RUBBERFLUX: An in natura platform to study carbon and water cycles in Rubber tree plantations

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Why studying rubber plantations?
- Natural Rubber is a biopolymer produced by millions of small farmers which is essential for high-value-added industrial sectors (mainly tire industry).
- Harvesting of latex by tapping creates an artificial carbon sink that completely modifies the whole carbon allocation pattern of the trees.
- High demand for NR has triggered the expansion of rubber plantations in marginal areas with adverse climate (drought, cold) and soil (poor fertility) conditions, and has induced land use changes with possible detrimental environmental (deforestation) and social impacts.

Impact of climate on C allocation and plantation productivity
A network of 3 flux tower sites along a rainfall gradient (TICA and Heveadapt projects)

1/ Chachoengsao site
Set-up in 2007
Main PI: F.Gay, Cirad

2/ Bueng Kan site
Set-up in 2012
Main PI: J.Pattarlerphong, Kasetsart University

3/ Nakorn Si Thammarat site
Set-up in 2015
Main PI: C.Chayawat, Kasetsart University

Continuous/automatic measurements
- CO2 et H2O flux (eddy covariance)
- Micro-meteorological variables (T°, HR, Rainfall, Wind speed, Rg, Rn, PAR)
- Water content and temperature soil profiles
- Sap flow

Spot measurements
- Aboveground and belowground NPP: stand inventory, litter fall, fine root turnover, latex yield, LAI
- Soil respiration
- Natural abundance of 13C in leaves and latex

Impact of rubber plantations on soil biodiversity
3 networks of farmers’ plantations + a soil microbiology lab in Bangkok (IFC Biodiv and Heveadapt projects)

4/ Chachoengsao province
Impact on SOC and soil biodiversity of cultivating rubber trees after intensive cassave cultivation.

5/ Khon Kaen province
Impact of the intensification of management practices on soil biodiversity

6/ Surathani province
Impacts of replanting rubber trees on nutrient dynamics, soil biodiversity and NPP.

Impact of nutrient management on C allocation and plantation productivity
Large scale, long-term trial (10ha) with 4 levels of NPK fertilisation + 2 tapping system (Yara and Heveadapt projects)

7/ Bangburd site
Set-up in 2014
Main PI: F.Gay, Cirad

Experimental design: split-plot with 4 repetitions.
Main measurements: micro-climate, yield, NPP, LAI, soil water and nutrient dynamics (lysimeters)

Recent publications

The Heveadapt project (ANR 2014-2017) How tree-based family farms can adapt to global changes? Agronomists, socio-economists, ecologists and soil scientists are mobilized to assess the sustainability of rubber tree smallholdings. contact philippe.thaler@cirad.fr