Characterising Spatial Structure of Natural Forests in Mexico

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Abstract

Stand structure is related to the spatial and temporal arrangement of individual trees in a forest stand. The spatial structure defines the organisation of the trees in space while temporal structure refers to successional patterns over time. The study presents a characterisation of spatial structure and intertype analysis of tree locations in natural forests of greater diversity and of high ecological significance in Durango, Mexico. These forests, with rare conifers including the species: *Picea chihuahuana*, *Abies durangensis* and *Pseudotsuga menziesii*, are found on particular sheltered, humid sites. Two different spatial statistics, know as nearest neighbour analysis F(r) and Ripley's K(r) function have been used for analysing the tree-mapped data. Patterns and spatial interactions for trees in different species, sizes, and dominance classes were analysed separately. The results show that both methods are complementary and give a detailed description about the types and scales of the observed tree patterns. However, Ripley's K(r) analysis better revealed different aspects of the spatial process for the analysed classes of trees within the plots when compared to the nearest neighbour statistic and is a powerful tool for analysing the spatial relationships between different classes of trees. The examples presented here indicate: a significant dependence or attraction between species. Trees in the smallest class significantly avoid trees in the tallest height class, and there is a positive association between suppressed trees and co-dominant and dominant trees, reflecting the presence of self-thinning within the plots. Positive spatial associations (aggregation) in this forest seem to be highly linked with seed dissemination processes, the relative shade tolerance of some species, and specific preferences for soil patches. On the other hand, repulsive interactions (spatial regularity) could be an indication of competition processes that imposes a minimum distance between trees.

Keywords: Nearest neighbour analysis, Ripley's K(r) analysis, spatial tree distribution

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