

U.S. A.I.D. Mission to Ghana
P.O. Box 1630, Accra, Ghana

August 7, 1964

Technical Report

OBSERVATIONS ON SOIL FERTILITY
ACTIVITIES IN GHANA

By

Dr. J.W. Fitts and Dr. W.V. Bartholomew
Soils Department, North Carolina State University

Resume of Visit

J.W. Fitts, Director of the International Soil Testing Project of North Carolina State and W.V. Bartholomew, Professor of Soil Science of North Carolina State and Consultant to the AID International Soil Testing Project, visited Ghana during August 1-8, 1964. The objective of their visit was to discuss soil testing and plant analyses and to ascertain what is being done in Ghana in these areas of activity.

Visits were made to see the soils of the Accra Plains, to observe the research work of the Cocoa Research Institute at Tafo, and to see the soil analyses facilities of the University of Ghana at Legon, Kwame Nkrumah University of Science and Technology at Kumasi, and the Ghana Academy of Science at Kumasi.

General soil testing and soil fertility problems of Ghana were discussed with Mr. Edward Quist-Arcot, Principal Secretary, and Mr. A.K. Asem, Extension Commissioner, Ministry of Agriculture; and with J.P. Emerson, Food and Agriculture Officer, and members of his staff, US A.I.D./Ghana.

Consultations on soil testing were held with P.M. Ahn of the soils staff of the University of Ghana, with S.T. Quansah, Director of the Cocoa Research Institute and members of his staff, including R.H. Kenten, Y. Ahenkorah, and E.J.A. Asomaning; with K.A. Quagraine, A.S. de Endredy, and S.K. Takyi of the Ghana Academy of Science at Kumasi; with B.N. Roy and R.K. Djokoto of the Kwame Nkrumah University of Science and Technology, and with S. Lampe, FAO representative in Accra. An effective soil testing and plant analyses program was the subject of a discussion before the soil scientists of the Ghana Academy of Science at a meeting in Accra.

Appreciation is expressed to the Ministry of Agriculture of Ghana and to US A.I.D./Ghana for the hospitality shown us and especially for arranging of visits to the several agencies and institutions where soil science interest The tours were enjoyable and the people visited were most cordial and helpful.

In keeping with the announced purpose of the visit, an effort was made to become acquainted with soils work and soil science personnel which are concerned with or are pertinent to a soil testing program. The observations relative to a soil testing program which were made during the course of the visit are passed on in the hope that they may be of help in a progressive program in Ghana. Some general suggestions on program operation and implementation are made, based on the experience from similar work in other countries. Plans for organization and operations must be made by Ghanaian officials and scientists who are more conversant with local problems and organizational needs.

Using Soil Test Information

Soil test information will be useful in a number of ways in bettering agriculture in Ghana. The primary purpose in obtaining the information is to advise individual cultivators about the need for and use of fertilizers. Application of such information has expedited economic increases in crop production in many countries. Soil test information also provides a generalized picture of the plant nutrient deficiency patterns and thereby an evaluation of the need for fertilizer in the several regions of a country. Such information should form the basis for the development of a fertilizer industry and/or a supply and distribution system for Ghana.

Soil Testing includes Research and Extension

A soil testing program includes the application and use of information gained through research in the several disciplines in soil science. This includes information on soil chemical and physical analyses, soil survey information, and soil fertility data gained through greenhouse and field trials. This information comes through research.

Experience has shown that the best soil testing programs develop where research has had the responsibility of developing the testing methods, devising the procedures for taking soil samples, calibrating the test procedures with greenhouse and field trials, setting the standards for making recommendations for fertilizer use, and giving direction and training to the extension agents who expedite the application of the soil test results. Further, research agencies should be given the general responsibility for a continuing concern for soil testing so that each new finding in research might be reflected in better soil testing and in more efficient fertilizer use.

Extension agencies have functioned best in the soil testing programs by educational activities and by assisting in soil sampling and in fertilizer application techniques. Extension agents hold training meetings on taking soil samples by farmers and in some instances supervise taking samples. They also have often had the responsibility of conveying and explaining the soil test information and fertilizer recommendations to the cultivator.

