

## **Report on the collective training on MicroResp technic**

**Title :** Characterization of the physiological profiles of the soil microbial community

**Date :** 2<sup>st</sup> to the 4<sup>th</sup> of April 2014

**Participants:** 18

10 from LDD, 2 from KCU, 3 from KU, 2 from Nuol (Laos) , 1 from SFRI (Vietnam)

**Trainers:**

- Tiphaine Chevallier: Senior soil scientist, IRD, UMR ECO&SOLS, France
- Josiane Abadie: technical assistant, INRA, UMR ECO&SOLS, France
- Pascal Alonso: TICA temporal expert, in charge of the microbial lab. IRD, posted at LDD
- Monrawee Peerawat: LDD soil scientist, Biotechnology Dept.

**Localization:** LMI-LDD platform of microbiology

**Funded by:** LMI LUSES, UMR ECO&SOLS, French Rubber association, LDD Biotechnology Dept.

**Cost of the training:** 6000 € (~265000 bath)

### **Context of this training**

The LMI LUSES and its LDD Partnershas developed since 2012 acommon platform of microbiology within the Biotechnology department of LDD. The aim of this laboratory is to characterizethe soil microbial compartment of the soil subject to different perturbations (land uses, farmers practices, organic matter management such as biochar etc..). Why this focus on soil microorganisms, because, there are more microbes in a teaspoon of soilthan there are people on the earth. Soilscontain about 8 to 15 tons of bacteria, fungi, protozoa, nematodes, earthworms, and arthropods. They (microorganisms) are the main driver of the nutrient cycling (90%) their characterization is thus critical to better assess the soil functioning. This platform will allow to determine what kind of agricultural practices or organic matter management are more sustainable for the farmer. However, most of the measurements today are related to the characterization of the molecular diversity of microorganisms. But if it's important to determine who is there? (diversity), its even more essential to understand what do they do (metabolic activities)? This will be the aim of this training

### **Methodology: the microresp<sup>TM</sup> method**

To assess the metabolic profiles of the soil microbial community, we choose the MicroResp<sup>TM</sup> method developed by Campbell et al (2003) which combines the advantages of Biolog<sup>TM</sup> (without the drawbacks) and those of the SIR (Substrate Induce Respiration). It consists of a miniaturized measuring device for measuring the CO<sub>2</sub> production of the total microbial community in soil, induced by the addition of various carbon substrates during a short incubation. This

technique allows to determine the profile of catabolic a microbial community It also allows to estimate the soil microbial biomass by measuring the respiration induced by glucose.

### **Short description of the training**

The training will last 3 days, the first day will be devoted to the theoretical aspect of techniques for assessing the soil activities, the two others days will be devoted to measurements and analyses of the data produced.

See the schedule with pictures below.

### **How to improve?**

The training was globally appreciated by trainees and trainers. All people were interested in the training, ask lots of question. Some of them said that they would practice the technics in their lab. Nevertheless, some improvements have been suggested by trainees:

- Less trainees, not more than 10 could be fine to practice the technics
- Have all the documents printed before the training (lecture and protocols)
- Follow carefully the schedule planned
- The calibration curve has not been showed properly because of supply delays (bottle of CO<sub>2</sub> was not delivered on time)
- Be careful of the English speaking of the trainers
- The exercises on the data analysis were not explained to everybody at the end of the training but to each group. It would be better to explain the analysis to all people at the same time

## MicroResp™ training

8h30-  
9h00

Welcome ceremony



Wednesday 2<sup>nd</sup> April

9h00  
12h

Theoretical part

- Presentation of the objective of the training : Alain Brauman (theory 30 minutes)



- How to measure soil biological activity? (theory 1h-2h)
  - *Soil organic matter*
  - *Soil microbial activity*
  - *CO<sub>2</sub> emissions measurement*
  - *Soil microbial activity and diversity (soil microbial functional diversity)*



- Presentation of MicroResp™ technic (theory 30 minutes)
  - *Principle of the method*

**13h30 - Microplate preparation - Gel (Practical 1h)**  
**15h30**

- Gel, color indicator, how pour microplate without bubble
- Incubate overnight plate



**15h30- Soil and substrate preparation, Calibration curve (Practical 1h00)**  
**17h00**

- Filled the microplate, which substrate? prepare substrate solution, and antibiotic solution, design the soil microplate

**8h30-09h30 Soil and substrate preparation (Practical 1h00)**

- Soil humidity, add substrate ?, Antibiotic application
- First Gel reading
- Closing MicroResp system (soil microplate and gel microplate)



**09h30-10h00 Calibration curve (theory30 min, Pratical30 min)**

- Presentation of 2 methods of calibration
- Preparation of the calibration

**10h30-12h00 Discussion and questions about the method**

**14h00-15h30 Data analysis (theory, 1h30)**

- Data presentation
- Microbial Biomass

**16h00-17h00 Measures (Practical 30 minutes)**

- 6h after closing MicroResp system or calibration curve preparation Final gel reading

Thursday 3<sup>th</sup> April

Friday 4<sup>th</sup> April

**9h00**      **Calculation (Practical 1h30)**  
**10h30**

- Calculate the calibration equation
- Calculate the data



**10h30**      **Data analysis (Practical 1h30)**  
**12h00**

- Data analysis