Crown Structural Indicators in a Natural Mixed Coniferous Forest in Northeastern Mexico

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Abstract

This study presents the results of indicators for the crown structure of a natural, uneven-aged forest (Abies vejari, Pseudotsuga menziesii, Pinus ayacahuite and Pinus hartwegii) at the Cerro El Potosí at 3100 m.a.s.l in the Sierra Madre Oriental, Nuevo León, México. Position, age, diameter, height, basal area and crown parameters of 504 trees were measured in this area. There is a wide variability in age, height and diameter of species due to the fact that the forest is uneven-aged and mixed. Tree distribution diameter classes and height zones are calculated from the data to show the population structure. The Weibull bimodal distribution was applied to determine the diametric distribution of coniferous species, determining the presence of two strata in their vertical structures (high zone I and II). Several crown indexes (crown width index, crown thickness index, crown spread ratio, crown projection area and crown surface area) were used. For the description of specific crown properties related to the tree species, the crown thickness index and the light crown percentage (light crown length/crown length) were found to be quite adequate. The variation of these indexes is surprisingly high even within the same tree species. Finally, the ratio between the crown surface area regarding the surface area of the light crown and the crown projection area differs greatly between the four tree species. According to the heterogeneous structure of the uneven-aged and mixed stand a large variability in stem dimensions and crown parameters was observed. In conclusion, the uneven mixed stands present a specific structure, thus making the method of evaluation developed here reliable, being of high value for forest ecosystem management plans, where forest structure is considered to have a high priority. This study was financially supported by Consejo Nacional de Ciencia y Tecnología, México, through the project: Caracterización Estructural del Estrato Arbóreo en Bosques Multicohortales del Norte de México: 333919—B.

Keywords: Crown index, Mexico, mixed forest, uneven-aged stand, Weibull distribution

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