THE need of supplementary data for use as an aid in interpreting the results of fertilizer experiments is one generally acknowledged by field agronomists. Fields designated as the same soil type may respond differently to fertilizer or lime. These differences in response may be the result of previous treatments, inaccurate designation of soil type, or a number of other factors. Consequently, in making fertilizer recommendations based on the results from experimental plots alone, the field for which the recommendations are being made often differs in response to those used in formulating the recommendations.

Discussing agronomic problems of the South, Funchess (5) states, “In practically all cases field plot experiments are located on land that is very much more productive than the average land in the area represented”. Moreover, because of difficulties involved, many fields in the South, as well as fields in other sections of the United States, may be considered unsuitable for conducting fertilizer experiments. It is necessary, therefore, to resort to methods of bridging the gap between the fields on which experiments are conducted and those for which recommendations must be made. Laboratory methods, while not adequate in themselves as a means of determining the fertilizer requirements of soils, should be included in any well-balanced study of soil fertility along with experimental fields and possibly pot culture studies.

It is the purpose of this report to show some of the results where laboratory data have been used in the interpretation of data from field fertilizer experiments with cotton and corn in Georgia.

The laboratory determinations reported for the soil consist of reaction, clay content, available potash, base-exchange capacity, and exchangeable bases. Plant tissue tests were made for nitrate nitrogen, phosphate, and potash. Modifications of existing analytical methods were used in most of this work. Soil reaction was determined by means of a glass electrode; clay content, by the method of Bouyoucos (1); base-exchange capacity by the method of Olson and Bray (6); total exchangeable bases, according to Bray; and the available potash, the sum of the exchangeable and water-soluble potash, by a modification of the method of Bray (2). Tests on plant tissue were made according to the technic suggested by the Purdue Agricultural Experiment Station.

Field tests reported were conducted on a cooperative basis with individual farmers in the state and involved short-time, 1- and 2-year tests. At the beginning of each experiment, the fertilizer and cropping history of the land was obtained from the cooperator. In most cases, six replications of 1/20-acre plots were used.

EXPERIMENTS WITH COTTON

In fertilizer tests with cotton, the increase in yield for 24 and 48 pounds of K₂O with 32 pounds of nitrogen per acre and varying rates of phosphate application, were determined. When these results were grouped according to soil type (Table 1), it is evident that there is considerable variation in response of cotton to potash fertilizer within the same soil type. For example, on Cecil sandy loam the increase in pounds per acre of seed cotton from the use of potash varied from —18 to +413 pounds. On a percentage basis on this soil type, potash fertilization resulted in a 1.5 to +61.0% increase in yield. Each value representing the increase from potash was obtained by averaging the yields from the plots receiving 24 pounds of K₂O and those receiving 48 pounds of K₂O. In the same table, it is seen that the cotton yield increased by potash from —9.4 to 20.4% on Appling sandy loam and from 43.6 to 115% on Norfolk Tifton sandy loams. A 2.3% and 6.5% increase was obtained on Greenville clay loam.

In view of the wide variation in response to potash grown on the same soil type, it is apparent that supplementary data are needed in making recommendations for fertilizing cotton with potash. The previous fertilizer and cropping history of the field is an important factor in determining the response to potash, and this history must be taken into consideration in formulating the recommendations.