TURFGRASS—ITS DEVELOPMENT AND PROGRESS

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THE average golfer thinks little if at all about progress toward achieving the healthy green fairways and extraordinary putting surfaces of greens as he relaxes and enjoys his game of golf. Except perhaps for some circumstance which might have affected the turf adversely, or because his own lawn has suffered from some serious setback, he takes good turfgrass pretty much for granted. He will frequently remark on the beauty of the golf course and occasionally ask the superintendent, "How do you do it?" The superintendent usually replies with a shrug of his shoulder, but the obvious answer is "know-how."

The road to "know-how" has been a long and sometimes rough trail to travel. To the superintendents who have suffered many frustrations; to the men of science who have labored with fascinated interest; and to many prominent and successful business men who have found recreation in the mysteries of turf, golf owes a debt of gratitude.

Golf is a relatively new sport in this country—it was first introduced in the United States about 1888. In 1922, there were an estimated 1834 golf courses and by 1956, the total had climbed to more than 5300 in number. Hence golf, and thus golf course maintenance, is now big business.

To understand or to evaluate the development of turfgrass and turfgrass maintenance into the field of big business, we should consider the various stages in its progress. Broadly speaking, those stages were:

(1) the period of trial and error.
(2) the period of transition.
(3) the period of chemistry.

Period of Trial and Error (1885-1920)

The first work done toward establishing an experimental turf garden began in the United States as early as 1885, when Mr. J. B. Olcott conceived the idea of selecting samples of turf and expanding them by vegetative propagation. After the work was well under way, he was assisted by the Connecticut Experiment Station.

Olcott selected many hundreds of samples, not only in the United States but also during his travels in Europe, Australia, and New Zealand. Most of his selections were of stains of red fescue and bentgrass.

Olcott was certainly a pioneer and few, if any, recognized the significance of his work at that time, since golf courses were not established in this country until many years later. In fact, it was not until 1906, more than twenty years later, that golf course turf problems were pronounced enough to command any attention from the standpoint of scientific research. It was then that Dr. W. S. Harban met with Dr. C. V. Piper and Dr. R. A. Oakley to discus with them the possibilities of obtaining help from the United States Department of Agriculture. The need for further assistance was emphasized when in 1908 Charles B. MacDonald, well-known architect of his day, encountered such severe problems in establishing turf on the sand dunes at the National Links at Southampton, Long Island, N. Y., which was then being built, that he requested technical aid from the Department of Agriculture.

Early Articles on Greenkeeping

No funds for research were available but a considerable amount of investigation was begun and continued by Piper and Oakley in cooperation with many golf clubs. As a result, articles began to be published in the golfing magazines of the day, the first of which appeared in January 1913.

In the spring of 1915, the Executive Committee of the USGA formally requested additional help in solving greenkeeping problems.

It is interesting to note that their appeal was partly based on the fact that ten million dollars per year was being spent on the establishment and maintenance, combined, of golf course turf in the United States. By comparison, in 1955, it has been estimated that over $4,000,000 for maintenance alone was spent in the one state of New Jersey. In Los Angeles County, Cali-

fornia, an annual maintenance expenditure of over $2,300,000 was spent on 33 golf courses in just one county. In 1955 the maintenance costs for an 18 hole course in Los Angeles County averaged over $70,000.

As a result of the USGA appeal, the turfgrass experiments were begun at Arlington in the spring of 1916.

Through the efforts of E. J. Marshall (Inverness Club, Toledo) and Hugh Wilson (Merion, Philadelphia), the Executive Committee of the USGA formally established the Green Section November 20, 1920, the first Bulletin being published February 10, 1921.

The Transition Period 1920-1930

The intense interest of Piper and Oakley combined with the supporting efforts of the USGA. This interest and support was the basis upon which the first era of organized scientific research was founded.

Prior to the establishment of the Green Section, much of the information available was obtained from reports of experiences and maintenance practices as they pertained to individual courses. There was no clearing house through which these results could be verified by duplication nor any source through which the results could be coordinated and distributed by publication for general information and use.

