

# THE BULLETIN

of the

## UNITED STATES GOLF ASSOCIATION GREEN SECTION

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### Contents

	Page
Instruction in Greenkeeping Given at State Colleges.....	102
Winter School for Greenkeepers at Massachusetts Agricultural College. By Lawrence S. Dickinson.....	104
Special Instruction for Greenkeepers at Pennsylvania State College. By H. W. Thurston, Jr.....	107
Greenkeeping Instruction at State University of New Jersey. By Howard B. Sprague .....	109
Studies in Greenkeeping at Michigan State College of Agriculture. By C. E. Millar.....	111
Short Course of Instruction for Greenkeepers at University of Wisconsin. By James G. Moore.....	112
Instruction in Greenkeeping at Cornell University. By Ralph W. Curtis....	114
The Bluegrass Webworm.....	115
Japanese Beetle Spread.....	116
Questions and Answers.....	117

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## Instruction in Greenkeeping Given at State Colleges

In this issue of the Bulletin are given descriptions of five short courses of instruction in greenkeeping at five state agricultural colleges and experiment stations. In addition to these short courses, at least one agricultural college includes in its regular curriculum for the 4-year college student a special course in which the problems of turf production are given particular attention. This special course is described in the Bulletin by Professor Curtis, of Cornell University.

The propagation of good turf for golf courses or other purposes has in recent years been placed on an entirely changed status due first, to higher standards demanded by club members, and second, to the introduction of new machinery and scientific methods which have become necessary in handling the many problems faced by those who care for turf. The United States Golf Association Green Section has taken the leadership in the application of scientific principles to turf production, and its success in this field has led to an ever increasing interest in this type of work and to a greater demand for more information. For years there have been many who felt that the Green Section should establish schools where greenkeepers and others interested in turf growing might avail themselves of the opportunity to study by means of lectures and laboratory exercises some of the recent developments in turf culture. However, such instruction calls for certain accommodations in the way of lecture rooms and laboratories with suitable equipment. Such facilities have not been available to the Green Section, but are readily available in many of the state agricultural colleges where such courses are part of the regular routine work. Those who have applied to the Green Section for such instruction have always been directed to get in touch with the courses that are available in the agricultural colleges. When called upon to do so, the Green Section has always rendered every possible service to those who have conducted these short courses, and members of its staff will take part in the programs of three of the short courses offered in 1931.

Short courses in a great variety of subjects have been in operation in many of our state colleges for years. Almost every specialized subject of agriculture is taken into consideration in the short courses offered by the various state agricultural colleges. The first short course in which the problems of the greenkeeper were given chief consideration was conducted by the Massachusetts Agricultural College, at Amherst, under the supervision of Professor Dickinson. In the spring of 1929 the New Jersey and Pennsylvania State agricultural colleges gave short courses of instruction primarily for greenkeepers and park superintendents. In 1930 the Wisconsin agricultural experiment station added to its program a short course for greenkeepers. In February, 1931, the Michigan College of Agriculture will be the fifth state college to give such a short course. The large attendance at these several greenkeepers' programs has clearly indicated the interest in such educational features and shows the attitude that the modern greenkeeper takes toward such instruction.

The short-course movement, like any movement that involves progress, has had its full share of criticism. There are many who attempt to discredit these courses and condemn them on the grounds that greenkeeping can not be learned in a class room. This truth is

fully recognized by even the most enthusiastic supporter of short courses. It must be remembered, however, that although the short course for greenkeepers is relatively new, the short-course principle is now well established as a feature of agricultural college programs. The farmer recognizes very well that he or his son can not learn all about the dairy business, poultry raising, or other agricultural subjects merely by attendance at a short course of instruction. Each year indicates, however, that the farmers recognize the value of such courses as an adjunct to their practical experiences. The need for practical experience and information is certainly as important in farming as it is in greenkeeping, and anyone who understands the American farmer recognizes that this practical side is thoroughly understood. Practical farmers for their part realize that in these days of scientific progress technical information most readily obtainable in college lecture rooms and laboratories can be of great value if placed at the disposal of individuals with enough judgment to put those principles to practical application. The big majority of greenkeepers who attended these courses undoubtedly returned to their clubs better greenkeepers. It is true, there are always students in any college class, whether it be in a short course or an advanced course, who are deprived of the benefits of such instruction, due to the antagonistic and disparaging mental attitude with which they approach the subject. However, the large number of greenkeepers who have attended these short courses from year to year indicates that those who have entered into the proper spirit of the short course have recognized that there is something to be gained from it.

The Green Section recently received a letter from a greenkeeper who apparently has taken the broad-minded viewpoint of short courses. He wrote that he had in different years attended the short courses given in the state colleges of Massachusetts, New Jersey, and Pennsylvania, and during 1931 he hoped to attend a short course conducted by another institution. It is evident that this greenkeeper recognized fully the advantage of getting as many viewpoints as possible in enabling him to understand more fully the problems that he faced from day to day on his golf course. Green committees that have the right kind of men as greenkeepers can probably do their club no greater service than to encourage their greenkeepers to attend these courses and make provisions for the payment by their clubs of the expenses involved.

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The length of time over which seeds may retain their viability while buried in soil is an important problem in weed control and in storage of seed of desirable crops for future use. Much experimental work of this kind is now being undertaken by the United States Department of Agriculture and its cooperators. At the Michigan Agricultural College a test has been under way for 40 years, and it was found that after the expiration of this period of time one-half of the seeds used in the experiment retained their ability to germinate. In another test, conducted at Arlington, Va., at the end of 20 years 51 of the 107 kinds of seed buried in soil were viable. As a rule, grass seeds are relatively short lived; fescue especially loses its germination rapidly.

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The prime essential for a good putting green is proper drainage.

## Winter School for Greenkeepers at Massachusetts Agricultural College

By Lawrence S. Dickinson

Massachusetts Agricultural College, Amherst, Mass.

