Recent Technical Developments in Turf Maintenance

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Address delivered February 3, 1933, before the National Association of Greenkeepers' Convention at Hotel Sherman, Chicago, Ill.

The layman is inclined to expect of scientific research a series of miracles or discoveries rather than a gradual development. This is due probably to the extensive publicity that immediately follows the announcement of some new discovery. As a matter of fact, a scientific discovery, which may be known everywhere within a brief period of a few days after it is announced, is usually the result of many years' work, with gradual developments, which even the discoverer himself may at the time not have been able to recognize as real developments.

It takes time to test new ideas. Unfortunately most of the new ideas of scientists, like those of the politicians, do not work. The scientist, before exposing his ideas to the public, is expected to test them out carefully in the laboratory; and if they do not work out as expected he has only himself to blame and no one hears anything of them. The politician, on the other hand, first tries out his ideas on the long-suffering public, and then if they do not work out he has another party to blame for interfering and everybody hears about it.

A good example of slow technical development with which we are all familiar is that of the automobile. This industry has kept a large staff of technical men busy for many years in improving the various parts of cars. There has been a steady improvement, and that improvement is still going on. It is probable, however, that no two research engineers would agree as to what were the technical developments in automobile design or manufacture in 1932. They can agree, however, on the outstanding developments over a period of years, for these have been exposed to the tests of road service.

In considering technical developments in turf culture it should be remembered that there is little research work on turf under way. When one considers the enormous capital investment in public and private golf courses in this country alone and the annual expenditures on their upkeep it is surprising that such a trivial amount of money is available for the study of the application of modern science to the building and care of golf courses. It is true that we have some appropriations for such work in this country, in Great Britain, and, recently, in other countries. Most of the funds available must be used for educational and service purposes rather than for technical developments.

It is amusing to hear what some greenkeepers and green-committeemen expect of the small number of men who are conducting research work on turf problems. If a new disease appears, a new treatment is expected within a few days. If unusual weather conditions bring about new turf disorders, the scientist is expected to have a full explanation and a remedy within a week—else of what value is he? Unreasonable demands of this kind signify an ignorance of the problem. The unreasonable demands that greenkeepers and others make of the technical man must therefore be ignored just as those that players make of greenkeepers and green committees must be ignored if there is to be any real progress.

During the present century there have been some fundamental changes in the methods used in growing plants, just as there have

been changes in almost every other human activity. Farming has been decidedly changed as the result of the widespread replacement of horses and mules by automobiles and tractors. The replacement of animals by machines has necessitated the general use of commercial fertilizers to replace animal manure in maintaining soil fertility. The development of methods for controlling insects and diseases has also accomplished important changes in routine farm methods. These changes, which we regard as modern improvements, have certainly not made farming any simpler. They have made it necessary for the farmer to know more about his animals and plants and have also made it necessary for him to know something about machinery, fertilizers, fungicides, insecticides, and other things with which the farmer of a few years ago did not have to bother. Similar changes have gradually come about in greenkeeping, and with them have come problems which could not be solved with old methods.

One of the first turf problems to be subjected to scientific tests was that of the mysterious loss of turf from disease attacks. A systematic study of such losses during the past few years has shown that there are a large number of parasitic and nonparasitic diseases affecting golf course turf in this country. In many cases they have been confused, due to the similarity of symptoms; but it is now possible to readily identify many of them and to apply treatments according to their various causes. These ailments have been compared in a number of our Bulletin which has just been published, so I shall not dwell on them here. One of the interesting technical developments of this study has been the proof of the relationship between certain environmental conditions and the development of many of these ailments. In some instances some of the contributing factors have been suspected for many years but there had been no positive proof. In other instances little-suspected factors have been found to be important, whereas others that have been considered important have been proved to have little or no influence on these ailments.

From the study of fungicides for the control of brownpatch and dollarspot there has developed the information that fungicides containing mercury are the most effective against these diseases. This study has proved that practically all of the mercury compounds will check these diseases if properly applied. Furthermore, it has shown that the simple, less-expensive, inorganic mercury salts are as effective for this purpose as are the more complicated compounds which cost more to manufacture.

