THE ABSORPTION OF AMMONIUM AND NITRATE NITROGEN BY VARIOUS PLANTS AT DIFFERENT STAGES OF GROWTH

JAMES A. NAFTOL

A knowledge of the absorption of ammonium and nitrate ions by plants is of fundamental importance in a study of the use of nitrogenous fertilizers. This has been too generally overlooked by agronomists and soil chemists. Moreover, little consideration has been given to the possibility of the actual absorption of nitrogen in the ammonium form. This is true even though more work has been done on nitrogen fertilization than on any other phase of soil fertility. It has generally been conceded that nitrogen applied in the form of ammonium salts or in organic forms must be oxidized to the nitrate form before it can become available to plants. The rice plant is an exception to this general assumption.

It has been observed that plants fertilized with both NH₄⁻ and NO₃⁻ make more rapid growth in their early stages than those receiving NO₃ alone. Hutchinson and Miller (1) gave a review of the early work on absorption of NH₄⁻ and NO₃⁻ and concluded that most plants can utilize either form of nitrogen. Some plants grew better throughout their entire growth period when the nitrogen was supplied as NO₃. The best growth was generally obtained, however, when both forms of nitrogen were present. Jones and Skinner (2) found that soybeans and corn absorbed more NH₄⁻ than NO₃⁻ in the early stages of growth.

No work has been found wherein plants have been compared as to the relative absorption of NH₄⁻ and NO₃⁻ and the corresponding growth resulting therefrom, either in nutrient solutions of varying concentrations of each form of nitrogen, or in solutions of only one form of nitrogen. Moreover, no work has been found wherein nitrogen absorption has been studied in solution cultures with controlled H-ion concentrations. It has previously been shown by Jones and Shive (3) that the reaction of nutrient solutions with growing plants is

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2Assistant in Agronomy and Soils. The author expresses his sincere appreciation for the helpful criticisms and suggestions of Doctor J. W. Tidmore and Doctor P. W. Parker.

3Reference by number is to "Literature Cited," p. 157.