The Massachusetts Agricultural College, at Amherst, was the first college in the United States to offer a resident course of instruction for greenkeepers, and at present is the only institution carrying the course for a full term. This course was first proposed by the writer, in 1926, and accepted by the short-course department of the college the same year. Seven men registered for the first course on January 3, 1927. Succeeding courses have been oversubscribed, and as many as 40 applicants have been refused admission to a single course.

The geographical distribution of member students during the four years the course has been presented is as follows:

<i>State</i>	1927	1928	1929	1930
Canal Zone.....	..	..	..	1
Connecticut .....	..	..	2	..
Illinois .....	1	..	..	1
Indiana .....	..	..	2	..
Iowa .....	..	..	..	..
Kentucky .....	..	..	1	2
Maine .....	..	..	..	1
Massachusetts .....	5	16	9	9
Michigan .....	..	..	..	1
Minnesota .....	..	..	..	..
New Hampshire.....	..	..	..	1
New York .....	..	..	..	1
Ohio .....	..	..	1	1
Pennsylvania .....	..	..	..	2
Vermont .....	1	..	..	..
Total students.....	<u>7</u>	<u>16</u>	<u>15</u>	<u>20</u>

Every phase of greenkeeping is touched upon in the course and each factor governing results is discussed. The course is a specialized one for men engaged in greenkeeping and for members of green committees. The subjects included in the course can be effectively studied during the winter months.

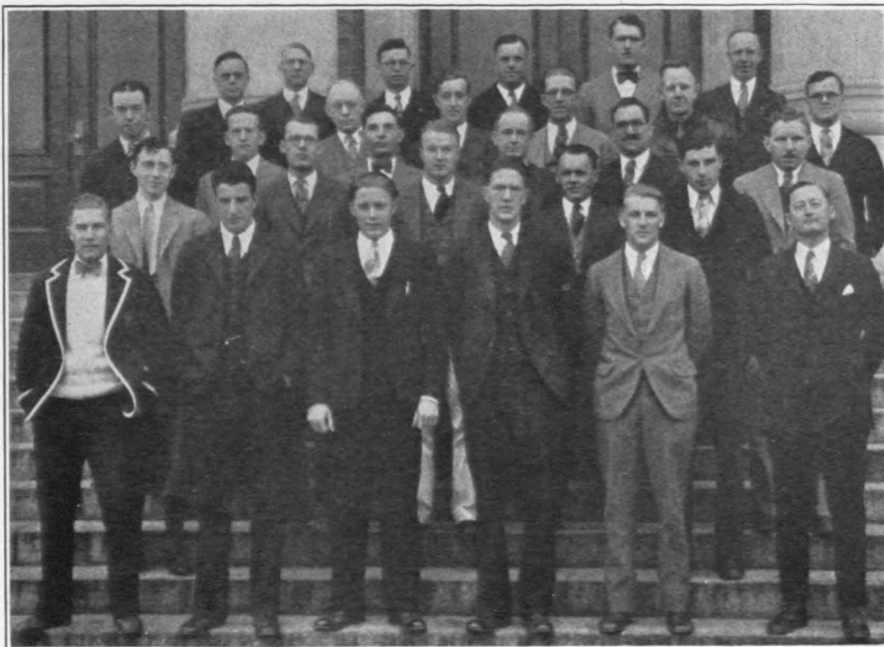
The duration of the course is about eleven weeks. Registration is the first Monday in January and the term ends about March 20. The last few days are devoted to an exhibition and convention. Four hundred and fifty greenkeepers and their chairmen attended the 1930 exhibition.

No entrance examinations are required, but it is expected that the student will have a reasonable education in the English language.

The number of students is now limited to 20 and applications are accepted in the order of their being filed provided the applicants are actual greenkeepers. Preference is given to greenkeepers and green-committeemen. Two applications have been accepted for the 1932 course. Certificate is given to those who complete the full course with credit.

There is a tuition fee of \$10 for the term, and each student is re-

quired to pay to the treasurer a \$5 registration fee in addition. No laboratory fees are charged. Board may be obtained at the college dining hall for approximately \$7.50 a week, also from private dining rooms. Furnished rooms may be obtained in private houses at prices varying from \$2.50 to \$4 a week for each occupant.



Greenkeepers' class at Massachusetts Agricultural College, Amherst, 1930

Instruction is given seven hours a day and five days a week, and in addition the hour after lunch is given over to a forum discussion or to talks by visitors. Representatives of the leading commercial houses, as well as greenkeepers, are frequent visitors.

#### COURSES OFFERED

<i>Course</i>	<i>Weekly Periods</i>	<i>Length of Course</i>	<i>Instructor</i>
Landscape background....	..... 1 lecture	Full term	F. A. Waugh
Botany .....	1 laboratory, 2 lectures	Full term	W. H. Davis
Water systems.....	2 laboratories, 3 lectures	Six weeks	C. I. Gunness
Drainage .....	2 laboratories, 3 lectures	Five weeks	M. J. Markuson
Equipment .....	3 laboratories, 2 lectures	Six weeks	L. S. Dickinson
Managerial problems.....	3 laboratories, 2 lectures	Six weeks	L. S. Dickinson
Grasses and grass seeds..	3 laboratories, 2 lectures	Six weeks	L. S. Dickinson
Cost keeping and analysis	3 laboratories, 2 lectures	Five weeks	L. S. Dickinson
Soils and fertilizers.....	2 laboratories, 2 lectures	Full term	M. H. Cubbon

Forum and special lecture hour daily during full term. Professor L. S. Dickinson, leader.

A description of the courses follows:

I. Landscape Background.—Planting and pruning of shrubs and trees. Shrubs for club house grounds and the use of native shrubs and natural landscape resources. Paths, walks, and picking gardens are also discussed.

II. Water Systems.—A study of standard types of water systems, with particular reference to the relation of size of pipe, pressure, and nozzles to the flow and delivery of water.

III. Soils and Fertilizers (special for greenkeepers).—Fundamental properties of soils, and their management, as related to golf green conditions, will constitute the main part of the course. The study of fertilizers and their uses will be made as complete as possible. Individual problems and discussions will be given as much time and attention as are warranted.

