TURF RESEARCH REVIEW

A Compilation of Experiment Stations engaged in Turf work, Workers, Projects, Publications, Conferences, Field Days, Fellowship and Research Grants, and other information regarding the National Turf Program in the United States.

Compiled by

THE UNITED STATES GOLF ASSOCIATION GREEN SECTION

PLANT INDUSTRY STATION

BELTSVILLE, MARYLAND

1951

TURF RESEARCH REVIEW

Issued Summer 1951
Compiled by
THE UNITED STATES GOLF ASSOCIATION GREEN SECTION
Plant Industry Station
Beltsville, Maryland

For the second issuance of Turf Research Review, again we are indebted to the workers at experiment stations for their generous cooperation in supplying information on which this review is based. We hope that the information is of value to everyone who acquires a copy and that we may continue to publish an annual review. As we progress we hope to include other features such as carefully-screened recommendations for certain materials based on national coordinated trials.

This issue of Turf Research Review, covering the 1950 calendar year, very nearly died a-borning. Marvin Ferguson did nearly all the work on it, but before it was completed he was called to service (on a leave of absence) with the Military Air Transport Service. The delay in publishing is regrettable but not serious.

We are sending free copies of this issue to:

Members of the USGA Executive Committee
Members of the USGA Green Section Committee
Directors of all State Agricultural Experiment Stations
Green Section Service Subscribers
Foreign Turf Research Centers

Extra copies will be sold at $1.25 each to help defray the cost of publication.

As the National Turf Program expands and as more state experiment stations accept turf research, teaching, and extension as a legitimate phase of agriculture, it becomes more necessary to provide a clearing house of information to act as a guide to logical integrated procedure. The USGA Green Section, a non-profit, privately-financed association, has provided that leadership and shall continue to provide it as long as there is a need and as long as golf clubs, firms, and turf and superintendents associations continue to lend their active support.

We hope that Turf Research Review will fill a need in promoting harmony and more cordial relations among workers in turf, in providing a medium for integration and coordination of research projects, to reduce needless duplication, and to stimulate needed research and teaching on the most pressing current problems. Direct contact among workers in related fields greatly is to be encouraged. The USGA Green Section will welcome suggestions for the improvement of Turf Research Review.

Fred V. Grau

Fred V. Grau
Director, USGA Green Section

TURF RESEARCH REVIEW

Contents

	Page
Experiment Stations Engaged in Turf Research, Extension and Education	1
Personnel Who Spend Part or All of Their Time on Turf Work	2
Research Projects Listed at the Various Stations in 1950	3
Publications, Reprints and Reports	14
Field Days and Turf Conferences	26
Contributions Made Through the Green Section for Use in Turf Research at Beltsville and at the Cooperating Experiment Stations	30
Subscribers to Green Section Service	31
Research Fellowships and Research Grants Administered by the Green Section in 1950	35
Summary of Accomplishments in Turf in 1950	36

EXPERIMENT STATIONS ENGAGED IN TURF RESEARCH, EXTENSION AND EDUCATION

Alaska Agricultural Experiment Station, University of Alaska, Palmer, Alaska.

Beltsville Turf Gardens, U. S. Department of Agriculture, Plant Industry Station, Beltsville, Md.

California, University of, at Los Angeles, and at Davis, Calif.

Connecticut Agricultural Experiment Station, New Haven, Conn.

Florida Agricultural Experiment Station, Gainesville, Fla., and Belle Glade, Fla.

Georgia Coastal Plain Experiment Station, Tifton, Ga.

Indiana Agricultural Experiment Station, Purdue University, West Lafayette, Ind.

Iowa Agricultural Experiment Station, Iowa State College, Ames, Iowa.

Kentucky Agricultural Experiment Station, University of Kentucky, Lexington, Ky.

Massachusetts Agricultural Experiment Station, University of Massachusetts, Amherst, Mass.

Michigan Agricultural Experiment Station, Michigan State College, East Lansing, Mich.

Missouri Agricultural Experiment Station, University of Missouri, Columbia, Mo.

New Jersey Agricultural Experiment Station, Rutgers University, New Brunswick, N. J.

New York Agricultural Experiment Station, Cornell University, Ithaca, N. Y.

Oklahoma Agricultural Experiment Station, Oklahoma A & M College, Stillwater, Okla.

Ohio Agricultural Experiment Station, Wooster, Ohio.

Oregon Agricultural Experiment Station, Oregon State College, Corvallis, Oreg.

Pennsylvania Agricultural Experiment Station, Pennsylvania State College, State College, Pa.

Rhode Island Agricultural Experiment Station, University of Rhode Island, Kingston, R. I.

Texas Agricultural Experiment Station, Texas A & M College, College Station, Texas.

Virginia Agricultural Experiment Station, Northern Virginia Pasture Research Station, Middleburg, Va.

PERSONNEL WHO SPEND PART OR ALL OF THEIR TIME ON TURF WORK

Andrews, E. A.	Michigan
Bremmer, James	Oklahoma
Brown, E. Marion	Missouri
Buckner, R. C.	Kentucky
Burton, G. W.	Georgia
Cooper, A. E.	Pennsylvania
Cornish, Geoffrey	Massachusetts
Cornman, J. F.	New York
Crummett, D. O.	California
Daniel, William H.	Indiana
Davis, R. R.	Ohio
Davis, S. H.	New Jersey
DeFrance, J. A.	Rhode Island
Dickinson, L. S.	Massachusetts
Elder, W. C.	Oklahoma
Engel, Ralph E.	New Jersey
Fergus, E. N.	Kentucky
Ferguson, M. H.	Maryland
Forbes, Ian, Jr.	Maryland
Gallagher, John	California
Garman, W. L.	Oklahoma
Gibson, William	Rhode Island
Grau, Fred V.	Maryland
Grigsby, B. H.	Michigan
Hagan, R. M.	California
Hallowell, C. K.	Pennsylvania
Harper, Jack C.	Pennsylvania
Holben, F. J.	Pennsylvania
Holt, E. C.	Texas
Howard, F. L.	Rhode Island
Huberty, M. R.	California
Hutson, Ray	Michigan
Jackman, E. R.	Oregon
Jefferson, R. N.	California
Jeffries, C. D.	Pennsylvania
Kelsheimer, E. G.	Florida
Lantz, H. L.	Iowa
Lee, O. C.	Indiana
Likes, Don E.	Indiana
Mahdi, M. Z.	California
Means, Robert M.	Pennsylvania
Miller, Pierre	California
Morofsky, Walter	Michigan
Mott, G. O.	Indiana
Musser, H. B.	Pennsylvania
Myers, W. M.	Maryland
Noer, O. J.	Wisconsin
Norton, Burnett	Rhode Island
Nutter, Gene C.	New York
Odland, T. E.	Rhode Island
Oyer, E. B.	Indiana
Payne, Kenyon T.	Indiana
Pennington, R. P.	Pennsylvania
Pepper, J. O.	Pennsylvania
Potts, R. C.	Texas
Radko, A. M.	Maryland
Robinson, B. P.	Georgia
Sarthou, Charles	Oklahoma
Schoth, H. A.	Oregon
Schread, J. C.	Connecticut
Sharvelle, E. G.	Indiana
Simmons, J. A.	Rhode Island
Skoss, Jesse	California
Skrdla, Willis H.	Virginia
Stanford, John	Pennsylvania
Staten, Earl D.	Indiana
Stephens, James	Oklahoma
Stoner, W. N.	Florida
Stoutemyer, V. T.	California
Thames, Walter A.	Florida
Thurston, H. W.	Pennsylvania
Tyson, James	Michigan
Vaughn, John	Michigan
Watson, James R., Jr.	Texas
Waxman, Sydney	Rhode Island
Wilfong, James M.	Maryland
Wilson, Charles G.	Maryland
Wright, L. Neal	Pennsylvania

RESEARCH PROJECTS LISTED AT THE VARIOUS STATIONS IN 1950

Management Studies

Zoysia japonica - Cool Season Grass Combinations.
Massachusetts Agricultural Experiment Station, Amherst, Mass.