As a result, every superintendent was more or less self-sufficient without technical support in his opinions when he was right, and without sufficient reason for condemnation when he was wrong.

However, these were only growing pains and served the useful purpose of indicating to the superintendent that he must be better informed if he hoped to protect himself against amateurs and quacks.. Today the situation is reversed; the science of growing turf has far outstripped the knowledge of any one man and the average golf club is only too glad to turn the whole mess of headaches over to the man responsible for results. As for the amateur expert, he now seeks the advice of the man he once so freely gave it to. So much for the professional turfman as an individual, but just how did he shape up as a craftsman? In terms of the way we think today:

1. He believed in frequent and periodic topdressing which today is somewhat controversial.
2. He practiced thatch removal.
3. He did not believe in overstimulating turfgrass with chemical fertilizers, but used organics liberally.
4. He had some knowledge of chemical weed control using iron sulphate and sodium arsenite in a limited way.
5. He used corrosive sublimate for earthworm control.
6. For brownpatch he used mostly Bordeaux mixture, but prior to 1920 brownpatch fungus had not been isolated as a definite disease.

COMING EVENTS

September 16-17
Midwest Regional Turf Foundation Field Days
Purdue University
Lafayette, Ind. — Dr. Wm. H. Daniel

September 17-19
Florida Turf Conference
University of Florida
Gainesville, Fla.

October 3 and 4
Washington State Turf Conference
Washington State College
Pullman, Wash. — Dr. J. K. Patterson

October 7 and 8
Utah-Idaho Turfgrass Conference
Ogden Country Club
Ogden, Utah — J. W. Richardson

October 10 and 11
Rocky Mountain Turf Conference
Colorado State College
Fort Collins, Colo. — Prof. George A. Beach

October 14 and 15
New Mexico Turf Conference
New Mexico College of Agriculture and Mechanic Arts
State College, N. M. — Prof. C. E. Watson

October 16-17-18
Kansas State Turfgrass Conference
Kansas State College
Manhattan, Kans. — Dr. Ray A. Keen

October 17 and 18
Arizona Turf Conference
University of Arizona
Tucson, Ariz. — Prof. J. S. Folkner

October 21-22
Louisiana Turfgrass Conference
Lafayette, La.
SLI Box 65, Lafayette — Mr. L. G. Vickers

November 18-22
American Society of Agronomy Annual Meeting
Atlanta Biltmore Hotel
Atlanta, Ga.

7. The use of lime was rather limited in the belief that it encouraged weeds. Although a little later he led the way to the liberal use of lime..
8. He occasionally used complete fertilizer, mixing his own in various combinations of sulphate of amonia or nitrate of soda with acid phosphate and muriate of potash.
9. Grasses used on the greens were mostly red fescue and bents, while for fairways Kentucky bluegrass, Red Fescue and Red Top predominated.
10. Aeration was not widely used but when helpful the tools were forks, discs, and spiked rollers.

Fundamentally the superintendent before 1920 was acquainted with many of the theories and practices of today; the main difference being in the limitation of technical knowledge and refinement of practical application.

With the improved standards of maintenance demanded today the superintendent could not get by in the use of the limited knowledge and tools of his early predecessors.

Greenkeepers Form Association

Two of the great influences of this period were in the form of publications. The Bulletin of the Green Section was first published in 1921 and in 1926 the National Association of Greenkeepers of America was organized. This organization published The National Greenkeeper as the official organ of the association. The two publications provided a much needed source of information. The Green Section Bulletin stressed the scientific and technical aspects of turfgrass maintenance, while the National Greenkeeper provided the medium for the exchange of practical ideas and methods.

Although the turf plots at Arlington were established in 1916, it was not until August of 1927 that the first meeting sponsored by the Green Section was held at the site of the plots. The 10-year period preceding this meeting was devoted to establishment of the plots by volunteer workers of the USGA who donated their time and efforts and acted as advisors. O. B. Fitts and G. T. Cunningham were the only paid employees of the Green Section and their job must have been stupendous during the early 1920's.