IV. Equipment.—All equipment used in golf course maintenance is considered. A particularly thorough study is made of mowers (fairway, rough, tee, and putting green) and other major equipment. Practical efficiency data are obtained and studied. The results can then be applied to the student's individual problem.

V. Managerial Problems.—This course uses for its laboratory a very large and complete model of a golf course, about which the many problems of a greenkeeper are discussed. The model is so complete that the discussion is practical and not of a theoretical nature. The problems are not merely discussed, but figured and balanced to a conclusion both as to immediate results and cumulative effects.

VI. Grasses and Grass Seed.—This course enables the student to identify the various grasses, also grass and weed seeds usually found in seed mixtures. The soil and fertilizer requirements of the various grasses are discussed. Emphasis is placed upon seed judging and purchasing; also pests and turf diseases and their control.

VII. Drainage.—The entire problem of land drainage will be discussed and practical problems worked out. The student will be taught the use of the level and how to set ditch grades.

VIII. Botany for the Greenkeeper.—Laboratory demonstrations and lecture discussions dealing with the living plant and its parts and consideration of the work performed by each part.

IX. Cost Keeping and Analysis.—The value of cost keeping and its analysis is demonstrated and a method of cost keeping suggested. The many factors that enter into the cost of maintenance are noted and their effects analyzed. As much emphasis is placed upon remote and cumulative costs as upon the immediate expenditure.

X. Forum and Special Lecture Hour.—The course has become so popular that a day seldom passes without a visit from some practical greenkeeper, green-committee chairman, or a representative of some commercial house.

The forum hour is for the purpose of having an informal and confidential discussion with these visitors. The interest and cooperation shown by commercial houses is most gratifying. Their representatives very seldom appear as salesmen. They come to give information about their part in golf course maintenance. This hour makes the course a continuous convention.

In 1931 the climax in the course will probably take place in the form of a convention, with more time being given to an educational program than in past years. This does not mean that there will be no exhibition, but that exhibits will be supplementary. The exact dates of this convention, together with program, will be announced later. All green-committee chairmen, greenkeepers, professionals, and others interested in turf maintenance are invited.

Further information may be obtained by those interested in future courses by addressing either Roland H. Verbeck, director of short courses, or the writer, at Massachusetts Agricultural College, Amherst, Mass.

## Special Instruction for Greenkeepers at Pennsylvania State College

By H. W. Thurston, Jr.

Pennsylvania State College, State College, Pa.

The first short course of instruction for greenkeepers given in Pennsylvania was presented in 1929 by the School of Agriculture and the Agricultural Experiment Station of the Pennsylvania State College, located at State College, Pa. In that year the course lasted only two days, but was attended by over 70 students, representing 46 golf clubs. So marked was the success of this experiment that the following year a 4-weeks course was given, embracing lectures, demonstrations, and laboratory work in various subjects fundamental to the handling of fine turf grasses. This was followed by a one-week conference. The attendance at the 4-weeks course was 24, and at the conference 65. Funds for initiating research on turf production and placing such work on a permanent basis have become available through the instrumentality of a committee of greenkeepers who attended the first two courses and who obtained subscriptions totaling \$800 for the purpose, and through the generosity of the United States Golf Association Green Section, which followed with a donation of \$1,000. It is expected that the Pennsylvania State College will provide funds to continue and expand the work.



First class of greenkeepers at Pennsylvania State College, 1929

In 1931 a 4-weeks course will be given February 2 to 27, concluding with a 3-days conference February 25 to 27. Owing to limited facilities enrollment for the 4-weeks course will be limited to the first 30 applicants. Applications should be made to the Dean of the School of Agriculture, 111 Agricultural Building, State College, Pa. Applicants should give the name and address of the golf club or other organization to which they are attached. The instruction is intended for the benefit of greenkeepers, green-committee chairmen, superintendents of parks, and others interested in fine turf problems. No

limit is placed on the number who may attend the 3-days conference to be held at the conclusion of the 4-weeks course.

The program for the 4-weeks course embraces the following subjects. They will be taught in the college class rooms and laboratories.

*Soils and fertilizers.*—Discussion and laboratory studies covering the origin, formation, and physical properties of soils; soil acidity; purchase, mixing, and use of fertilizers and lime.

*Fine turf grasses.*—Class room and laboratory work on classification, identification, and propagation of the important fine turf grasses; seed identification and analysis.

*Weeds.*—Characteristics, life habits, and control of common golf-course weeds; weed seed identification.

*Insects.*—Characteristics, life history, and control.

*Diseases.*—Nature and effects of plant diseases; their prevention and control. Application to turf problems will be emphasized.

*Landscape problems.*—Factors determining the location and layout of a golf course; a study of golf course plans; grading problems; selection, identification, use, planting, and maintenance of trees and shrubs for golf courses and club house grounds.

*Maintenance, drainage, and irrigation.*—Detailed study of gasoline engines, their operation, repair, care, and adjustment. Location, design, and construction of drainage systems. Power requirements. Design and operation of spray irrigation systems. Pipe friction, pipe sizes, and pumps.

The conference, to be held from 1 p. m. February 25 to noon, February 27, is designed for greenkeepers, green-committee chairmen, and others who desire to keep informed on the most recent developments in fine turf management. The major portion of the time will be given to round-table discussions. The subjects to be considered will be essentially the same as those presented during the 4-weeks course. The speakers will be discussion leaders rather than lecturers. A prominent part of the program will be short talks by practical greenkeepers based on their own experience. The following program has been arranged for the conference:

#### WEDNESDAY, FEBRUARY 25

Registration.

Address of welcome. . . . . *R. L. Watts, Dean of School of Agriculture*  
Report of the Pennsylvania Fine Turf Research Committee. . . . *Joseph Valentine*  
Progress report on research projects at State College.