Performance of Z-52 and U-3 Bermuda in Combination with Cool-season Grasses.
New Jersey Agricultural Experiment Station, New Brunswick, N. J.

Association of Warm and Cool-season Grasses.
Pennsylvania Agricultural Experiment Station, State College, Pa.

Grass Variety and Turf Management Studies.
V. T. Stoutemyer. California Agricultural Experiment Station, UCLA, Los Angeles, Calif.

Various Grass Seed Mixtures Planted Spring and Fall of 1949 for Observation and for Cutting Height Experiments. Iowa Agricultural Experiment Station, Ames, Iowa.

Clipping Heights on Various Turf Grasses. Kentucky Agricultural Experiment Station, Lexington, Ky.

Use of Hops as a Pre-seeding Soil Amendment and as Topdressing Fertilizer.
Massachusetts Agricultural Experiment Station, Amherst, Mass.

Fairway Management in Relation to Playing Conditions. (Fertilization, Soil Properties and Management, Mowing Practices, Suitability of Various Species and Strains.) Michigan Agricultural Experiment Station, East Lansing, Michigan.

Times and Rates of Seeding Turf - Comparison of Seeding Mixture and Individual Varieties in Establishing Turf. Michigan Agricultural Experiment Station, East Lansing, Michigan.

Relative Values of Different Strains and Varieties for Producing Putting Green and Fairway Turf. Michigan Agricultural Experiment Station, East Lansing, Mich.

The Effects of Frequency of Aerifying on Mixed Turf Mowed at 7/8-Inch. New Jersey Agricultural Experiment Station, New Brunswick, N. J.

Time of Cultivation of Bent Turf (1/4-inch) with Different Levels of Nitrogen, Phosphorus. New Jersey Agricultural Experiment Station, New Brunswick, N. J.

Cultivation of Mixed Turf (7/8-inch) with Different Levels of Nitrogen, Phosphorus, and Potash. New Jersey Agricultural Experiment Station, New Brunswick, N. J.

Cultivation of Mixed Fairway Turf in Conjunction with Different Levels of Fertilizer, Lime and Gypsum. New Jersey Agricultural Experiment Station, New Brunswick, N. J.

Study of Prevention of Invasion of Bentgrass Greens by Bermudagrass.
Oklahoma Agricultural Experiment Station, Stillwater, Okla.

Management Studies (continued)

Studies of Fairway Management, Compaction, Irrigation and Aeration. Pennsylvania Agricultural Experiment Station, State College, Pa.

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, topgrowth, vigor and density, root growth and accumulation, weed population, wear resistance, speed of recovery, winter hardiness, drought resistance, and disease and insect incidence.) Texas Agricultural Experiment Station, College Station, Texas.

Aerification Methods and Their Interrelationships with Fertilizer as They Affect the Quality of Turf. Texas Agricultural Experiment Station, College Station, Texas.

The Proper Rate and Method of Irrigation as It Influences Quality of Turf. Texas Agricultural Experiment Station, College Station, Texas.

The Influence of Clipping Heights and Frequency On: Density of Grass, Weed Population, Root Development, Drought Resistance. Texas Agricultural Experiment Station, College Station, Texas.

Lime and Compost Requirements of Velvet Bent Turf. J. A. DeFrance and T. E. Odland. Rhode Island Experiment Station, Kingston, R. I.

Turf Quality of Different Turf Grasses Mowed at Different Heights. Kentucky Agricultural Experiment Station, Lexington, Ky.

Turf Qualities of Different Turf Grasses Fertilized with Nitrogen at Different Times and Rates. Kentucky Agricultural Experiment Station, Lexington, Ky.

Trials with Fairway-Green Aerifier on Greens and Fairways and Use of Moling Equipment on Greens. Florida Agricultural Experiment Station.

Observation of the Effect of Mowing Heights on the Growth and Survival of Some Turf Species. Northern Virginia Pasture Research Station, Middleburg, Va.

Clipping Heights on Strains of Fescues, Bents and Zoysiagrasses. USGA Green Section, Beltsville, Md.

Nutrition

Studies of Ureaform Materials on Alta Fescue Turf. USGA Green Section, Beltsville, Md.

Field Tests Using 20-10-10 Fertilizer (Uramite base) on Fairways. (Material furnished by the duPont Company.) USGA Green Section, Beltsville, Md.

Plant Tissue Testing. Duan O. Crummett and Edward Roach. California Agricultural Experiment Station. UCLA Los Angeles, Calif.

Plant Nutrition Studies. California Agricultural Experiment Station. UCLA, Los Angeles, Calif.

Variety Tolerance of N-P-K Deficiency. Massachusetts Agricultural Experiment Station, Amherst, Mass.

Nutrition (continued)

Fertilizer on Growth of Grasses, Particularly Effect of Various Levels of N-P-K on Washington, Arlington, Congressional, and Cohansey Bents. Michigan Agricultural Experiment Station, East Lansing, Mich.

Rates of N-P-K on Putting Green Turf. New Jersey Agricultural Experiment Station, New Brunswick, N. J.

The Effect of Several Rates of N-P-K on Turf Seeded to New Jersey #1 (mowed at 7/8" and 1-1/2"). New Jersey Agricultural Experiment Station, New Brunswick, N. J.

The Effect of Time of Fertilization on Turf Seeded with New Jersey #1 (mowed at 7/8" and 1-1/2"). New Jersey Agricultural Experiment Station, New Brunswick, N. J.

The Effect of Time of Fertilization of Bent Turf (1/4-inch). New Jersey Agricultural Experiment Station, New Brunswick, N. J.

Potash-Nitrogen Ratios. Effects on Growth Rates and Disease Incidence. Pennsylvania Agricultural Experiment Station, State College, Pa.

Ureaform as Source of N. Comparison with other N Carriers. Effect on Growth, Disease, Weed Invasion. Pennsylvania Agricultural Experiment Station, State College, Pa.

Trace Elements on Golf Course Soils. Pennsylvania Agricultural Experiment Station, State College, Pa.

Lime and Compost Requirements of Velvet Bent Turf. J. A. DeFrance and T. E Odland. Rhode Island Experiment Station, Kingston, R. I.

Turf Qualities of Different Turf Grasses Fertilized with Nitrogen at Different Times and Rates. Kentucky Agricultural Experiment Station, Lexington, Ky.

The Effect of Various Nitrogeneous Fertilizers Upon the Seasonal Growth of Centipedegrass and Bermudagrass. Georgia Costal Plain Experiment Station, Tifton, Ga.

Water Management

Studies on Soil Moisture - Its Measurement and Control. Michigan Agricultural Experiment Station, East Lansing, Michigan.

Studies of Water Relations in Various Sand-Vermiculite Mixtures (for possible use in putting greens). USGA Green Section, Beltsville, Md.

Effects of Excess Water and Soil Compaction. Pennsylvania Agricultural Experiment Station, State College, Pa.

The Determinations of the Usefulness of the Mole Drains in the Draining of Putting Greens and Other Turf Areas. New York Agricultural Experiment Station, Ithaca, New York.

Soil Physical Conditions

Soil Aeration. Pennsylvania Agricultural Experiment Station, State College, Pa.

Study of the Mechanical Composition of Soils in Relation to Turf Development. Project #669. Oklahoma Agricultural Experiment Station, Stillwater, Okla.

Studies on Physical Characteristics of Soils. Pennsylvania Agricultural Experiment Station, State College, Pa.

Soil Relation to Growth of Bents, Bluegrass, Red Fescue. Michigan Agricultural Experiment Station, East Lansing, Mich.

Mechanical Cultivation of Turf. California Agricultural Experiment Station. UCLA, Los Angeles, California.

Soil Compaction and Amendments. M. R. Huberty. California Agricultural Experiment Station, UCLA, Los Angeles, Calif.

Grasses

Zoysia Studies at USGA Green Section, Beltsville, Md.

