

THE DISTRIBUTION OF ¹³⁷Cs TOTAL ACTIVITY IN ABOVE-GROUND PHYTOMASS OF PURE PINE STANDS

The distribution of the radionuclide total activity in the components of phytocenosis or timber stand is the theoretical basis of forest radioecology. At the same time, the information on the levels of radiation contamination of phytocenosis or timber stand has a direct practical value, as far as the phytocenosis' separate components are the raw material for a certain type of forestry production. Thus, the study of ¹³⁷Cs total activity distribution in pure pine plantings which grow in different types of forest vegetable conditions was carried out.

Tissues and organs of trees which grow in humid bory form a certain order according to the coefficients of the radionuclide total activity absorption: timber without bark (45,48 %) > external bark (19,66 %) > thick branches (14,59 %) > one-year-old pins (7,09 %) > thin branches (6,36 %) > two-year-old pins (2,69 %) > one-year-old shoots (2,51 %) > inner bark (1,62 %).

The distribution of the radionuclide total activity in pine plantings of wet bory is different compared to the mentioned above data. The timber without bark has the major part of the phytomass, however it is not the dominant phytomass structure and it makes just 41,35 %. The other components of tree stock form the following portions of phytomass: external bark – 13,57 %; inner bark – 0,88 %. Thus, the tree stock components make 55,80 % of above-ground phytomass of pine plantings in wet bory. The components of tree crown make less than 44,20 % of phytomass, respectively.

The distribution of ¹³⁷Cs total activity in above-ground phytomass of pine plantings is specific in wet bory. The maximum part of this radionuclide total activity is in thick branches – 38,02 %. The timber without bark is on the second place – 19,24 % and the external bark is on the third place – a 15,21 %. The obtained data confirm that the total radioactivity concentrated in stock components makes 37,44 % of ¹³⁷Cs distribution in above-ground phytomass of pine plantings in the conditions of wet bory; the total radioactivity concentrated in crown components is 62,56 %.

It is important to compare the fractional structure of above-ground phytomass of pure pine plantings and the distribution of the radionuclide total activity in this phytomass in humid subory. The obtained data show that the total radioactivity concentrated in timber stand in above-ground phytomass in humid subory is bigger than that in the humid bory: 83,62 % and 81,69 %, respectively. The total radioactivity concentrated in the external bark and the inner bark in bory and subory increases. Thus, the tree stock components (timber, the external bark and the inner bark) in humid subory (B3) make 90,13 % of above-ground phytomass; the crown components make 9,87 %, respectively. The radioactivity ratio concentrated in thick branches, thin branches and one-year-old shoots is much bigger in humid bory in comparison with humid subory.

The comparative analysis of the radioactivity ratio of the pine plantings' components in the fractional structure of above-ground phytomass with the ¹³⁷Cs total activity in phytomass shows that with the improvement of edaphic conditions (the change of humid subory into humid bory) the radioactivity ratio concentrated in timber increases both in the above-ground phytomass and in the distribution of the radionuclide in this phytomass. The increase of the total radioactivity concentrated in other tree stock components in above-ground phytomass is exhibited in the order and it is detected when humid bory change into humid subory: external bark is from 19,66 to 22,21 %; inner bark is from 1,62 to 1,65 %. The crown components form the less part of above-ground pine plantings' phytomass of humid bory and humid subory: one-year-old pins – from 0,99 to 0,90 %; one-year-old shoots – from 0,31 to 0,29 %; thick branches – from 6,47 to 4,65 %; thin branches – from 2,67 to 2,21 %. The situation is similar to the described above when speaking about the distribution of ¹³⁷Cs total activity in above-ground components of pine plantings' phytomass and in the case of edaphic conditions improvement when humid bory change into humid subory. Thus, the ratio of the total activity increases in all tree stock components with the change of humid bory into humid subory: timber without bark – from 45,48 to 48,88 %; external bark from – 19,66 to 22,21 %; inner bark – from 1,62 to 1,65 %. The major crown components in the given edatope order show a considerable decrease in the concentration of the radionuclide total activity: one-year-old pins – from 7,09 to 5,84 %; one-year-old shoots – from 2,51 to 2,14 %; thick branches – from 14,59 to 9,48 %; thin branches – from 6,36 to 5,08 %.

Thus, it can be summarized that stock components concentrate 72,74 % of the total radionuclide activity in above-ground phytomass of pine plantings. The crown components concentrate 27,26 % of the total radionuclide activity. The corresponding values for humid bory are of 66,76 % and 33,24 %, respectively.

It should be mentioned that in carrying out cutting-area work the crown components are gathered in 10–15 huge heaps on the territory of 1 ha and are burned. As a result, considerable values of the radionuclide activity are concentrated in humid bory – up to 33,24 % and in humid subory – up to 27,26 % of the total radionuclide activity in phytomass of pine plantings. It must be pointed out that these local areas could be the source of high radioactivity in wild berries, medicinal plants and edible mushrooms when the herbaceous-bushy layer of micocenosis is renewed.