Research project of counterparts funded at IPB

Name	Counterpart	Title
Triadiati Antono	**B04**	Root hydraulic conductivity of rubber and oil palm in riparian and non-riparian sites in Jambi Province

Background and methods:

Water movement from the soil to the atmosphere is controlled by the conductance of the components of the hydraulic pathway. Accordingly, roots have an important role in water uptake and transport through the xylem to the shoot. The water transport rate through the xylem is determined by the hydraulic efficiency of the conductive cells. Therefore, xylem hydraulic properties play an essential role in supporting growth and photosynthesis and influence sensitivity of plants to environmental conditions such as drought. Xylem conductivity is determined by the structure and size of the vessels and by their efficiency. However, information on diameter variation in root xylem anatomical and hydraulic properties is as yet very limited, especially in tropical agroforestry systems that differ seasonally in water availability.

The scientific project B04 focuses on the diversity of tree hydraulic strategies in both intensively used and natural tropical landscapes in Jambi, Sumatra. Due to the complexity of this topic, researchers from Germany will focus on the aboveground component (stem hydraulic properties) and researchers from Indonesia will focus on the belowground component (root hydraulic properties). We will jointly analyse the dataset and correlate root and stem hydraulic conductance to each other and to total aboveground growth performance.

The OBJECTIVE of the study is to analyse the variability in xylem anatomy and the derived hydraulic traits of small- and medium-sized roots (1 10mm in diameter) up to a soil depth of 0.5m in each of four riparian and non-riparian rubber and oil palm sites. We predicted that (i) vessel diameter and hydraulic conductivity is a function of root diameter and that (ii) vessel diameter and hydraulic conductivity differ between riparian and non-riparian sites in equally-sized roots.

The study site was located in Jambi, in rubber and oil palm plantations in both riparian and non-riparian sites. In order to analyse the root diameter and the root anatomy and to derive the hydraulic properties of the roots, root segments were assessed across a 0.5m deep soil profile.

For the complete xylem cross-sectional area without bark, we determined the total hydraulic conductance, calculated from single vessel diameters. The potential hydraulic conductivity was calculated according to the Hagen Poiseuille equation.