

# Characterization of microbial community isolated from cocoa crop soils in a producer region in Colombia, as a contribution to soil fertility management

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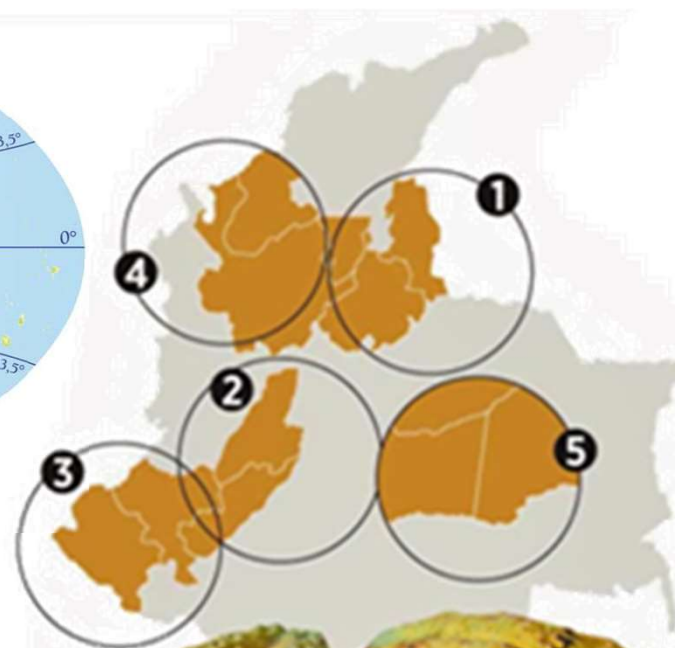
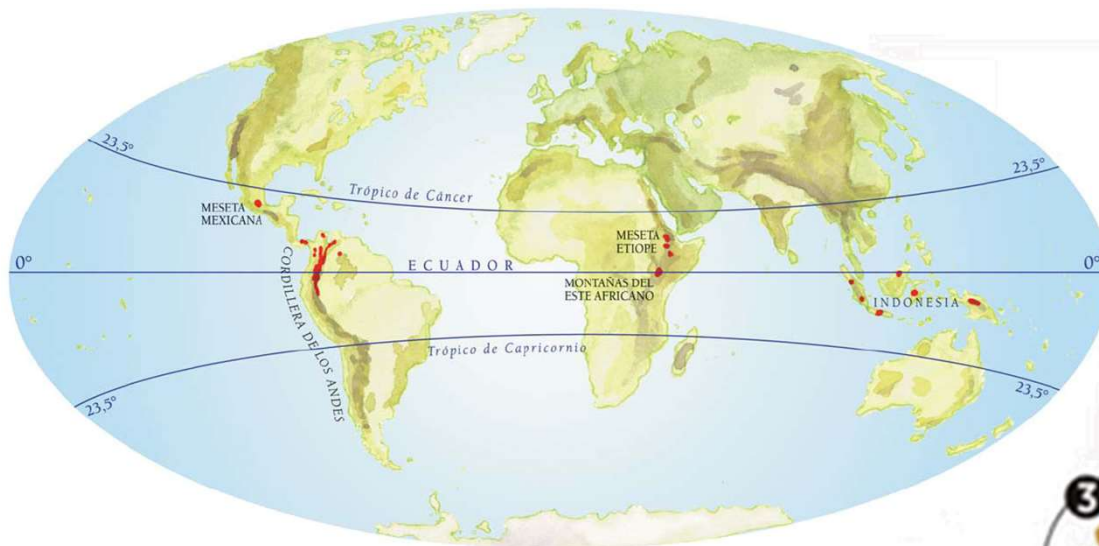
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# Introduction: key aspects



121.000 ha in 5 main producer areas (2013).  
A production of 56.785 ton in 2016

**Colombia** harbors potentially suitable agro-ecological areas for cacao to expand cultivation area from 140.000 to 670.000 ha.



