

# TURF RESEARCH REVIEW

Compiled by  
THE UNITED STATES GOLF ASSOCIATION GREEN SECTION  
PLANT INDUSTRY STATION  
BELTSVILLE, MARYLAND  
1950

## TURF RESEARCH REVIEW

Compiled by  
The United States Golf Association Green Section  
Plant Industry Station  
Beltsville, Maryland

Fred V. Grau, Director

With the Generous Cooperation of Experiment Station Workers

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A listing of Project Workers, Projects, Financial Support, Publications and Reprints covering the subject of Turf during the period of 1946-1949.

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Distributed by the United States Golf Association Green Section to all State Experiment Stations, Golf Associations, Turf Associations, Turf Foundations, Greenkeeping Superintendents Associations, and USGA Officials and Committee Members in the United States.

This Turf Research Review is presented in an effort to promote more cordial relations and harmony among all turf workers, to provide an integration and coordination of effort, to reduce needless duplication, and to stimulate needed research on the most pressing current turf problems. Free direct correspondence among workers in related fields greatly is to be encouraged. It is hoped that this Review may be revised and reprinted each year so as to provide an up-to-date reference manual.

The costs of printing and mailing are borne by the USGA Green Section.

BELTSVILLE TURF GARDENS  
United States Department of Agriculture  
Plant Industry Station  
Beltsville, Maryland

United States Department of Agriculture, Bureau of Plant Industry, Soils and  
Agricultural Engineering  
and

United States Golf Association Green Section  
Cooperating

Project Workers

United States Golf Association Green Section

F. V. Grau, Director  
M. H. Ferguson, Agronomist in Charge of Research  
C. G. Wilson, Agronomist  
A. M. Radko, Technical Assistant  
J. M. Wilfong, Field Superintendent

Bureau of Plant Industry, Forage Crops and Diseases

W. M. Myers, Head  
Ian Forbes, Jr., Agronomist

Projects

Critical studies on the nutritional requirements of zoysia in relation to seed production and turf quality. (Greenhouse studies supplemented by field plot work.) It is planned to continue similar studies on other grasses (bent, bluegrass, bermudagrass, fescues).

Studies on management of zoysia turfs in relation to:

Seed yields

Adaptation to varying turf uses

Ability of different zoysia strains to associate harmoniously with various cool-season grasses

Ease of harvesting seed as affected by different types of management

Study of planting methods for zoysia (vegetative and by seed)

Methods of harvesting zoysia seed

Method, dates, and rates of seeding zoysia

Studies to determine the optimum storage conditions for zoysia seed

Management studies on U-3 bermudagrass to learn reaction to:

Fertility levels

Heights of cut

Methods of planting

Association with cool-season grasses

Evaluation of bentgrasses from seed and from stolons under varying management conditions for fairways and lawns

Evaluation of selections of bentgrasses for quality factors for use on putting greens and fairways

Evaluation of Merion (B-27) bluegrass and common bluegrass alone and in combination with other grasses

Studies on the value of tall fescues alone and in mixtures

Studies of nurse grasses and their effects on permanent species

Evaluation of turf produced from seed of Z-52 strain of Zoysia japonica  
Production of nursery stock of improved strains of grasses by vegetative propagation  
Study of bermudagrass strains in association with bluegrass turf  
Evaluation of red fescue strains in cooperation with Pennsylvania Experiment Station  
Traffic tests on various turf  
Studies of water relations in various sand-vermiculite mixtures (for possible use in putting greens)  
Studies of Ureaform materials on Alta fescue turf

Much practical work is being done through cooperation with the Grounds Committee of the Plant Industry Station. These projects furnish information to augment that gained through research projects.

In addition to the projects listed above there is an additional group of cooperative projects which are primarily the responsibility of the Division of Forage Crops and Diseases.

Selection and breeding of improved strains of zoysia  
Selection and breeding of improved strains of bluegrass

#### Publications During 1949

Numerous articles have been published by the Green Section Staff during 1949.  
Journals in which articles have been published:

What's New in Crops and Soils  
USGA JOURNAL  
Golfdom  
Greenkeepers Reporter  
American Cemetery Association News

CALIFORNIA AGRICULTURAL EXPERIMENT STATION

University of California  
Los Angeles, California

Informal Cooperation - No USGA Green Section project or agreement  
Supported by funds from several organizations in Southern California concerned with turf problems.

Project Workers

V. T. Stoutemyer  
Duane O. Crummett  
Edward F. Roach  
Jesse Skoss  
John Gallagher, Jr.  
M. R. Huberty  
Pierre Miller  
R. N. Jefferson

Projects

Plant Tissue Testing, Duane O. Crummett and Edward Roach  
Types of Herbicides and Their Uses, Jesse Skoss  
Herbicide Tests, John Gallagher, Jr.  
Turf Insect Control, R. N. Jefferson  
Grass Variety and Turf Management Studies, V. T. Stoutemyer  
A Survey of Twelve Golf Courses in the Los Angeles Area, Edward F. Roach  
(graduate student now with Rio Hondo Golf Club)  
Soil Compaction and Amendments, M. R. Huberty  
Studies on Turf Diseases, Pierre Miller

Other Projects

Plant Nutrition Studies  
Mechanical Cultivation of Turf  
California Turf Survey, Charles K. Hallowell, Visiting Associate  
Ecology of Grass Mixtures

Publications, Reprints and Reports

"Research and Extension Turf Projects on a Regional Basis," V. T. Stoutemyer,  
Greenkeepers' Reporter 17 (5):21-23. 1949.  
"Fall Field Day on Turf Culture," October 10, 1949.  
"A Survey of Twelve Golf Courses in the Los Angeles Area," Ed. F. Roach,  
October 1949.

