A COMPARISON OF THE NEUBAUER, PLANT-SAP-ANALYSIS, AND HOFFER STALK-TEST METHODS FOR DETERMINING THE NUTRIENT SUPPLY OF SOILS

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For the past several years the writers have been interested in the development and application of methods for determining the nutrient needs of soils. The senior author has been engaged in determining the value of the analysis of the expressed sap of corn plants as a guide to nutrient needs (3), while the junior author has been interested in determining the reliability of the Neubauer method (5) and in developing simple chemical tests on plant material as indicators of fertilizer needs (6, 7). The former has found that the chemical composition of the sap of corn plants quite accurately reflects the supply of available nitrogen, phosphorus, and potassium in the soil, while the latter has found that the Neubauer procedure is an accurate and reliable method when the proper precautions are observed.

During the course of these investigations an opportunity presented itself for testing certain fertilizer plats by both the sap analysis and Neubauer methods, thereby making possible a determination of the degree of agreement between these two methods in estimating the available phosphorus and potassium requirements. Records also were available of the results obtained from the application of the Hoffer stalk test to the plants grown on the plats used in comparing the sap analysis and Neubauer methods; hence, a comparison has been possible of the available potassium requirements shown by three methods. It is the purpose of the present paper to present the nutrient-requirement data obtained by applying the Neubauer, sap-analysis, and Hoffer stalk-test methods to a series of plats which have received specified fertilizer treatments for more than 20 years, and to comment on the agreement shown by the results obtained by the different methods. The study covers the 5-year period of 1927–31, inclusive.

MATERIALS AND METHODS

The plats used in the studies reported here are known as the "Rotation with fertilizer" plats at the Virginia Agricultural Experiment Station, Blacksburg, Virginia. The experimental details concerning these plats have been given elsewhere (3), hence, only the more important features will be given here. Four series of fortieth-acre plats have carried in rotation the following crops since 1909: First year, corn; second year, wheat; third and fourth years, a hay mixture of mammoth clover and timothy. Stable manure and commer-