

THE IMPACT OF CLIMATE CHANGE ON OUTBREAKS OF THE BEECH LEAF-MINING WEEVIL *RHYNCHAENUS FAGI* L. IN SERBIA

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Fagus sylvatica L. is a key broadleaf species in Serbia, with an important ecological and economic role in forest ecosystems. In recent decades, due to climate changes, various forms of stress and pest outbreaks have been recorded with increasing frequency in beech stands. Among them, the beech leaf miner *Rhynchaenus fagi* L. has emerged as a significant defoliator, as milder winters and warmer springs allow higher overwintering of adults and a more favorable phenological synchrony with beech leaf-out.

The aim of this study was to quantify the intensity of *R. fagi* infestation in selected beech stands in Serbia during 2024, to present the spatial distribution of damage across management units, and to examine their relationship with current climatic conditions. Potentially affected areas were identified using remote sensing, through the analysis of Sentinel-2 and Landsat 8/9 satellite images, based on changes in vegetation indices and visual interpretation. At these sites, field investigations were carried out in 17 representative forest management units belonging to three forest enterprises.

The intensity of infestation was determined by selecting representative beech trees in each chosen management unit, from which branches at least 1 m in length were sampled. On the samples, leaves attacked by miners were counted against leaves were not attacked, and the proportion of attacked leaves was used as an indicator of defoliation in the crowns. Damage caused by supplementary feeding of adults was recorded qualitatively, without being included in the numerical assessment.

The results indicate a regional gradient of damage. In the southern forest enterprises of Leskovac and Vranje, most management units fall into the category of severe to very severe damage, with average defoliation values in some units exceeding 80%, which is comparable to heavy beech infestations reported in the region. In the Kragujevac forest enterprises, a considerably lower infestation intensity was recorded, with an average value of 13.53% in the Bešnjaja management unit, and only sporadic, locally restricted symptoms at other sites.

Climate analysis shows that 2024 was the warmest year on record in Serbia, with positive anomalies in winter and spring temperatures, which likely favors the overwintering and mass occurrence of *R. fagi*. The results of this study support the assumption that climate warming may increase the frequency of outbreaks and the occurrence of calamity of this pest, highlighting the need to combine remote sensing with standardized field monitoring within an early-warning system and adaptive management of beech forests.

Key words: *Rhynchaenus fagi*, climate changes