- Critical Studies on the Nutritional Requirements of Zoysia in Relation to Seed Production and Turf Quality (Greenhouse Studies Supplemented by Field Plot Work).
- Seed Harvest Methods.
- Seed Storage Methods.
- Establishment Procedures - Rates, Dates, and Methods of Seeding - Vegetative Planting Methods.
- Evaluation of Turf Produced by Vegetative Propagation and by Seeding Various Zoysia Strains.
- 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.

Grass Variety and Turf Management Studies. V. T. Stoutemyer, California Agricultural Experiment Station, Los Angeles, Calif.

Evaluation of Improved Strains on Specialized Use Tests. Texas Agricultural Experiment Station, College Station, Texas.

Ecology of Grass Mixtures. California Agricultural Experiment Station.

Adaptation of Turf Grasses. Florida Agricultural Experiment Station.

The Development of Superior Turf Grasses. Georgia Costal Plain Experiment Station, Tifton, Georgia.

Study of Adaptation of Species and Strains for Fairway and Lawn Use. Kentucky Agricultural Experiment Station, Lexington, Ky.

Grasses (continued)

Study of Species and Strain Adaptation and Management. Oklahoma Agricultural Experiment Station, Stillwater, Okla.

Turf Development and Maintenance. Project #628. Breeding Work on Bermuda and Buffalograss. Oklahoma Agricultural Experiment Station, Stillwater, Okla.

Strain Testing. Pennsylvania Agricultural Experiment Station, State College, Pa.

Production of Improved Strains of Grasses. Pennsylvania Agricultural Experiment Station, State College, Pa.

Collection and Evaluation of Species and Strains of Turf Grasses According to Their:

Seeding Ability
Vegetative Characteristics and Habits
Reaction to Environmental Factors
Texas Agricultural Experiment Station, College Station, Texas.

Association of Improved Strains of Cool Season Grasses. Pennsylvania Agricultural Experiment Station, State College, Pa.

Rhode Island Bent Selections for Turf and Seed Production. J. A. DeFrance and T. E. Odland. Rhode Island Agricultural Experiment Station, Kingston, R. I.

Mixed U-3 Bermudagrass and Kentucky Bluegrass for Turf. Kentucky Agricultural Experiment Station, Lexington, Ky.

Relative Turf Qualities of Different Species and Strains of Turf Grasses. Kentucky Agricultural Experiment Station, Lexington, Ky.

Turf Quality of Different Turf Grasses Mowed at Different Heights. Kentucky Agricultural Experiment Station, Lexington, Ky.

Zoysia Tests. Kentucky Agricultural Experiment Station, Lexington, Ky.

Alta Fescue. Oregon Agricultural Experiment Station, Corvallis, Oregon.

Kentucky 31 and Alta Fescue Comparisons. Kentucky Agricultural Experiment Station, Lexington, Ky.

Test Bent Putting Green. Massachusetts Agricultural Experiment Station, Amherst, Mass.

A Test of Bentgrasses for Putting Green Turf. New Jersey Agricultural Experiment Station, New Brunswick, N. J.

A Comparison Study of Five Colonial Bents and Five Red Fescues. New Jersey Agricultural Experiment Station, New Brunswick, N. J.

Highland Bent. Oregon Agricultural Experiment Station, Corvallis, Oregon.

Breeding and Testing of Bents and Fescues. Pennsylvania Agricultural Experiment Station, State College, Pa.

Thirty Strains Bentgrass Tested for Adaptation. Congressional, Arlington and Old Orchard Found Superior. Iowa Agricultural Experiment Station, Ames, Iowa.

Grasses (continued)

Strains Tested for Disease Resistance (dollarspot particularly). Arlington, Old Orchard, Congressional, Metropolitan, Toronto, Washington, and Norbeck. Iowa Agricultural Experiment Station, Ames, Iowa.

A Comparison of Four Kentucky Bluegrass Strains. New Jersey Agricultural Experiment Station, New Brunswick, N. J.

Merion (B-27) Bluegrass. Nearly all stations.

Red Fescues. Oregon Agricultural Experiment Station, Corvallis, Oregon.

U-3 Bermuda Added to Nursery to Test for Winter Hardiness. Iowa Agricultural Experiment Station, Ames, Iowa.

Study of U-3 Bermudagrass and Bluegrass, Including Merion Bluegrass. Kentucky Agricultural Experiment Station, Lexington, Ky.

Study of Bermudagrass Strains in Association with Bluegrass Turf. USGA Green Section, Beltsville, Md.

Performance of Z-52 and U-3 Bermuda in Combination with Cool-season Grasses. New Jersey Agricultural Experiment Station, New Brunswick, N. J.

Breeding of Turf Grasses. Indiana Agricultural Experiment Station, Lafayette, Indiana.

1. Approximately 200 individual plants have been selected, principally for drought tolerance, from a large single plant bent nursery. These have been propagated during 1950 and will be put into replicated plots in 1951 to be tested principally for adaptability to fairway use.

2. A study to compare two methods of covering bent grass seed stalks for purposes of obtaining self-pollinated seed was conducted on S_1 plants in the field in 1950. This study was made in connection with attempting to obtain S_2 seed from these plants. Germination tests indicate extremely wide differences in open pollinated seed production among the S_1 plants and germination tests on the selfed seed will be conducted in the spring of 1951.

3. Freezing resistance studies have been conducted on a series of Zoysia japonica and Zoysia matrella seedlings. The plants, in flats, were subjected to freezing temperatures to evaluate the parental clones as to prepotency for tolerance to freezing, and to isolate individual plants which demonstrated an ability to survive low temperatures.

4. Individual plant nurseries have been established from open pollinated seed of several Zoysia japonica clones. These individual plants will be compared and evaluated for possible fairway and tee grass use.

5. A study was made to determine whether certain growth regulating substances might be effective in stimulating seed production by creeping bent grass strains under greenhouse conditions. Varying concentrations of 2,4-D, MCP, and TCA were applied to two strains of bent grass (C-1 and C-36). The results were entirely negative, no seed heads being produced.

Grasses (continued)

Combination of Warm-Cool Season Grasses. Indiana Agricultural Experiment Station, Purdue University, Lafayette, Ind.

1. U-3 bermuda overseeded with three different grasses to be maintained under different heights of cut, nitrogen levels, and soil moisture ranges. Begun 1950.
2. U-3 bermuda under golf course play - Purdue golf course - overseeded with 4 grasses. Similar plots maintained at Westwood Country Club, St. Louis, Mo.
3. Five bermuda strains overseeded with Merion bluegrass. Begun 1950.
4. Clonal plantings of Zoysia japonica and Zoysia matrella have been established to study the relative adaptabilities of several common clones alone and in combination with cool season grasses.

Bentgrass Plots and Test Greens (Species and Strain Testing 1940-1951 and continuing). Iowa Agricultural Experiment Station, Ames, Iowa.

Adaptation and Management of Cool-Season Grasses. Georgia Coastal Plain Experiment Station, Tifton, Ga.

Selection Studies with Strains of Bermuda and Bentgrasses Maintained Under Putting Green Conditions. Florida Agricultural Experiment Station.

Testing New Selections of Grasses for Use in Lawns. Florida Agricultural Experiment Station.

Testing a Number of Grasses for Turf Qualities and Climatic Adaptation When Maintained Under Turf Conditions. Northern Virginia Pasture Research Station, Middleburg, Va.

Testing Companionability and Development of Certain Warm-Season and Cool-Season Grasses When Grown Together Under Turf Conditions. Northern Virginia Pasture Research Station, Middleburg, Va.

Management Studies on U-3 Bermudagrass to Learn Reaction to:
Fertility Levels
Heights of Cut
Methods of Planting
Association with Cool-season Grasses.
USGA Green Section, Beltsville, Md.

Evaluation of Bentgrasses from Seed and from Stolons Under Varying Management Conditions for Fairways and for Lawns. USGA Green Section, Beltsville, Md.

Studies of Nurse Grasses and Their Effects on Permanent Species. USGA Green Section, Beltsville, Md.

Evaluation of Various Grasses in Turf from the Standpoint of the Effects of Traffic. USGA Green Section, Beltsville, Md.