*C. O. Cromer, J. W. White, H. B. Musser, Dept. Agronomy*

#### THURSDAY, FEBRUARY 26

Soil types; outstanding physical and chemical characteristics of the important soil groups of the state. . . . . *A. L. Patrick, Dept. Agronomy*

Organic matter; importance, functions, sources, and maintenance.

*F. G. Merkle, Dept. Agronomy*

Drainage and irrigation. . . . . *W. P. Miller, Drainage Engineering*

Soil acidity; nature, cause, effect, and extent.

*F. G. Merkle, Dept. Agronomy, and*

*C. K. Hallowell, Extension Dept.*

Effect of soil fertilization on the development of grasses, weeds, and fungous diseases.

Nutritional requirements of plants; a discussion pointing out some of the important life processes of the plant, including the intake of nutrients and the manufacture of compounds. . . . . *H. W. Popp, Dept. Botany*

Nature and value of fertilizer materials; special consideration to be given to availability, cost, and effect on soil reaction.

*A. L. Patrick and J. W. White, Dept. Agronomy*

Dinner (7 p. m.).



FRIDAY, FEBRUARY 27

Relation of soil treatment to fungous diseases.

*John Monteith, Jr., U. S. G. A. Green Section*

Relation of soil treatment to grasses and weeds.

*J. W. White and A. L. Patrick, Dept. Agronomy*

Summary of fertilizer studies; recommendations for fine turf grasses.

*J. W. White, Dept. Agronomy*

The expenses to students attending the 4-weeks course need not exceed \$60, including both living expenses and college fee. The largest single item of expense is room and board, which will be from about \$9.50 to \$10.50 a week. The college fee is \$10. Other expenses would consist of laundry, stationery, and miscellaneous items. In some of the subjects books may be required.

## Greenkeeping Instruction at State University of New Jersey

By Howard B. Sprague

State College of Agriculture, New Brunswick, N. J.

Our first short course of instruction in turf management was held in 1929, and was attended by 54 greenkeeping students. The following year the attendance increased to 66 students. In 1931 we shall offer, in addition to the regular course, a special course for advanced students.



Attending group at the second annual short course of instruction in turf management given at the State College of Agriculture, Rutgers University, New Brunswick, N. J., February, 1930

The regular course will be held during the week February 16 to 21, 1931. There is no charge for tuition, but a registration fee of \$5 is payable at the time of registration, or may be sent in with the application for enrollment. A fee of \$1 also is charged for outlines of lectures. Applicants for enrollment must be at least 18 years of age. Applications should be sent to F. G. Helyar, Director of Short

Courses, Rutgers University, New Brunswick, N. J. The applicant should give his age and place of residence and indicate with what golf club he is connected and in what capacity. Registration for the regular course will be held from 9 to 10 a. m. Monday, February 16, in the Short Course Building. This is located just off Nichol Avenue, New Brunswick, opposite Suydam Street, and may be reached by busses to South Amboy, stopping at Nichol Avenue and walking two blocks west, or by south-bound trolleys and getting off at Suydam Street and walking three blocks south. The work in the regular course will consist of lectures and discussions, supplemented by laboratory demonstrations where possible. The program is as follows:

#### MONDAY, FEBRUARY 16

##### Registration.

Modern turf management.....J. G. Lipman, *Dean of College*  
Soil types and plant growth.....L. L. Lee, *Dept. Soils*  
Soil physics; structure, aeration, moisture supply, etc.....J. S. Joffe, *Dept. Soils*  
Drainage; natural and artificial.....E. R. Gross, *Dept. Agricultural Engineering*

#### TUESDAY, FEBRUARY 17

Principles of soil and plant chemistry.....J. S. Joffe, *Dept. Soils*  
Natural supply of plant nutrients from the soil.....J. G. Lipman, *Dean of College*  
Nature of commercial fertilizers.....A. W. Blair, *Dept. Soils*  
Use of commercial fertilizers.....A. W. Blair, *Dept. Soils*  
Nature of soil acidity and its detection.....A. L. Prince, *Dept. Soils*  
Forms of lime and their use on turf.....H. R. Cox, *Extension Agronomist*

#### WEDNESDAY, FEBRUARY 18

Fertilizer tests at New Brunswick.....H. B. Sprague, *Dept. Agronomy*  
Soil micro-organisms and plant nutrition.....R. L. Starkey, *Dept. Soils*  
Compost materials and composting.....H. R. Cox, *Extension Agronomist*  
Structure and function of plants.....H. B. Sprague, *Dept. Agronomy*  
Characteristics of good turf plants.....H. B. Sprague, *Dept. Agronomy*

#### THURSDAY, FEBRUARY 19

Climatic adaptation of turf plants.....H. B. Sprague, *Dept. Agronomy*  
Soil adaptation of turf plants.....E. E. Evaul, *Dept. Agronomy*  
Seeds of turf plants.....Jessie G. Fiske, *State Seed Laboratory*  
Inspection of seed testing laboratory.....Jessie G. Fiske, *State Seed Laboratory*  
Turf-infesting insects and their control.....C. C. Hamilton, *Dept. Entomology*  
Weeds and their control.....H. B. Sprague, *Dept. Agronomy*

#### FRIDAY, FEBRUARY 20

Turf diseases and their control.....E. E. Evaul, *Dept. Agronomy*  
Starting new turf.....H. B. Sprague, *Dept. Agronomy*  
Renovating poor turf.....E. E. Evaul, *Dept. Agronomy*  
Care of turf; watering, mowing, rolling, top-dressing, etc.  
H. B. Sprague, *Dept. Agronomy*  
Final conference.....Led by H. B. Sprague, *Dept. Agronomy*

The advanced course, which will be held the three days February 23, 24, and 25, is open to students who have already completed the regular one-week course. The attendance will be restricted to 20 students. The registration fee is \$3. The subjects to be presented in the advanced course are as follows:

Problems in irrigation and drainage.....E. R. Gross, *Dept. Agricultural Engineering*  
Soil analysis.....H. B. Sprague, *Dept. Agronomy*  
Commercial fertilizers and lime.....H. R. Cox, *Extension Agronomist*  
Study of disease organisms.....E. E. Evaul, *Dept. Agronomy*  
Seed analysis.....Jessie G. Fiske, *State Seed Laboratory*  
Identification of turf plants.....H. B. Sprague, *Dept. Agronomy*

## Studies in Greenkeeping at Michigan State College of Agriculture

By C. E. Millar

Michigan State College of Agriculture, East Lansing, Mich.

