THE INFLUENCE OF ACIDITY ITSELF ON PLANT GROWTH WITHOUT REGARD TO OTHER FACTORS.¹

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In the consideration of the soil factors detrimental to plant growth, there is frequently a lack of differentiation between the effect of acidity itself and other factors that may exercise an influence over the growth rate of crop plants. A review of the literature reveals the fact that the nature of soil acidity is so little understood that it is not possible to define it nor to explain its action except in the most general terms. It has been the common practice among agronomists to use the term “soil acidity” to cover all of the more or less unfavorable conditions for plant growth arising from soil conditions that are improved by additions of liming materials. It is not necessary at this time to enter into a discussion of the nature of soil acidity with regard to the methods that have been proposed for its quantitative determination, since the literature on this subject was thoroughly reviewed by MacIntire (1)³ in a paper presented at the thirteenth annual meeting of this Society.

Recent physico-chemical and physiological investigations have suggested three factors which may account for the conditions existing in the soil which are ameliorated by the addition of lime: (1) the existence of an unfavorable hydrogen-ion concentration; (2) the presence of soluble aluminum, iron or manganese, the presence of which is usually accompanied by a hydrogen-ion concentration on the acid side of neutrality, and (3) the lack of sufficient calcium to serve as a nutrient or as a cooperative agent to facilitate the entrance, into the plant, of other nutrient ions.

The presence of active toxic bases in many so-called acid soils has been shown by numerous recent investigations both in this country and abroad, and True (2) has shown that the presence of calcium in the nutrient medium is necessary to insure the entrance into the plant of nutrient ions other than those of calcium itself.

It is the purpose of this paper, however, to consider only the effect, per se, of hydrogen-ion concentration upon the growth of plants and to emphasize the fact that neither an alkaline nor even a neutral condition in the soil is always essential to successful crop

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³ Reference by number is to “Literature cited,” p. 296.