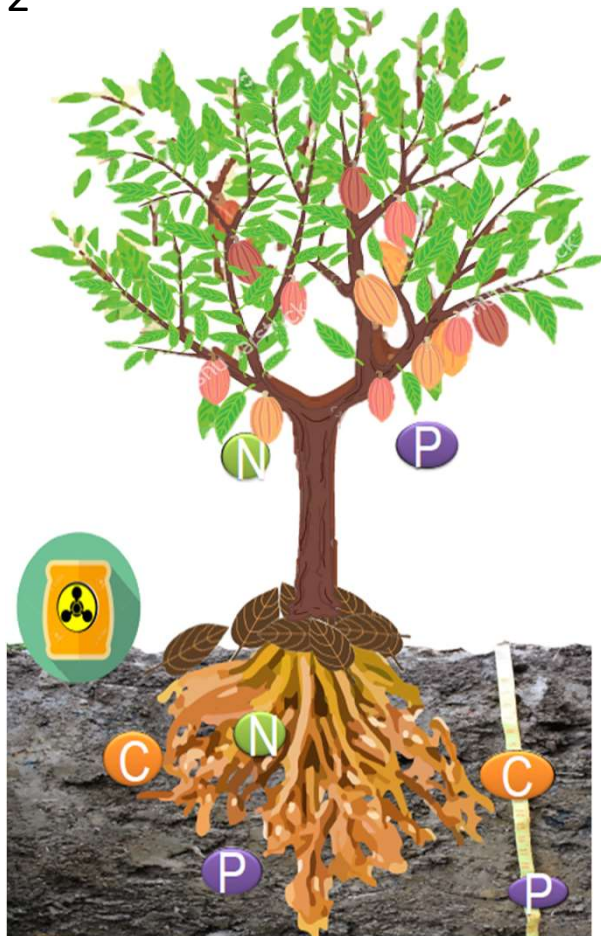


# Introduction: Key aspects

- Limitations of the crop:  
Low yield ( $0.5\text{t.ha}^{-1}$ ); 56.785 ton in 2016

The low yield is a multi-factor problem

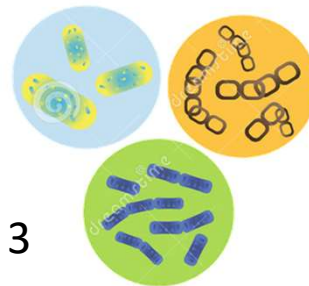
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- Poor pest and disease management
- Inefficient fertilization practices
- Fertilization programs do not based on nutritional requirements
- Poor knowledge of edaphic microbial community.

Knowing the microbial potential in soils we can create an integrated fertilization plan

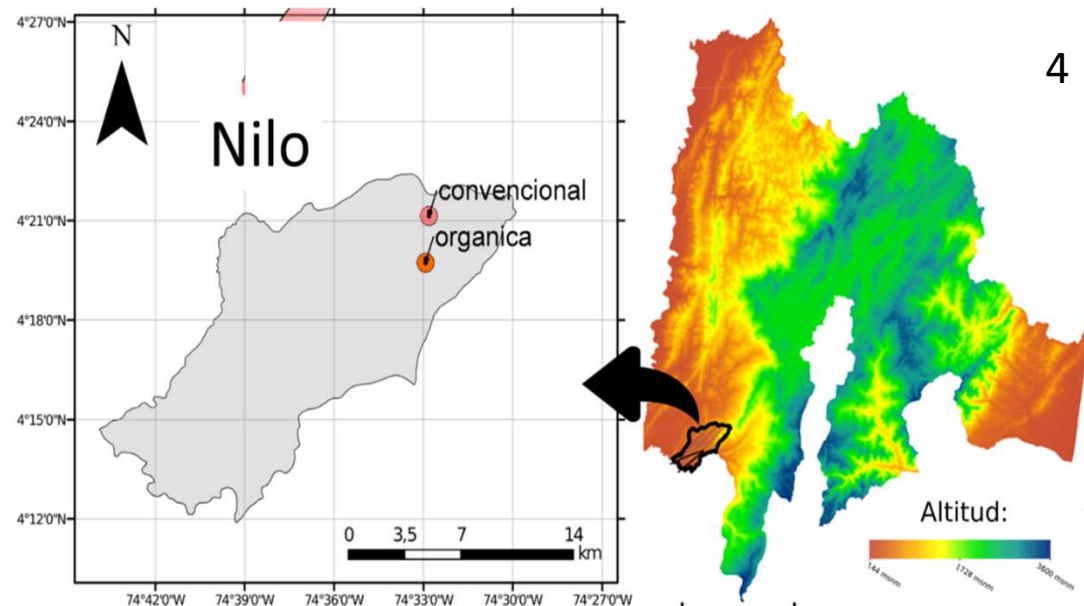
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# Project aims

- To identify the cultivable microorganisms with cellulose degradation potential, nitrogen fixation and phosphate solubilization present in cocoa soils under conventional and organic fertilization in Nilo, as a contribution to the soil fertility management.