Plots were established in 1947 with Green Section assistance and guidance.

CONNECTICUT AGRICULTURAL EXPERIMENT STATION  
University of Connecticut  
New Haven, Connecticut

Informal Cooperation - No USGA Green Section Project or Agreement\*

Project Worker

John C. Schread

Projects

Control of white grubs (Jap beetle, Asiatic beetle, native white grub)  
DDT, Chlordane, Parathion, Aldrin  
Control of chinch bug - Chlordane - 5% dust and as emulsifiable concentrate  
Control of oriental earthworm (stinkworm), Parathion, Chlordane, Aldrin  
emulsions  
Phytotoxicity of insects  
Compatibility of insecticides with 2, 4-D and PMAS  
Effects of organic phosphates and chlorinated hydrocarbons on the fauna in turf

Publications, Reprints and Reports

- "Chlordane for the Control of Soil Insects." September 16, 1947.  
"Tropical Earthworm Project." Second 1949 Progress Report by H. Alfred Langben, June 1, 1949.  
"The Effect of Chemical and Flame Weed Killers on Soil Structure." C. L. W. Swanson and H. G. M. Jacobsen, January 5, 1949. (Presented at North-eastern Weed Control Conference.)  
"Control of Ants in Turf and Soil." John C. Schread and Gordon C. Chapman, May 1948.  
"Control of the Japanese Beetle." John C. Schread. Circular 166, May 1948.  
"Chinch Bug Control in Lawns." John C. Schread. Circular 168, May 1949.  
"Toxicity of DDT Residues." Neely Turner and Nancy Woodruff. Bulletin 524, October 1948.  
"Spirally Arranged Plots in a Design for Field Assay of Fungicides." James G. Horsfall and Saul Rich. Bulletin 530, April 1949.  
"How Good Lawns Grow." H. G. M. Jacobsen, E. M. Stoddard, and John C. Schread. Circular 169, June 1949.

\*Work was initiated in 1947 as the result of correspondence between H. Alfred Langben, USGA Green Section and the New Jersey Experiment Station. Supported by funds raised in the New York Metropolitan area from interested clubs.

EVERGLADES EXPERIMENT STATION

University of Florida

Belle Glade, Florida

USGA Green Section Cooperation - Agreement dated July 1, 1947. USGA Green Section and U. S. Department of Agriculture, 1946. Research Grant of \$300 annually.

Contributed through

Education Fund	\$900
USDA	300
USGA (in Offset)	300
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	\$1500

Project Workers

Roy A. Bair  
David L. Stoddard  
E. G. Kelsheimer  
Warren N. Stoner  
Walter A. Thames

USGA Green Section Project

Adaptation of turf grasses

Other Projects

Selection studies with strains of bermuda and bentgrasses maintained under putting green conditions  
Testing new selection of grasses for use in lawns  
Determination of agronomic practices combined with fungicide applications as related to obtaining a stand with temporary winter greens  
Trials with Fairway Green Aerifier on greens and fairways and use of moling equipment on greens  
Evaluation of spray chemicals and agronomic practices for weed control on fairways and greens  
Identifying pathogens on St. Augustine and bermuda and disease control spray treatments. Warren N. Stoner  
Rates of application with compound 118 and other insecticides on insect control. Walter A. Thames

Publications, Reprints and Reports

"Report on Management Practices Responsible for Turf Improvement at the Country Club of the Everglades."  
"Grasses for Lawns, Recreational Areas, Parks, Airports and Roadsides."  
Roy A. Bair. Annual Report 1948-1949, State Project 533.  
"Progress Report." January 1948.  
"Sixty Years of Grass Research in Florida." June 7, 1948.  
"Turf Grass Field Day." May 10, 1948.  
"Chlordane Controls Mole Crickets on Lawns and Golf Courses." E. G. Kelsheimer. December 18, 1947.  
"Insect Pests of Lawn." E. G. Kelsheimer. Press Bulletin 642. February 1948.  
"Control of Moles." A. N. Tissot. Press Bulletin 643. March 1948.

GEORGIA COASTAL PLAIN EXPERIMENT STATION  
University of Georgia  
Tifton, Georgia

USGA Green Section Cooperation - and U. S. Department of Agriculture

Research Grant, July, 1946 - \$400  
Research Fellowship replaced Grant

Contributed through	
Contributions	\$7,030
GS Budget	1,200
USDA	900
USGA (in Offset)	900
Total Funds Contributed 1946-1950	<u>\$10,030</u>

Project Workers

Glenn W. Burton  
B. P. Robinson

USGA Green Section Projects

Seed production in turf grasses  
Insect control in turf  
The production and sterilization of organic topdressing materials  
The development of superior turf grasses

Other Projects

Seed production in turf grasses - centipede and bahia  
Development of superior turf grasses - bermudagrass, centipedegrass and bahiagrass  
The effect of various nitrogenous fertilizers upon the seasonal growth of centipedegrass  
Insect control in turf  
The production and sterilization of organic topdressing material  
Lime and fertilizer requirements of southern turf grasses  
Hastening the transition from ryegrass to bermuda and vice versa  
The establishment of southern turf grasses  
The effectiveness of various chemical fungicides and herbicides upon southern grasses should be investigated (no funds for this)

Publications, Reprints and Reports

"The Influence of Various Nitrogen Sources upon the Yields of Dry Clippings of Centipedegrass Grown on a Tifton Sandy Loam." July 10, 1946; December 16, 1947; and December 3, 1948.  
"Breeding Bermudagrass for Golf Greens." G. W. Burton (Abstract).  
"The Southeastern Turf Research Center." G. W. Burton. Published in Greenkeepers Reporter, October 25, 1947.



