1. A GENERAL DISCUSSION OF BASE EXCHANGE IN SOILS

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The fact is well established that an exchange of bases takes place when a soil is treated with certain salt solutions. As is well known, Way (9) noted three-quarters of a century ago that when a sample of soil was treated with a solution of potassium chloride, or certain other neutral salts, a part of the base of the salt was absorbed by the soil and an equivalent amount of calcium passed into the solution. He also noted that the anions of neither the soil nor the salt were affected by the treatment. It was only the bases that were concerned. These facts have since been verified with soils from various parts of the world. Investigation has shown that the exchange property is characteristic of soils in general.

Although the subject has been investigated for many years, it is only within the past 10 or 15 years that the study of base exchange has been placed on a reasonably satisfactory quantitative basis, and only recently that its importance has been widely recognized. In this connection special credit is due to Gedroiz (3, 4) of Russia. Paralleling his work, although quite independently, Hissink (5) of Holland has made almost, if not quite, as important a contribution to the subject and has drawn conclusions remarkably similar to those of Gedroiz. The serious student of the subject will find a source of great stimulation and suggestion in the work of these two men. The foundation was laid, however, by Way. Gans (1, 2), in connection with his extensive investigations on artificial zeolites, and various others, have contributed to the subject. Some of the more important phases of alkali soils as related to base exchange are strongly suggested by Gans' experiments, both with normal soils and with artificial zeolites.

The exchange compounds of soils, or complex as it is frequently called and which I consider to be composed of complex salts of alumino-silicic and organic acids, exert an important influence on the H-ion concentration of the soil solution. As Gedroiz (3) has shown, the exchange reaction is equally involved in, and lies at the very foundation of, certain conditions met with in the acid soils of humid regions, on the one hand, and the peculiar properties of alkali soils on the other.

1Paper read as a part of the symposium on "Base Exchange Phenomena in Soils" at the meeting of the Society held in Chicago, Ill., November 17, 1925.
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3Reference by number is to "Literature Cited," p. 457.
4For reference to Gedroiz' earlier papers see Kelley and Brown (7).