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A PROPOSED CLASSIFICATION OF THE CHEMICAL ELEMENTS WITH RESPECT TO THEIR FUNCTIONS IN PLANT NUTRITION

By the late Professor R. W. THATCHER

MASSACHUSETTS STATE COLLEGE

THE suggestion which is presented in this paper has two purposes in view: First, to systematize and perhaps to simplify the teaching of the subject of the mineral nutrition of plants; and second, to establish a systematic basis for investigations of the specific functions of the different chemical elements in plant nutrition, with special reference to those of the rarer elements discussed in a previous paper.¹

There has been an immense amount of experimental study of the necessity for and specific functions of individual chemical elements in plant nutrition. The general result has been a rough classification of all the elements which have been found in plant tissues into two groups; the so-called "essential" and "non-essential" elements. The segregation of the elements

into these two classes is based upon observed differences in the ability or failure of plants to thrive and reach normal maturity in the presence or absence of each particular element in the nutrient medium and atmospheric environment in which the plants are grown. On this basis, ten elements, namely, carbon, hydrogen, oxygen, nitrogen, sulfur, phosphorus, potassium, calcium, magnesium and iron, are usually listed as "essential," and all others as "non-essential."

As was pointed out in the paper just cited, however, it is now known that other elements are fully as "essential" to plant growth as are these ten; although their physiological function and the actual quantities required for adequate nutrition may be quite different from what is true of those previously included in that class.

Further, so far as the writer is aware, no attempt

¹ R. W. Thatcher, "Some New Aspects of Plant Nutrition," SCIENCE, 76: 1970, 281-285, 1932.

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