

研究论文

# 杉木(*Cunninghamia lanceolata*)连栽地力退化和杉阔混交林的土壤改良作用

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**摘要** 收集了有关杉木连栽的地力退化和连栽杉阔混交林的对比研究文献, 并进行分析表明, 杉阔混交林土壤容重平均比杉木纯林降低5%; 连栽杉木人工林随代数增加呈现容重变大的趋势, 2代比1代平均增加6%, 3代比2代平均增加9%。这种容重的变化使看似具有可比性的对比样地之间失去了可比性, 可能导致对杉木连栽人工林地力退化和杉阔混交林的土壤改良作用的评价产生偏差。通过对这种容重变化产生的影响进行校正, 对杉木连栽人工林地力退化和杉阔混交林的土壤改良作用进行了重新评估。结果表明, 采用固定深度采样的杉阔混交林与对照的杉木纯林、多代连栽杉木人工林不同代次间土壤有机碳和全氮贮量的相对变化均出现不同程度的低估现象。固定深度采样时, 与对照的纯林相比, 杉阔混交林对土壤的改良作用被低估, 土壤有机碳和全氮贮量的相对变化平均低估6%和5%; 杉木连栽引起的地力退化也被低估, 土壤有机碳和全氮贮量从1代到2代分别低估5%和7%, 从2代到3代分别低估7%和8%。经t-检验表明, 杉阔混交林与对照的杉木纯林、多代连栽杉木人工林不同代次间土壤有机碳和全氮贮量的相对变化在土壤容重影响校正前后有明显差异( $p=0.05$ )。

**关键词** [容重影响](#); [杉木](#); [连栽](#); [退化](#); [混交](#)

**分类号** [Q142.3](#), [Q948](#), [S152.5](#), [S718](#)

## The assessment of soil degradation in successive rotations of Chinese fir plantation and the soil amelioration of mixed plantation of Chinese fir and broad-leaved

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**Abstract** Soil degradation in the successive rotations of Chinese fir (*Cunninghamia lanceolata*) and the soil improvement of the mixed plantations of Chinese fir and broad-leaved species have been widely reported. However, changes in soil bulk density are usually reported at the same times. We collected soil bulk density, soil organic carbon and nitrogen data from paired site studies of successive rotations of Chinese fir and mixed plantations. Our analyses found that soil bulk density of mixed plantation was 5% smaller than that of pure Chinese fir plantation, and the soil bulk density of Chinese fir plantation increased by 6% and 9% from the 1st rotation to the 2nd rotation, and from the 2nd rotation to 3rd rotation, respectively. The changes in soil bulk density may cause significant errors when assessing soil fertility among different rotations and planting models (pure versus mixed plantations), because the comparability of the paired sites was lost. In this paper, we tried to re-assess the changes in soil organic carbon and nitrogen among different successive rotations of Chinese fir plantations and mixed plantation of Chinese fir and broad-leaved trees, by eliminating the impacts of soil bulk density. Results showed that soil amelioration of mixed plantations and the soil degradation of successive rotations of Chinese fir plantation were underestimated. Comparing to Chinese fir pure plantation, relative changes of soil organic carbon and total nitrogen stocks in mixed plantations were underestimated by 6% and 5%, respectively. Relative changes of soil organic carbon and total nitrogen stocks were significantly underestimated by 5% and 7% from the first rotation to the second rotation, and 7% and 8% from the second rotation to the third rotation, respectively ( $p=0.05$ ).

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**Key words** [changes in soil bulk density](#) \_ [Chinese fir](#) \_ [successive rotation](#) \_ [soil degradation](#), [mixed plantation](#)

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