

Influence of climatic factors on tree-ring widths of European larch in Lithuania

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A dendroclimatological study of European larch (*Larix decidua* Mill.) has been carried out in Lithuania. The analysis of signature years has revealed that the formation of narrow rings is linked to hot/dry summers and of wide rings to warm winters and springs (Vitas and Žeimavičius 2010). The influence of climatic factors on tree ring widths of European larch was assessed using response function analysis (DendroClim 2002). Our investigation, based on a wide network of 25 experimental plots (Vitas and Žeimavičius 2010) demonstrates that the radial growth of larch is mostly related to climatic conditions of a prior year: positively to precipitation in June and negatively to air temperature in July (significant correlations in 25% and 72% experimental plots, respectively). Amount of precipitation in June of a current year positively influenced the growth of larch in 16% of experimental plots, while the influence of current year temperature is weak and insignificant. The tree-ring widths of European larch have been investigated in several studies in Lithuania (Kaminskaitė 2002, Kaselytė 2003, Pukienė and Bitvinskas 2000). However, the results were based on one or few research plots, and they were controversial: positive influence of cold winter (Pukienė and Bitvinskas 2000), cool and humid summer (Pukienė and Bitvinskas 2000, Kaminskaitė 2002) and negative impact of air temperature and precipitation in March (Kaselytė 2003). The interpretation of signature years, assessed from the regional tree-ring chronology of larch (Vitas and Žeimavičius 2010) has shown that growth reductions were triggered by hot and dry summers. This is seen in positive correlation with precipitation in June and also confirms that analysis of signature years extends the analysis of the response function pointing out to the influence of extreme climatic conditions, especially in this case, when most statistically significant correlations predominate with climate of a prior year. This finding is in accordance to Oleksyn and Fritts (1991) who found that larch radial growth in Poland is directly related to summer precipitation. We confirm the previous findings that there is no clear negative influence of cold winters to the radial growth of larch in Lithuania. On the other hand, the increase in the radial growth was triggered by warm winters and springs (Vitas and Žeimavičius 2010).

References:

- Kaminskaitė, G. 2002. Lenkinio maumedžio (*Larix polonica* Racib.) augimas ir būklė Degsnės maumedynė [The growth and state of European larch (*Larix polonica* Racib.) in the Degsnė larch stand]. Bachelor thesis. VMU. Kaunas. 90 p. [in Lithuanian]
- Kaselytė, A. 2003. Pietų Lietuvoje augančių maumedžių ir pušų dendroklimatochronologiniai tyrimai [Dendroclimatochronological investigations on larch and pine growing in the South Lithuania]. Master thesis. VMU. Kaunas. 53 p. [in Lithuanian]
- Oleksyn, J. and Fritts, H.C. 1991. Influence of climatic factors upon tree rings of *Larix decidua* and *L. decidua* × *L. kaempferi* from Pulawy, Poland. *Trees - Structure and Function* 5 (2): 75-82.
- Pukienė, R. and Bitvinskas, T. 2000. Europinio maumedžio (*Larix decidua* Mill.) radialinio prieaugio kaitą lemiantys aplinkos veiksniai [Environmental factors influencing European larch (*Larix decidua* Mill.) radial growth variations]. *Dendrologia Lithuanica* 5: 72-77. [in Lithuanian].
- Vitas, A. and Žeimavičius, K. 2010. Regional tree-ring chronology of European larch (*Larix decidua* Mill.) in Lithuania. *Baltic Forestry*, 16 (2): 187-193.