THE RELATION OF CORN YIELDS TO NUTRIENT BALANCE AS REVEALED BY LEAF ANALYSIS

EDWARD H. TYNER AND JOHN R. WEBB

In recent years, considerable interest has developed in methods of applying heavy rates of fertilizer in such a manner as to combine maximum response with an avoidance of early plant injury. The reported yield responses resulting from heavy fertilization have served not only to focus attention on the inadequacy of fertilization as commonly practiced, but likewise on the crop production potentially possible in humid regions if adequate fertilization were the rule. Uppermost in the minds of many is the question of the economy of heavy fertilization as a general farm practice. It would appear that this would be profitable, assuming favorable crop prices, so long as efficient use of applied nutrients was obtained. Among the various factors which may affect efficiency of nutrient utilization, there is that of nutrient balance. Willcox (35), in a recent study, reports on yield-depression effects resulting from unbalanced nutritional conditions. His report indicates this condition to be rather prevalent, and he believes that, in many cases, nutritional unbalance is imposing severe limits on crop yields.

The present investigation is concerned with the nitrogen, phosphorus, and potassium interactions and balances occurring within corn leaf tissue and their significance in determining the efficiency of utilization of applied fertilizers.

The search for optimum and balanced solutions for plant growth began almost as soon as definite information concerning the major elements required for plant growth had been established. The literature abounds with references to nutrient solutions proposed by Sachs, Knop, Tollens, Pfeffer, Crone, Tottonham, and many others. One might infer from this that perhaps plants do exercise a high specificity as to their requirements. In general, however, the conclusion of Hoagland (13) that there is not sufficient evidence to prove that plants require any very specific or limited ratio of ions or elements reflects present opinion.

The use of the triangular system for varying N, P₂O₅, and K₂O ratios in fertilizer experiments proposed by Schreiner and Skinner (27) also represents an attempt to determine specific crop fertility requirements. It aroused considerable interest and stimulated much work. Hibbard (12) used the triangular system in greenhouse and field experiments to determine whether Marquis wheat and Worth oats had

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2Associate Agronomist and Assistant in Agronomy, respectively. The authors wish to express their appreciation to Mr. Ward Cunningham, on whose farm this study was conducted, for his cooperation, and to Professor J. A. Rigney of the Statistics Department of North Carolina Agricultural Experiment Station, for his assistance.

3Figures in parenthesis refer to "Literature Cited", p. 183.