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## THE USE OF SOIL ANALYSES

**I**N recent years various agricultural scientists have given much attention to the testing of soils to determine plant food requirements. For years the Green Section has been using several methods for testing soils in an effort to help clubs select the most effective and economical combinations of fertilizers for their particular needs. There is still much confusion as to what can and cannot be expected from laboratory tests of soil samples.

The Green Section is always glad to test samples of soil from member clubs, report results and offer recommendations based on these tests. To make this service most useful it is necessary for the club official to cooperate fully in sending good representative samples and in furnishing some information concerning them. The taking and shipping of samples is described in this issue.

Laboratory tests of soils serve only as guides. In some cases overzealous individuals have given the impression that all that is necessary is to put a sample of soil through a complicated chemical test and, presto! the whole complicated problem of turf fertilization could be figured out to the nth degree. Agricultural chemists years ago learned that this could not be done with farm crops, and notwithstanding all the showmanship on the part of some soil testers the fact remains that soil tests have in themselves only limited values for turf work.

It is well recognized by those who are best informed in methods of testing soils that the actual results of these tests as an aid in turf culture represent not more than 20 per cent. of the value, whereas the interpretation of these laboratory results represents fully 80 per cent.

A club official will send in a report occasionally of a complete chemical analysis of soil which he has had made by competent chemists.

After going to this great expense this club official has found he is unable to interpret the results and has submitted the report for a Green Section interpretation. In some instances even though the chemical work may have been entirely satisfactory no interpretation can be made of the analysis that could reasonably be expected to justify the expenditure for even the postage stamp used in forwarding the report.

Tests of soil samples with laboratory methods offer a valuable guide in the diagnosis of turf disorders or in determining the amount and kind of materials that should be applied to turf. They should be considered as no more than this.

To understand the value and limitations of soil tests, they may be compared with the taking of temperatures in human ailments or the making of urine analyses. When a physician examines a patient he invariably first takes his temperature. He may find a high fever. This in itself is important but the most important part of the diagnosis is the physician's interpretation of this temper-

ature. It may represent a minor disorder or a serious chronic ailment.

In order to determine what is wrong and be able to suggest remedies the physician makes other tests. He counts the pulse and may have urine, blood and various other tests made. In some cases he can directly locate the source of illness by these tests. In the big majority of cases, however, his diagnosis is based on information he obtains from the patient, or someone well acquainted with his case, as to his various aches or pains, what he has been eating or drinking, when he first noticed any ailment, etc., through a whole series of questions to determine the history of the case and all symptoms relating to it.

The science of turf culture is in its infancy as compared with medical science. Yet there are individuals who register their disappointment when they fail to have their turf problems solved by a soil analysis. We occasionally receive from clubs some samples of soil without even a postal card in reference to them. We often receive samples with letters something to this effect, "We are sending you some samples of our soil. Will you please examine them and let us know what is wrong with the turf?" After examining the soil we may no more be able to diagnose the turf ailment than a physician would be able to diagnose an ailment merely by an examination of urine, blood, temperature, etc., without a collection of other odds and ends of information collected from the patient. Since we cannot obtain this miscellaneous information from the soil samples, it is necessary to ask the club officials furnishing the soil to cooperate in supplying it.

An examination of urine may show albumen in sufficient quantities to quickly guide the physician to a diagnosis of his case. Likewise an examination of soil may reveal grubs or layers of sand, clay or peat which provide definite leads to the disorders. Just as an extremely high blood pressure may give the physician a valuable clue, an excessive acidity of the soil as indicated by soil tests may give a definite clue to turf disturbances. However, in both the cases of blood pressure and soil acidity there is a wide range of tolerance that, except in extreme cases, makes these tests unreliable unless correlated with other symptoms. In the large majority of cases the physician finds that the test he has at his disposal does not in itself definitely locate the disturbance. The same applies to the diagnosis of turf ailments.

When soil tests are used merely as a guide to the solution of turf problems they serve a useful purpose. When overemphasized they can lead to waste and confusion. When recommendations based simply on soil analyses are sent out from any laboratory (regardless of its supposed rating) which assume to describe definite turf feeding or management procedure with hair-splitting differences for the various fairways and putting greens, they should be regarded with suspicion. Quackery is by no means a stranger in the field of turf culture.

## COLLECTING AND SHIPPING SOIL SAMPLES

**A** GOOD sample of soil for analysis represents the area in question. The ideal sample from an area of 1,000 square feet of turf should consist of five or more

small plugs removed at random. In established turf the surface soil to a depth of 1 or 2 inches is of most importance for an analysis of a chemical nature, such

as the determination of pH or phosphorus. The plugs can be cut approximately 1 inch square with a knife or by means of some other device. Approximately one-quarter of the plug taken with a hole-cutter serves as a convenient sample.

A method for collecting soil samples which is convenient and provides good samples is the following: Procure a piece of 3/4-inch steel pipe and cut it approximately 6 inches long. Then sharpen one end and bore a hole through the pipe 1/2 inch from the other end. The pipe may be driven into the soil and when withdrawn will be filled with a plug to the depth desired. A tenpenny nail put through the hole at the end of the pipe will assist in withdrawing it from the soil. The plug can then be pushed out of the pipe by means of a rammer.

