Translocation of minor elements from soil in organicly cultivated tomato plants grown in different locations -I-

Comparison of element quantities by PIXE and ICP-AES

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Abstract

This study aims to determine the quantities of minor elements in different organs of tomato plant at different growth stages by PIXE analysis for the purpose of grasping the effects of an organic fertilizer in organic cultivation. In addition, a similar quantitative analysis was performed on tomato plants grown in different locations under the same fertilizing conditions and by the same cultivating methods to compare the contents of vitamin C and the like in fruit.

A sample preparation method was established for PIXE analysis at different growth stages in the study starting this fiscal year. A particular problem was that samples decomposed with nitric acid sometimes formed solid sediments. Therefore, the samples were centrifuged. The centrifugation decreased Si concentration to about one tenth but did not significantly change the concentrations of other elements. Separate quantitative analyses performed on three samples ranging roughly 30-60 mg in dry weight revealed that the average error in the concentrations of the elements was 24 % (maximum, 72 %).

Further analyses were carried out on samples prepared from laminae taken on the 118th day after sowing by PIXE analysis and ICP-ASE to determine the concentrations of P, K, Fe, and Cu. The concentrations ranged 10^{-5}-0.03 g/g and the values from the two analytical methods were in agreement.