- "Centipede, A City Lawn Grass. " Published in Southern Seedsmen, November 12, 1948.
- "Centipede Grass Seed Production. " November 27, 1948.
- "Control of Fall Army Worm on Turf. " G. W. Burton. Published in Greenkeepers Reporter, September 5, 1947.
- "2, 4-D Aids the Establishment of Southern Turf Grasses. " Published in Timely Turf Topics, August 1947.
- "Instructions for Those Who Received Planting Stock of Tifton 57 Bermuda. " August 16, 1949.
- "Comparative Performance of a Number of Bermudagrass Selections, etc. " August 25, 1949.
- "Breeding Bermudagrass Turf. " G. W. Burton and B. P. Robinson. January 3, 1950.

INDIANA AGRICULTURAL EXPERIMENT STATION

Purdue University  
LaFayette, Indiana

USGA Green Section Cooperation - Research Fellowship, September 15, 1947

\$4500, 3 years at \$1500  
Indiana Associations \$500  
USGA Green Section 500  
MRTF 500

Contributed through:

Contributions \$ 500  
Education Fund 1500  
U. S. D. A. 1200  
\$3200

Project Workers

G. O. Mott  
E. G. Sharvelle  
Kenyon T. Payne  
Richard R. Davis  
Don E. Likes  
Earl Staten  
William Daniel

USGA Green Section Projects

Test new adapted species of grasses under conditions of fairway management -  
height of cut - fertility treatments, G. O. Mott - 1947  
Species and strain testing for fairway and greens, E. C. Holt - 1948  
Studies on nutritional requirements of turf grasses, Richard Davis - 1948  
Management studies, Don Likes and G. O. Mott - 1948  
Disease control, Eric Sharvelle and Don Likes - 1948  
Increase nursery of proven strains for distribution, H. H. Kramer - 1948  
Greenhouse studies on turf stabilized granular materials, W. H. Skrdla and  
E. J. Yoder - 1948  
Breeding of Turf Grasses, Kenyon Payne - 1949  
Soil factors and their effect on turf, Richard Davis - 1949  
Chemical weed control, Richard Davis - 1949  
Seed setting studies in creeping bents, Kenyon Payne - 1949  
Cool season - warm season grasses for fairways and tees, Don Likes and  
G. O. Mott - 1949

Publications, Reprints and Reports

"Turf Fungicide Tests." E. G. Sharvelle and W. H. Skrdla.  
"Bentgrass Strains." Ethan Holt.  
"Fairway Turf Nursery." Richard Davis.  
"Spraying Weeds with 2,4-D." Leaflet 293, 1948.  
"Strain Differences in Tolerance to 2,4-D in Creeping Bent Grasses." Reprint  
from A. S. A. Journal, Vol. 39, No. 2, February 1947.

"Turf Stabilized Granular Materials." G. O. Mott. November 1944.

"Fertilizing Golf Greens." G. N. Hoffer

"Turf Disease Control in 1950." E. G. Sharvelle. Mimeo. B. P. 41.

"Midwest Turf News and Research." Published quarterly.

"A Study of Creeping Bentgrass for Fairway Uses." E. C. Holt, Ph. D. Thesis,  
1950.

IOWA AGRICULTURAL EXPERIMENT STATION  
Iowa State College  
Ames, Iowa

Informal Cooperation - No USGA Green Section Project or Agreement

Project Worker

H. L. Lantz

Projects

Thirty strains bentgrass tested for adaptation. Congressional, Arlington, and Old Orchard found superior.

Strains tested for disease resistance (dollarspot particularly). Arlington, Old Orchard, Congressional, Metropolitan proved most resistant. Toronto, Washington and Norbeck proved very susceptible.

Fungicide tests. Cadmium compounds outstanding in control of dollarspot. Mercury compounds and Tersan dependable for control of brownpatch.

Crabgrass control. Tat-C Lect gave 85% control on football field. Tests on greens failed.

Aero-Cyanate, Preliminary work indicates promise in lawns and fairways. Further trials to be made in 1950.

Fungicide treatments - dandelion count. Mercury compounds had a definite effect in inhibiting germination of dandelion seed.

Various grass seed mixtures planted spring and fall of 1949 for observation and for cutting height experiments.

U-3 bermuda added to nursery to test for winter hardiness.

Fertilizer tests. None have been feasible on bent grass plot design.

Problems which need study under Iowa conditions:

Topdressing vs. no topdressing

Soil compaction

Drainage on flat low lying greens, mole, french wells, tile, etc.

