

# 人工林經營對土壤養份循環及落葉分解速率影響之研究

## Influences of artificial forest managements to soil nutrient cycles and litters decomposition rates

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### 研究計畫中英文摘要：

#### (一) 計畫中文摘要

人工林經營是提高林木生產及穩定森林生態系之重要措施。人工林疏伐及其後之經營措施對森林生態系之功能及結構有著重要影響，同樣對土壤養分境況也會產生極大的影響，反之土壤養分境況之改變對森林生態系及環境都會產生影響。作為整合計劃之子計劃，本項目將採集分析蓮華池人工杉木林疏伐前後之20個疏伐樣區之3重復土壤樣品，分析土壤基本理化性質之變化，同時分析土壤中有效養分（氮、磷、鉀）、低分子量有機酸等變化；以埋藏袋法現地測定土壤有機氮磷之礦化過程及其隨時間的改變，以瞭解疏伐及其後經營措施對土壤養分循環的影響；現地定期收集枯落物，並採用枝葉袋法測定落葉之分解；同時以實驗室孵育方法，通過調節溫度、水分、光照等條件來研究疏伐措施對土壤養分境況的影響。在預定的四年計劃期間，第一年將主要做疏伐前土壤基本資料之分析調查，第二年開始疏伐後養分狀況變化之對比研究，第三四年繼續前年之研究路線，並做論文撰寫、報告整理。另外，也將提供土壤之基本資料與其他子計劃分享，同時需要獲得其他子計劃之資料支援來解釋說明相關土壤過程的變化及原因，最後整合其他子計劃結果，提出相關森林經營之科學依據及因應措施，為林業經營決策提供基礎依據。

#### (二) 計畫英文摘要

Reasonable artificial management of forests is one of the most important strategies to improve timber production and stabilize forest ecosystems. The artificial forest thinning and associated managements can influence the functions and structure of forest ecosystems as well as the status and dynamics of soil nutrients that affect the forest ecosystem and related environment reciprocally. As one part of the integrate project, this proposal will be conducted in the artificial fir forest of

Lianhuachi. In the plan, soil samples will be collected from each 3 points from different soil horizons of the total 20 thinning treatments zones for the analysis of soil basic physical and chemical properties. Available nutrients including nitrogen, phosphorus, potassium and low molecular weight organic acids (LMWOAs) will be measured during the whole scheduled period. Buried bag method *in situ* will be adopted to measure the soil mineralization rates of nitrogen and phosphorus for investigation the impacts from the forest thinning treatment. Litterfall will be collected regularly and litterfall bag method will be used for determination of organic matter decomposition *in situ*. Meantime, the laboratory incubation experiments will be employed to test the soil response to water, temperature and light for simulation the influence of the forest thinning. During the planned four years, we will make the basic investigations of soil and related factors at the first year. At the second and later years, the comparison of nutrient contents and dynamics before and after the forest thinning will be done. Final reports will be written according to the data. Furthermore, we need other data obtained from other related proposals to better elucidate and explain the associated soil variables and processes. Also, we will provide the soil parameters to other proposals for production of an integrate report that can propose scientific data and corresponding measurements of the specific forest management for the decision and policy makers of forest management.