

A02

Tree and palm water use characteristics in rainforest transformation systems

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Background

Large scale rainforest transformation may alter ecosystem water cycles with respect to associated magnitude of fluxes, within-system variability and temporal dynamics. Under given environmental conditions, both, stand-level water use and productivity, may be driven by the degree of complementary soil water use.



Objectives

- * Estimate whole-plant water use rates in trees and palms and derive transpiration rates
- * Determine depth of soil water uptake and degree of complementarity in soil water resource use



Daily stand-level transpiration rates (normalized), 50 days

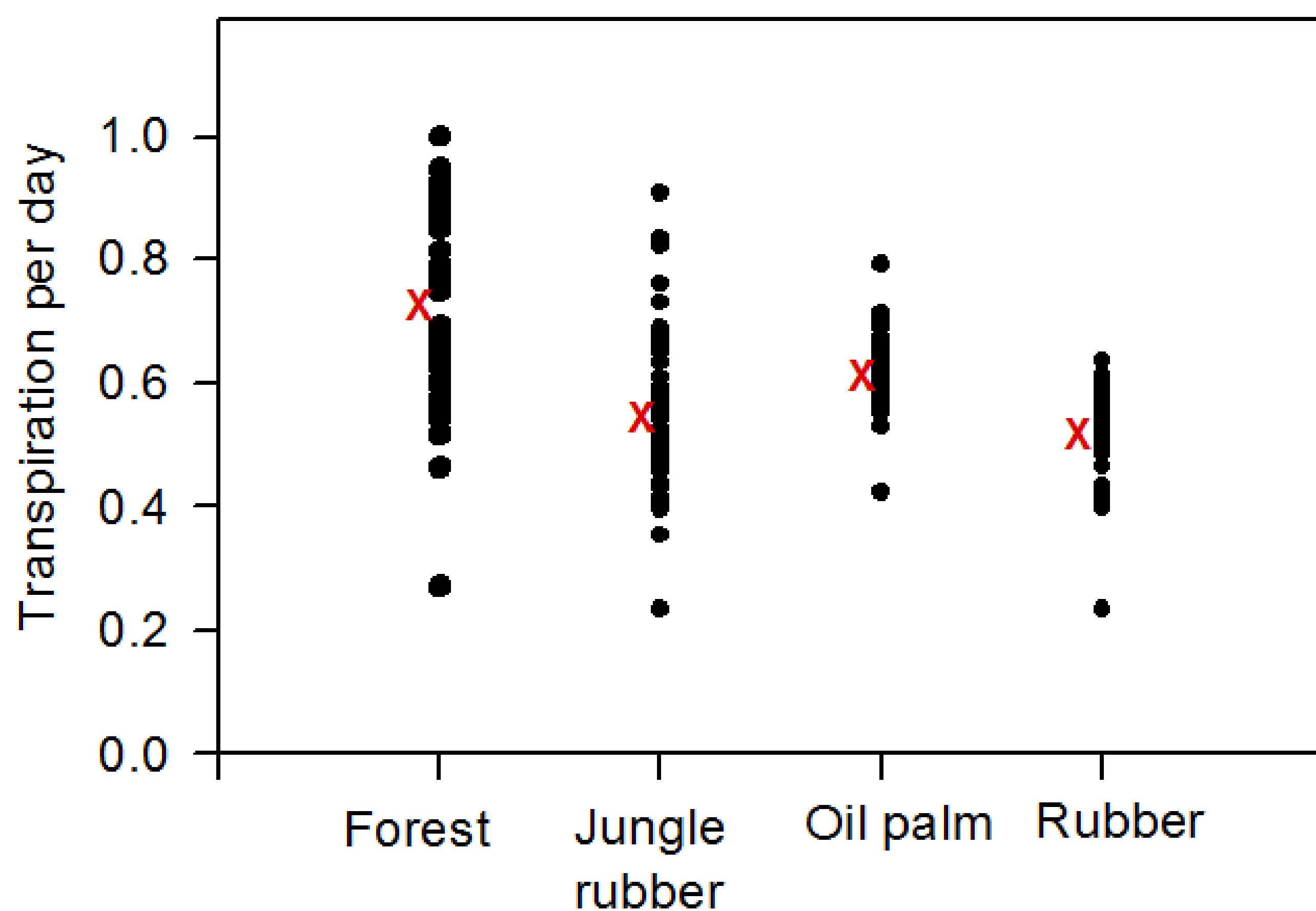


Figure 1. Daily stand-level transpiration rates of the monitoring plots in rainforest (BF3), jungle rubber (BJ5), oil palm (BO3) and rubber (BR3). Time frame: May 11 – July 29, 2013; 50 days, normalized; mean: x.