Recognizing the desire of greenkeepers and others engaged with fine turf problems to participate in the benefits to be derived from studies of their problems in college class room, laboratory, and experiment station, the Michigan State College of Agriculture and Applied Science has arranged to give a 4-days course of instruction in greenkeeping February 16, 17, 18, and 19, 1931. The program of this course is presented below. It is open to greenkeepers, green-committee members, officers and managers of public and private golf courses, and others engaged in like work. Applications for enrollment



Agricultural Building, Michigan State College of Agriculture and Applied Science, East Lansing, Mich., headquarters for the short course of instruction in greenkeeping

should be addressed to R. W. Tenny, Director of Short Courses, Michigan State College of Agriculture and Applied Science, East Lansing, Mich. It is planned in the future to enlarge this work and present more extensive programs as the requirements of the students may seem to indicate.

### MONDAY, FEBRUARY 16

Registration.

Meeting called to order by C. E. Millar, Department of Soils.

Address of welcome..... *J. F. Cox, Dean of Agriculture*

Recent developments in golf course management.

*John Monteith, Jr., U. S. G. A. Green Section*

Soils and fertilizers..... *G. M. Grantham, Dept. Soils*

Laboratory study of soils and peats.

*P. M. Harmer and G. M. Grantham, Dept. Soils*

### TUESDAY, FEBRUARY 17

Introduction of John Dustin, president of the Greenkeepers' Association of Western Michigan, who will serve as chairman.

Grasses for golf courses..... *John Monteith, Jr., U. S. G. A. Green Section*

Round table discussion of grasses.

*Led by John Monteith, Jr., U. S. G. A. Green Section*  
 Drainage problems..... *O. E. Robey, Dept. Agricultural Engineering*  
 Landscaping the golf course..... *C. P. Halligan, Dept. Landscape Architecture*  
 Gas engines..... *H. H. Musselman, Dept. Agricultural Engineering*  
 Laboratory study of gas engines.

*H. H. Musselman and staff, Dept. Agricultural Engineering*

#### WEDNESDAY, FEBRUARY 18

Introduction of Herbert Shave, president of Michigan and Border Cities Greenkeepers' Association.

Service offered by the department of botany of the Michigan State College.

*J. H. Muncie, Dept. Botany*  
 Turf Diseases..... *John Monteith, Jr., U. S. G. A. Green Section*  
 Round table discussion of turf diseases.

*Led by John Monteith, Jr., U. S. G. A. Green Section, and*  
*J. H. Muncie, Dept. Botany*

Weed control..... *C. R. Megee, Dept. Farm Crops*  
 Mowers..... *H. H. Musselman, Dept. Agricultural Engineering*  
 Inspection of the Ideal lawn mower factory.

#### THURSDAY, FEBRUARY 19

Introduction by Prof. Halligan.

Service offered by the Michigan State College in insect control.

*R. H. Pettit, Dept. Entomology*  
 Control of turf insects..... *Kenneth Welton, U. S. G. A. Green Section*  
 Round table discussion of insect control.

*Led by Kenneth Welton, U. S. G. A. Green Section, and*  
*R. H. Pettit, Dept. Entomology*

Grass Seeds..... *C. A. Stahl, State Seed Analyst*  
 Round table discussion of problems in green management, including cutting and watering..... *Led by Kenneth Welton, U. S. G. A. Green Section*  
 Joint meeting of the greenkeepers' associations of Michigan.

## Short Course of Instruction for Greenkeepers at University of Wisconsin

By James G. Moore

University of Wisconsin, Madison, Wis.

In 1930 a short course of instruction was given for greenkeepers at the College of Agriculture of the University of Wisconsin. This course was so well received that requests have been made for its repetition. Arrangements are therefore being made for the presentation of a similar course February 9 to 13, 1931. The course will be open to greenkeepers, members of greens committees, and officers of golf clubs. The enrollment will be limited to about 80 students. Requests for enrollment will be accepted in the order of their receipt. Applications should be made to James G. Moore, Department of Horticulture, University of Wisconsin, Madison, Wis. The enrollment fee is \$10, which must accompany the application. Other expenses, including hotel, should run from \$20 to \$30.

The 1931 program and staff of instructors are as follows:

#### MONDAY, FEBRUARY 9

Registration.

Fundamentals in preparing soils for green construction.

*O. J. Noer, Soils and Fertilizers*  
 Topography of the green in relation to drainage and play.

*Kenneth Welton, U. S. G. A. Green Section*  
 Other drainage problems of the green.

*E. R. Jones, Dept. Agricultural Engineering*  
 Orientation of the green as regards the snow problem.

*J. G. Dickson, Dept. Plant Pathology*



Greenkeepers in attendance at the short course of instruction in greenkeeping held at the University of Wisconsin, Madison, Wis., in 1930

#### TUESDAY, FEBRUARY 10

What to look for in a fairway mower.

*F. W. Duffee, Dept. Agricultural Engineering*

Fundamentals in grass development..... *G. B. Mortimer, Dept. Agronomy*

What to look for in grass seeds..... *A. L. Stone, Dept. Agronomy*

Grasses for greens..... *John Monteith, Jr., U. S. G. A. Green Section*

Laboratory instruction. Four sections: (1) seeds and weeds; (2) mowers; (3) land drainage; (4) soil problems.

Experience in growing bent..... *C. T. Pedlow, Robert Zwerg, H. A. Arnold*

#### WEDNESDAY, FEBRUARY 11

Sources of plant nutrients..... *C. J. Chapman, Dept. Soils*

Fertilizing and top-dressing greens..... *O. J. Noer, Soils and Fertilizers*

Mowing greens; its relation to maintenance and play.

