Weathering of Iodine Deposited on Grass Leaf Surfaces

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Abstract

Radionuclides released into the atmosphere are deposited on the leaf surfaces of crop plants, taken up by the plants, and translocated to other parts from the leaves. Some amount of the radionuclides deposited onto the leaves is removed from the surface by the environmental process called weathering, i.e. removal by rain, wind, etc. Although weathering, foliar uptake and translocation are important processes involved in the radiation dose assessment of radionuclides from crops, site-specific parameters to describe those processes have not yet been elucidated. Since root vegetables are one of the main agricultural products in Rokkasho, the behaviors of Cs, Sr and I deposited on leaf surfaces of radish plant (*Raphanus sativus L.*) as dry aerosol were studied in FY 2006-2010. A model for describing behavior of the elements deposited on the surface was constructed from the results.

Since the behavior of the radionuclides on a leaf surface is considered to depend on leaf surface conditions, behavior on the leaf surface of other crops, such as monocotyledonous plants, should be studied separately. In Rokkasho, grasses are cultivated for livestock farming which is one of the primary industries there. Iodine-129 discharged from the nuclear reprocessing plant in Rokkasho is an important radionuclide for assessing radiation dose to people living around the plant. Since the weathering behavior of iodine from grasses is not well known, we started a research project to determine the behavior of iodine on the surface of grasses.

The experimental methods for the behavior of I on the leaf surface of a grass species were examined in FY 2011. Orchard grass (*Dactylis glomerata L.*) was selected as the experimental plant, and the method of solid substrate cultivation using polycarbonate pellets was established to diminish I uptake from roots. We plan to expose the grass to gaseous I and I in liquid droplets and dry aerosol to simulate actual dry and wet deposition of ^{129}I on the leaf surface. While the exposure method to I in dry aerosol that was previously applied to radish plant was adopted to the present experiment, the exposure methods to gaseous iodine or I in liquid droplets were newly developed. The measurement method of leaf surface area of grass using a three-dimensional scanner (MHT-PC; OPT Technologies Co., Ltd, Tokyo, Japan) was also established for estimating I burden on the leaf surface.