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Sommario/riassunto

This open access book is only an introduction to show that radiation and radioisotopes (RI) are premier tools to study living plant physiology which leads to new findings. Who had ever imagined that we could see water in a plant? Who had ever imagined that we could see ions moving toward roots in solution? Who had ever imagined that we could see invisible gas (CO2) fixation and movement in a plant? These studies demonstrated for the first time that water, ions and gas can be visualized in living plants, which could be hardly seen by anyone before. This publication summarizes the results obtained by Nakanishi' s lab in The Univ. of Tokyo, based on her original concept and her original tools or systems. It is useful for professional scientists, plant physiologist, and those studying plant imaging. The chapters demonstrates the innovative imaging work of the author, using radioactive tracers and neutron beam to follow the absorption and transport manner of water as well as major, minor, and trace elements in plants. Through these studies the author developed a real-time macroscopic and microscopic imaging system able to apply commercially available gamma- and beta-ray emitters. The real-time movement of the elements is now possible by using 14C, 18F, 22Na, 28Mg, 32P, 33P, 35S, 42K, 45Ca, 48V, 54Mn, 55Fe, 59Fe, 65Zn, 86Rb, 109Cd, and 137Cs. The imaging methods was applied to study the effect of 137Cs following 3/11 Fukushima Daiichi nuclear plant accident, which has revealed the movements of radiocesium in the contaminated sites. .