*John Monteith, Jr., U. S. G. A. Green Section*

Controlling diseases of the green..... *A. S. Dahl, U. S. G. A. Green Section*

Laboratory instruction. Four sections: (1) mowers; (2) land drainage; (3) soil problems; (4) seeds and weeds.

Landscaping problems..... *F. A. Aust, Dept. Horticulture*

#### THURSDAY, FEBRUARY 12

Grasses for tees, fairways, and rough.

*John Monteith, Jr., U. S. G. A. Green Section*

How cutting affects grass..... *L. F. Graber, Dept. Agronomy*

What the movies show..... *F. A. Aust, Dept. Horticulture*

Traps; their location and maintenance.

*Kenneth Welton, U. S. G. A. Green Section*

Laboratory instruction. Four sections: (1) land drainage; (2) soil problems; (3) seeds and weeds; (4) mowers.

The greenkeeper's records..... *F. H. Elwell, School of Commerce*

## FRIDAY, FEBRUARY 13

The well-kept course.....*John Monteith, Jr., U. S. G. A. Green Section*  
 Fertilizers as related to the character of the turf on fairways.

*G. B. Mortimer, Dept. Agronomy*

How to determine the need of plant food elements.

*O. J. Noer, Soils and Fertilizers*

White grub control.....*C. L. Fluke, Dept. Entomology*

Control of weeds on the fairways.....*A. L. Stone, Dept. Agronomy*

Laboratory instruction. Four sections: (1) soil problems; (2) seeds and weeds;  
 (3) mowers; (4) land drainage.

Final conference.

## Instruction in Greenkeeping at Cornell University

By Ralph W. Curtis

New York State College of Agriculture, Ithaca, N. Y.

Studies in greenkeeping are taken up in the New York State College of Agriculture at Cornell University, as a part of both the regular 4-year course and the special 2-year course in ornamental horticulture. These longer courses are designed to fit students for nursery management and for special landscape service. Our special one-term course in lawn making and greenkeeping can be taken by any student in Cornell University. It covers a period of 14 weeks in the spring, 7 weeks before the Easter recess and 7 weeks after the recess. It is a brief survey course designed to introduce the student to the field under discussion. The class meets only once a week for a 5-hour period on Saturday from 8 to 1 o'clock.

The first half of the term is used for a thorough review of the literature on the subject, including all important books, complete files of the Bulletin of the United States Golf Association Green Section and other magazines devoted to greenkeeping, and all special bulletins and reports by experiment stations and trade organizations. A topic is assigned to each student for a term report. The second half of the term begins with a study of lawn grasses and weeds. Fresh lawn material is used at all times—first in the greenhouse by collecting flats of material in the fall and bringing them into the greenhouse as needed, and second by field trips to the lawns on the college campus and in the neighborhood and to the 18-hole golf course of the local country club. This plant study is accompanied by seed testing and by practice in making lawns and in the handling of bent stolons both for making a nursery and for laying down a putting green by the stolon method. Two inspection trips are taken late in the spring—first to the south for studies on the Arlington turf garden near Washington, D. C., and to some of the best golf courses in Philadelphia, and second to the course of the Yahmundasis Golf Club, at Utica, N. Y.

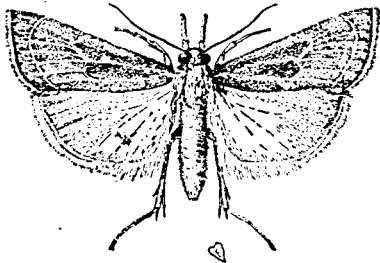
More than half the agricultural land of the United States has been mapped and classified by the Bureau of Chemistry and Soils. The airplane has recently been employed for procuring photographs for a base map in a soil survey. This was in Jennings County, Ind., where the entire county of 400 square miles was photographed at a height of 13,000 feet at a cost of less than 1 cent an acre. The map was produced on a scale of 4 inches to the mile.

## The Bluegrass Webworm

Technical Bulletin 173, issued by the United States Department of Agriculture, entitled "The Bluegrass Webworm," written by George G. Ainslie, of the division of cereal and forage insects of the Bureau of Entomology, may be obtained from the Office of Information, Department of Agriculture, Washington, D. C. The following abstract of the bulletin is published in order to indicate to our readers the subject matter contained in it.

The bulletin was prepared mainly from the standpoint of pasture infestation, but naturally our readers who are interested in golf course turf will recognize the fact that the insects which affect pasture grasses have no scruples when it comes to infesting expensive golf course turf. The bulletin should be in any complete greenkeeper's library. The word bluegrass as used in the common name to designate this webworm is misleading, because the insect attacks other grasses also. The webworms in golf-turf management have usually been very much overlooked as a factor in turf production; nevertheless they may become very serious pests under certain conditions and may cause a great deal of damage, particularly on putting greens of the finer grasses. The bulletin contains a well prepared summary, which we quote:

"The bluegrass webworm is so called because it is most abundant in the sections of the country where bluegrass is a dominant plant species and because it is found feeding principally upon it. The adult is a small grayish moth.



Moth of the bluegrass webworm (enlarged three times)

"It was described in 1821, but has attracted very slight attention from entomologists, and its complete bibliography is very short.

"It is widely distributed in the eastern and the southeastern parts of the United States, and in several States is probably the most abundant species of moth.

"Its economic importance is undoubted. In ordinary seasons it is a cause of serious depletion of pastures, and in dry years may be the real cause for the complete killing out of sod in pastures and lawns.

"Under ordinary conditions there are three broods each year, but individuals vary so greatly in their rate of growth that progeny of a single moth may cover one, two, or three generations in the same season. The principal flights of the moths occur in May, July, and September.

"The egg is similar to the eggs of other species of the genus, but averages slightly larger. The larvae construct flimsy tubes of silk and earth particles, in which they remain during the day, emerging at night to feed. The normal number of instars for this species seems to be eight, although there is great variation. As many as 20 instars have been observed in the case of some specimens, but in such instances there was no increase in size after the eighth instar.

