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Memorandum

Miss Blanton,

TO : WOH/RIG, Erven J. Long

DATE: January 29, 1968

FROM : WOH/ARDS, Alvin D. Ayers

Alvin D. Ayers

SUBJECT: Seminar for Latin America Fertilizer Executives

Attached are two copies of the proceedings of this seminar. I call your attention to the presentation of Dr. Hunter, csd-287, given on page 34. You may wish to include this as part of the record for our North Carolina State University project on the Nutrient Status of Soils of Latin America.

Attachments (2)
"Seminar for Latin America Fertilizer Executives", TVA, Sept. 18-29, 1967

5010-108

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THE ROLE OF THE INTERNATIONAL SOIL TESTING PROJECT IN THE SOIL TESTING PROGRAM OF LATIN AMERICA

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Raleigh, N. C.

Gentlemen, I am happy to have the opportunity of meeting with you this afternoon and of sharing with you some thoughts, ideas and experiences with respect to the International Soil Testing Project. This project was put into operation about 3-1/2 years ago under the direction of Dr. J. W. Fitts of North Carolina State University. The idea for the project was born out of the Alliance for Progress and nurtured by the necessity we have as nations, people and particularly as agronomists to do something about increasing food supplies. As all of us are aware, in those nations where food and fiber production have reached a high capacity per hectare, many advances in agriculture technology and improvements in crop production practices have necessarily been incorporated. A most important part of these changes and improvements has been concerned with the development of the fertilizer industry, its manufacture, its distribution and its use. All three phases of fertilizer technology have to be properly coordinated and functioning before any large increase in agriculture production can be realized.

These are facts of which all of you are no doubt aware. My purpose for calling attention to them here is that I want to indicate at least a few of the ways in which a soil testing program is related to and may aid in the development of these three phases of fertilizer technology.

First, with respect to the manufacturing of fertilizers. Have you ever heard of a company or government which was interested in building a fertilizer manufacturing facility that has not first attempted to get as much information as possible concerning the kinds and amounts of fertilizers needed to be produced for the intended market area? Probably you have not, but I do not doubt that you have heard of many instances in which this type of information was very difficult or even impossible to obtain. Of course one might be able to determine how much and what kind of fertilizers are now being used in the area and make an estimate as to what the increase might be for the future. However, what assurance would he have that the types being used are correct. Remember if they are not correct then fertilizer use might well decrease rather than increase simply because the desired results would not be obtained.

Wouldn't you feel much more secure in your decisions if you have available a quantity of reliable data from soil test results for the area Or better yet, a summary of such data indicating the areas of deficiency or sufficiency of the fertilizer elements of interest to you? A properly conducted soil testing program can make this type of information available to you.

Now what about the distribution of fertilizers. Would you want to invest your money in dealer and distributor facilities without having some reasonable assurance that your product was needed in the area and would produce results if used? Demand for fertilizer depends directly on the results obtained by farmers. Many a farmer has become discouraged in using fertilizer because the results were not sufficiently profitable. Naturally this has an effect on his neighbor as well. The problem is practically never due to the fact that he did not need fertilizer but rather is accounted for by the fact that he did not use the right amount or the right kind. As you know nitrogen cannot give its best response if phosphorus or lime is the first limiting factor. A properly conducted soil testing program can prevent most of these discouraging experiences and can provide information which permits a dealer or distributor to make wiser decisions concerning the amounts and kinds of fertilizer to stock.

And what about fertilizer use? Even after fertilizer is manufactured and is available in the right quantities, kinds and locations, fertilizer use still depends on the decision of the farmer and the farmer is a person who usually has limited capital and many decisions to make with respect to how he can get the best return on the money he can invest. He needs guidance from qualified people who can provide him with accurate information. A properly conducted soil testing program can provide the farmer and his advisors with good information.

We who work with the International Soil Testing Project make no claim to having all of the information needed by industry, farmers or others. However, we do feel that through this project which in effect is a cooperative effort between many countries, much progress can be and is being made toward establishing better soil testing programs and providing good information for farmers and agriculture business.

I would like now to briefly discuss with you some of the philosophies of the project and the developments which are taking place.

Research and service by means of analysis, interpretation, recommendations, and education are the ingredients which form the foundation for an effective soil testing program.

A fundamental objective of soil testing is to predict from values obtained by the rapid analysis of a small, but representative sample of soil, the probability of obtaining a profitable response from the application of a fertilizer element or lime. To accomplish this objective, a statistical association is made between the amount of nutrient extracted from the test sample and the crop response to the application of the element to the soil from which the tested sample came. By this system of analysis of the data, soil analytical values can be grouped into various categories designated for example as "low", "medium" or "high". Usually it has been found, however, that the data are grouped in such a manner as to allow separation into only two categories, "low" and "high". It may be well to mention here that those soils which have a low soil test value and therefore are designated as "low" are the soils which have a large probability of showing large crop response to the added fertilizer element in question. Those soils which have a high soil test value and are classed as "high" are soils which have a small probability of large crop response to the added element.