Early experiments at Arlington dealt with only most urgent problems of the day. Space does not permit a detailed report of these experiments and they are not particularly important now except that each experiment contributed to the progress being made. In passing, it should be noted that it was during this phase of development that the mercurials were discovered as an agency of control for turf diseases and are still today important chemical fungicides.

Except for earthworms, insects were not universally troublesome. It was for earthworm control that bichloride of mercury was first used, and with excellent results. It could be surmised that from experiments carried on for earthworm control that the fungicidal value of the mercurials might have evolved. This value was substantiated by the work of Dr. John Monteith, Director of the Green Section from 1927.

Interest in the fertilizer experiments seemed to center around the use of sulfate of ammonia and acid residual fertilizers compared to nitrate of soda and alkaline types. This interest was stimulated by the problems of weed control, particularly clover. Much work was done on the chemical fertilizers because organics had long been used as practically the only source of fertilizer and much had already been learned from their practical use. On the other hand, chemical fertilizers were relatiely new insofar as turf was concerned.

Propagation of Bents

Perhaps the most important development in the scientific field which might serve as a great impact on the future was the selection and vegetative propagation of certain types of bents. Up to 1920 only four types of bents were available for golf turf. They were known as

1. *Agrostis alba* (red top)
2. *Agrostis tenuis* (Rhode Island)
3. *Agrostis canina* (velvet bent)
4. *Agrostis palustris* (carpet bent—creeper)

Rhode Island bent seed was also im-

ported from New Zealand and was at that time classified as Colonial bent.

All of the principal types were found in South German mixed bent harvested in Germany.

From established turf areas of this mixed bent, Piper, Oakley, and Lyman Carrier made selections and propagated them vegetatively for distribution to member clubs of the Green Section. Just who originate the vegetative method of propagation is not known, but in a search for information on the subject a reference was found to a Dr. William Richardson. He was a Doctor of Divinity and an agricultural hobbyist who prepared a publication in 1818—"An Essay on Agriculture" —a memoir drawn up at the express desire of Arch-Duke John of Austria on the nature and nutritive qualities of Fiorin grass (creeping bent).

Dr. Richardson was a native of Ireland where creeping bent was known as Fiorin.

By 1927 Washington, Metropolitan, Velvet, Columbia and Virginia strains of creeping bent had been added to the list of vegetatively propagated grasses. Also Lyman Carrier had developed a seed-bearing creeper known at that time as Cocoos bent (Seaside) *Agrostis maritima.*

In April 1927 Dr. John Monteith was appointed Director of the Green Section and under his guidance much scientific progress in turf was made. Meanwhile state experimental stations were developing experimental work in various parts of the Country including the New Jersey experimental plots with Dr. Howard Sprague (1928).

During the development period of the Green Section research program, the National Association of the Greenkeepers of America was expanding and solidifying its membership, laying another cornerstone in the building of knowledge which was to follow.

Thus it was during this period that the practical and scientific fields joined forces in the evolution of progress as illustrated in joint efforts of the Green Section and Superintendents in every section of the country in the establishment of demonstration gardens. The Green Section provided the materials and the superintendents applied them and evaluated the results on monthly reports. All reports were then consolidated and a composite picture of the entire country could be arrived at.

These demonstration garden experimental plots were the forerunner of the pie green which again was a cooperative effort between the Green Section and the superintendents. From the pie green new strains of putting green turf were developed such as: Arlington, Congressional, Cohansic, Toronto, and Dahlgren.

Similar procedures followed in the development of Merion blue grass and the Zoysias.

As a result of experimental work at State Experiment stations in the south, combined with practical tests by the superintendents, new Bermuda grass strains including Tif green (Tifton 328), Tiffine (Tifton 127), Gene Tift and other selections have found wide acceptance in Bermuda grass areas.