The development of arsenate of lead as a turf insecticide is a recent development. It has been shown that it has two distinct uses; that of poisoning the soil to check those pests that feed in the soil, and poisoning the grass for the control of insects which feed only on the leaves. Arsenate of lead and the mercury fungicides are weapons which technical men, within a comparatively few years, have given the greenkeeper to use in fighting pests.

The study of soil conditions as they affect the growth of turf has brought out some interesting information in recent years. In this country we have golf turf growing on a great variety of soils, and it is only natural that there should be found many differences in the response of grass to these varying soil types. Several years ago there were experiments performed which indicated that soils should be acid for the best growth of bent grass. The acid-soil theory was

widely accepted, but recent developments have decidedly modified that theory. We now realize that many of the results attributed to acidity of the soil were actually due to other factors, which had been overlooked. Although it is still recognized that the bent grasses will thrive best in most soils if they are slightly acid, we know that the juggling of the acidity of the soil will not accomplish everything that was claimed for it. It has been shown that bent grasses grow best in some soils if they are decidedly acid, whereas in other soils the best growth may occur when they are alkaline. Therefore it is impossible to state that soils for golf course turf should be within certain prescribed limits of acidity. The study of soil acidity has naturally led to the study of other chemical conditions of the soil and has brought to light many instances of chemical deficiencies or excesses which were not suspected a few years ago.

In addition to the study of chemical conditions of soil there has been a study of physical conditions as they affect golf course maintenance. It has been shown that the physical properties of soil may be as important as the chemical properties in influencing the growth of grass, particularly on putting greens on heavy soils which are exposed to excessive trampling and consequent puddling. Various mixtures of soil and sand with different types of organic matter have indicated that putting green soils on most golf courses could be greatly improved both from the standpoint of play and of the growth of grass.

A study of the relation of height of cutting grass to the maintenance of turf and the control of weeds has pointed out a serious danger in our modern turf maintenance practices. This recent development has already been discussed on your program and in the Bulletin.

There have been many other additions to our technical information on growing grass, controlling weeds and other pests, improving soil, and similar subjects. The greenkeeper in recent years has also received much technical help from engineers in the design and production of the great assortment of machinery and watering systems now at his disposal. It is surprising how quickly the general public becomes so familiar with a new development that it is regarded as commonplace. Many of the comparatively recent developments in golf course upkeep are now so generally used that they are regarded as being almost as old as golf itself.

It was suggested that I call attention to the practical application and promises of recent technical developments in turf culture. The practical application and the promise of these developments rest with the greenkeeper and not with the technical worker. The technical man's job is done when he has shown the way to use a new material or device. He should then be free to turn in search of something else which possibly may replace entirely his last improvement. Only time can tell the full importance of any technical development. Time already has had an opportunity to tell something about the practical application of some of the developments I have mentioned. I can therefore give you a little from that story.

Greenkeepers make no exception to the rule that the self-styled practical man invariably views with suspicion any suggestion from the scientist, whom he erroneously calls the "theorist." As a matter of fact, the worst theorists are usually the practical men. If you

want to hear a big assortment of theories on any subject, talk to some of the so-called "practical men" instead of most scientists. The scientist has to have theories, but he puts them to work and in most cases is able to keep them properly harnessed. On the other hand, when some practical men get theories they just play with them, then turn them loose to roam with many other wild theories. In time there is a stampede, and the poor practical man is overpowered by his wild herd of apparently harmless theories. Theories are like mustangs; they are all right if you know how to ride them. I know of nothing more pathetic than a practical man overpowered by theories unless it is the practical man so scared of theories that he will have nothing to do with anything which he suspects may have some time come in contact with a theory. We are all apt to forget that most of the things regarded as of greatest practical value today were once regarded as fanciful dreams and theories. Even such devices as railroads, automobiles, and airplanes were scoffed at by practical men not so many years ago.