"Kentucky bluegrass is by far the most commonly infested food plant although other grasses are eaten readily. No food plants other than grasses are known to be eaten.



"The pupae are formed in loosely made pupal cases constructed separately from, but near, the feeding burrow. The moths become active about dusk, and are attracted to lights in large numbers. They do not feed, except possibly on water.

"Eggs are dropped promiscuously. The average number produced by one moth is probably about 200 or 250, although one moth laid 564. The moths mate at night; mating was observed only when they were abundant around lights. The normal life of a moth is from 7 to 10 days.

"In the investigation here reported only a single parasite was reared, *Cymodusa mississippiensis*, Ashm. Several predacious enemies were observed feeding on both larvae and adults.

"The use of ordinary poisoned-bran bait gave no apparent results in the control of the larvae, but by combining it with some attractive substance it is possible that an effective bait may yet be devised."

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### Japanese Beetle Spread

During the period from 1919 to 1929 the area of the United States heavily infested with the Japanese beetle has increased from 48 square miles to 21,353 square miles. In 1929 the heavily infested area included New Jersey, the District of Columbia, eastern Pennsylvania, northern Delaware, and small portions of Connecticut, New York, Maryland, and Virginia. The most isolated point of known infestation was 192 miles by air line from the center of the heavily infested area. The beetles spread of their own accord, by flight, from 10 to 15 miles a year. Their spread by artificial means, as in the transportation of infested soil and nursery stock, can be much greater than this; but the Government's quarantine on the transportation of nursery stock and farm and garden products from the infested areas has succeeded in confining the spread of the beetle practically to its natural flight of 10 to 15 miles a year. There is, however, in addition to the local spread by flight, another type of movement which it is impracticable to attempt to control, and that is the accidental transportation of the beetle on railroad and motor cars. The most outlying points at which the beetle was found in the summer of 1929 included Boston, Mass., Providence, R. I., and Norfolk and Cape Charles, Va. It seems reasonable to infer that the beetle reached these places by the movement of boats from Philadelphia during the height of the travel season, aided possibly also by accidental railroad carriage.

The use of beetle traps at Baltimore, Washington, and in Alexandria County, Va., has resulted in the collection of great numbers of beetles. That enormous quantities of beetles can be collected by trapping has been fully demonstrated. On a single property in New Jersey nearly a ton of beetles were thus collected in a single season. In the heavily infested areas, however, such trapping is of little value if conducted only in isolated places and if not generally adopted as a means of control. The placing of numbers of traps on individual properties may indeed have the unfortunate effect of attracting enormous numbers of beetles to such properties from adjacent land. This objection, however, does not apply to cases of infestation confined in an isolated area. A description of the Japanese beetle trap is given on page 119 of the Bulletin for July, 1929.



### QUESTIONS AND ANSWERS

All questions sent to the Green Section will be answered in a letter to the writer as promptly as possible. The more interesting of these questions, with concise answers, will appear in this column. If your experience leads you to disagree with any answer given in this column, it is your privilege and duty to write to the Green Section.

While most of the answers are of general application, please bear in mind that each recommendation is intended specifically for the locality designated at the end of the question.

**Covering northern greens with stable manure over winter.**—We have obtained a plentiful supply of well-rotted stable manure. Should we make a compost pile of this for use on our greens next spring, or put the manure on the greens as a dressing before winter sets in? Our winters are very cold, often the greens being covered with ice. (New York)

**ANSWER.**—All experiments and observations of which we have knowledge indicate that nothing is gained by covering putting greens in the North with any material in order to protect the grass from winter injury, but that in many cases much damage has resulted from such practice. In any case we would advise that stable manure, no matter how well rotted, be kept off of putting greens. It is almost impossible to get manure free from weed seeds. As a winter top-dressing, stable manure forms a soggy blanket by the time spring has arrived, which is liable to smother and otherwise injure the grass at that season. Even in northern Canada it has been found that it is not necessary to cover putting greens over winter to protect the grass from injury. Winter injury usually occurs on poorly drained greens, and is not due to lack of covering. In certain cases it is due to snow-mold, a fungous disease which may be controlled by applications of mercury fungicides. As will be noted in the article on snow-mold in the Bulletin for October, 1928, greens covered over winter have proved to be more liable to suffer from snow-mold than greens uncovered. If greens in your vicinity suffer from winter injury it is probably due to the existence of pockets in them or to inadequate drainage.

**Winter injury to bent greens in the North.**—On April 2 there suddenly appeared in one of our bent greens dead patches 6 to 18 inches in diameter which resembled the injury from brown-patch except that the patches were almost white, nearly round, and very clearly defined. This occurred after a period of almost uniform freezing weather at night lasting for a month. Your recommendations for treating this condition will be appreciated. (Massachusetts)

**ANSWER.**—The injury is probably due to snow-mold. Grass injured by this disease is bleached and the injury appears as white patches. Its name snow-mold, like the common names of many diseases, is somewhat confusing, leading to the impression that it is caused only by snow. The injury is caused by the action of a fungus which is most likely to grow when the temperature is low and there is abundant moisture; consequently it is most frequently associated