Studies on the Value of Tall Fescues Alone and in Mixtures. USGA Green Section, Beltsville, Md.

Grasses (continued)

Evaluation of Selections of Bentgrasses for Quality Factors for Use on Putting Greens and Fairways. USGA Green Section, Beltsville, Md.

Evaluation of Merion (B-27) Bluegrass and Common Bluegrass Alone and in Combination with other Grasses. USGA Green Section, Beltsville, Md.

Evaluation of Red Fescue Strains in Cooperation with Pennsylvania Experiment Station. USGA Green Section, Beltsville, Md.

Tested Winter Hardiness of Bermudagrass. Strain unknown. Massachusetts Agricultural Experiment Station, Amherst, Mass.

Seed Production

Seed Production Studies. Pennsylvania Agricultural Experiment Station, State College, Pa.

Studies to Determine the Optimum Storage Conditions for Zoysia Seed. USGA Green Section, Beltsville, Md.

Seed Production in Turf Grasses. Georgia Costal Plain Experiment Station, Tifton, Ga.

Grass Nurseries

Production of Nursery Stock of Improved Strains of Grasses by Vegetative Propagation. USGA Green Section, Beltsville, Md.

Increase Nursery for Proven Strains for Distribution. Indiana Agricultural Experiment Station, Lafayette, Ind.

Development of Improved Strains 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

Texas Agricultural Experiment Station, College Station, Texas.

Increase Nursery for Proven Strains for Distribution. Georgia Costal Plain Experiment Station, Tifton, Ga.

Weed Control

Types of Herbicides and Their Uses. Jesse Skoss. California Agricultural Experiment Station, UCLA, Los Angeles, Calif.

Herbicide Tests. John Gallagher, Jr. California Agricultural Experiment Station, UCLA, Los Angeles, Calif.

Weed Control (continued)

Aero-cyanate. Preliminary Work Indicates Promise on Lawns and Fairways. Iowa Agricultural Experiment Station, Ames, Iowa.

Chemical Control of Weeds - Crabgrass Control. Michigan Agricultural Experiment Station, East Lansing, Michigan.

Crabgrass Control Studies. New Jersey Agricultural Experiment Station, New Brunswick, N. J.

Crabgrass Control with Potassium Cyanate. American Cyanamid Grant. New York Agricultural Experiment Station, Ithaca, N. Y.

Weed Control. Pennsylvania Agricultural Experiment Station, State College, Pa.

Crabgrass Control. Pennsylvania Agricultural Experiment Station, State College, Pa.

Pre-seeding Soil Treatments with Herbicides for Weed Control in Seeding Turf. Pennsylvania Agricultural Experiment Station, State College, Pa.

Effective Means of Controlling Turf Weeds. Texas Agricultural Experiment Station, College Station, Texas.

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. Rhode Island Agricultural Experiment Station, Kingston, R. I.

Water-soluble Mercurials for Crabgrass Controls. J. A. DeFrance. Rhode Island Agricultural Experiment Station, Kingston, R. I.

Control of Annual Bluegrass (Poa annua). J. A. Simmons and J. A. DeFrance. Rhode Island Agricultural Experiment Station, Kingston, R. I.

Crabgrass and Weed Control. A Study of Common Chemicals for Crabgrass Control on Unirrigated Bluegrass and on Irrigated Bentgrass Turf. Indiana Agricultural Experiment Station, Purdue University, Lafayette, Ind.

Weed Killer Cooperative Tests Since 1945 (with USGA and various chemical companies). Iowa Agricultural Experiment Station, Ames, Iowa.

Crabgrass Control. Iowa Agricultural Experiment Station, Ames, Iowa.

Weed Control. Georgia Coastal Plain Experiment Station, Tifton, Ga.

Evaluation of Spray Chemicals and Agronomic Practices for Weed Control on Fairways and Greens. Florida Agricultural Experiment Station, Gainesville, Fla.

Spraying Weeds with 2, 4-D. O. C. Lee. Leaflet 293, 1948, Purdue.

Insect Control

Turf Insect Control. R. N. Jefferson. California Agricultural Experiment Station, UCLA, Los Angeles, California.

Effects of Organic Phosphates and Chlorinated Hydrocarbons on the Fauna in Turf. Connecticut Agricultural Experiment Station, New Haven, Conn.

Insect Control (continued)

Compatibility of Insecticides with 2, 4-D and PMAS. Connecticut Agricultural Experiment Station, New Haven, Conn.

Phytotoxicity of Insects. Connecticut Agricultural Experiment Station, New Haven, Conn.

Control of Oriental Earthworm (stinkworm), Parathion, Chlordane, Aldrin Emulsions. Connecticut Agricultural Experiment Station, New Haven, Conn.

Control of Chinch Bug - Chlordane 5% dust and as Emulsifiable Concentrate. Connecticut Agricultural Experiment Station, New Haven, Conn.

Control of White Grubs (Jap Beetle, Asiatic Beetle, Native White Grub) DDT, Chlordane, Parathion, Aldrin. Connecticut Agricultural Experiment Station, New Haven, Conn.

Insect Control in Turf. Georgia Coastal Plain Experiment Station, Tifton, Ga.

Insect Control. Michigan Agricultural Experiment Station, East Lansing, Mich.

Rates of Application with Compound 118 and Other Insecticides on Insect Control. Florida Agricultural Experiment Station, Gainesville, Fla.

Observe Disease and Insect Incidence Among the Turf Grasses. Northern Virginia Pasture Research Station. Middleburg, Va.

Disease Control

Studies on Turf Diseases. Pierre Miller. California Agricultural Experiment Station, UCLA, Los Angeles, Calif.

Fungicide Tests. Cadmium Compounds Outstanding for the Control of Dollarspot. Mercury Compounds and Tersan Dependable for the Control of Brownpatch. Iowa Agricultural Experiment Station, Ames, Iowa.

Fungicide Treatments - Dandelion Count. Mercury Compounds had a very Definite Effect on Inhibiting Germination of Dandelion Seed in 1949 and 1950. Iowa Agricultural Experiment Station, Ames, Iowa.

Disease Control Studies. Michigan Agricultural Experiment Station, East Lansing, Mich.

Cooperative Turf Fungicide Trials. New Jersey Agricultural Experiment Station, New Brunswick, N. J.

Disease Control. Pennsylvania Agricultural Experiment Station, State College, Pa.

Disease Control Studies. State College and Philadelphia. Pennsylvania Agricultural Experiment Station, State College, Pa.

Control of Diseases of Grasses. F. L. Howard and J. A. DeFrance. Rhode Island Agricultural Experiment Station, Kingston, R. I.

A Study of the Protective Value of Common Turf Fungicides Against Dollarspot Disease in 1950. Indiana Agricultural Experiment Station, Lafayette, Ind.

A Study of the Curative Value of Common Turf Fungicides when Applied to Severe, Medium, and Light Outbreaks of Established Dollarspot Disease. Indiana Agricultural Experiment Station, Lafayette, Ind.

Disease Control (continued)

A Laboratory Study of the Toxicity of Turf Fungicides to Pure Cultures of Turf Disease Fungi. Indiana Agricultural Experiment Station, Lafayette, Ind.

Determination of Agronomic Practices Combined with Fungicide Applications as Related to Obtaining a Stand with Temporary Winter Greens. Florida Agricultural Experiment Station, Gainesville, Fla.

Identifying Pathogens on St. August and Bermuda and Disease Control Spray Treatments. Florida Agricultural Experiment Station, Gainesville, Fla.

Observe Disease and Insect Incidence Among the Turf Grasses. Northern Virginia Pasture Research Station. Middleburg, Va.

Topdressing

The Production and Sterilization of Organic Topdressing Materials. Georgia Coastal Plain Experiment Station, Tifton, Ga.

The Effects of Time, Rates and Kind of Topdressing on the Quality of Turf. Texas Agricultural Experiment Station, College Station, Texas.

Lime and Compost Requirements of Velvet Bent Turf. J. A. DeFrance and T. E. Odland. Rhode Island Agricultural Experiment Station, Kingston, R. I.