Tile vs. no tile in new greens

Food materials. Conventional methods vs. liquid form

Weed killer cooperative test in 1945 (with USGA Green Section and Dow Chemical Co.)

Bentgrass plots and test greens (species and strain testing). 1945.

Disease Control

Publications, Reprints and Reports

"Rodent Pests and Their Control." Bulletin Press 43, May 1942. H. Gunderson and G. C. Decker.

Conducts Iowa Greenkeepers Short Course.

KENTUCKY AGRICULTURAL EXPERIMENT STATION  
University of Kentucky  
Lexington, Kentucky

Informal Cooperation - No USGA Green Section Project or Agreement

Project Workers

E. N. Fergus  
R. C. Buckner  
Lawrence Henson

Projects

Zoysia tests  
Kentucky 31 and Alta fescue comparisons  
Clipping heights on various turf grasses  
Study of adaptation of species and strains for fairway and lawn use  
Study of U-3 bermudagrass and bluegrass, including Merion bluegrass

Publications, Reprints and Reports

None

Plots were established in 1948 and 1949 with Green Section assistance.

MASSACHUSETTS AGRICULTURAL EXPERIMENT STATION  
University of Massachusetts  
Amherst, Massachusetts

USGA Green Section Cooperation - Agreement dated December 14, 1948  
Research Grant for \$300 for two years  
Contributed through Education Fund \$300

Project Worker

Lawrence S. Dickinson

USGA Green Section Project

A study of Zoysia japonica - Cool season grass combinations

Other Projects

Test bent putting green

Winter 1948-1949. Seven fungicides compared for snowmold. Mercuric compounds most effective. Ryegrass used as nursegrass in all but sodded velvet bents.

Records kept on green - open to general use mid-May 1949 - 5,000 rounds of putting golf played

Variety tolerance of N-P-K deficiency

Use of hops as a pre-seeding soil amendment and as topdressing fertilizer.  
Trials to be continued in 1950.

Winter School for Greenkeepers

No publications

MICHIGAN AGRICULTURAL EXPERIMENT STATION

Michigan State College  
East Lansing, Michigan

<u>USGA Green Section Cooperation</u> - Research Fellowship	
July 15, 1947, \$4500 - \$1500 for 3 years	
Detroit Dist. G. A.	750
USGA Green Section	375
MRTF	375
Contributed through	
Contributions	\$1500
Education Fund	750
USGA (in Offset)	500
	<hr/>
	\$2750

Project Workers

James Tyson  
B. H. Grigsby  
John Vaughn  
E. A. Andrews  
Ray Hutson  
Walter Morofsky

USGA Green Section Projects

Fairway management in relation to playing conditions  
Fertilization  
Soil properties and management  
Mowing practices  
Suitability of various species and strains

Other Projects

Times and rates of seeding turf - comparison of seeding mixture and individual varieties in establishing turf, Carter Harrison  
Chemical control of weeds - crabgrass control, B. H. Grigsby  
Disease control studies, John Vaughn and E. A. Andrews  
Insect control, Ray Hutson and Walter Morofsky  
Fertilizer on growth of grasses, particularly effect of various levels of NPK on Washington, Arlington, Congressional and Cohansey bents, James Tyson.  
Soil relation to growth of bents, bluegrass and red fescue  
Studies with Farm Crops Department to compare relative values of different strains and varieties for producing putting green and fairway turf  
Studies with Michigan State Highway Research on highway shoulders and resultant effect of treatments on stability  
Studies on soil moisture, its measurement and control

Publications, Reprints and Reports

"Soil Moisture in Relation to the Growth of Turf." William H. Daniel.  
December 8, 1948.

Progress Report - July 15, 1949.

Progress Report - November 21, 1949.

"Selective Control of Crabgrass." B. H. Grigsby, Article 30-47, May 1948.

"Destruction of Quackgrass Rhizomes by Application of Isopropylphenylcarbamate."



MISSOURI AGRICULTURAL EXPERIMENT STATION  
University of Missouri  
Columbia, Missouri

USGA Green Section Cooperation - Research Grant, August 30, 1949 - \$400  
Contributed through Contributions - \$700

Project Workers

R. B. Livingston  
E. Marion Brown

USGA Green Section Project

Adaptation and Management Studies of Species and Strains for Fairway and Lawn  
Use in St. Louis Vicinity

Selection of suitable turf grasses

Warm season grasses: zoysia - slow growing

80 selections of bermuda planted - Maples 6 (Pinehurst, N. C.)

Thomas 1 (Charlotte, N. C.) and U-3 most promising for  
fairways and tees

Methods of establishing superior grasses in existing fairways and tees

Best method - stripping best for bermudagrass

Seeding of B-27 bluegrass seed good - must have at least one  
years test

Publications, Reprints and Reports

"Lawn Culture in Missouri," T. J. Talbert and E. Marion Brown.

"Bermuda Grass Studies in Missouri," R. B. Livingston, July 8, 1949.

NEW JERSEY AGRICULTURAL EXPERIMENT STATION

Rutgers University  
New Brunswick, New Jersey

USGA Green Section Cooperation - Research Grant, in cooperation with U. S.  
Department of Agriculture  
Contributed through

USDA	\$1,200	
USGA (in Offset)	1,200	
		<u>\$2,400</u>

Project Workers

Ralph E. Engel  
Jack C. Harper  
S. H. Davis  
Gus Silbers  
Warren Wistendahl  
Raymond Battle  
Steve Szabo

USGA Green Section Project

Study of turf species and strains and their management for fairway and lawn use. Includes mixtures of grasses.

