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INVITED LECTURE - Distribution and transfer of radionuclides including iodine-131 in Japanese environment following the Fukushima nuclear accident

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A large amount of radionuclides was released from the accident of Fukushima Daiichi Nuclear Power Plant in March 2011. We have studied distribution of radiocaesium and radioiodine in the environment and their transfer to agricultural products. Shortly after the accident, high iodine-131 concentrations were observed in leaf vegetables harvested in Fukushima and surrounding Prefectures. The levels of iodine-131 in vegetables decreased markedly in April due to the termination of the release and to its short half-life (8 days), then attention has been paid to radiocaesium (caesium-134 and caesium-137) deposited in soil. Results of the monitoring for agricultural crops harvested during spring to autumn showed that no higher values of radiocaesium were found in most vegetables cultivated in Fukushima Prefecture, excluding the evacuation area. However, values higher than the provisional guideline for radiocaesium (500 Bq/kg) were found in some agricultural products such as bamboo shoots, some fruits (e.g. Japanese citron, persimmon) and new tea leaves. These facts could not be explained by root-uptake pathway. Translocation pathway from leaves and barks should be important to understand the contamination of the other organs in the plants. Higher radiocaesium concentrations (>500 Bq/kg) were observed in some areas, although the most of rice in the same area showed the values markedly lower than 100 Bq/kg. We have studied possible mechanisms for the enhancement of radiocaesium in crops. Since there are not enough data of iodine-131 to understand its detailed spatial distribution, we have analyzed iodine-129 by AMS to examine whether there is any relationship between these two isotopes in soil. It is interesting to note that a relatively good correlation was found between the concentrations of iodine-131 and iodine-129. This finding suggests the usefulness of iodine-129 analysis for the retrospective evaluation of iodine-131 depositions following the accident.

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