Highway Slope Control

Studies with Michigan State Highway Research on Highway Shoulders and Resultant Effects of Treatment on Stability. Michigan Agricultural Experiment Station, East Lansing, Mich.

Highway Slope Control. Best Adapted Species. Production of Seed Mulching Materials. Off Season Seedings and Companion Plantings of Crown Vetch with One and Two Grasses. Pennsylvania Agricultural Experiment Station, State College, Pa.

PUBLICATIONS, REPRINTS, AND REPORTS

Grass (Descriptive)

Centipede Grass. M. A. Hein, USDA Mimeo. 3-20-47.

Bentgrass for Lawns. Marvin H. Ferguson and Ian Forbes, Jr. USDA Mimeo leaflet.

Merion (B-27) Bluegrass. Charles G. Wilson and Fred V. Grau. USGA Journal, April 1950.

U-3 Bermudagrass. USGA Green Section Mimeo.

Major Turf Grasses of The United States. USGA Green Section Mimeo.

Observations on the Zoysia Grasses. Ian Forbes, Jr. and Marvin H. Ferguson. The Greenkeepers Reporter, March-April 1947.

Effects of Strain Differences, Seed Treatments, and Planting Depth on Seed Germination of Zoysia Spp. Ian Forbes, Jr. and Marvin H. Ferguson. Journal of American Society of Agronomy, Vol. 40, No. 8, August 1948.

Turf Species and Fertility. Rhode Island.

*Experiments with Turf Grasses in New Jersey. H. B. Sprague and E. E. Evaul. Bulletin 497, 1930. New Jersey.

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FIELD DAYS AND TURF CONFERENCES 1950

California

The Southern California Conference on Turf Culture
College of Agriculture
University of California
Los Angeles - May 8, 9, 1950

Northern California Turf Conference
College of Agriculture
University of California
Berkeley - May 16, 17, 1950

Florida

Florida Greenkeepers Association, affiliated with Florida State Florists Association 29th Annual Convention
Palm Beach - May 21, 22, 23, 1950

Grounds Maintenance Conference
Air Forces Agronomists
Eglin Air Base - March 28, 31, 1950

Georgia

Annual Southeastern Turf Management Conference
Abraham Baldwin College and Georgia Coastal Plain Experiment Station
Tifton - September 7, 8, 1950

Iowa

Sixteenth Annual Greenkeepers Short Course
Iowa State College
Ames - March 13, 14, 15, 1950

Indiana

Midwest Regional Turf Conference
Purdue University
Lafayette, Indiana - March 6, 7, 8, 1950

Kansas

First Annual Turf Conference sponsored by Central Plains Turf Foundation and Kansas State College
Manhattan - October 25, 26, 27, 1950

Kentucky

Kentuckiana Greenkeepers Association Annual Field Day
Ft. Knox - April 6, 1950

Field Days and Turf Conferences 1950 (continued)

Maryland

1950 National Turf Field Day
USGA Green Section and USDA, Bureau of Plant Industry, Division of Forage Crops & Diseases, cooperating
Beltsville - October 15, 16, 17, 1950

Mid-Atlantic Greenkeepers Conference
Baltimore - January 12, 13, 1950

Massachusetts

Twenty-first National Turf Conference and Show
National Greenkeeping Superintendents Association
Boston - February 6-10, 1950

Annual Fine Turf Conference
Massachusetts State College, Amherst - March 9, 10, 1950

Michigan

Twentieth Annual Greenkeepers Turf Conference
East Lansing - March 16, 17, 1950

National Greenkeeping Superintendents Association
Annual Soil Science Symposium and Golf Tournament
East Lansing - September 18, 19, 1950

Minnesota

Minnesota Greenkeepers Association Annual Turf Conference and Business Meeting
Minneapolis - March 8, 9, 10, 1950

Montana

Turf Conference at The Highlands Golf Club
Billings - July 10, 11, 1950

New Jersey

Rutgers Turf Field Day
New Brunswick - August 8, 1950

One-Week Course in Turf Management
Rutgers University, New Brunswick - January 30-February 3, 1950

New York

Third Cornell Turf Conference
New York State College of Agriculture
Ithaca - March 15, 16, 17, 1950

Southeastern New York Turf School sponsored by The Westchester County Extension Service, Westchester-Connecticut Turf Improvement Association, New York State College of Agriculture at Cornell
White Plains - October 30, 31, 1950

Field Days and Turf Conferences 1950 (continued)

Oklahoma

Oklahoma Turf Conference
Oklahoma Agricultural Experiment Station and Oklahoma Turf Association
Stillwater - November 27-29, 1950

Ontario, Canada

School of Soils, Fertilization, and Turf Maintenance
Sponsored by the Greens Section of the Royal Canadian Golf Association, Ontario Agricultural College
Guelph, Ontario - March 20, 21, 22, 1950

Pennsylvania

Nineteenth Annual Turf Conference
Pennsylvania State College
State College - February 27-March 2, 1950

Philadelphia Turf Field Day
Philadelphia Country Club - August 17, 1950

Penn State Turf Field Day
Pennsylvania State College
State College - September 11, 12, 1950

Philadelphia Lawn School
Llanerch Country Club
Havertown - March 3, 1950

Rhode Island

Eighteenth Annual Greenkeepers Field Day
Rhode Island State College
Kingston - September 7, 8, 1950

Tennessee

Tri-State Turf Conference
Sponsored by Choctaw, Inc.
Memphis - March 28, 1950

Texas

First Annual Turf Field Day
College Station - June 28, 1950

Texas Turf Conference jointly with Oklahoma Turf Conference
Oklahoma Agricultural Experiment Station
Stillwater - November 27-29, 1950

Field Days and Turf Conferences 1950 (continued)

Washington

Third Annual Turf Conference
State College of Washington
Pullman - March 29, 30, 1950

Wisconsin

Mineral Nutrition Symposium. University of Wisconsin
Madison, Wisconsin - August 31-September 3, 1950

CONTRIBUTIONS MADE THROUGH THE GREEN SECTION FOR USE IN TURF RESEARCH AT BELTSVILLE AND AT THE COOPERATING EXPERIMENT STATIONS

Contributions to Turf Research Made Through The Green Section

American Cyanamid Company, New York, N. Y.

Capital City Club, Atlanta, Ga.

Central Pennsylvania Greenkeepers' Association, Indiana, Pa.

Clapper, O. O., West Newton, Pa.

Coultas, James, Ltd., Grantham, England

Geary Brothers, Klamath Falls, Oreg.

Golf & Lawn Supply Corp., White Plains, N. Y.

Georgia State Golf Association, Columbus, Ga.

Jacobsen Mfg. Company, Racine, Wis.

Lapp, Walter S., Lansdale, Pa.

Maryland State Golf Association, Baltimore, Md.

New England Golf Association, Boston, Mass.
(Contributed by Six State Golf Associations)

Oklahoma Turf Association, Tulsa, Okla.

Old Orchard Turf Nurseries, Madison, Wis.

Parker Pattern & Foundry Company, Springfield, Ohio

Pennsylvania Golf Association, Pittsburgh, Pa.

Pocono Turf Association, Buck Hill Falls, Pa.

St. Louis District Golf Association, St. Louis, Mo.

Sewerage Commission, City of Milwaukee, Milwaukee, Wis.

Toro Mfg. Co., Minneapolis, Minn.

Wagner, H. L., & Sons, Imbler, Oreg.

West Point Lawn Products, West Point, Pa.

Western Pennsylvania Golf Association, Pittsburgh, Pa.

Women's Golf Association of the Augusta Country Club, Inc., Augusta, Ga.

Worthington Mower Company, Stroudsburg, Pa.