Other Projects

Development and Evaluation of turf grasses

- A comparison study of five colonial bents and five red fescues
- The use of companion grasses in turf
- A test of bentgrasses for putting green turf
- Performance of Z-52 and U-3 bermuda in combination with cool season grasses
- A comparison of 4 Kentucky bluegrass strains
- A rate of seeding study with New Jersey #1 grass seed mixture

Turf Maintenance

- Cooperative turf fungicide trials
- Rates of N, P, and K on putting green turf
- The effect of time of fertilization of bent turf (1/4-inch)
- The effect of time of fertilization on turf seeded with New Jersey #1 (mowed at 7/8-inch and 1-1/2-inches)
- The effect of several rates of N, P, and K on turf seeded to New Jersey #1 (mowed at 7/8-inch and 1-1/2-inches)
- The effects of frequency of topdressing
- The effects of frequency of aerifying on mixed turf mowed at 7/8-inch
- Time of cultivation of bent turf (1/4-inch) with different levels of nitrogen, phosphorus
- Cultivation of mixed turf (7/8-inch) with different levels of nitrogen, phosphorus, and potash
- Cultivation of mixed fairway turf in conjunction with different levels of fertilizer, lime, and gypsum

Rutgers offered two types of curriculums in turf maintenance.

Short Course - 10 weeks - Turf management, weed identification, weed control, identification of grasses, diseases, insects, etc.

Four-year Regular Course - B. Sc. degree

Crabgrass Control Tours - September 22, 1948

September 22, 1949

Annual Turf Field Day

700 different plots for crabgrass control (sodium arsenite, ammonium sulfate, phenyl mercury compounds)

#### Publications, Reprints and Reports

- "Planting and Caring for the Lawn." Gilbert H. Ahlgren and Ralph E. Engel. Bulletin 724, March 1949.
- Progress Report on "Renovation, Improvement and Evaluation of Turf on Lawns, Parks, Athletic Fields, Fairways and Similar Areas and Renovation Study." Ralph E. Engel.
- "Nitrogen Absorption and Aeration." John W. Shive and Luther B. Arrington. Reprint from New Jersey Agriculture, September and October 1934.
- "Spring Care of Established Lawns." Gilbert H. Ahlgren and Ralph E. Engel. Circular 524, 1949.
- "Summer Care of the Lawn." Gilbert H. Ahlgren and Ralph E. Engel. Circular 525, 1949.
- "Making a New Lawn." Ralph E. Engel and Gilbert H. Ahlgren. Circular 531, 1949.
- "Chemicals for Crabgrass Control." Ralph E. Engel and Dale E. Wolf. Proceedings of the Northeast Weed Conference, January 1949.
- "Results of Testing Chemicals for Crabgrass Control in 1949." Ralph E. Engel and Dale E. Wolf. Proceedings of the Northeast Weed Conference, January, 1950.
- "Killing Turf Weeds with Chemicals." Dale E. Wolf and Ralph E. Engel. Circular 513, 1949.
- "History of Turf at the New Jersey Experiment Station." Ralph E. Engel and E. E. Evaul. Greenkeepers Reporter. Vol. 16, January-February 1948.
- "Results of 1948 Turf Disease Control Studies in New Jersey." Spencer H. Davis and Ralph E. Engel. Greenkeepers Reporter, Vol. 17, May-June, 1949.
- "New Greens Aerator." Gilbert H. Ahlgren. Greenkeepers Reporter.
- "Your Lawn." GROUND FOR LIVING. Gilbert H. Ahlgren. Rutgers University Press, March 1946.
- "Twenty-one Problems to Trouble the Greenkeepers." Gilbert H. Ahlgren. Golfdom, April 1946.
- "Influence of Thiamin Additions on Germination and Growth of Certain Grasses and of White Clover." Gilbert H. Ahlgren. Bulletin 692, 1942.
- "Destroying Lawn Weeds with 2, 4-D." G. H. Ahlgren and H. R. Cox. Bulletin 725, 1946.
- "Sabadilla and DDT to Control the Hairy Chinch Bug." R. S. Filmer and Charles L. Smith. Journal Economic Entomology 39: 309-313. 1946.

Publications, Reprints and Reports (Continued)

- "Studies on the Penetration of Nutrient Elements and Their Seasonal Fluctuations in Grassland Soil as Measured by Rapid Chemical Tests." Thomas C. Longnecker. Master's thesis, Rutgers University, 1937.
- "Rates of Penetration for Lime in Soils Under Permanent Grass." T. C. Longnecker and H. B. Sprague. *Soil Science* 50: 277-288. 1940.
- "Root Development of Perennial Grasses and Its Relation to Soil Conditions." H. B. Sprague. *Soil Science* 36: 189-209. 1933.
- "Utilization of Nutrients by Colonial Bent (*Agrostis tenuis*) and Kentucky Bluegrass (*Poa pratensis*). H. B. Sprague. *Bulletin* 570, 1934.
- "Annual Bluegrass (*Poa annua* L.)." H. B. Sprague and G. W. Burton. *Bulletin* 630. 1937.
- "Experiments with Turf Grasses in New Jersey." H. B. Sprague and E. E. Evaul. *Bulletin* 497, 1930.
- "The Effect of Various Sources of Organic Matter on the Properties of Soils as Determined by Physical Measurements and Plant Growth." H. B. Sprague and J. F. Marrero. *Soil Science* 32: 35-49. 1930.
- "Further Studies on the Value of Various Types of Organic Matter for Improving the Physical Condition of Soils for Plant Growth." H. B. Sprague and J. F. Marrero. *Soil Science* 34: 197-208. 1932.

