The impact of this land use change on soil biodiversity remains unknown. However in Thailand (first world natural rubber producer), rubber plantation replaced intensively managed annual crops. Rubber plantations impact on biodiversity is undeniable when tree plantations encroached natural forests. Rubber plantations represent the second world perennial crop and most of natural rubber is produced in Asia (94% of world production). Tree plantations are often denigrated for their negative impact on natural resources particularly loss of biodiversity.

**Context: Perennial crop and biodiversity: a debate**

- Tree plantations are often denigrated for their negative impact on natural resources particularly loss of biodiversity.
- Rubber plantations represent the second world perennial crop and most of natural rubber is produced in Asia (94% of world production).
- Tree plantations are often denigrated for their negative impact on natural resources particularly loss of biodiversity. However in Thailand (first world natural rubber producer), rubber plantation replaced intensively managed annual crops. Rubber plantations impact on biodiversity is undeniable when tree plantations encroached natural forests. Rubber plantations represent the second world perennial crop and most of natural rubber is produced in Asia (94% of world production).

**Objective and question of the study**

**Objective**
Impact of land use change (cassava->rubber trees) on soil biodiversity

**Question of the study**
What is the most important driver of soil biodiversity

<table>
<thead>
<tr>
<th>Objective</th>
<th>Question of the study</th>
<th>Plantation age</th>
<th>Soil type</th>
<th>Land uses changes</th>
</tr>
</thead>
</table>

**Methodologies**

- A chronosequence containing four classes of plantation ages and cassava field (the previous crop) have been selected.
- Sampling and field measurements were realised at the same time in 3 blocks contains a full sequence of four age-classes of rubber.

**Research site**: Thailand, Rubber Research Center (CRRC) Chachoengsao Province. Tropical climate, 1200 mm annual rainfall, 4 months dry seasons, T°=28°C, sandy clay type soil.

**Parameters measured**: soils physico-chemical parameters, soil fauna diversity using TSBF methodology (Anderson & Ingham (1993)); soil microbial physiological profiles (15 substrats) using Microresp™ techniques (Campbell et al., 2003), microbial diversity using barcoded pyrosequencing analysis (454) using universal primer 27F and 518R for bacterial and ITS 1F and ITS2 for fungal diversity.

**Results**

**I-Soil fauna dynamic**

<table>
<thead>
<tr>
<th>Total Density (ind/m²)</th>
<th>Cassava</th>
<th>1-3y</th>
<th>4-6y</th>
<th>8-12y</th>
<th>23-25y</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>35</td>
<td>55</td>
<td>75</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Young plantations**: High decrease of density but slight structural change

**Old plantations**: increase of fauna’s biomass and change of soil fauna structure at the canopy closure

**Soil engineers**

- Young plantations dominated by ants
- Old plantations dominated by termites and earthworms

**II-What are the main driver of soil fauna diversity**

**Soil Parameters**

- Plantation age

<table>
<thead>
<tr>
<th>Soil Parameters</th>
<th>Plantation age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>60.2</td>
</tr>
<tr>
<td></td>
<td>10.8</td>
</tr>
<tr>
<td></td>
<td>35.4</td>
</tr>
</tbody>
</table>

**Soil properties and age of plantation are the main driver of soil fauna diversity**

**Conclusions**

- Land management (pineapple intercropping) rather than land use changes (cassava to rubber) affects the density and activity of the soil fauna.
- Plantation age and soil type are the main drivers of soil fauna diversity in rubber plantations.
- Old rubber plantations represent a specific environment in terms of soil biodiversity characterized by the dominance of earthworms and Firmicutes.