

抚育方式对鄂中丘陵区马尾松人工林林下持水能力的影响

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摘要 明晰不同抚育方式林下结构持水能力有助于提升森林生态系统水源涵养功能。本研究以鄂中丘陵区马尾松人工林为研究对象, 分析了对照、间伐强度 15%、30%、45% 和结构化经营 5 种抚育方式对林下灌草层、枯落物层和土壤各层持水能力的影响, 通过综合指标体系构建评价了林下总持水能力。结果表明: 灌草层持水能力在不同抚育方式下无一致规律, 但结构化经营显著提高了灌木的有效拦蓄量 ($0.61 \pm 0.14 \text{ t} \cdot \text{hm}^{-2}$) 和有效拦蓄率 ($69.90 \pm 32.39\%$), 15% 的间伐强度显著提高了草本的持水能力。随间伐强度增加, 枯落物层的最大持水量和有效拦蓄量均表现为先增加后减小的趋势, 间伐强度为 30% 时持水能力最高。马尾松人工林抚育处理显著降低了土壤的自然持水量和田间持水量。不同抚育方式下, 林下总持水能力表现为间伐强度 30% (0.546) > 对照 (0.502) > 结构化经营 (0.494) > 间伐强度 15% (0.473) > 间伐强度 45% (0.423)。整体上看, 间伐强度 30% 的抚育方式最利于提升林下水源涵养能力。

Influence of tending methods on the understory water-holding capacity of *Pinus massoniana* plantations in hilly region of central Hubei Province

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Abstract: Clarifying the water-holding capacity of understory structure in different tending methods is helpful to improve the water conservation function of forest ecosystem. In this study, *Pinus massoniana* plantations in hilly region of central Hubei Province were selected as the research object to analyze the effects of water-holding capacity of understory shrub, herb, litter and soil layer under five different tending methods: control, thinning intensity of 15%, 30%, 45% and structured management. The total understory water-holding capacity was evaluated through the construction of a comprehensive index system. The results showed that there was no consistent rule of water-holding capacity of shrub and herb layer under different tending methods. However, structured management significantly improved the effective storage capacity ($0.61 \pm 0.14 \text{ t} \cdot \text{hm}^{-2}$) and effective retention rate ($69.90 \pm$

32.39%) of shrub, and thinning intensity of 15% significantly improved the water-holding capacity of herb. With the increase of thinning intensity, the maximum water-holding capacity and effective storage capacity of litter layer both showed the trend of increasing first and then decreasing, and the water-holding capacity at thinning intensity of 30% was the highest. The tending methods of P. plantations significantly decreased the nature water-holding capacity and field water-holding capacity of soil. Under different tending methods, the total water-holding capacity of understory showed thinning intensity of 30% (0.546) > control (0.502) > structured management (0.494) > thinning intensity of 15% (0.473) > thinning intensity of 45% (0.423). Overall, the thinning intensity of 30% was the most conducive tending method to improving the water conservation capacity of understory