NEW YORK AGRICULTURAL EXPERIMENT STATION  
Cornell University  
Ithaca, New York

USGA Green Section Cooperation - Agreement dated June 1, 1949

Secured by Research Grant of \$400  
Contributed through Education Fund - \$400

Project Workers

John F. Cornman  
Gene C. Nutter

USGA Green Section Project

The determination of the usefulness of the mole drains in the draining of putting greens and other turf areas.

Other Projects

Crabgrass control with potassium cyanate - American Cyanamid Company Grant

Publications, Reprints and Reports

"The Quality of Seeds on Sale in New York in 1949." M. T. Munn and A. B. Bucholz, Bulletin No. 739.

"The Home Lawn." John F. Cornman, Cornell Extension Bulletin No. 469, April 1949.

"The Japanese Beetle." J. Alfred Adams and John G. Matthyse. Bulletin No. 770, July 1949.

"Control of Weeds in Special Purpose Turf with 2,4-D." Progress Report No. 1, July 1948.

"Low Pressure, Low Volume Spray Equipment for Applying 2,4-D and Other Herbicides to Turf." A. M. S. Pridham, P. B. Kaufman, and E. B. Wahlgren. Proceedings of the Northeastern States Weed Control Conference, January 1949.

Bulletin of the New York State Turf Association.

OKLAHOMA AGRICULTURAL EXPERIMENT STATION

Oklahoma A & M College

Stillwater, Oklahoma

USGA Green Section Cooperation - Research Fellowship - \$6000 (Tulsa Golfers' Fund for War Wounded, Inc. February 26, 1948). (\$2000 a year for three years.) Contributed through contributions \$4500.

Research Grant - \$5000 (Project 669) \$1000 a year for five years. June 1, 1949.  
Contributed through contributions - \$1000.

Project Workers

W. C. Elder  
William L. Garman  
Alva Niles  
James Stephens

USGA Green Section Projects

Study of prevention of invasion of bentgrass greens by bermudagrass

Study of species and strain adaptation and management

Project #628, "Turf Development and Maintenance." Project Leader W. C. Elder. Breeding work on bermuda and buffalograss.

Project #669, "Study of the Mechanical Composition of Soils in Relation to Turf Development." Project Leader, William L. Garman. (Topdressing mixture has been of too coarse texture - too low clay content. Recording on porosity of soil materials and synthetic mixtures.)

Publications, Reprints and Reports

Progress Report - Project 628

"Mechanical Analyses, Infiltration Rates and Moisture Percentages of Greens from Several Golf Courses in Oklahoma."

"A Study of the Physical Properties of Golf Greens in Oklahoma." William L. Garman.

OREGON AGRICULTURAL EXPERIMENT STATION  
Oregon State College  
Corvallis, Oregon

Informal Cooperation - No USGA Green Section Project or Agreement

Project Workers

E. R. Jackman  
H. A. Schoth

Projects

2, 4-D Tests with Dow Company - February 1946  
Airplane landing strips  
Alta fescue  
Red fescues  
Merion (B-27) bluegrass  
Highland bent

Publications, Reprints and Reports

"Weeders Readers"

"Alta Fescue Production in Oregon." H. H. Rampton, Bulletin 427, Extension  
Bulletin #665.

"Man with 20,000 Friends." (E. R. Jackman), Saturday Evening Post, January  
31, 1948.

"So You Want to Plant a Lawn?" J. J. Inskeep. February 1948.

PENNSYLVANIA AGRICULTURAL EXPERIMENT STATION  
Pennsylvania State College  
State College, Pennsylvania

USGA Green Section Cooperation - Research Grant \$500, April 22, 1946.  
(Terminated)

Research Fellowship \$4,500 (Jim Watson)  
\$1,500 a year for 3 years, February 7,  
1947. (Terminated)

Research Fellowship \$6,000 (H. L. Wagner  
Grant) \$2,000 a year for 3 years, July 1,  
1948. (Payment completed)

Grant Contributed through G. S. Budget \$500  
Fellowship (Watson) Contributed through  
Education Fund \$5,060.

Fellowship (Wagner Grant) Contributed through  
G. S. Budget \$6,000.

Aerification Research Fellowship (West Point  
Lawn Products) Contributed through G. S.  
Budget \$2,000.

