

# 杨树人工林林木个体大小比数与溃疡病发生程度的关系\*

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**摘要:** 由于林木病害的发生与林分空间结构密切相关, 对于单一树种组成的杨树人工林而言, 如何优化林分空间结构, 提高树木生长势, 增加抵抗胁迫能力, 才是防治杨树溃疡病的有效途径。大小比数能够准确地量化参照树与相邻木的大小关系, 从而使在空间结构参数基础上人工重复复杂的林分结构成为可能。本文采用胸径、树高和冠幅计测大小比数分析其与杨树人工林溃疡病发生程度的关系。结果表明, 欧美杨 107、108 和 DN113 在同密度下, 溃疡病发病程度与胸径、树高和冠幅的大小比数均呈极显著负相关, 且在不同指标个体优势度间存在极显著差异。其中, 108 杨溃疡病发生情况与胸径大小比数相关性最高, 相关系数为 -0.672, 其次为 DN113 杨和 107 杨 ( $r_{DN113}=-0.595$ ,  $r_{107}=-0.560$ )。欧美杨 DN113 的发病情况与树高大小比数相关性高于 108 杨和 107 杨 ( $r_{DN113}=-0.620$ ,  $r_{108}=-0.471$ ,  $r_{107}=-0.406$ )。个体冠幅大小比数与溃疡病发病情况的相关系数大小: 108 杨 > DN113 杨 > 107 杨。针对同一品种不同密度下进行比较分析, 欧美杨 107 杨在 3×2 栽培密度下的发病程度与这些指标大小比数的相关性显著, 且均呈显著性负相关, 胸径大小比数相关性明显高于 4×2 栽培模式 ( $r_{3×4}=-0.553$ ,  $r_{4×2}=-0.362$ ), 而 3×4 模式基本无相关性 ( $r_{3×2}=-0.129$ ); 树高大小比数和冠幅大小比数均呈极显著负相关, 另两个栽培模式下它们之间均无相关性,  $p>0.05$ ; 但随着密度的减小, 其相关性越来越弱, 当株行距达到 3m×4m 时, 杨树溃疡病病害的发生基本不受林木个体优势度强弱的影响。

**关键词:** 杨树人工林; 溃疡病; 树干感病面积比; 大小比数; 空间结构

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## Relationships between neighborhood comparison of shorts-rotation poplar plantations and canker disease incidence

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**Abstract:** Since the occurrence of tree diseases has great correlation with the stand spatial structure. For poplar plantation composed with single tree species, to optimize the spatial structure, improve tree's potential growth, increase resistance of disease is the efficient way of prevention and treatment of poplar canker. Neighborhood comparison can accurately quantify the size relationship of reference tree and adjacent trees, so it can make that to be possible what is artificial repeated the complex stand structure repeat based on the space structure parameters. In this paper, the correlation between canker occurrence of poplar plantation and neighborhood comparison of diameter at breast height,

tree height and the size of tree crown was analyzed. The result shows that poplar 107,108 and DN113 in the same density, the occurrence of canker has significant negative correlation with neighborhood comparison of diameter at breast height, tree height and the size of tree crown. Among them, the occurrence of canker has the highest correlation coefficient of -0.672 of poplar 108 with neighborhood comparison of diameter at breast height, followed by the poplar DN113 and poplar 107 ( $r_{DN113} = -0.595$ ,  $r_{107} = -0.560$ ). Poplar DN113 has highest correlation coefficient of neighborhood comparison of diameter at tree height with the occurrence of canker ( $r_{DN113} = -0.620$ ,  $r_{108} = -0.471$ ,  $r_{107} = -0.406$ ). The relationship of the size of tree crown influence the occurrence of canker is that: poplar 107 > poplar DN113 > poplar 108. Comparative analysis of the same species with different densities was conducted in poplar plantation with planting space of 3m×2m, the disease severity index of poplar 107 has great negative correlation with neighborhood comparison of those indicators as well, the score of DBH was significantly higher than the correlation between the 4 x 2 cultivation mode ( $r_{3 \times 4} = 0.553$ ,  $r_{4 \times 2} = 0.362$ ), and 3 x 4 cultivation model basic was no correlation ( $r_{3 \times 2} = 0.129$ ); The tree height and crown breadth size neighborhood comparison was all were very significant negative correlation, the other two cultivation mode are no correlation between them,  $p > 0.05$ . The correlation was decreased with the declining of the density. When the planting space reaches to 3m×4m, the occurrence of canker would not be impact by individual dominance.

**Key words:** Poplar plantation; Canker; Infected area ratio of trunk; Neighborhood comparison;

Spatial structure