This work was followed somewhat later by the release of Pennlu and Penn Cross both bent grasses developed and released by Pennsylvania Agriculture Experiment Station, as likewise was Pennlawn Creeping Red Fescue.

Combined efforts of the practical and the scientific fields continue at many state Agriculture Experiment Stations such as Georgia Coastal Plains Experiment Station, Texas Agriculture Experiment Station, Kansas State College, New Jersey Experiment Station, Purdue, and Rhode Island Experiment Station.

Mechanization Takes Over

In the practical field a milestone was reached in the passing of the horse drawn equipment and while the Green Section did not experiment in the mechanical field at that time it did act as a clearing house for information. Between 1920 and 1925 the transition period from horse to tractor drawn equipment was well under way and revolutionary maintenance practices were receiving shots in the arm as a result of the work being done by Monteith and others such as Sprague, Musser, Noer and the Greenkeepers of America. Commercial fertilizer was being more widely used; the

mercurials were rapidly being adopted as a fungicide, and arsenate of lead was the answer to the Japanese beetle which was then rapidly becoming a pest; fairway water systems had begun to feel their way into a never ending controversial issue. The golf course superintendent was catching up at this time in his knowledge of maintenance practices and familiarity with technical advances, which was to prepare him to meet very shortly an unexpected collapse of our whole economic system with the crash of 1929, followed by the 1930's and the depression.

Golf, being a luxury, was hit hard and immediately by the economic depression. Income dropped far below operating costs and many clubs passed completely out of the picture, others retrenched to a minimum, and no monies were spent which could possibly be avoided.

Research suffered for the same reasons and by 1933 scientific work had reached a standstill except for extension work. For eight or nine years, both practical and scientific work faltered. About 1937 or 1938 an upward swing in our economy was felt, to be followed by World War II and its effects—and we entered into an age of chemistry.

The Age of Chemistry

While the wartime years of the early and middle '40's saw a curtailment of maintenance practices and of turfgrass research, there were pressures exerted which contributed to progress. A shortage of mercury necessitated a search for other turf fungicides. Thiram and the cadmium materials were the result of this search.

Widespread use of DDT was born of wartime urgency and this insecticide was followed by a whole group of related chlorinated hydrocarbons.

Considerable work had been done with sodium arsenite as a weed killer, and it found wide usage, particularly in clover control. The war had shut off imports of foreign seed and prices advanced to such an extent that domestic seed growers in the states of Washington and Oregon expanded their seed production to include varieties of fescues and Colonial bents such as Astoria and Highland. In New Jersey, Raritan and Emerald strains of velvet bent (selections of Dr. H. B. Sprague) found a limited market as did Piper and Arlington from Rhode Island.

During the depression a receptive market was found at the clubs for power equipment such as the power green mower, but the professional turfman showed sales resistance because it meant reduction of labor forces—not a very popular idea of that time; also he still preferred the hand type of maintenance.

However it was inevitable that with increased labor costs, due to the war, equipment would be found to replace antiquated hand methods. As golf clubs recovered from the depression they found themselves in a more favorable financial position and the road block to new equipment was broken. Manufacturers were encouraged to expand, and a flood of new types of equipment found early buyers in the market. Aeration devices, thatch removal machines and attachments, multi-purpose equipment, and even caddie carts are only a few types to find a place on the golf course.

Perhaps the most controversial of all mechanical aids is the fairway irrigation system. Controversial because it most certainly has its proponents as well as its opponents. The question of fairway irrigation however, will be discussed in a later issue.

The search for better ways and means to produce improved turf will continue. Golf clubs can still lead the way in turf improvement by

(1) Subscribing to the Regional Turf Service and to the Green Section's Research and Education Fund.
(2) Providing adequate expense allowance for the superintendent to attend local and national educational turfgrass conferences and short courses.
(3) Providing in the budget for one or more trainees for the superintendent to train for the future.

Turfgrass is big business—it needs superintendents, technicians, scientists and funds.

For better golf, every golfer should find a way to contribute, either individually or through his club, to better turf.