All of the recent technical developments which I have mentioned have already found practical application on golf courses. On some courses they are all in general use. On other courses none of them are in use and will not be in use as long as those who are now in charge retain their positions. No educational program of yours, nor of any other organization, will change the practices of some men. The big majority of greenkeepers, however, are constantly changing methods to meet new conditions. Many greenkeepers are taking advantage of the new developments upon the direct advice from the technical men, while others are unknowingly taking advantage of them through the use of commercial products. Thanks to the alertness of American business and to the persuasiveness of modern salesmen, the "practical man" often takes, without knowledge, some of the products of the research workers whom he spurns. One amusing case of this type is perhaps worth telling here. One greenkeeper who takes no small pride in being extremely practical and who almost shudders when anyone mentions science was admittedly hard pressed with brownpatch. One time when he was admitting his difficulties I ventured the suggestion that he try a combination of corrosive sublimate and calomel. That was before any of the tests with these chemicals had been announced. He said he was interested, and I gave him the rates to use. Two or three years later I asked him about his brownpatch troubles and he informed me he had discovered a wonderful cure for brownpatch. I asked about it and was told that a salesman had urged him to try some new dope. He had done so, it had accomplished wonders, and he intended to continue to use it. He could not recall the name but he volunteered to take me to the shop to show me a label. On the way he informed me that he had tried the combination I had suggested but that it was worse than worthless. Fortunately, he did not notice my smile when he showed me the package, and to this day he probably does not know that the wonderful remedy he had discovered was the same mixture of corrosive sublimate and calomel which I had suggested to him earlier but which was put out by an enterprising chemical company under a trade name, following our recommendations exactly. There are many such instances where salesmen keeping in touch with technical developments are able to extend the application of these developments on golf courses.

There are many cases of abuse of technical information on golf courses. Unfortunately, most useful devices offer possibilities of abuse. The new improvements that add speed to automobiles not only add to the value of automobiles but add to their danger when in reckless hands. Many of the drugs which have done so much to relieve human suffering have in other hands wrecked lives. One could cite any number of such instances and could include most of the new developments in greenkeeping. Improved mowers and watering systems have made better turf over longer periods, but they have also contributed to the ruination of turf. New chemicals which have offered possibilities for improved playing conditions at lowered costs have by many been used to squander money and injure turf. As more technical information becomes available the more complicated the job of greenkeeping will become and the more efficiently can golf courses be maintained. On the other hand, the more complicated the job becomes, the greater the possibility for the uninformed greenkeeper to waste money and damage his turf. That obviously leads to the need of more educational programs such as this one to keep the greenkeeper informed. Only those who know little of science believe that foolish notion that science simplifies one's life. It adds many comforts and aids, but by no means simplifies one's existence. These days of moving mountain sides or performing other miracles by pushing a button many miles away are apt to give a wrong conception of science. It is all right to push the button provided some one has made all the complicated calculations and installations to make that push amount to something. There are some who are still foolish enough to believe that the aim of technical developments in turf culture is to make greenkeeping a push-button job. It tends rather to make the greenkeeper a far more effective and essential individual at the business end of a push-button connection. The practical application of these developments therefore is the job of the greenkeeper and not of the technical worker.

Soy beans are an excellent crop for use as green manure in preparing soil to serve as topdressing material for putting greens. The crop of soy beans should be plowed under when the plants are in bloom. From 30 to 95 days are required for soy beans to blossom, depending on the variety of soy bean planted and upon other factors that affect plant growth. If allowed to grow beyond the blossom stage the plants become woody and when turned under require more time for decomposition. At the time of blossoming the plants are still tender, have produced about the maximum amount of organic matter, and have acquired most of their nitrogen. When plants at this stage of growth are covered with about 3 inches of soil, decay will be accomplished within 35 to 45 days. Decomposition may be retarded if the plants are covered with less soil, because of insufficient moisture; and if covered with too much soil the exclusion of the air may retard decomposition.

A screen of shrubs properly arranged around an exposed green is certainly attractive. Besides, it will do much toward keeping weed seeds from blowing upon the green and taking root.