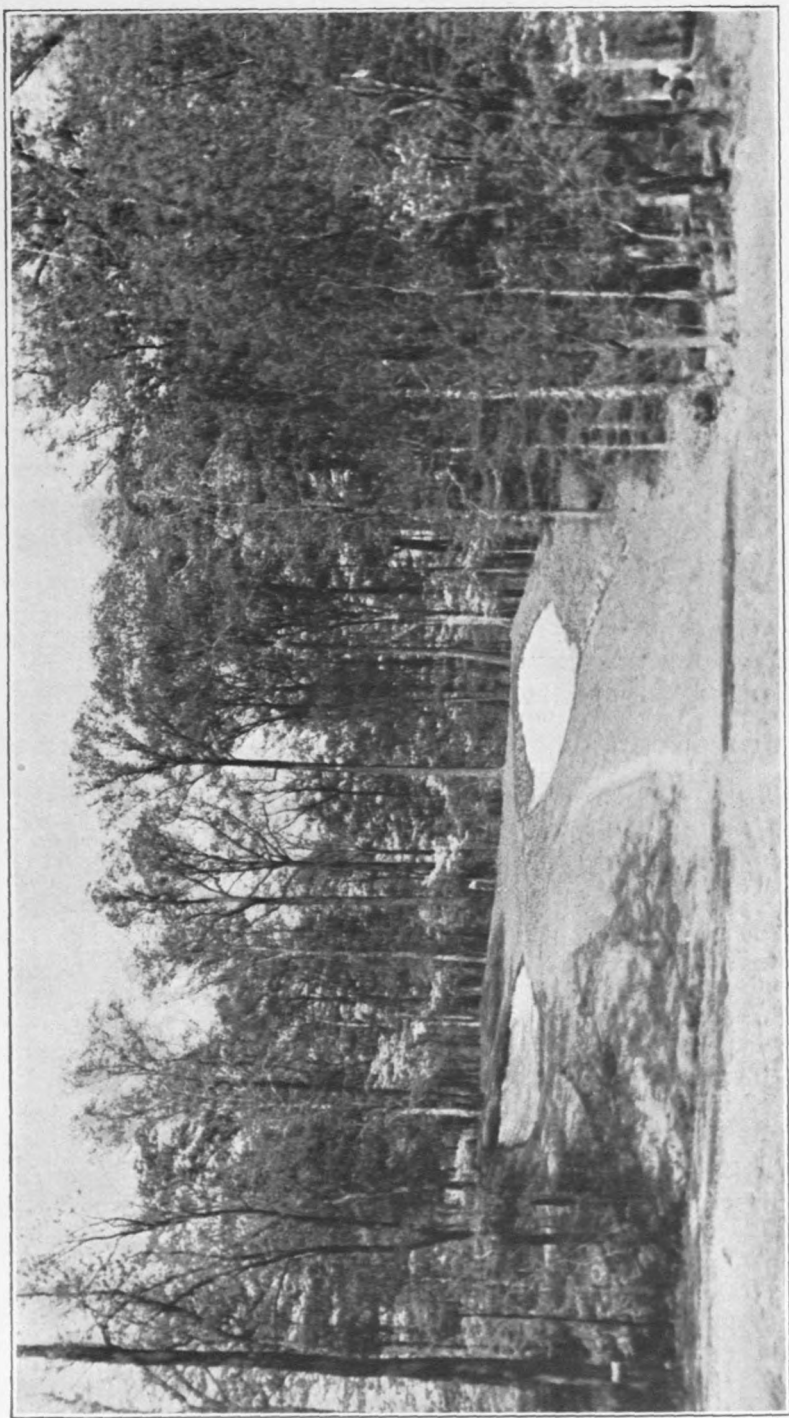
with thawing snow. It, however, occurs many times when there is no snow, as during cold weather there is often sufficient moisture from frost, dew, or mist. If you have had a prolonged period of temperatures near the freezing point it is likely that the disease would find conditions favorable for its development. It would be well to treat your green with corrosive sublimate at the rate of 1 to 2 ounces to 1,000 square feet. The chemical may be dissolved in a barrel of water and applied by means of a sprinkling can or sprayer. Complete information on the nature and treatment of snow-mold is found in articles in the Bulletin for April, 1927, October, 1928, and August, 1929.

**Value and use of tannery refuse, sawdust, and charcoal as material for top-dressing.**—We have available a supply of tannery refuse, sawdust, and charcoal. Would these be suitable for use as material for top-dressing putting greens? (Cuba)

**ANSWER.**—If tannery refuse is composted in the proper manner, it should be a good source of organic matter to mix with sand and loam. We would not advise the use of sawdust unless it has first been broken down into a pulpy texture. The rotting of sawdust can be hastened by sprinkling nitrate of soda on piles of sawdust and then dampening them. It can then be used much as tannery refuse is used. Charcoal does not serve the same purpose as rotted tannery refuse and sawdust, as it is practically pure carbon and is extremely inert. Tannery refuse or rotted sawdust may be used in piles much as old sods and clippings are used. If you can not obtain sufficient manure to make layers of manure in the pile, we would recommend that you build up the pile with a layer of loam, then a layer of tannery refuse or sawdust, and then a layer of sand, the layers of loam, refuse, and sand being repeated as the pile is built up. In preparing the layer of tannery refuse or sawdust it is best to mix hydrated lime with it, using 25 pounds of lime to a cubic yard of refuse, and then dust the top of the layer with sulphate of ammonia at the rate of 10 pounds to the cubic yard. By treating the layers of refuse in this manner while the pile is being built up the rotting process will be much quicker and more thorough. The pile will heat up rather quickly and should be cooled by wetting several times before being turned. Further information on the construction of compost piles is contained in the Bulletin for February, 1928.

**Controlling cutworms.**—A year ago the turf on our practice putting green began to turn brown along the entire outer edge of the green. Since that time the trouble has been gradually extending inward over the green in an irregular circle. We are sending you a plug of turf from the browned area and shall be glad to have your advice in the matter. (Delaware)

**ANSWER.**—Your turf is being destroyed by cutworms, which feed on the roots and the tender shoots of the grass. These can be controlled by poisoned bait prepared and applied as follows. Thoroughly mix 1 pound of white arsenic with 10 pounds of wheat bran. Moisten the mixture sufficiently to make it crumbly, with a solution of 1 pint of molasses in 10 pints of water. Scatter this bait on the green just before nightfall at the rate of  $3\frac{1}{2}$  pounds to 1,000 square feet. The treatment may have to be repeated once or twice.



The sixteenth hole of the Rolling Green Golf Club, Media, Pa.



**There is quite as much education and true learning in the analysis of an ear of corn as in the analysis of a complex sentence; ability to analyze clover and alfalfa roots savors of quite as much culture as does the study of the Latin and Greek roots.**

**O. H. Benson**

