PHYSIOLOGICAL ACIDITY AND ALKALINITY OF INORGANIC NITROGENOUS COMPOUNDS IN SOLUTION CULTURES

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Pantanelli (1915) explained that physiological alkalinity results from the OH ions left in the medium through the dissociation of water when H ions are absorbed by the plant with the NO₃ ions and that physiological acidity is due to the H ions correspondingly left behind when OH ions are absorbed with the NH₄ ions. From the point of view of the residual effect of concentrated nitrogen fertilizers on permanent soil acidity, Allison (1) submitted evidence which substantially agrees with Pantanelli’s theories. The writer elsewhere advanced the processes of protein formation and that of similar compounds as the fundamental causes of these phenomena. These processes may be summarized in the following reactions for physiological alkalinity (A) and physiological acidity (B):

\[ a \ \text{H}_2\text{CO}_3 + b \ \text{HNO}_3 + c \ \text{H}_2\text{SO}_4 + d \ \text{H}_3\text{PO}_4 = \text{protein} + m \ \text{H}_2\text{O} + n \ \text{O}_2 \]  

(A)

\[ a \ \text{H}_2\text{CO}_3 + b \ \text{NH}_4\text{OH} + c \ \text{H}_2\text{SO}_4 + d \ \text{H}_3\text{PO}_4 = \text{protein} + m' \ \text{H}_2\text{O} + n' \ \text{O}_2 \]  

(B)

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The steps by which proteins are formed from ammonium compounds as postulated by Engel (5) agree with the over-all equation (B).