

Fertilizer Prescriptions Effective When Soil Tests Considered

Midwest practices switching to chemical fertilizers from soil organic matter, legumes, and manures

CHICAGO.—Results of a series of studies on Wisconsin farms show that soil test data can be used to prepare specific fertilizer prescriptions that will permit reasonably accurate predictions of crop yield. In order for a fertilizer prescription to be effective, however, not only soil test information but also the crop to be grown, the yield expected, and the amount of nutrients normally taken up by the given crop must all be taken into consideration. Since only a fraction of the total available nutrients found by test in a soil, or applied as fertilizer or manure, can be taken up by a crop during one growing season, the fertilizer prescription must take into account the availability of nutrients in the soil, the ability of the plant to extract added nutrients from mineral or organic fertilizers, and the total nutrient content of the fertilizer to be used.

Since a 100-bushel crop of corn, for example, requires 150 pounds of nitrogen, and can get only 40%, or 80 pounds, from a soil that contains 200 pounds of available nitrogen per acre, the difference of 70 pounds must come from added manure or mineral fertilizer. And since only part of the nitrogen in the fertilizer is available to the plants, the final fertilizer prescription must be based upon appropriate calculations—not only for nitrogen, but also for phosphorus and potassium.

The efficacy of this prescription ap-

proach was reported by K. C. Berger of the University of Wisconsin, speaking here Feb. 19 at the sixth annual joint Meeting of Agronomists with the Fertilizer Industry. The method has been successfully tested on a fairly large scale during two crop seasons in Wisconsin, Berger said. Results showed that even Wisconsin, with its 58.5 bushels-per-acre average corn yield last year, highest for any state in the country, still is wide open for improvement. Last year, said Berger, about 1600 Wisconsin farmers requested and obtained accurate prescriptions for their farms, based on careful soil testing, and designed for a yield of 100 bushels of corn per acre. A post-harvest check on 765 of these farms revealed an average yield of 102 bushels per acre. The year before, when only a few farmers had made the prescription test, the average yield on the farms where accurate checking was possible was 124 bushels per acre. These results offer strong evidence, said Berger, that a proper understanding of individual crop needs and individual soil capacities can be used to design a fertilization program for any desired yield—within reason.

The prescription approach is very sound economically, Berger added. One Wisconsin farmer who kept an accurate record of all costs after carefully following the fertilizer prescription for his land harvested 160 bushels of corn per acre, at a net cost of 56 cents per bushel. With-



The principal weakness in soil testing is the result of nonrepresentative sampling, according to G. E. Smith of Missouri. Laboratory analyses are generally more accurate than the sampling methods

out fertilizer, his land had previously produced 70 bushels per acre at a net growing cost of \$1.25 per bushel.

Midwest Programs. The Middle West is just getting a good start on the problem of prescribing proper fertilizer programs for optimum crop growth, according to G. E. Smith of the University of Missouri. First attempts at using soil tests to determine the kind of starter fertilizer to use, for example, were generally unsatisfactory. Early tests, first developed for the low exchange capacity soils of the East and South, said Smith, gave poor correlations in the Midwest. However, he said, recent developments and correlations in the individual regions show the nutrient reserves in individual soils, and aid in calculations of the quantities of separate nutrients which must be added to eliminate the individual elements as limiting factors in crop growth.

Tests are not yet perfect, but if soil samples are properly secured and properly analyzed, they can give information that will aid greatly in formulating efficient fertilization programs.

Fertilization practices on Midwest soils are rapidly changing, Smith noted. Less dependence is placed on soil organic matter, legumes, and farm manures as the principal sources of nitrogen and other elements. In most areas in this section, there have been spectacular increases in use of chemical fertilizing materials. It is just now being generally appreciated, he said, that legumes, when removed for hay, do not greatly increase soil fertility as previously believed, but add only limited amounts of nitrogen, while actually masking fertility decline.

K. C. Berger (right) of University of Wisconsin says good soil test data should be the first requirement for fertilizer prescriptions. Session chairman F. W. Smith of Kansas State College is at left