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Adikes, J & L., Inc.	Jamaica, N. Y.
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American Agricultural Chemical Co.	New York, N. Y.
American Chemical Paint Co.	Ambler, Pa.
American Cyanamid Co.	New York, N. Y.
Armour Fertilizer Works	Atlanta, Ga.
Associated Seed Growers, Inc.	New Haven, Conn.
Baker Grass Industries	New York, N. Y.
Bell, D. B., & Son, Inc.	Kansas City, Mo.
Bell, William P., & Son	Pasadena, Calif.
Belleview-Biltmore Hotel Co.	Detroit, Mich.
Belt Seed Co., Inc., The	Baltimore, Md.
Bolgiana, F. W., & Co.	Washington, D. C.
Bottoms, George D.	Athens, Ala.
Buchanan-Cellers Grain Co.	McMinnville, Oreg.
Butternut Creek Nursery	Fayetteville, N. Y.
Cargill, Inc.	Minneapolis, Minn.
Cascio, Peter J., Mrs.	West Hartford, Conn.
Catholic Cemeteries Assn.	Cleveland, Ohio
Cave Hill Cemetery Co., Inc.	Louisville, Ky.
Chapman, Rose-Marie, Mrs.	Washington, D. C.
Chesmore Seed Co.	St. Joseph, Mo.
Clapper Co., The	West Newton, Mass.
Clark, John J.	Whichita, Kans.
Cleveland District Greenkeeping Supts. Assn.	Cleveland, Ohio
Connell, Bud	Marion, Iowa
Cooperative Seed & Farm Supply Service, Inc.	Richmond, Va.
Corneli Seed Co.	St. Louis, Mo.
Cornell, G. L. Co.	Bethesda, Md.
Crenshaw McMichael Seed Co.	Tampa, Fla.
Dannenbaum, Walter	Rydal, Pa.
Davies, Joseph E., Mrs.	Washington, D. C.
Davis, George A., Inc.	Chicago, Ill.
Davison Chemical Corp., The	Baltimore, Md.
Deere & Co.	Moline, Ill.
Des Moines, City of	Des Moines, Iowa
Ditman, J. A.	Laurel, Md.
Drumcliff Co., The	Towson, Md.
Dryfoos, Sidney L.	Cleveland, Ohio
duPont de Nemours, E. I. & Co. (Retail Products Div.)	Wilmington, Del.
duPont, H. F.	Winterthur, Del.
Elmwood Cemetery	Birmingham, Ala.
Engbretson Seed Co.	Astoria, Oreg.
Evans Implement Co.	Atlanta, Ga.
Everett Seed Co.	Atlanta, Ga.
Evergreen Cemetery Assn.	Chicago, Ill.
Father Flanagan's Boys Home	Boys Town, Nebr.
Ferry-Morse Seed Co.	San Francisco, Calif.

Subscribers to Green Section Service (continued)

Food Machinery & Chemical Corp. (Agricultural Dept., John Bean Div.)	Lansing, Mich.
Forest Preserve, District of Cook County	Chicago, Ill.
Funk Bros. Seed Co., Inc.	Bloomington, Ill.
Gallowhur Chemical Corp.	New York, N. Y.
Garden Products Co.	St. Louis, Mo.
Gate of Heaven Cemetery	Montgomery, Ohio
Geary Brothers	Klamath Falls, Oreg.
Germain Seed & Plant Co.	Los Angeles, Calif.
Glissmann, Henry C. & Son	Omaha, Nebr.
Green, Jack	Arlington, N. J.
Griffith, E. H.	Pittsburgh, Pa.
Godwin, Hiram F.	Detroit, Mich.
Golf & Lawn Supply Corp.	White Plains, N. Y.
Gordon, William F., Co.	Bala Cynwyd, Pa.
Hall, Arthur F.	Kansas City, Kans.
Hargreaves, W. & Co., Ltd.	Cheshire, England
Harris, Joseph, Co., Inc.	Rochester, N. Y.
Harris, Robert Bruce	Chicago, Ill.
Hastings, H. G., Co.	Atlanta, Ga.
Hartford Park Department	Hartford, Conn.
Hector Supply Co.	Miami, Fla.
Henderson, Peter, & Co.	New York, N. Y.
Hoffman, A. H., Inc.	Landisville, Pa.
Hudson Bay Mining & Smelting Co., Ltd.	Flin Flon, Manitoba, Canada
Hyper-Humus Co.	Newton, N. J.
Island Landscape Co.	Palm Beach, Fla.
Jacobsen Mfg. Co.	Racine, Wis.
Jones, Robert Trent	New York, N. Y.
Kellog Seed Co.	Milwaukee, Wis.
Kelly Agricultural Products Co.	McKeesport, Pa.
Knollwood Park Cemetery, Inc.	Queens, N. Y.
Korber, Josephine W., Mrs.	Great Neck, L. I., N. Y.
Kylander Co., The	West Hartford, Conn.
Ladd, Greeley	Minneapolis, Minn.
Laguna Beach Lawn Bowling Club	Laguna Beach, Calif.
Lapp, Walter S.	Lansdale, Pa.
Lawn & Golf Supply Corp.	Philadelphia, Pa.
Lawn-Rite Sales & Service	Denver, Colo.
Lawrence, Robert F.	Miami Beach, Fla.
Lee, Ivan W.	Seattle, Wash.
Lilly, Charles H., Co., The	Seattle, Wash.
Linck, O. E. Co., Inc.	Clifton, N. J.
Link's Nursery, Inc.	Clayton, Mo.
Lyon, John D., Inc.	Belmont, Mass.
McCullough, J. Chas., Seed Co., The	Cincinnati, Ohio
McGovern, J. B.	Wynnewood, Pa.
Mallinckrodt Chemical Works	New York, N. Y.
Mangelsdorf, Ed. F., & Bro., Inc.	St. Louis, Mo.

Subscribers to Green Section Service (continued)

Marlborough Golf & Country Club, Ltd.	Montreal, P. Q., Canada
May, Earl, Seed Co.	Shenandoah, Iowa
Meisel, Lawrence J., Co.	Clayton, Mo.
Miamisburg, City of	Miamisburg, Ohio
Michigan Peat, Inc.	Capac, Mich.
Mid-Atlantic Association of Greenkeepers	Washington, D. C.
Minneapolis, City of	Minneapolis, Minn.
Minnesota Milorganite Co.	Long Lake, Minn.
Minnesota Toro, Inc.	Minneapolis, Minn.
Mock Seed Co.	Pittsburgh, Pa.
National Greenkeeping Supts. Assn.	St. Charles, Ill.
National Landscape Nurserymen's Assn.	Niles, Mich.
Northrup, King & Co.	Minneapolis, Minn.
Northwest Missouri State College	Maryville, Mo.
Ohio Toro Co.	Cleveland, Ohio
Old Orchard Turf Nurseries	Madison, Wis.
Oliger, J. C., Seed Co.	Akron, Ohio
Peppard Seed Co.	Kansas City, Mo.
Peterson, Arthur D., Co., Inc.	New York, N. Y.
Pfizer, Chas., & Co., Inc.	Brooklyn, N. Y.
Philadelphia Housing Authority, The	Philadelphia, Pa.
Philadelphia Seed Co., Inc., The	Philadelphia, Pa.
Philadelphia Toro Co.	Philadelphia, Pa.
Rain Bird Sprinkler Mfg. Corp.	Glendora, Calif.
Raynor, Ralph I.	Melrose Park, Pa.
Rosehill Cemetery Co.	Chicago, Ill.
Scarlett, Wm. G., & Co.	Baltimore, Md.
Scherer, George J.	Rock Island, Ill.
Scott, O. M. & Sons Co.	Marysville, Ohio
Scoville Mfg. Co.	Waterbury, Conn.
Seaboard Seed Co.	Philadelphia, Pa.
Sewerage Commission, City of Milwaukee	Milwaukee, Wis.
Sexauer, Geo. P., & Son	Des Moines, Iowa
Shearman, Mike	Sioux City, Iowa
Skinner Irrigation Co., The	Troy, Ohio
Sluis & Groot of America, Inc.	Palo Alto, Calif.
Smith, E. J. & Sons, Co.	Charlotte, N. C.
Soilaire Industries	Minneapolis, Minn.
Spalding, A. G., & Bros., Inc.	New York, N. Y.
Spring Grove, Cemetery of	Cincinnati, Ohio
Stumpp & Walter Co.	New York, N. Y.
Summit Hall Turf Farm	Gaithersburg, Md.
Swift & Co., Plant Food Division	Baltimore, Md.
Terminal Sales Corp.	Dearborn, Mich.
Teweles, L., Seed Co.	Milwaukee, Wis.
Thompson, Stanley, & Associates	Guelph, Ont., Canada
Toro Mfg. Co.	Minneapolis, Minn.
U. S. Naval Academy Assn.	Annapolis, Md.
Vine Street Cemetery, The	Cincinnati, Ohio

