

SOIL TESTING FROM THE GOLF COURSE SUPERINTENDENTS' STANDPOINT

by V. J. Zolman

Soil testing programs were initially developed to improve the crop-yielding capacity of soils used in farming and fruit and vegetables growing as new, less fertile lands were being brought into production, or as the once virgin soils were being depleted of essential minerals. These methods tested largely for basic elements such as Phosphorus (P), Potassium (K) and pH.

Later, during the Thirties, as scientific research in crops and soil chemistry advanced, tests for other elements, such as Nitrogen (N), calcium (Ca), Magnesium (Mg), Sulphur (S) and Sodium (Na) and for humus were included in the standard testing.

During the 1940's, further significant scientific discoveries were made. Professor Underwood of Australia discovered that presence of certain chemical elements in small, trace amounts is essential for proper functioning and interaction of major elements in the soil, and for proper metabolism of plants. His findings were substantiated through years of research and laboratory and field testing carried on both in the United States and abroad. These elements became known as the Micronutrients or Trace elements. These include: Boron (B), Manganese (Mn), Iron (Fe), Copper (Cu), Zinc (Zn) Molybdenum and others.

These discoveries—plus the rapidly changing natural environment (particularly in our industrial areas)—pose a new challenge to the traditional soil testing methods. In our present natural environment where, on one hand, the soils are being depleted by ever higher-yielding varieties of crops and on the other hand, subject to pollution from air, irrigation waters, herbicides, fungicides and insecticides, requirements for proper soil testing have increased tremendously. Methods that were once satisfactory no longer suffice. It is becoming increasingly (and at times painfully) clear to many whose existence depends upon proper soil husbandry—such as farmers, fruit and vegetable growers and indeed, the golf course superintendents—that the maintenance of top-yielding soils under these conditions requires more precise and more scientific methods of soil testing. Plants that once thrived under application of conventional fertilizers are now more and more becoming diseased, fungi and weeds prove as the changing environment is placing an ever increasing demand for precise balancing of major, secondary and trace elements in the soil.

Proper testing methods for golf course turfs

In principle, the test requirements for golf courses are not fundamentally different from general agriculture. However, there are some significant differences arising from special problems confronting the golf courses. For example, the fact that golf courses are usually (simply for business reasons) located near industrial centers—that is, in areas subject most severely to the effects of pollution—makes it imperative that the tests are carried out on the basis of latest scientific principles. Such tests should include the following:

(1) Sampling of soil must be designed on the basis of precise statistical techniques. Usually, a minimum of 10 plugs must be obtained for each sample. Improper sampling yields erroneous analytical results that fail to provide a proper basis for treatment recommendations.

(2) The analysis must be specifically designed for golf course turf. It should include:

- a. pH
- b. Major, Secondary elements (lbs./acre) and Micronutrients (p.p.m.)
- c. Cation Base Saturation Percentages
- d. Total Exchange Capacity
- e. Standard of factors (nutrients) in the soil according to requirements of turf grasses

(3) Tests must be carried out for soil, on each green, tee and fairway, top-dressing and irrigation water by group of suitable quantitative analyses.

(4) Interpretation of the analysis of data contained in the Research Report is very responsible work. It must be carried out by an analyst with a good background in chemistry, bio-chemistry and soil science. It should include:

- a. Evaluation of analytical data and interactions for determination of diagnoses for each tested part of golf courses (greens, tees, fairways).
- b. Suggested treatment, calibration of chemical compounds (fertilizers) for 2-4 years program for balance the soil, based analytical data of soils, top-dressing, irrigation water and requirements of turf grasses.

Only through application of well designed tests such as these can the superintendents cope with problems confronting them in turf management in the Seventies.

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