Thinking within the Ministry of Agriculture to organize the country on the basis of districts and regions would provide an organizational pattern that would lend itself well to the functions of a soil testing program. Agents in specific geographical and agricultural areas can become well acquainted with conditions in a specific area. In the soil testing program each agent would become conversant with the soil distribution pattern, the cropping conditions, the problems of sampling, the meaning and interpretation of soil test information, and the specific and general need for fertilizer for each crop in his district. He then becomes an efficient link between research and application.

Soil Testing As a Program

Successful soil testing programs have generally given attention to aspects other than chemical analyses and fertilizer recommendations. We believe that a successful program will be cognizant of at least six phases. These are: (1) Research upon which the program is based, (2) Obtaining representative soil samples, (3) Analyses (including procedures and techniques), (4) Interpretation of the results of the analyses, (5) Recommendations relative to the use of fertilizer and other management practices, and (6) Follow-up educational program to assure the tests are understood and can be followed; Also, that suggested fertilizers are available.

In developing a soil testing program, all of the six phases must be given consideration. Simply establishing a laboratory without the other phases of the program is very likely to result in failure. Actually setting up a laboratory is perhaps the easiest phase of a soil testing program. It is important that an adequate number of representative soil samples are taken and that a good follow-up program is developed. These phases of the program are dependent upon education and involve a trained staff rather than a large investment in equipment. (Of course, adequate transportation for Extension Agents is vital in carrying out the program which may necessitate an investment in vehicles).

Sampling soils will be a problem in Ghana, particularly in the higher rainfall areas along the coast where the soils are quite variable. Sampling soils from tree crops such as cocoa and citrus is more difficult than for annual crops such as maize or groundnuts.

Fertilizing annual crops including proper fertilizer placement is easier and more likely to give a greater response than fertilizing tree crops.

From the viewpoint of soil sampling and of getting good fertilizer response, it would appear that a soil testing program can be more readily initiated in the northern part of Ghana, in the reddish savanna soils than in the rain forest area.

In locating laboratories, it is suggested that they be developed one at a time with the idea that a good laboratory should be able to test at least 100 samples a day with 20,000 to 25,000 a year as a goal. This number can be easily attained for any laboratory and probably will be the most efficient range. Laboratories should be located in the most accessible cities where the samples can be readily delivered by mail or otherwise and where there will be a minimum of delay in getting the results returned. (A laboratory testing 100 samples per day should be able to get the answers back to the farmer within a reasonable length of time). The number of laboratories will depend upon the ease of transportation of samples and upon the number of samples tested. It is suggested that a start be made with one or two laboratories and no more built until the numbers of samples analyzed exceeds 10,000 per year per laboratory. A laboratory geared to test 100 samples per day will get the samples tested and the results returned more quickly than a laboratory testing 25 samples per day, even though one or two more days is required for the samples to reach the larger laboratory.

Soil Testing - A Coordinated Program

Since soil testing is the application of information from the various disciplines of soil science, an effort should be made to assemble all the soil information that has been gathered over the years in Ghana. There are several good soil scientists at the Ghana Academy of Science, the University of Ghana, the Cocoa Institute at Tafo, and other institutions and agencies in Ghana. Their studies and their knowledge should be utilized to the fullest in developing the soil testing program.

Information from other areas with similar soils or crops should be utilized, too. Extracting procedures which have been successful in similar soil conditions of other areas should be tested. Laboratory equipment that has been found to speed up analyses without sacrificing accuracy should be adopted. A lot of expensive equipment is not required for a good soil testing laboratory. Only the types of analyses should be made that will furnish information which will be useful in making recommendations to the farmers.

The laboratories should be designed so they can be used for routine analyses of research samples as well as for farmers' samples.

Plant tissue analyses should not be overlooked as a source of information on fertility requirements and fertilizer practices. As with soil testing data, information on plant analyses also should be assembled.

Rather extensive information has been accumulated in Ghana on many aspects of soils and soil fertility which would be helpful in expediting a soil testing program. Furthermore, Ghana has a number of well-qualified soil scientists who could make important contributions to the program. Several soils laboratories are adequately equipped and with some reorientation could be organized to serve as analytical centers. An effective Extension Service is an essential part of a potentially successful soil testing program and is needed to expedite the application of knowledge obtained through research.