

# IMPACTS OF FOREST CONVERSION ON SOIL ORGANISMS

Iswandi, A., F.X. Susilo, S. Hardiwinoto, R.D.M. Simanungkalit  
Y. Setiadi, Djunaedy, and M. van Noordwijk

Imperata

Cassava

Regrowth

Agroforest

Forest

## INTRODUCTION

Soil organisms maintain nutrient cycling and soil fertility. Conversion of tropical rain forests to agriculture leads to a loss of aboveground biodiversity. Little is known of the impacts belowground, but the conversion causes changes in soil temperature, soil water balance and organic matter inputs (Quantity and Quality) and reduces the diversity of roots and rhizosphere. **What happens to the soil (micro and macro) organisms during this conversion? Are important functional groups reduced below critical threshold levels?**

## HYPOTHESES:

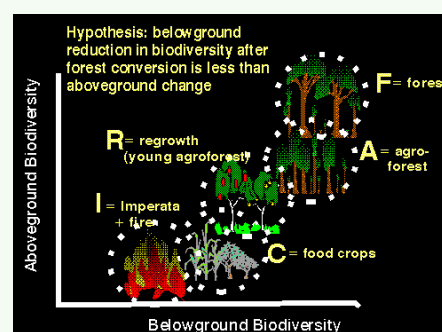
- Forest conversion to agriculture reduces the diversity of soil organisms
- The loss of functional groups of soil organisms may affect soil fertility
- All Imperata and Cassava fields are similar, where as between forest plots a high level of diversity exists

Conclusion

Limited evidence

No evidence

No evidence



## MATERIALS AND METHODS

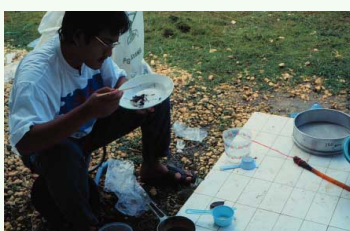
Jambi and Lampung (Sumatra, Indonesia)

- Imperata
- Cassava
- Regrowth (young agroforest)
- Agroforest mature
- Forest

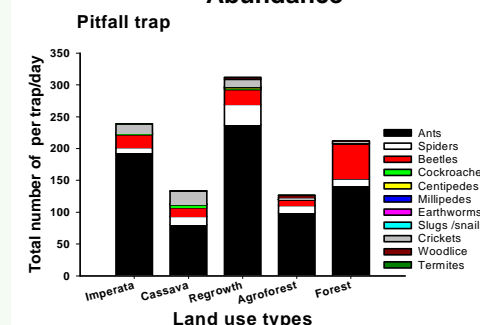
Sampling size:  
plot = 40 m x 5 m  
sub plot = 13 x 5 m



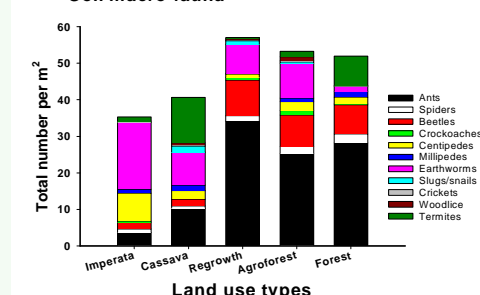
Variable	Methods
<b>Macro-fauna</b>	
• Surface litter	Pitfall trap Ø 15.5 cm, 13 cm height for 24 hours Handsorting
• Soil	Handsorting 25 cm x 25 cm x 25 cm
<b>Soil microbe</b>	
• Azotobacter	Plate counting
• Azospirillum	NPN, N-free Bromthymol Blue medium
• P-solubilizers	Plate counting, Pikovskaya medium
• Fungi	Plate counting, Martin Agar
• Total number of propagules	Plate counting, Nutrient Agar
• Mycorrhiza (AMF)	Sucrose centrifugation



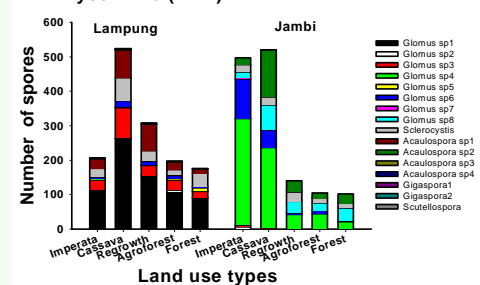
## Abundance



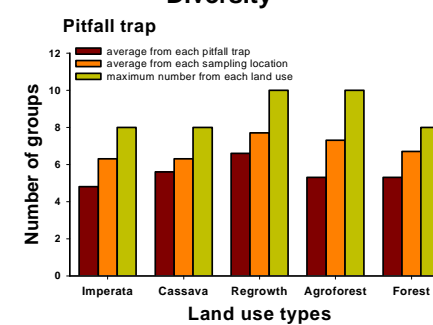
## Soil macro-fauna



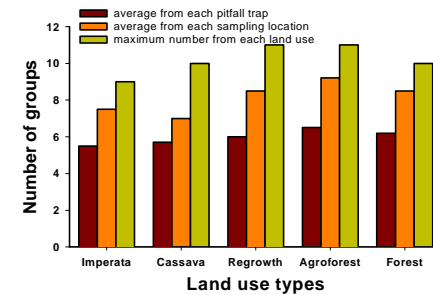
## Mycorrhiza (AMF)



