A statistical small-area method of estimation of spatial distribution of the tree damage degree

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The objectives of this study are to demonstrate a small-area method of estimation of the spatial distribution of the tree damage degree, and to initially verify it during the assessment of fir (*Abies alba* Mill.) and beech (*Fagus sylvatica* L.) vitality in the Świętokrzyski National Park. In order to estimate the degree of tree damage the classification based on the degree of defoliation, and assumed by the International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests – ICP, was used. The tree damage degree is presented in P_3 fields of the SINUS System of Information on Natural Environment. To estimate the spatial distribution of the tree damage degree an unrestricted simple random sampling scheme was used. During the initial verification of the presented method the total error as well as errors of the upper and lower intervals were analysed in two forest sections of the Świętokrzyski National Park, i.e. on the total area of 1,997.18 ha. The maximum total errors in individual P_3 fields of the SINUS system for fir and beech amounted to 31.3%. The average errors (total, of upper and lower intervals) were lower than 25% for both tree species. The method presented in this paper can become a valuable complement to existing large-area methods of the tree damage degree estimation since it allows to determine the tree vitality in a whole forest district or national park, as well as in individual compartments or even subcompartments.

Keywords:

survey sampling; unrestricted simple random sampling; Sinus system; defoliation; *Abies alba*; *Fagus sylvatica*; Świętokrzyski National Park

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