Project Workers

H. B. Musser  
H. W. Thurston  
F. J. Holben  
Albert E. Cooper  
C. K. Hallowell  
R. P. Pennington  
C. D. Jeffries  
J. O. Pepper  
L. Neal Wright  
Jack C. Harper  
Robert M. Means  
J. P. Stanford

USGA Green Section Projects

Studies of fairway management, compaction, irrigation and aeration  
Weed control  
Breeding and testing of bents and fescues  
Strain testing  
Studies on physical characteristics of soils  
Disease control  
Seed production studies  
Soil Aeration

Other Projects

Production of improved strains of grasses (Musser and Wright)



Creeping bent - 225 selections, 50 under test for turf quality

Study of practicability of producing seed by polycrossing

Red fescue - 75 selections, 35 under test for clipping heights at State College and Beltsville

Studies in progress to determine whether type can be held in successive seed generations of improved strains

Kentucky bluegrass - 10 selections under turf quality test

Soil relationships to turf production

Potash-nitrogen ratios. Effects on growth rates and disease incidence, Holben, Jeffries, Musser

Ureaform as source of N. Comparison with other N carriers. Effect on growth, disease, weed invasion, Musser, Stanford, Watson

Effects of excess water and soil compaction (Watson). To be continued next two years by Harper.

Trace elements on golf course soils (Pennington)

Special Projects

Crabgrass control

Association of warm and cool season grasses

Association of improved strains of cool season grasses

Pre-seeding soil treatments with herbicides for weed control in seeding turf (Musser)

Highway slope control (Stanford)

Best adapted species

Production of seed mulching materials

Off-season seedings and companion plantings of crown vetch with one and two grasses

Disease Control Studies - at State College and Philadelphia (Thurston and Means)

Extension Work - A. E. Cooper

1949 - 202 demonstrations, field meetings and tours

6,500 individual contacts

Publications, Reprints and Reports

Progress Report - Maintenance Practices on Fairway Turf. James R. Watson.

Progress Report - James R. Watson. February 10, 1948.

Progress Report - Breeding Program of Special Purpose Turf Grasses. Neal Wright. July 1, 1949.

Progress Report - Comparison of Various Organic Materials for Use in Construction and Maintenance of Golf Greens. A. C. Richer, J. W. White, H. B. Musser and F. J. Holben. September 1949.

"Fairway Renovation with Weed Control Practices." M. E. Farnham and C. K. Hallowell. June 20, 1947.

"Evaluation of Various Organic Materials for Use in Construction and Maintenance of Golf Greens."

"Comparison of 2,4-D Formulations." May 1946.

Publications, Reprints and Reports (Continued)

- "Athletic Field Renovation." A. E. Cooper.
- "Fertilizer Suggestions where Reseeding is not Necessary."
- "Availability of Nitrogen from Various Carriers." 1947.
- "Compaction and Irrigation Studies on Compacted Turf." J. R. Watson, Jr.
- "Turf Disease Control 1948." Robert M. Means.
- "Crabgrass Comments." C. K. Hallowell. August 1949.
- "Athletic Field Turf." C. K. Hallowell. November 1949.
- "Effects of Soil Acidity and Available Phosphorus on Population Changes in Mixed Kentucky Bluegrass-bent Turf." H. B. Musser. Reprint from ASA Journal, Vol. 40, No. 7, July 1948.
- "Pest Control Materials, 1949, (Pa. and Maine), Pa. Progress Report #4. D. E. H. Frear, M. T. Hilborn, A. E. Prince.
- "The Effect of Burning and Various Fertilizer Treatments on Seed Production of Red Fescue." H. B. Musser. Reprint from ASA Journal, Vol. 39, No. 4, April 1947.

RHODE ISLAND AGRICULTURAL EXPERIMENT STATION  
Rhode Island State College  
Kingston, Rhode Island

USGA Green Section Cooperation

Research Grant - \$450, April 1, 1946  
Research Grant - John S. Clapper Memorial - \$1,500  
\$500 a year for 3 years, 12/15/47

Contributed through:

Green Section Budget	\$ 450
Education Fund	600
Contributions	2,650
	<u>\$3,700</u>

John S. Clapper Memorial Grant	
Contributions	1,500
	<u>\$5,200</u>

Project Workers

T. E. Odland  
J. A. DeFrance  
J. A. Simmons  
J. B. Rowell  
F. L. Howard  
T. O. Diener  
Joseph G. Barrat

Recipients of the John Samuel Clapper Memorial Awards

1948	1949
James Simmons	Conrad R. Skogley
Robert Wakefield	Minot Crowell
Miasnig Hogopian	William Marcil

Projects

The control of diseases of grasses and a study of seed production of bent grasses based on velvet and Rhode Island colonial bent strains developed from crossed or inbred plants.

- 1945 Formulation, development and testing of synthetic organic chemicals for control of diseases and insects in bentgrass turf  
Selecting, testing and production of superior strains of colonial and velvet bentgrass, with emphasis on the production of seed
- 1947 Bentgrass for adaptability  
Bentgrass for disease control  
Disease control on colonial, creeping and velvet bents  
Bentgrass seed production  
Velvet bent - testing insecticides

