



HANS EM
FACULTY OF FOREST SCIENCES
LANDSCAPE ARCHITECTURE AND
ENVIRONMENTAL ENGINEERING



Spatial structural characteristic of Macedonian pine (*Pinus peuce Gris.*) forest in National Park Pelister in North Macedonia

Vladimir Tanovski^{1*}, Bratislav Matovic², Pande Trajkov¹

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

² Institute of Lowland Forestry and Environment, University of Novi Sad, Novi Sad, Serbia

* Corresponding author: vladimirtanovski@yahoo.com

Abstract:

Forest spatial structure strictly defines ecosystem resilience, the success of its functioning, and development. The spatial structure of forest compartments provides additional information on the forest stand heterogeneity. The aim of this study is to examine structural patterns (both spatial and nonspatial ones) in Macedonian pine (*Pinus peuce Gris.*) forests located at National Park Pelister, North Macedonia. We analyzed middle-aged (~ 90 years) Macedonian pine stands in terms of structural metrics collecting data from geo-referenced trees on the established 14 circle sample plots (SP). The area of each SP was 500 m². In SP for the nonspatial characteristic (NC) were collected data for tree diameter at breast height (DBH), tree height (H), azimuth, the distance of trees from the center of SP and data for stand characteristic. For spatial characteristic (SC) were calculated the index aggregation of Clark and Evans, mean distance, uniform angle index (W), mean directional index, DBH, H differentiation and domination. For testing the spatial structure of stands, we were used L and pair correlation functions. Were used Excel, Crancod and StatSoft Statistica software for NC and SC analysis. The average age of SP ranges from 88 to 99 years. The average value of DBH, H, basal area and volume of trees per hectare are 33.9 cm, 20.1 m, 55,8 m² and 502 m³/ha respectively. According to the aggregation index, trees in SP are randomly deployed with coefficients from 0.73 to 1.34 with an average value of 1.07. Distances between the reference tree and 1st neighbourhood are in the range from 1.27 to 3.36 with an average value of 2.18. The position of the four trees around the reference tree is random and uniform because the range value of the W index is from 0.49 to 0.67 with an average value of 0.56. The mean directional index points out that trees are grouped around referent trees with an average value of 2.05. In the stand of Macedonian pine, trees have low differentiation of DBH and H with average values of 0.19 and 0.09 respectively. Regarding domination of DBH and H, it can be said that trees around the reference tree have some bigger diameter with the coefficient of 0.54, while regarding height



HANS EM
FACULTY OF FOREST SCIENCES
LANDSCAPE ARCHITECTURE AND
ENVIRONMENTAL ENGINEERING



they have an equal domination index with a value of 0.5. L correlation function points out that trees are grouped and, in some cases, they are randomly positioned. The same result has a pair correlation function where trees are grouped and relatively randomly positioned. It can be concluded that trees in the Macedonian pine stand have a rather random and uniform arrangement, with little differentiation and a small dominance in the DBH and the H.

Keywords: spatial structure; index of aggregation; uniform angle index; mean directional index; differentiation and domination index; *Pinus peuce Gris*.