

The Signal of Climate in the Radial Increment of Pine Stands in Modal Forest Types of the Voronezh Region

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Keywords: climatic signal, limiting factors, Scots pine, radial increment

We considered variability of the radial increment of 100–200-year-old stands of Scots pine, under the influence of climatic factors limiting growth in a protected mode (Voronezh State Biosphere Reserve) in the modal site of forest «pine with herbal and with oak.»

Analyzed climate dynamics (according to weather station «Voronezh») for the three 30-year interval: 1961–1990, 1981–2010, 1986–2015. Revealed the intensive growth of air temperature and weak growth of amounts of precipitation on the background of their cyclical fluctuations. Since 2007, the average annual temperature does not fall below 7 °C, and in 2015 it set a record value: 8.7 °C. It is proved that the main limiting factor in the growth of pine forest in the Central forest-steppe is the amount of precipitation of the warm period and the objective measure of the frequency of droughts – hydrothermal coefficient of Selyaninov.

We determined the parameters of the similarity of dendrochronological series of pine stands, the range of fluctuations of the radial increment and communication dates of extremes with variations of climate factors. It is shown that the generalized chronology of radial increment of pine in the surveyed stand contains a high variability due to the influence of climatic factors. There is a significant effect of drought on the width of the growth rings of the surveyed stand, but not always in proportion to the strength of the drought.

The highest coefficients of variation radial increment of stands (up 69.2%) observed in the years of severe drought, and especially – in the coming behind them. Found a clear cyclical recurrence lows of radial increment at intervals close to the 11-year cycle (Schwabe-Wolf).

Deep stable lows of radial increment detect recurrence close to Bruckner cycle (32–38 years): 1905–1906, 1939–1940, 1971–1972 and 2009–2010. Correlation coefficients were calculated of growth indices (total width of the growth rings and, separately, of late wood) the amounts of precipitation for April–October (no more than 0.27) and with solar activity, expressed in the Wolf numbers. The correlation coefficient with the Wolf numbers with indices offset to forward by two years, reached minus 0.36. Correlation of climate factors with indices of the radial increment of late wood of Scots pine is above.