STUDIES IN THE MINOR ELEMENT NUTRITION OF VEGETABLE CROP PLANTS: I. THE INTERRELATION OF NITROGEN, PHOSPHORUS, POTASH, AND BORON IN THE GROWTH OF RUTABAGAS

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THE problem of minor element nutrition of crop plants has received increasing attention from physiologists, soil chemists, fertilizer specialists, and practical growers. This may be readily substantiated by reference to the frequency with which the subject recurs in current agronomic literature. The plant nutrient which has received most attention among the so-called “minor elements” is boron.

In general, studies dealing with the boron nutrition of plants have constituted, on the one hand, the identification of the deficiency upon various crops, on various soil types, and under various conditions, and, on the other hand, the determination of the “tolerance” limits of boron nutrition for crops grown under field conditions.

Although these considerations are important and a necessary step in the practical solution of the problems of the commercial grower, frequently the results are found to belie satisfactory replication even under conditions presumably constant. A great deal of confusion has therefore arisen, and unfortunately, not a little real misgiving on the part of practical men. Thus, for example, carefully replicated tests over a period of several years have indicated with statistical significance, that 10 pounds of commercial borax applied per acre will adequately protect cauliflower against “brown rot” under Long Island conditions (5). Yet, in spite of careful practice of this recommendation, reports are made at the conclusion of the season that “brown rot” did occur in such treated fields, with quality and market demand of the crop consequently reduced. Such apparent exceptions cannot be ascribed in all cases to inefficiency, poor dissemination of the borax, or to mistaken identity in the diagnosis. They represent, in some cases, true failure of the recommendation to fulfill its requirement. Other factors are involved, how many and to what extent can only be ascertained by experiment, but related nutritional factors are distinct possibilities. It is the purpose of these studies to explore this field.

Although few studies have approached this problem by the factorial method, Purvis and Hanna (10) have drawn attention to the possible interrelative effects of potash and boron, and Powers and Bouquet (9) have noted that in studies of “black canker” of table beet, additional potash fertilizer in the absence of borax aggravated the condition.

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3Figures in parenthesis refer to “Literature Cited”, p. 921.