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EFFECTS OF HETEROGENIETY ON SPATIAL PATTERN ANALYSIS OF WILD PISTACHIO TREES IN ZAGROS WOODLANDS, IRAN

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Abstract. Vegetation heterogeneity biases second-order summary statistics, e.g., Ripley's *K*-function, applied for spatial pattern analysis in ecology. Second-order investigation based on Ripley's *K*-function and related statistics (i.e., *L*- and pair correlation function *g*) is widely used in ecology to develop hypothesis on underlying processes by characterizing spatial patterns of vegetation. The aim of this study was to demonstrate effects of underlying heterogeneity of wild pistachio (*Pistacia atlantica* Desf.) trees on the second-order summary statistics of point pattern analysis in a part of Zagros woodlands, Iran. The spatial distribution of 431 wild pistachio trees was accurately mapped in a 40 ha stand in the Wild Pistachio & Almond Research Site, Fars province, Iran. Three commonly used second-order summary statistics (i.e., *K*-, *L*-, and *g*-functions) were applied to analyse their spatial pattern. The two-sample Kolmogorov-Smirnov goodness-of-fit test showed that the observed pattern significantly followed an inhomogeneous Poisson process null model in the study region. The results also showed that heterogeneous pattern of wild pistachio trees biased the homogeneous form of *K*-, *L*-, and *g*-functions, demonstrating a stronger aggregation of the trees at the scales of 0–50 m than actually existed and an aggregation at scales of 150–200 m, while regularly distributed. Consequently, we showed that heterogeneity of point patterns may bias the results of homogeneous second-order summary statistics and we also suggested applying inhomogeneous summary statistics with related null models for spatial pattern analysis of heterogeneous vegetations.

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