- Compatibility - ryegrass, Kentucky bluegrass, Canada blue, Chewing's and creeping red fescue and Colonial bent, clover with mixtures of the basic grasses
- Height of cut - lawn turf with regard to quality factors, drought and disease resistance
- Piper velvet bent - minimum maintenance on seeded and stolon plots
- Improved strains of velvet bent and lime-compost study
- Lime and compost study on Piper velvet bent to determine effect on mat of undecomposed root accumulation
- Nurseries, varietal and hardiness test and increase
- Velvet bent seed production
- Special projects:
- Weed control studies - campus and athletic field
  - Soil sterilization
  - Insect control in cooperation with Dr. Theo. W. Kerr
  - Fairway fertilization - Pt. Judith Golf Course
  - Roadway test - Turf roadways between areas
  - Formaldehyde - in cooperation with USGA - campus or athletic field
- 1948 Disease control studies on putting green turf
- Insect control studies
  - Species and strain evaluation of various turf grasses
  - Soil sterilization studies
  - Weed control studies
  - Study of the value of ryegrass in turf grass seed mixtures
  - Evaluation of compost and lime on velvet bent putting green turf
  - Individual grasses and mixtures for turf roadways and for areas with competition from Norway maple tree roots
- 1949-1950 Lime and compost requirements of velvet bent turf - J. A. DeFrance and T. E. Odland
- A study of the value of certain fertilizers and chemicals for destroying weed seeds in soils previous to cropping - J. A. DeFrance and T. E. Odland
  - Water-soluble mercurials for crabgrass control - J. A. DeFrance
  - Rhode Island bent selections for turf and seed production - J. A. DeFrance and T. E. Odland
  - Control of diseases of grasses - J. B. Rowell, F. L. Howard, J. A. DeFrance
  - Control of annual bluegrass (Poa annua) - J. A. Simmons and J. A. DeFrance

#### Publications, Reprints and Reports

- "Selection and Developing of Improved Colonial Bents Based on the Study of Quality Factors, Drought and Disease Resistance at R. I. Agricultural Experiment Station." January 1950.
- "Weed-Free Compost and Seedbeds for Turf." J. A. DeFrance. Misc. Pub. No. 31, Revised May 1948.
- "Killing Weed Seeds in Grass Seedbeds by the Use of Fertilizers and Chemicals." J. A. DeFrance, R. S. Bell, and T. E. Odland. Reprint from ASA Journal, Vol. 39, No. 6, June 1947.

Publications, Reprints and Reports (Continued)

- "Result of Disease Control Studies. " 1947.
- "Turf Making and Lawn Management in Rhode Island. " J. A. DeFrance. Misc. Pub. No. 6, April 1940.
- "Turf Management in Rhode Island. " Robert S. Bell) Misc. Publication
- "The Control of Insects. " Cedrick Jennings ) No. 26,
- "Turf and Lawn Diseases. " Harry L. Keil ) May 1945
- "Weed-Free Compost. " J. A. DeFrance. Misc. Pub. No. 31, January 1947.
- "The Morphological Variations and the Occurrence of Aneuploids in Some Species of Agrostis in Rhode Island. " Irene H. Stuckey and Wm. G. Banfield.
- "Dollarspot on Creeping Bent C-15. " Fungicide Development Research, 1946.
- "Previewing New Materials for the Control of Turf Diseases. " Harry L. Keil and Frank L. Howard. December 1946.
- "Water-Soluble Mercurials for Crabgrass Control in Turf. " J. A. DeFrance. Reprint from Greenkeepers Reporter, January-February, 1947.
- "Killing Weed Seed in Grass Seedbed by the Use of Fertilizer and Chemicals. " J. A. DeFrance and T. E. Odland.
- "Turf Species and Fertility. "
- "Soil Sterilization for Weed Control. "
- "Make-up and Use of Fertilizers for Putting Greens, Grass Tennis Courts and Bowling Greens in Rhode Island. " April 1947.
- "Insect Control, 1947. "
- "Preparation of Weed-Free Seedbeds for Turf. " J. A. DeFrance. February 1948.
- "Turf Insect and Disease Control Under Rhode Island Conditions. "
- "Controlling Weeds in Turf with 2, 4-D. " J. A. DeFrance. Misc. Pub. No. 30, April 1946.

Rhode Island Experiment Station publishes "Turf Maintenance Tips. "

Rhode Island Experiment Station holds an Annual Greenkeepers Field Day.

TEXAS AGRICULTURAL EXPERIMENT STATION

Texas A & M College  
College Station, Texas

USGA Green Section Cooperation - Research Grant \$900 - \$300 a year for 3  
years, November 1, 1947  
Contributed through Education Fund - \$1800

Project Workers

R. C. Potts  
Ethan C. Holt  
James R. Watson, Jr.

USGA Green Section Projects

To collect and evaluate species and strains of turf grasses according to their:

- Seeding ability
- Vegetative characteristics and habits
- Reaction to environmental factors

To develop improved strains of turf grasses by breeding for:

- Resistance to disease
- Recovery from injury (use)
- Tolerance to climate
- Appearance and wearing qualities
- Turf forming qualities
- Drought resistance
- Soil nutrient requirements

To evaluate improved strains in specialized use tests

Establishment, Maintenance and Improvement of Turf by Cultural Methods

The effects of fertilizer elements and combinations thereof on turf with regard to: rapidity of coverage, top growth, vigor and density, root growth and accumulation, weed population, wear resistance, speed of recovery, winter hardiness, drought resistance, and disease and insect incidence

Aerification methods and their interrelationships with fertilizer elements as they affect the quality of turf

The effects of time, rate and kind of topdressing on the quality of turf

The proper rate and method of irrigation as it influences quality of turf

The influence of clipping heights and frequency on:

- Density of grass
- Weed population
- Root development
- Drought resistance

Effective means of controlling turf weeds

Publications, Reprints and Reports

None

