

# Soil properties changed with forest stand treatments in Eucalyptus plantation in South China

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The ecological impacts of Eucalyptus plantations (EPs) have garnered increasing attention. Compared with natural forests, EPs have relatively simple structure and caused declines in soil quality. To maintain a sustainable forest ecosystem, forest managers attempt to convert EPs into mixed forests. However, effects of such stand treatments on soil quality are poorly understood. Here we investigated soil property change with Eucalyptus monoculture conversion into mixed plantation. This study was conducted at the Dalingshan Forest Park in Dongguan City, Guangdong, China. A stand conversion experiment was established in a 15-year-old EP in 2008. The plantation treatment methods were: evenly removing 30% of Eucalyptus trees followed by planting native broad-leaved trees in the canopy gaps (Mode I), evenly removing 60% of Eucalyptus trees followed by planting native broadleaved trees in the gaps (Mode II). The un-thinned plantation served as control (CK). Effects of stand treatments on soil nutrients were assessed seven years after the conversion. Results showed that compared to control, Mode II significantly increased SOM, total potassium, and available potassium in 0-20 cm, 20-40 cm, and 40-60 cm soil layers. Moreover, Mode II had 71% more total nitrogen, 77.4% more available nitrogen, 94.2% more available potassium, and 71% more soil organic matter than CK in 0-20 cm soil layers. Total and available nitrogen, potassium, and phosphorus contents in 0-20 cm, 20-40 cm, and 40-60 cm soil layers of Mode I did not differ significantly from CK. A significant increase occurred only in the content of SOM in 20-40 cm soil layers of Mode I compared with CK. Soil pH did not differ among the control, Mode I and Mode II. Our results suggested that thinning 60% of Eucalyptus trees and inter-planting of native broad-leaved species in EPs was beneficial to increase soil nutrients and SOM.