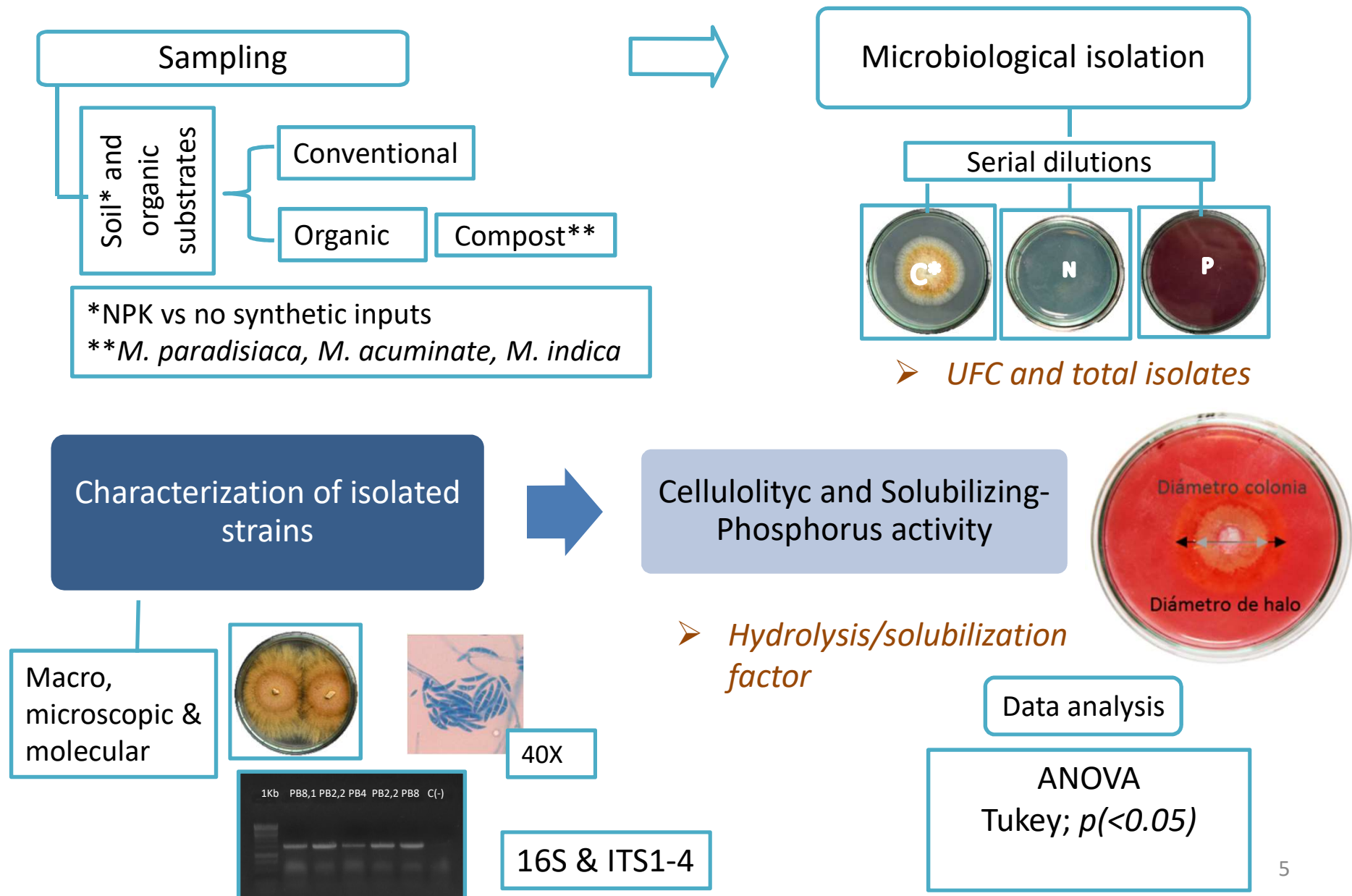


Dry tropical forest  
according to Holdridge





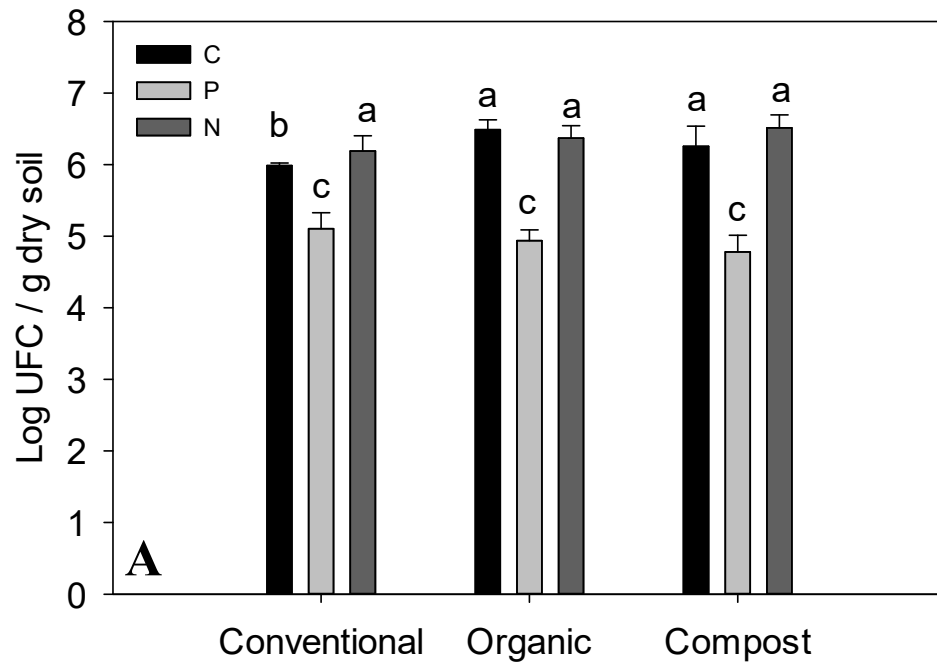
