Current Information Letter

For the Information of County Extension Agents and Extension Workers Only

AGRICULTURAL EXTENSION DIVISION—PAUL E. MILLER, DIRECTOR

File for Future Reference—Complete Index Will Be Furnished Annually

MAY 29, 1941 | UNIVERSITY FARM ST. PAUL, MINNESOTA | No. 000010

FILE UNDER: SOILS -- Fertilizers

CHEMICAL SOIL TESTS AS GUIDES TO FERTILIZER NEEDS

C. O. Rost
Division of Soils, University of Minnesota

Chemical soil testing is not new. More than a hundred years ago chemists were attempting to determine fertilizer needs of soils in the chemical laboratory. Soil scientists and soil chemists are still working on the problem and while much progress has been made, most of the chemical tests still fall short of perfection. Using modern testing procedures along with the consideration of a number of other factors and conditions, trained technicians are able to predict plant nutrient deficiencies with fair success.

Interpretation of Soil Tests

For the interpretation of soil tests two major requirements are essential:

(1) the consideration of certain internal and external factors which influence plant growth and (2) interpretation by an individual whose background of experience gives him the ability to weigh and interrelate the various factors involved. Under (1) the following need consideration.

1. Previous cropping history

2. Previous applications of fertilizer and manure

3. Character of the soil
   - a. Texture
   - b. Reaction
   - c. Presence or absence of carbonates
   - d. Kind and amount of organic matter
   - e. Base exchange capacity
   - f. Fixing power for phosphate and potash

4. Results of chemical soil tests

5. Results of plant tissue tests

6. Results of field trials (when available)

7. The kind of crop grown

8. Climatic factors - precipitation and temperature

Cooperative Extension Work in Agriculture and Home Economics, University of Minnesota, Agricultural Extension Division and United States Department of Agriculture Cooperating, P. E. Miller, Director. Published in furtherance of Agricultural Extension Acts of May 8 and June 30, 1914.

One can see at once that the interrelationship of these various factors makes the interpretation complicated and requires consideration by an individual who has a sufficient background of training and experience to evaluate them. The problem is to correlate the various factors in such a way as to reduce the number of erroneous diagnoses to a minimum. Even under such conditions the diagnoses are not infallible and 15 to 25 per cent of them will prove incorrect.

Recently a scientist who has devised one of the best soil testing systems was asked as to how he would evaluate the tests and his reply was that the making of the tests themselves represented about 20 per cent and the interpretation 80 per cent of their total value. That is, while the tests themselves are rather simple and not difficult to make, the main part of their value lies in their proper interpretation.

Soil tests being studied

I have been studying the various proposed soil tests and their interpretation for a number of years and during the past year rather intensively. At the present time I am not in a position to recommend any soil testing system, but intend to continue the study until the limitations of the tests so far as they apply to Minnesota conditions are worked out. It seems probable that certain of them will prove useful working tools in the hands of an experienced individual. In the hands of an individual with limited experience, the value of these tests is usually overweighted and the diagnoses are based on them entirely. Under such circumstances the tests are often quite misleading.

Soil testing agencies

A number of the fertilizer companies have, in the past, made use of soil tests in recommending fertilizers. Some of them have now discontinued the practice entirely, others are no longer emphasizing them, while a few others are continuing soils testing as a service to customers. Information available would indicate that few, if any, of the fertilizer salesmen now carry testing kits, but such soil samples as are taken are sent to a central soil testing laboratory where the tests are made by men with considerable training and experience. How accurate their diagnoses have been is not known to me.

What Soil Tests are Made by the University

The Division of Soils has, for a number of years, examined soil samples without charge. Such samples are submitted to a test for acidity, the texture determined and the amounts of organic matter and nitrogen estimated. From these and our knowledge of the area from which they come, suggestions for management or for fertilizer trials are made. Since this service is given without charge, it has to be fitted into the other work of the Division and this often makes it impossible to send reports or samples as promptly as would be desirable. This work is in charge of the Extension Soils Specialist and often his duties call for his absence from his office for as much as a week at a time, and the soil samples accumulate until he returns.

The Division of Soils does not have sufficient trained personnel to undertake, in addition to its obligated duties, the testing of soil samples by the so-called "quick tests" mentioned in the preceding sections of this circular. Such tests are being made in a few states where funds have been provided by special legislative appropriations or by grants from federal agencies such as the Works Progress Administration. In one state part of the cost is paid by the land owner and the remainder from a special legislative appropriation.