

## Movement of light elements in living plants measured by means of a standard-free method in in-air PIXE

K. Sera<sup>1</sup>, S. Goto<sup>2</sup>, C. Takahashi<sup>2</sup> and Y. Saitoh<sup>2</sup>

<sup>1</sup>Cyclotron Research Center, Iwate Medical University  
348-58 Tomegamori, Takizawa, Iwate 020-0603, Japan

<sup>2</sup>Nishina Memorial Cyclotron Center, Japan Radioisotope Association  
348-58 Tomegamori, Takizawa, Iwate 020-0603, Japan

### Abstract

The two methods, which enable us to observe changes in concentration of heavy elements in living plants and to perform quantitative analysis of all elements heavier than aluminum in in-air PIXE with two detectors, simultaneously, were successfully applied to studies on movement of light elements in plants. It was found that light elements including silicone, phosphorus and sulfur in leaves of living plants can be quantitatively analyzed. Accuracy of the method for light elements could be confirmed by comparing the results with those obtained by an internal-standard method. It was also confirmed that changes in elemental concentration with elapsed time after starting irradiation could be observed for silicone, phosphorus, sulfur and chlorine together with heavier elements at the same time. Interesting changes in elemental concentration with elapsed time were observed for phosphorus and sulfur together with heavier elements such as potassium, calcium and manganese. Moreover, quite interesting changes of concentration of some light elements were clearly observed after supplying water-soluble manure containing phosphorus acid and potassium to the plant.