Each plug should be wrapped in clean waxed paper to prevent crumbling and to preserve the sample in its original condition. The type of wrapping used for coins is approximately what is desired.

If the sample is to represent a pile or bed of compost, topsoil, sand or humus it must be a thorough mixture of several individual samples taken from different places. For most purposes a small sample is satisfactory since a pint is enough for a series of tests.

Many times samples are shipped without information as to what location they are from and the kind of trouble that the soil may be causing. It is helpful if data are sent on the following points: Is the area in shade or open sunlight? Does the soil dry easily or does it tend to remain wet and soggy? What humus material has been incorporated with it? What fertilizing and liming program has been followed in recent years? Is the soil artificially drained with tile? How long has the soil been used for turf purposes?

Where testing is desired as an aid to general fertilizing or liming of all fairways or greens it usually is unnecessary to sample each one. Only the typical or representative greens or fairways on each different type of soil need be sampled. One group of plugs from each such green or fairway is sufficient. It is interesting to keep a record of tests of soil from the same areas over a period of years.

When poor areas are sampled either a composite of the poor and another of the adjoining good area should be sent, or if the injury has a definite margin the sample may be taken at a place which will include half of the one and half of the other turf. The latter type of sample may be cut out to fit a cigar box for convenience in shipping. As the healthy grass may become brown and almost completely rotted during transit, a paper marked "good" or "bad" should be pinned into each side of the sample so that there can be no uncertainty when it is inspected.

Samples are of no value unless properly labeled, securely packed and properly addressed with the return as well as the sending addresses.

At this season of the year when clubs are interested in soil tests as a guide for fall fertilizing programs the Green Section often receives many samples. These are tested in the order in which they are received and unfortunately with our limited staff some delay is unavoidable. Clubs will help us materially by having samples forwarded to us well ahead of the time information concerning the samples is required for the pur-

chase of fertilizers. The principal reasons for wanting tests made of the soil should be stated, as, for instance, thin stand, excess of clover, excessive drying in patches, yellow, unthrifty growth, etc. Any general observations similar to the above may serve to aid the person who is testing the soil in making tests other than the regular routine tests and will be of much help in interpreting results and formulating recommendations.

The Green Section is planning a series of meetings to be held in different parts of the country for general discussions of turf problems. These meetings will be sponsored by local golf associations as well as greenkeeper and professional organizations. The schedule of meetings for the next few weeks is as follows:

Cincinnati, Ohio.—Date of meeting and place to be announced by the Cincinnati Golfer's League.

Chicago, Ill.—August 31 at Mill Road Farm Golf Course, Lake Forest.

Lincoln, Neb.—September 2 at The Country Club.

Denver, Colo.—September 4 at Denver Country Club.

San Francisco, Cal.—September—Date of meeting and place to be announced later by Northern California Golf Association.

Santa Barbara, Cal.—September 14 at Valley Club of Montecito.

Los Angeles, Cal.—September 16 at Bel-Air Country Club, Beverly Hills.

Phoenix, Ariz.—September 19 at Phoenix Country Club.

Tulsa, Okla.—September 22 at Southern Hills Country Club.

Kansas City, Mo.—September 24 at Mission Hills Country Club.

St. Louis, Mo.—September 25 at Westwood Country Club.

Indianapolis, Ind.—September 28 at Highland Golf and Country Club.

Pittsburgh, Pa.—September 30 at Allegheny Country Club.

The plan in most cases is to invite all in the district who are interested in turf maintenance to assemble for lunch or dinner. Immediately afterward Dr. Monteith of the Green Section will give a talk on some phase of turf maintenance, which will be followed by a general discussion of course upkeep problems, especially those of local interest. During the afternoon the course where the meeting is to be held will, in most instances, be open to play to all who attend. The details concerning the various meetings may be obtained by consulting the local associations sponsoring them, the club at which the meeting is to be held or the Green Section office in Washington.

All who are interested in the growing of turf are invited to attend.

Dr. Monteith will spend from one to four days in each of the above districts, during which time he will visit as many courses as time will permit and discuss with representatives of clubs any turf questions in which they are particularly interested. If any club that is a member of the United States Golf Association wishes to have Dr. Monteith make such an inspection of its course during the trip, please communicate with him directly at the Washington office or make arrangements through your local organization.

## PURCHASE GRASS SEED ON A BASIS OF QUALITY

THE extended drought this year has killed considerable fairway turf, making it necessary to reseed. This is the time to check up on the amount of seed that will be needed. Orders should be placed soon in order to have the seed on hand for each planting so as to take advantage of the full growing season this fall.

There may be a question as to whether to fertilize an area in order to force the surviving grass into a quick recovery or to reseed. Usually fertilizer is preferable if a scattering of plants is alive. If large patches are dead it is advisable to reseed. It is well to remember that tender seedlings have a slight chance to survive

where established plants have been struggling along only half covering the soil. It is a good rule to try the fertilizer method first if there is any doubt as to the proper manner to improve turf. In many instances best results are obtained by using both seed and fertilizer.

There are State laws governing the sale of seeds and they require that the quality of the seed shall be shown upon a label attached to the container. Such information as the purity and germination percentages, the percentage of weed seeds, and the date the seed was tested are invariably required by law. If one multiplies