

Original article

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Dynamics of Intrapopulation Competition of Spruce under the Canopy of Southern Taiga Birch Forests and after Birch Felling in the Ontocenogenesis of Forest Stands

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Abstract. The dynamics of the intensity of intrapopulation competition of the spruce layer with changes in the parcel structure at different stages of plantings ontogenesis is studied. The objects of research are southern taiga birch forests with a population of spruce under the canopy and spruce stands formed after cutting the birch canopy. The competition index CVU was used for the analysis. Index CVU is calculated from the ratio of the volumes of tree crowns in the group (by Bidding).

The competition index (CVU) was used to analyze the relationships between the layers of the spruce cenopopulation in the stand, between the leading and competing trees of the same layer. To assess intrapopulation competition, CVU used the method of calculating the sum of ratios of volumes of crowns of fir trees developed by Biding.

In birch forests in the first half of the stage of ontogenesis "maturity" in the second tier of spruce, the competition index $CVU = 3$. In the second half of the "maturity" stage, a decrease in the number of leading trees leads to a decrease in CVU to 2. A significant increase in the volume of spruce crowns at the beginning of the "aging" stage again increases CVU to 3. The influence of second-tier trees on spruce undergrowth during 20 years of observation decreases from $CVU = 1370$ to $CVU = 23$.

The volume of the crown of fir trees leading in the second tier is closely related to the cross-sectional area of the crown. The correlation coefficient increases from 0.78 to 0.99 during the observation period. In competing trees, the crown volume is related to their height, and the correlation coefficient increases from 0.48 to 0.93 over 20 years.

20 years after the cutting of the birch canopy, a spruce forest is formed in the stage of ontogenesis "pole-stage stand". Between the fir trees leading in the first tier, the competition index is low $CVU = 0.93$. During the transition to the "maturity" stage, an increase in the number of leading fir trees leads to an increase in competition by 3.7 times to $CVU = 3.41$, almost unchanged until the end of this stage of ontogenesis (up to $CVU = 3.44$). The influence of the first tier of spruce on the second tier during the transition from the "pole-stage stand" to the "maturity" stage varies slightly from $CVU = 11.1$ to 10.3 .

Keywords: southern taiga, birch forests, under-canopy spruce stand, competition index.

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