Methods

- * Land-use systems: lowland rainforest, jungle rubber, rubber and oil palm plantations; two landscapes of the Jambi province; 32 CRC core plots and 10 additional locations for age-class and landscape-position measurements.
- * Water use rates: Sap flux density measurements with Thermal Dissipation Probes (TDP); incl. species calibration.
- * Plant water uptake: Natural abundance of stable isotopes (^2H , ^{18}O).

Averaged transpiration rates: oil palm over age

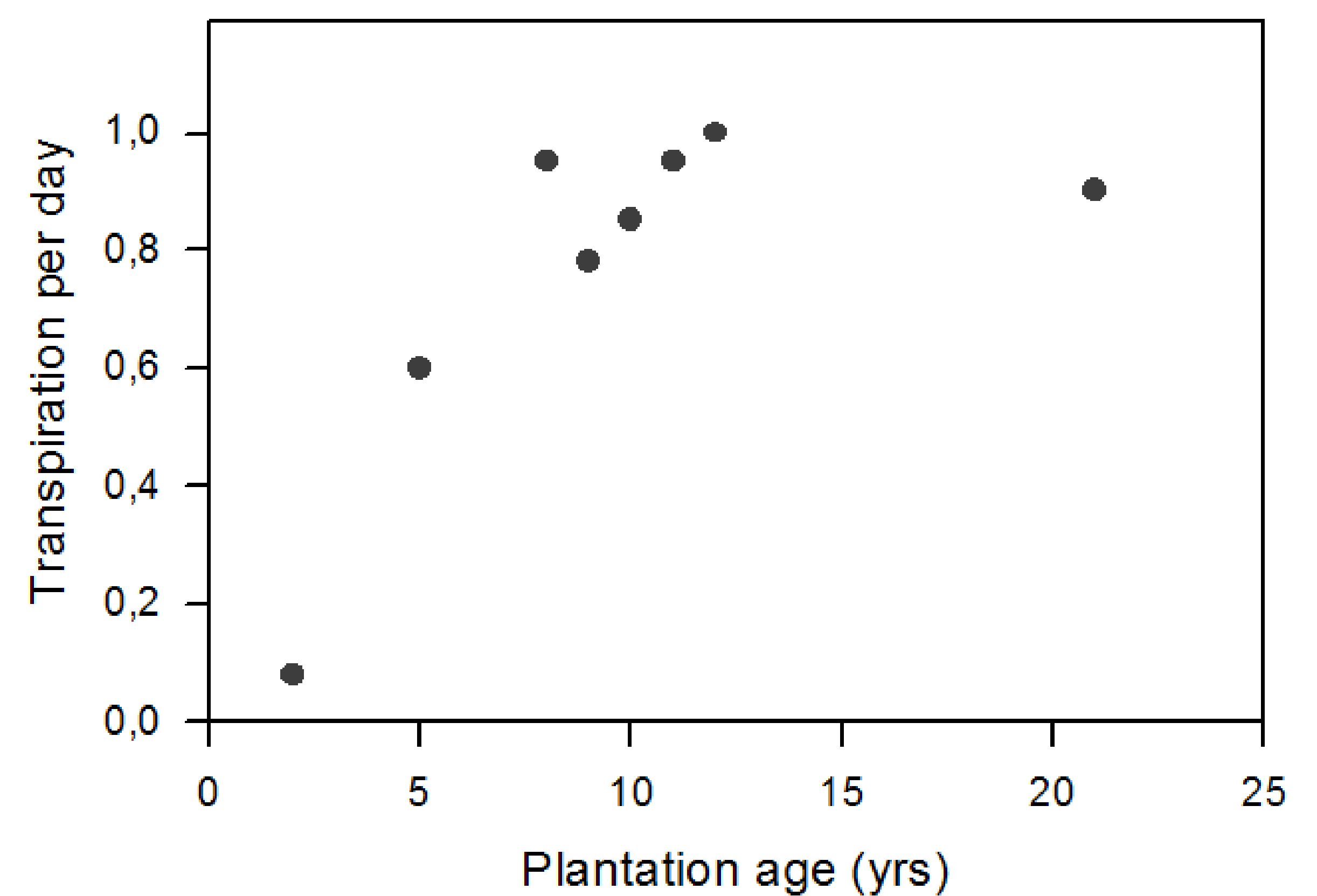


Figure 2. Averaged stand-level transpiration rates of oil palm over plantation age. ~ 30 days, normalized;

Preliminary Results

- * Maximum daily transpiration rates decrease in the sequence rainforest, jungle rubber, oil palm, rubber.
- * Variability of daily transpiration is highest in rainforest and jungle rubber (Fig. 1).
- * Daily transpiration rates of oil palm plantations are highly age-dependent (Fig. 2).

Conclusions

- * Forest and jungle rubber daily transpiration may be highest but there is much temporal variation.
- * Oil palm induces variation in transpiration on the landscape level due to the age class structure of plantations.