Dendroecology analysis of Macedonian pine (*Pinus peuce Gris.*) radial growth and climate relationships at National Park Pelister in North Macedonia

Tanovski Vladimir[1]*

[1] Ss. Cyril and Methodius University in Skopje, Hans Em Faculty of Forest Sciences, Landscape Architecture and Environmental Engineering, Skopje, North Macedonia

* Corresponding author: vladimirtanovski@yahoo.com

Abstract:

The climate-growth relationship in tree development is evident and the development of trees directly depends on climate. Numerous dendroecology analyses have been developed for Europe, but there are still regions with limited data of this kind. In order to assess the impact of climate variations on Macedonian pine stands in National Park Pelister (NPP), the radial growth of Macedonian pine trees and their dependence on temperature and precipitation were studied using dendroclimatological and dendroeloecological methods. In that context, at NPP 35 core samples were taken from dominant trees. The stands are located on the northern slope in pure even-aged Macedonian pine forests with the same structural characteristics. Core samples were firstly air dried, sanded, scanned with height resolution and then measured and visually cross-dated using CooRecorder and CDendro software. To standardize and evaluate the measurement of tree ring width was used dplR library package. Also were calculated some dendrochronological data as Mean sensitivity (MS), running rbar, Expressed population signal (EPS) and autoregression coefficient (AR). The climate-growth relationship was determined by Treeclim package in R. This dendroclimatic study was prepared using correlation and response function analysis. The Pearson correlation coefficients between the chronology indices and 18 precipitation and temperature data were calculated for the period from 1951 to 2015. The applied response function analysis included 18 precipitation and temperature variables from May of the prior year to October of the current year. Dendrochronology statistics show MS of 0.21, rbar value of 0.211, EPS of 0.831 and autoregression coefficient of 0.846. The results of the correlation analysis pointed out that there was a strong tendency towards a positive response to the summer and late summer/early autumn precipitation and a weak significant negative response to the summer temperatures. Climate-growth relationships were further studied using the response functions for individual months from previous May to current October. In that way, higher precipitation in August of the previous year as in May and June of the current year has a positive response to tree ring width (TRW). Otherwise, the high temperature in July of the current year has a negative impact on TRW. These results show the relationship between climate and growth, but as a result

of the small number of sample cores with a relatively small number of rings, these stands need to be further explored to define the climate-growth relationship.