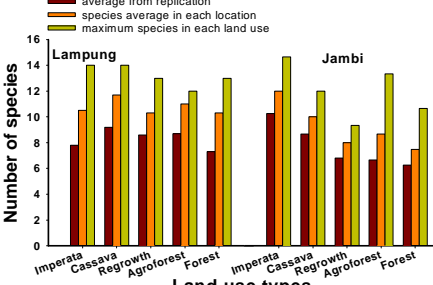
## Diversity



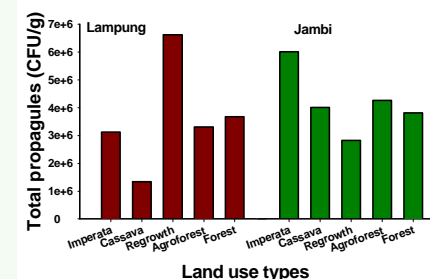
## Soil macro-fauna



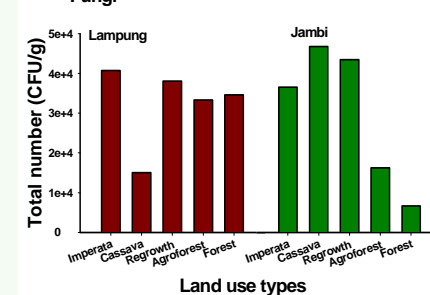
## Mycorrhiza (AMF)



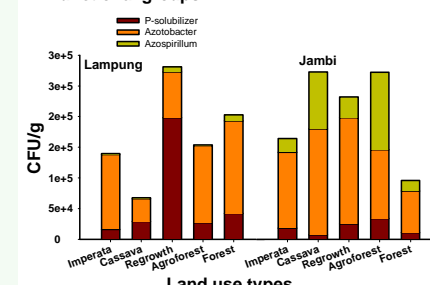
## Bacteria



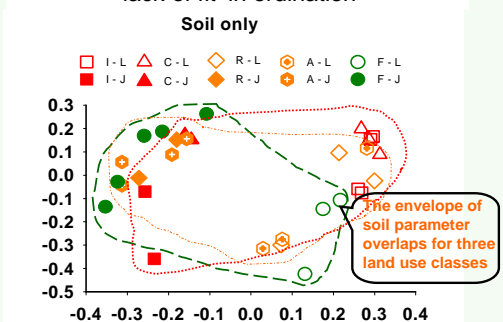
## Fungi



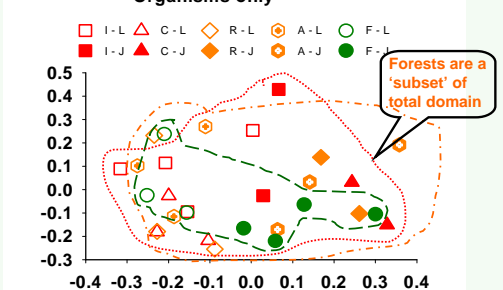
## Functional groups



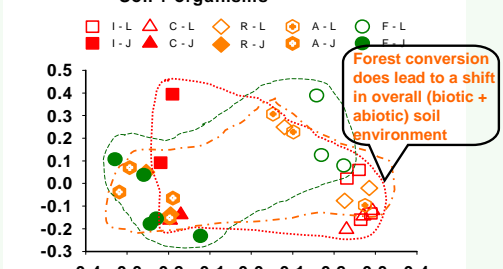
## Landscape-level diversity, as evident in 'lack of fit' in ordination



## Organisms only



## Soil + organisms



- Pitfall traps show little difference in surface active fauna
- Soil macro fauna effects mainly consist of reduction in litter layer fauna
- Mycorrhiza (AMF) increases after forest conversion

- Diversity depends on sample size, but there are no clear differences in scaling properties between land use types
- Imperata grasslands are not depleted in a soil biological sense; no main obstacles in 'reclamation' are to be expected from these results

## Conclusions:

- Land uses after forest conversion do maintain a high diversity of soil organisms despite loss of aboveground diversity
- Litter fauna decreases after forest conversion but mycorrhiza (AMF) diversity increases