

# MORPHOLOGICAL ABNORMALITIES IN JAPANESE RED PINE IN FUKUSHIMA ZONE

Vasyl Yoschenko and Kenji Nanba

Fukushima University, Japan

## *Abstract*

Japanese red pine (*Pinus densiflora* Siebold & Zucc.) is one of the most widely spread tree species in the forest ecosystems of the Fukushima zone. After the Fukushima accident this species extensive also colonizes the abandoned former agricultural fields and other areas adjacent to the forests. This species is closely related to Scots pine that is the main forest species in the Chernobyl zone.

High radiosensitivity of the coniferous species is a well known fact. In the Chernobyl zone the extremely high doses of acute radiation in April 1986 resulted in formation of the lethal damages to the populations of Scots pine growing in the vicinity of the ChNPP (Kozubov and Taskaev, 2002). Our observations (Yoschenko et al., 2011) showed that the comparable low rates of chronic radiation created morphological changes in the young pine trees. The most common morphological abnormality was cancelling the apical dominance. Frequency of this abnormality was high at the dose rates that can be also found in the Fukushima zone.

In 2014 we found the same abnormalities in the populations of young trees of Japanese red pine in the Fukushima zone. Also, similar abnormalities were reported in other coniferous species in the Fukushima zone (Watanabe et al., 2015). At the same time, we have not observed any morphological abnormalities in the mature pine trees. The lethal damages to the coniferous species even in the vicinity of the FD1NPP have not been yet reported.

In 2015-2016 we studied the morphological abnormalities in 8 young populations of Japanese red pine exposed to the different levels of chronic radiation. The probability of cancelling the apical dominance increased from the level 0.11-0.14 in the two less irradiated populations to 0.5 and 0.9 at the absorbed dose rates of approximately 14 and 25  $\mu\text{Gy h}^{-1}$ , respectively.

Most of the observed abnormalities appeared in the second whorl after the beginning of exposure. No new abnormalities were observed in the fifth whorl. This temporal pattern is similar to those reported for Scots pine in Chernobyl and for Japanese fir in Fukushima.

Further detailed studies are necessary for interpretation of the observed temporal pattern and, in general, for explanation of the mechanism of the morphological abnormalities.

## *References*

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