

Dendroclimatological study on the radial growth of European larch (*Larix decidua* Mill.) in Lithuania

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Larch trees were planted in Lithuania at the beginning of the 19th century. European larch is one of the most beautiful planted trees in Lithuanian parks and forests. The influence of climatic factors on tree-ring formation of larch in Lithuania is not adequately studied. Earlier results based usually on several trees or few experimental plots and applying different methodology have provided controversial results. It was known that the radial growth of larch in Lithuania is tolerant to winter colds as well as the significant role of climatic conditions in previous season. This study was aimed at investigating the climate/radial growth relationships of larch using response function and pointer year analysis in a network of experimental plots in Lithuania. Moreover, we have investigated the inter-relationships between negative pointer years and light rings of larch. 26 research plots (357 mature larches) were selected in larch stands in Lithuania. Tree-ring widths were measured using an image analysis technique. Then, the cross-dating and standardization were carried out and local chronologies were compiled. The response function analysis was carried out in 17 plots from 1950–2003. The stability of relationships was tested in three longest larch chronologies using moving intervals from 1895–2006. Response function has demonstrated that the radial growth of larch is inversely related to air temperature in previous June – September, while the relationships in previous July are statistically significant in all regions and stable from 1895–2006. The influence of air temperature in April and May is positive and increasing. The relationships in January are higher in Eastern Lithuania. However, coefficients are decreasing. The relationships with precipitation are usually positive across Lithuania, but more variable than the relationships with air temperature. A positive influence of precipitation in previous June is highest and significant in the Middle lowlands and Eastern Lithuania. The relationships are increasing from 1895–2006. A positive, significant and increasing influence of precipitation in the current June has been observed in the region of Middle lowlands. Analysis of pointer years has shown that the decreases in radial growth were mainly provoked by droughts in summer. Positive pointer years were triggered by warm conditions in winters and springs as well as abundant precipitation in summer. The wide-narrow tree rings repeated alternatively in 1963–1964, 1983–1984, 2000–2001 and 2005–2006. The decrease of growth lasted for two years in 1920–1921 and 1940–1941. Pointer years repeated successively indicate the high variability and sensitivity of tree-ring-width series in larch. During the majority of negative pointer years of larch, a significant decrease in radial growth of spruce was also observed. However, in 1927, 1933, 1940 and 1995, the majority of spruce trees have shown a growth increase rather than a decrease. Hence, it indicates that these pointer years in larch may contain an ecological signal rather than climatic.