost of the investigation.

Leakage of electric currents from high-power transmission lines often causes serious injury to trees. Another common type of injury to trees and shrubs is scorching or burning as a result of the plants being where whitewashed or light-colored walls reflect the heat of the sun. Other types of injury to trees are caused by dense shade or too intense sunlight.