INORGANIC SUBSTANCES, ESPECIALLY ALUMINUM, IN RELATION TO THE ACTIVITIES OF SOIL MICROORGANISMS.¹

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INTRODUCTION

Soil microorganisms perform their functions in a mass whose most abundant mineral constituents are aluminum, iron, and silicon. Their functions include the accumulation, transformation, liberation, and conservation of food for themselves and for higher plants. The preparatory processes which they carry on result in available food for crops and a measure of certain of their optimum activities shows a positive correlation with soil productivity or with crop production.

Thus it becomes of first importance, in attempting to promote better soil conditions for crop growth, to consider the wide contact which soil organisms have with the above mentioned elements and the influence these elements exert on the biological activity of soils. This contact may be beneficial, or it may be detrimental, to bacterial and mold action; depending upon the kind of organisms present, the soil conditions existing, and the state of the compounds containing these elements. Aluminum, iron, and silicon may exert toxic and acidic effects and may deprive soil organisms of essential elements through colloidal adsorption and chemical action. On the other hand, certain of these elements in the proper physical and chemical forms are decidedly beneficial, in regulating the concentration of salts in solution, in facilitating aeration, in the absorption of gases and liquids, and possibly by rendering non-toxic the undesirable products of microorganic and plant metabolisms. The writer studies the relation of soil organisms to soil conditions both from the standpoint of the present tendency to work out remedial measures for the injurious effects of these elements and from the standpoint of the much needed study of their beneficial effects. A knowledge of the influence of aluminum, iron, manganese, and silicon upon the various essential soil biological processes, including the organisms themselves and their products, will make easier the creation of optimum soil conditions for different plants. The object to be obtained is economic crop production. This implies efficient soil

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