Subscribers to Green Section Service (continued)

Volkman, C. M., & Co.	San Francisco, Calif.
Wagner, H. L., & Sons	Imbler, Oreg.
Weldele, Frank J.	Youngstown, Ohio
West Coast Fertilizer Co.	Tampa, Fla.
*West Point Lawn Products	West Point, Pa.
Whitney Seed Co., Inc.	Buffalo, N. Y.
Wichita Board of Park Commissioners	Wichita, Kans.
Williamson, Garfield, Inc.	Jersey City, N. J.
Wood, T. W. & Sons	Richmond, Va.
**Woodruff, F. H., & Sons	Milford, Conn.
Woodside Bent Grass Nurseries	Des Moines, Iowa
Worthington Ball Co., The	Elyria, Ohio
Worthington Mower Co.	Stroudsburg, Pa.
Zaun Equipment Co.	Jacksonville, Fla.

*Took out three subscriptions
**Took out four subscriptions

RESEARCH FELLOWSHIPS AND RESEARCH GRANTS ADMINISTERED BY THE GREEN SECTION IN 1950

Research Grants Made by The Green Section in 1950

Georgia Coastal Plain Experiment Station

Indiana Agricultural Experiment Station at Purdue

Massachusetts Agricultural Experiment Station

Missouri Agricultural Experiment Station

New York Agricultural Experiment Station at Cornell

Oklahoma Agricultural Experiment Station

Rhode Island Agricultural Experiment Station

Rhode Island Agricultural Experiment Station (from New England Golf Association)

Texas Agricultural Experiment Station

Fellowships Administered by The Green Section in 1950

Georgia Coastal Plain Experiment Station

Oklahoma Agricultural Experiment Station (Tulsa Golfers' Fund for War Wounded)

Pennsylvania Agricultural Experiment Station (1950 Green Section Fellowship)

Pennsylvania Agricultural Experiment Station (Wagner Fellowship Continued in 1950)

Pennsylvania Agricultural Experiment Station (West Point Lawn Products Fellowship)

SUMMARY OF ACCOMPLISHMENTS IN TURF IN 1950

The standards of turf maintenance are much higher today than they were thirty years ago. The users of turf demand that it approach perfection.

The improvement of turf and the demand for that improvement have grown together. The program of turf research, education and extension that has been carried on cooperatively by the United States Golf Association Green Section and the U. S. Department of Agriculture, Bureau of Plant Industry, for the past thirty years, has resulted to a large extent from the demands of golfers and other turf users for improvement. At the same time, progress along the lines of better grasses, better management practices, and better pest control measures has provided items of interest for the users of turf and has stimulated their desire for higher standards of turf quality. We may say that research, education, and extension do much to satisfy the demands of turf users for improvement, but on the other hand that very improvement tends to increase the demand for higher standards. Turf research has been accelerated greatly in the years following World War II. About half the state agricultural experiment stations in the United States presently are engaged in some activity relating to turf. These states and their activities are listed elsewhere in this review.

It seems appropriate at this time to document the progress that has been made in turf research since its inception in this country and to establish a point of departure upon which to base subsequent turf research reviews.

Turf research, turf extension, and turf education are all interrelated and interdependent. The establishment of research fellowships provides an opportunity for the education of a graduate student in the field of turf (and for the training of a future leader) and it assures the accomplishment of a significant piece of research. Turf extension specialists disseminate new information that is developed by turf research workers - and they bring back to the research man their findings relative to problems that exist in practice and news of practical applications of research results. There is need for exceptionally close liaison between extension workers and research workers and there is need for the research and extension workers to cooperate in carrying on educational activities. Only by close cooperation among turf workers may the maximum benefit be derived from the research work that is being done.

The United States Golf Association's new book on Turf Management, H. B. Musser, editor, provides an excellent foundation for an understanding of our present position with regard to our knowledge and our accomplishments in the field of turf culture. This book is well suited for use as a text by the student and for use as a manual by the practical grower of turf. It may be regarded as a compendium of facts gained from the combined experiences of many practical men and from research findings of the various institutions which have conducted investigations in the field of turf.

Research is progressing at the present time at an accelerated rate. Some information has been developed since the publication of Professor Musser's book. It is the purpose of Turf Research Review to record the turf research efforts being expended and the results of that research, bringing our readers up to date.

Grasses

A high percentage of the total research effort toward the improvement of turf has been expended in breeding projects for the improvement of various individual grass species. Breeding projects include various phases such as selection, hybridization through crossing individual plants and through polycross techniques, and selection from progeny nurseries. The practice of these techniques has provided a number of improved strains of grasses for turf purposes.

Improved strains of creeping bent include Washington (C-50), Old Orchard (C-52), Arlington (C-1), Congressional (C-19), Collins (C-27), Cohansey (C-7), and Toronto (C-15). One of the more recent developments, Dahlgren (C-115), has not been tested extensively but it shows promise of finding its place alongside the proven strains.

Stations which are actively engaged in projects for the improvement of bentgrasses include Pennsylvania. Purdue, Rhode Island, Oregon, etc. Many of the strains currently under test show promise, but require further testing. One of the great needs is for a strain of creeping bentgrass which will produce a satisfactory putting surface and which may be produced by seed. Current polycross studies in Pennsylvania give hope that we may have such seed soon.

Merion (B-27) bluegrass is one of the outstanding contributions of the effort to discover improved grasses. Merion bluegrass has been tested extensively over a period of fourteen years. An increase in commercial supplies of Merion bluegrass seed gives promise of a greater use of this grass.

The Penn State Blend of Chewings Fescue is a blend of selections from Chewings fescue which has produced turf of superior quality. Many of the newer strains of red fescue being tested at Penn State show promise of doing as well as or better than this blend. However, these strains have not been used very widely. They include F-74, F-65, F-79, F-80 and others. Some seed increase work is being done concurrently with the testing work because of the outstanding performance of the grasses in early tests.

U-3 bermudagrass, Tifton 57 bermudagrass, and some of the strains developed at the Everglades Experiment Station at Belle Glade, Florida, are among the most promising of the improved strains of bermudagrass. U-3 has been used for a number of years and has been outstanding in its performance on tees and other areas that are subjected to heavy wear.

Tifton 57 is the product of an extensive breeding program at the Georgia Coastal Plain Experiment Station. Many other selections of bermudagrass are under test at the present time.

Stations engaged currently in bermudagrass improvement include: Georgia Coastal Plain Experiment Station, Florida Agricultural Experiment Station, Texas Agricultural Experiment Station, Oklahoma Agricultural Experiment Station, California Agricultural Experiment Station and the USGA Green Section at Beltsville.

As this Review is being prepared plans are underway for an official release by the USGA Green Section and the U. S. Department of Agriculture of Z-52 strain of Japanese lawngrass (Zoysia japonica). Readers are asked to contact their own state experiment stations for information on this grass. Local recommendations vary because of climatic adaptation. In the so-called "crabgrass belt" Z-52 zoysia is able to crowd out crabgrass under ordinary lawn management.

Management

Studies of the proper use of fertilizer materials are among the most important pursuits of turf research workers. Many of the fertilizer practices that are now in use have been derived from the experience of turf users over a period of many years. Almost every experiment station that has been engaged in turf research has conducted one or more series of fertilizer tests under field conditions. Unfortunately, many of these experiments have not been well designed nor have they been conducted to yield data which could be used as a basis for determining proper fertilization practices.

