MECHANICAL DISPERSION AS AN AID IN THE CHEMICAL STUDY OF SOILS

L. D. Baver

INTRODUCTION

The rate of reaction in many chemical processes in soils is in part dependent upon the rate at which the chemical reagent comes in contact with the soil particles. This is one reason for using a soil sample ground to pass a 100-mesh screen in the usual chemical analysis. However, in some chemical studies it is not desirable to grind the soil so fine as to crush the mineral particles, but rather to use soil that has been crushed to pass a 20-mesh or 2-mm screen. This is especially true with soil acidity, lime requirement, and base exchange determinations in which grinding has been found to change the results obtained.

The time that is necessary for obtaining equilibrium in soil acidity, lime requirement, and base exchange reactions is influenced by the state of aggregation of the soil particles, since it is necessary for the solution to penetrate these soil masses before complete reaction can be obtained. In a clay soil the aggregates are more tenaciously held together than in a soil of coarser texture, and consequently, a longer time will generally be required for attaining equilibrium. If it were possible to break down these soil aggregates into their individual particles, a more rapid contact between the soil and the solution would result, thereby increasing the rate of reaction and shortening the time necessary for establishing equilibrium.

In this paper there is reported a study of the effect of mechanical dispersion on the establishment of equilibrium in the Jones (3) and Hopkins (2) lime requirement methods and in the determination of exchangeable calcium in soils.

EXPERIMENTAL

The dispersing apparatus used in this investigation is similar to that reported by Bouyoucos (1) except that the metal cup is replaced by a 250-cc beaker. This arrangement is shown in Fig. 1. A 250-cc beaker, A, is fitted with a rubber stopper, B, into which several glass rods, C, are inserted to break up the currents generated by the rapid rotation of the stirrer, D. Bouyoucos (1) has reported that 10 minutes stirring is sufficient for the dispersion of most soils.

1Contribution from the Department of Agronomy, Ohio Agricultural Experiment Station, Wooster, Ohio. Received for publication Jan. 21, 1928.
2Assistant in Agronomy (Soils).
3Reference by number is to "Literature Cited," p. 410.