THE RECONSTRUCTION OF LYMANTRIA DISPAR OUTBREAKS BY DENDROCHRONOLOGICAL METHODS IN THE SOUTH URALS

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INTRODUCTION

Interest in investigating the influence of extreme ecological factors on the radial growth of oak (*Quercus robur* L.) is bound up with oak dieback in the South Urals during the last decade. Factors contributing to this problem in the study area are hard winter frosts, late spring frosts, and *Lymantria dispar* L. outbreaks. To distinguish the influence of these factors on radial growth, I used a methodological approach involving the analysis of radial increment, anatomical structure of xylem, histograms of ring indexes, and comparative analysis of radial growth in different plots (Kucherov 1987, 1988). By means of dendrochronological analysis, I was able to determine which specific features of radial increment were influenced by different factors (Kucherov 1988).

RADIAL INCREMENT RESPONSE TO DEFOLIATION

I found that maximal reduction of radial increment occurred following pest outbreaks during which the level of defoliation reached more than 70 percent. When defoliation did not exceed 50 percent, reduction of radial growth was not observed. The character of radial increment, further, depended on the degree of leaf regeneration after defoliation. When secondary leaves did not form, maximal decrease in radial increment took place in the year following defoliation (an after-effect). On the other hand, when secondary leaves did form, the after-effect was negligible or absent. The period of radial growth reduction, depending on the level of canopy recovery, was 1 to 2 years. Long periods of mean radial increment reduction were observed only in suppressed trees. Some of these trees (4 percent after the outbreak in 1985) were drying up. The late spring frosts, which also damaged the leaves, caused less radial increment reduction than gypsy moth defoliation.

The radial increment patterns I identified allowed for reconstruction of growth limiting determinant events since 1848. It was established that 13 outbreaks have taken place between 1848 and 1989. Intervals between the subsequent outbreaks were as follows: 11, 10, 12, 13, 12, 14, 11, 12, 6, 12, 11, and 9 years (the mean being 11 years). I discovered that in the last 50 years a significant increase in outbreak intensity had occurred relative to the preceding 90 years.

BARANCHIKOV, Y.N., MATTSON, W.J., HAIN, F.P., and PAYNE, T.L., eds. 1991. Forest Insect Guilds: Patterns of Interaction with Host Trees. U.S. Dep. Agric. For. Serv. Gen. Tech. Rep. NE-153.

LITERATURE CITED

KUCHEROV, S.E. 1987. *Lymantria dispar* outbreaks' effect on radial growth of *Quercus robur* L. in the South Urals, p. 285-288. In Dendrochronological methods in forest science and ecological forecasting. Thesis of the International Workshop. Irkutsk.

KUCHEROV, S.E. 1988. The influence of pest outbreaks and climatic factors on radial growth of trees. Avtoreferat dissertatsii. Sverdlovsk. 24 p. (In Russian.)