

Estimation of ^{137}Cs uptake from forest floor in Japanese cedar and Japanese konara oak stands of the Abukuma Mountains, Fukushima

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An understanding of long-term environmental dynamics of radiocesium in forested area, which is released by the TEPCO's Fukushima Dai-ichi Nuclear Power Plant accident, is a key issue for predicting the future radiocesium distribution and forest products radioactivity, especially for ^{137}Cs (hereinafter, radiocesium) with long half-life of 30 years. In this paper we present the radiocesium uptake from forest floor in an evergreen Japanese cedar and a deciduous Japanese konara oak stands of the Abukuma Mountains, Fukushima.

An investigation was conducted in Oct. 2015 and Sept. 2017 at Japanese cedar stand and in Oct. 2018 and Oct. 2019 at Japanese konara oak stand near the living area. The average annual rainfall (1981–2010) is 1,221 mm and 1,465 mm in the konara oak and the cedar stands, and tree density is 791 trees ha^{-1} and 740 trees ha^{-1} , respectively. The breast height diameter has mode value of 10–14 cm and 25–30 cm in the konara oak and the cedar stands, respectively. Radioactive contamination in both stands is approximately 490–500 kBq m^{-2} via airborne monitoring results decay-corrected on April 1st, 2013. According to the procedure in International Biological Programme (IBP) for calculating of annual elemental uptake, annual radiocesium uptake from forest floor to the stand is defined as follows; annual radiocesium increment associated with tree growth plus annual loss through litterfall, stemflow, and throughfall [1].

The rate of annual radiocesium uptake associated with tree growth were estimated to be 0.1 and 0.06% of the total radiocesium inventory in Japanese konara oak and Japanese cedar stands, respectively. The sum of radiocesium uptake including the loss of radiocesium amount by litterfall, stemflow, and throughfall were 1.37 and 3.13% in the konara oak and the cedar stands, respectively.

The rate of radiocesium uptake estimated in this study are lower than the elemental uptake, such as nitrogen, phosphorus, potassium, in broad-leaved deciduous stand near Kyoto and Shimane Prefecture by IBP [2,3]. This indicate that the radiocesium uptake from forest floor to the konara oak and the cedar stands is restricted and no significant increase in radiocesium concentration of tree tissues is expected in the study stands.

[1] Cole et al. 1980, *Inter.Biol.Prog.* 23, 341-410.

[2] Katagiri & Tsutsumi, 1978, *J.Jap.For.Soc.*, 60, 195-202.

[3] Katagiri, 1988, *Jpn. J. Eloc.*, 38, 135-145.

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