Joint French-South-East Asia Research and Training initiative

DYNAMIC OF LAND USE CHANGES AND SOIL ECOSYSTEM SERVICES (LUSES)

Internal Call for small proposal

Year 2013

Project responsible	Monrawee Peerawat LDD, Soil Biotechnology

Title : Impact of Rubber Plantation on soil microbial activities and genetic structure
…..

LMI partners (French)	Alain Brauman, IRD, ECO&SOLS (Bangkok, Thailand)
	Tiphaine Chevallier, LMI LUSES ECO&SOLS Montpellier Anne Laure Pablo, ECO&SOLS Montpellier Fred Gay, CIRAD, ECO&SOLS(Bangkok, Thailand)

LMI partners (Asian)	Dr. Chaveevan Leaungvutiviroj, LDD expert in soil microbiology
	Dr. Chutinan Choosai, KKU, Soil ecologist

Others Partners	
Western Countries	….
Asian Countries	

Type of support	**Amount (€)**
Deadline (14 th of February)	
Student support	
Student research expenses	2500 €
Student mission	
Support to project building	
Collective training expenses	
Mission (exploratory, support)	
Field support	
Exploratory project	
Beside project support (link to a bigger one)	
Equipment	
Others	

Asian Countries involved (put an x)

Thailand	Vietnam	Laos	Others
X			

Working package involved (put an x)

WP1 Soil fertility and the dynamics of mineral nutrients	**WP 2 Soil and water functional biodiversity**	**WP 3 Carbon storage in plant biomass and soil**	**WP4 Regulation of water flow and erosion** s
	X		

General context of the proposal

In 2012-2013, a support to an exploratory project has been asked to the LMI LUSES. This project was intituled "Changes in soil organic carbon and biological diversity across a chronosequence of rubber plantation". Monrawee Peerawat, from LDD Biotech Dept. conducts successfully this project with the help of a French student from Agroparistech (Marin Lafaye) in the Rubber plantation Chachoengsao (Rubber Research Center).

The success of this project was mainly due to the involvements of many Luses partners:

- Fred Gay (CIRAD) and Chompunut Chayawat (KU): CO_2 measurements and C stock analysis;
- Henri Robain (IRD Thailand) and Nopmanee Suvannang (LDD): Soil variability and soil analysis);
- Chutinan Choosai (KKU) and Johnny Boyer (CIRAD): Soil fauna analysis;
- Anne Laure Pablo, Josiane Abadie and Tiphaine Chevallier, UMR ECO&SOLS Montpellier: Soil microbial analysis (QCR and microbial activities).

Mrs Monrawee Peerawat is currently in France at the UMR ECO&SOLS in Montpellier, from the 12^{sd} of January to the 15th of May, with a BST grant from IRD. Mrs Monrawee Peerawat learns different technics to assess the change in the structure and the activities of microbial populations (molecular technics and catabolic profiles technics) under different ages of rubber plantations . This work constitutes her future potential PhD thesis subject. One of the objectives of this training in Montpellier is to further implement all these technics in the microbial platform supported by the LMI LUSES and hosted by the LLD Biotech Dept.

Objective of the proposal

- Complement the budget (2500 € already obtained from ECO&SOLS) of lab fees in Montpellier in order to support all the analysis (216 samples)
- Buy the MicroResp^{TM} equipments and the chemical substrates (12) in France in order to implement rapidly this technic (measurements of microbial activities) in the LMI –LDD microbial platform. This equipment will be thus available for all the LMI partners. *This equipment is relatively inexpensive (500€ for the basic set but need a microplate reader) and thus could be implement in the future in the other microbial or biologic laboratories of our LMI partners.*
- Complement the results obtained on the others soils parameters in 2012 (soil fauna, soil C stock, Soil respiration etc.) in order to publish at least 2 papers in 2013 on this thematic involving different LMI partners.

Link with the LMI project (regional aspect, partnership, working package)

- The objective (determine the impact of Rubber tree compare to cassava on the soil biological diversity) fit with the scientific objective of the LMI LUSES define during the KOM.
- This project involves 3 partners of the LMI LUSES (LDD, KKU, KU).
- This project will benefit to the setting up of the LMI-LDD microbial platform and to the diffusion of simple microbial technics, which could be rapidly implement in the different labs of the LMI partners.
- This project will allow the publication of 2 papers (one on impact of Rubber tree on C sequestration and one on overall soil biodiversity) involving different LMI partners.
- The reinforcement of asian capacity building, which is the aim of LUSES) is link to the support of Asian future PhD students

Project description (one page maximum)

I- Experimental set up and sampling strategies.

To identify the long term impact of rubber plantations, we choose in Chachoengsao province a chronosequence of 4 groups of ages (1-3, 4-6, 8-12 and 14-25 years old) with three repetitions of each age and tree cassava fields as control plot which are the previous cropping of these plantations. We selected three areas which contain one repetition of each age and a cassava field.

II- Methodologies

A) Soil parameters measured in 2012:

A1) Soil physico-chemical characterization: (Resistivity, Bulk density, Granulometry, water content, roots density etc..)

A2) Soil carbon assessment: CO_2 emissions and Organic carbon content (N and C/N also)

A3) Soil Invertebrates: density, activity and diversity

B) Remains do be done in 2013

B1) *Soil microbial activities* (measurements of community level physiological profile (CLPP) (in Montpellier and Bangkok): The CLPP will be assess using a rapid microrespirometric method that can be performed in a 96-well microtiter plate. This method has many advantages: it is compact, holds many samples and/or replicates, and use existing plate readers. This method can be implemented in the LMI LDD microbial lab.

B2) *Soil microbial density* (In Montpellier): the main principles is to measure, after soil DNA extraction, the total bacterial (16SrDNA gene) and fungi (18SrDNA) gene density using quantitative PCR n the same soil samples

B2) *Soil microbial structure* (In Montpellier and Bangkok). A soil DNA extraction, the total bacterial (16SrDNA gene) and fungi (18SrDNA) genetic structure will be done using denaturing gradient gel electrophoresis (DGGE).

Budget description including identify amount budget from co -funding if it is available

The budget required to the LMI Luses corresponds to 50% of the total Budget. The ECO&SOLS budget has been already accepted.

	Budget required	**Designation**
ECO&SOLS	2500	DNA extraction, DNA quantification, quantitative PCR analysis,
LMI LUSES	2500	Microrespirometer measurements, Microrespirometric purchase, substrates purchases (~15), DGGE analysis (60 samples)