In recent years, fertilizer and nutrient studies have been conducted by more refined experimental methods and a great deal of fundamental data have been developed. Greenhouse tests in which nutrient solutions were used to grow bent and bluegrass were first conducted at Arlington Farm by Dr. Mary E. Reid. Dr. Reid wrote an article for the October, 1933, number of the Bulletin of the USGA Green Section on the "Effect of Variations in Concentration of Mineral Nutrients Upon the Growth of Several Types of Turf Grasses." After her initial work, nothing further was done along this line until after World War II.

Purdue University, Rutgers University, and the USGA Green Section are among the stations which have done some of the most critical nutrient culture studies on turf. The work done by the Green Section has been based upon the assessment of the nutrient status of grasses by analysis of the clippings. Concentrations of nutrient elements in the leaves of the grass have been determined and correlated with the performance of the grass from the standpoint of vegetative growth and seed yield. It is proposed that data of this kind may be used as a basis for fertilization of turf grown in the field. The successful use of similar techniques in the growth of various horticultural food crop lends encouragement to the hope that improved turf fertilization practices may be derived from such studies.

The ureaform products have been the subject of a considerable amount of investigation. Both greenhouse and field studies have been conducted in which ureaform products have been compared with other nitrogen carriers. It is agreed generally that research findings indicate that there is a place in turf management for a product having the properties of the ureaform materials. Details of the practical usage of these products probably will have to be worked out in practice, but sufficient information is now available to serve as an adequate guide to the practical user of ureaform materials.

The years since World War II have seen a growing consciousness among technical workers and practical turf maintenance men alike on the dangers of overwatering turf. Much research has been aimed toward determining the detrimental effects of overwatering and toward working out criteria for determining the optimum irrigation

practices. Inasmuch as water usage is closely related to physical soil conditions, aeration, and drainage, all studies which deal with any one of these subjects necessarily touch on the other as well. No one of these phases of the environment of turf may be isolated and studied alone.

Research along these lines has been conducted at Purdue, Michigan, Pennsylvania, California, New York, New Jersey and Oklahoma. Additional work has been done by the USGA Green Section in cooperation with the Saratoga Laboratories at Saratoga Springs, New York.

The data which have been collected as a result of studies on irrigation, drainage, soil structure and aeration are voluminous and complex. The chief findings, however, may be stated quite simply. Briefly, they are (1) use only as much irrigation water as is necessary to keep the grass from wilting; (2) apply water slowly so that the soil is capable of absorbing the total amount applied without runoff; (3) cultivate as much as is practicable, to relieve compaction and to promote aeration and water absorption; (4) provide as nearly perfect drainage as possible; (5) modify soils (when it is practical to do so) so that the soil will not tend toward compaction, so that it will allow ready percolation of water, and so that it will be naturally well-aerated and well-drained.

Mowing heights for turf have been the subject of numerous research studies. Most of these studies have been prompted by earlier findings that amounts of root and top growth were correlated and the rationalization that higher mowing heights would produce better root systems and healthier turf. There are no data to refute these ideas. There are numerous indications, however, that physical soil conditions, moisture and nutritional factors have a greater influence on the extent of the rootsystem than does the height of mowing.

When turf is used for a specific purpose, the use determines the height of cut. There is no practical necessity for height of cut studies, as such. Therefore, investigations which have been conducted in recent years on this phase of turf management have had as their purpose the determination of whether or not a particular grass is suitable for turf for any particular use. Grasses which will not tolerate mowing heights of 1-1/4-inches or less are not suitable for fairway use. Many other examples could be cited.

The use of topdressing has declined considerably in recent years. Some excellent greens have not been topdressed in the last decade. The elimination of the practice of topdressing necessitates careful management of the putting greens by the golf course superintendent. Most superintendents will continue to use some topdressing even though the tendency may be to topdress less frequently.

The Rhode Island Agricultural Experiment Station has conducted investigations in the preparation of topdressing for many years. As a result of their work, it is now standard practice to incorporate 13 pounds of calcium cyanamid in each cubic yard of topdressing mixture. This practice eliminates practically all weeds in topdressing. The Rhode Island Station continues to study the effects of applications of various rates of topdressing and lime on putting greens.

The Georgia Coastal Plain Experiment Station has investigated the possibility of using sawdust as a source of organic matter in topdressing. Various

mixtures of sawdust, soil and fertilizer mixtures have been studied. Preliminary reports indicate that sawdust is an excellent material in proper mixtures.

Pest Control

Much effort has been expended in weed control research in the period since 1945. 2, 4-D has been an excellent tool for controlling broadleaf weeds. However, like many other management tools, it must be used properly. The use of 2, 4-D has now become fairly well standardized.

The crabgrass control materials are presently receiving the major emphasis in weed control studies. An article in the USGA Journal, February 1951 issue, summarized the present information with respect to crabgrass control.

Chickweed is one of the broadleaf weeds which is not controlled easily by 2, 4-D. Potassium cyanate has shown promise in some tests as an agent in chickweed control. Sodium arsenite has been used for this purpose for many years. Preliminary tests have indicated that a mixture of one pound of sodium arsenite and 8 pounds of potassium cyanate per acre will provide excellent control for chickweed and even lighter rates may be used effectively.

Most insects of turf may be controlled by either DDT or Chlordane. Both of these materials are relatively non-toxic to warm-blooded animals. DDT is an excellent material for the control of Japanese beetle grubs (25 pounds of actual DDT to the acre) and many of the surface-feeding insects, such as sod webworms, army worms, and cut worms (5 pounds of DDT to the acre). Chlordane is considered to be a more reliable and a quicker-acting material for the control of most of the surface feeding insects than is DDT. It is considered to be a more effective agent in the control of white grubs in the soil (10 pounds of technical Chlordane to the acre is standard).

The two stations which have conducted the major part of the research on insects of turf are the Connecticut Agricultural Experiment Station and the Florida Agricultural Experiment Station.

While earthworms are not insects, they may be controlled by using the insecticide Chlordane at the rate of about 10 pounds to the acre. While this amount of Chlordane may not actually kill all the worms, it appears to be effective in reducing the worm population so that worm casts on greens are not a serious nuisance.

The early research on turf diseases was done almost exclusively by the USGA Green Section. This phase of turf research probably has been pursued more avidly and with a more scientific approach than any other. Mercury treatments for brownpatch and dollarspot and Tersan treatments for brownpatch were developed by the Green Section.

More recently, agricultural experiment stations have begun to investigate disease control methods. The Pennsylvania Agricultural Experiment Station and the Rhode Island Agricultural Experiment Station have been the leaders in this work. The cadmium materials have come into use for the control of dollarspot as

a result of the experimental work conducted at these two stations.

At the present time the National Coordinated Fungicide Trials on Turf are being conducted. These trials provide a means of testing fungicides at a number of locations under various conditions. At the end of the year each cooperating agency furnishes the coordinator with the results of his tests, and the results are then summarized and distributed to the cooperators. This appears to be an excellent method of screening new fungicides.

Miscellaneous pests include moles and other burrowing animals. Experience has shown that moles are rarely a problem if good control of grubs is effected. Other burrowing animals are generally controlled by trapping or by baiting with poisoned grain.

Outlook

The accelerated pace of turf research is highly encouraging. As more people are trained to do turf research work through research fellowships and research grants, more effort will be expended in attempting to solve the problems which confront turf users. As these trained workers, on the completion of their training, go into various state experiment stations and other work, they will encourage the investigation of turf problems by experiment stations that previously have not done any such research.

As interest in turf research grows, the demand for near-perfection in turf will grow. The resulting pressure on experiment stations will enable them to assign men to detailed phases of major problems and also to the solution of many relatively minor problems. The prospects for advancing the cause of better turf appear to be excellent. Of great significance is the fact that the original idea of "Better Turf for Better Golf," which started when the Green Section was organized, February 10, 1921, now has spread to all fields of turf and the slogan has broadened to "Better Turf for Everyone." At the present writing we see that athletic field turf is receiving the lion's share of attention, next to golf, and that home lawns rapidly are coming into focus. It is still unrefuted that "There are more taxpayers directly interested in Better Turf than in any other single agricultural enterprise."