An awareness of the probability concept in soil testing is fundamental to the understanding and use of this tool as a guide to recommending fertilizer and lime practices.

No method has yet been found whereby one can measure the quantity of a particular element contained in the soil or extracted from it by various means and use this measurement as a means to predict the size of yield increase expected by the addition of the element. A great deal of success, however, has been achieved in making measurements which allow prediction of the probability of obtaining a large or small response in crop yield by addition of an element to the soil.

In the slide shown here we can see the relationship between soil test values for one extracting solution and the probability of yield response to added phosphorus. A fairly large number of soils were used in this study. Here we see plotted on the vertical axis the percentage yield which is calculated as a percentage by dividing the yield with no P applied by the yield with adequate P added. In this case a low percentage yield indicates a large yield response to added P. The soil test value is plotted on the horizontal axis.

Using the technique, which was developed by Cate and Nelson and published as Bulletin No. 1 of the International Soil Testing Project technical series, a set of intersecting lines are drawn such that the number of points which occur in the two positive quadrants is at a maximum and the number of points in the negative quadrants is at a minimum. The point where the vertical line intersects the horizontal axis is defined as the "critical soil test level". It can be seen that most of the soils which have soil test values below the "critical level" have given, on the average, a large response to added P, whereas most of the soils with values above the critical level have given only small or no response to added P. Thus for this method and these soils we could predict with a good degree of accuracy which soils have a large probability of giving large yield responses to added P and which soils do not.

In the next slide we see the results where a different method was used with the same soils. It is obvious that this method does not allow us to predict the probability of response to the degree of accuracy allowed by the first method.

Research information is needed to determine which method may be most suitable for a particular country or soil area. To date the information which is becoming available through this research indicated that the critical level is approximately the same in several countries for a particular method. This in turn indicates that much of the research conducted in one area may be applicable to other areas. A soil testing program then can provide an effective tool for minimizing the time and money needed for research, first by focusing attention on the real and urgent problems and second by providing an avenue whereby research from other areas can be applied locally.

In increasing crop production few people will argue against the importance of using fertilizer. The following slide indicates the very close relationship found between increased crop production and increased fertilizer use in the United States during the past several years.

Many people, however, are not aware of the close relationship which exists between the amount of fertilizer used and the number of soil samples tested in the United States. The following slide shows this close relationship.

In order to obtain sufficient information to be of value in making summaries which will accurately reflect the fertilizer needs of an area a large number of samples must be accurately analyzed. If a real impact on crop production is to be realized in an area, a large percentage of the farmers need to be influenced and aided by a soil testing program. This means that soil testing laboratories need to be capable of accurately analyzing large numbers of samples.

According to technical Bulletin No. 2 of the International Soil Testing Project entitled,

"Evaluation of Soil Fertility in Latin America", a 1964-65 survey of Latin America indicated that all of the countries had laboratories in which soil analyses were being made. However, very few of the laboratories were analyzing farmers' samples as a basis for making suggestions for the better use of fertilizers and lime. Except in two countries the number of samples per year analyzed for farmers was less than 2,000. As a rule only the results of the analysis were given to the farmer with no attempt being made to interpret these results in terms of fertilizer or lime requirements for the crops to be grown. It was also found that only one laboratory was equipped and operated in such a way that they could analyze as many as 100 samples per day. Most of the rest had a maximum capacity from 10 to 20 samples. Very few of the laboratories were using control or standard samples for the purposes of checking the routine analytical results to insure precision and accuracy.

In brief this was the status of soil fertility testing in Latin America just three years ago.

Since 1964, 23 laboratories in 13 different countries of Latin America have been improved by the installation of equipment and use of methods which permit multiple analysis procedures. Through these procedures each of the laboratories now has a capacity to do routine analysis on more than 100 samples per day.

In 1965 approximately 20,000 samples were analyzed in these laboratories. In 1967 it is anticipated that about 150,000 samples will be analyzed.

Considering the total land area under cultivation and the number of farmers in these countries, even 150,000 samples per year seems almost significant, but if the rate of increase continues it will not be long until very significant effects of these programs will be witnessed through increased yields and improved quality of agriculture products.

As a matter of interest I would like now to show you a few procedures and items of equipment which make it possible for a soil testing laboratory to accurately analyze large numbers of samples per day.

Time saving devices, procedures and methods for improving accuracy may not seem important where only 10 samples a day are analyzed, but for the laboratory which must analyze 100, 500 or even 1,000 samples a day they become extremely important.

These then are a few of the problems with which the International Soil Testing Project concerns itself.

It is quite conceivable that the success experienced by the soil testing programs in the various countries will significantly affect the success of agriculture in producing the required quantities of food and fiber.

The soil testing program in your country is worthy of and needs your interest and support to help it succeed.

In return it will provide service and information which will help to assure your success in the fertilizer industry.