# Materials and Methods



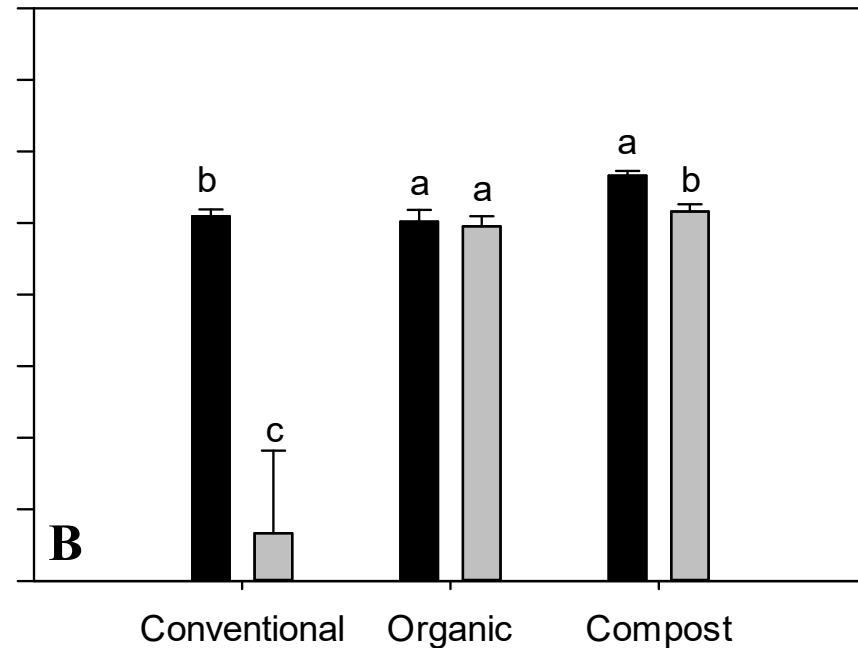


# Results I: Soil abundance

## BACTERIA



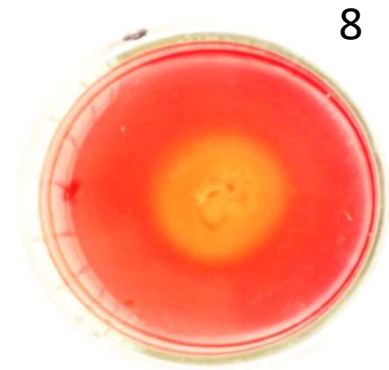
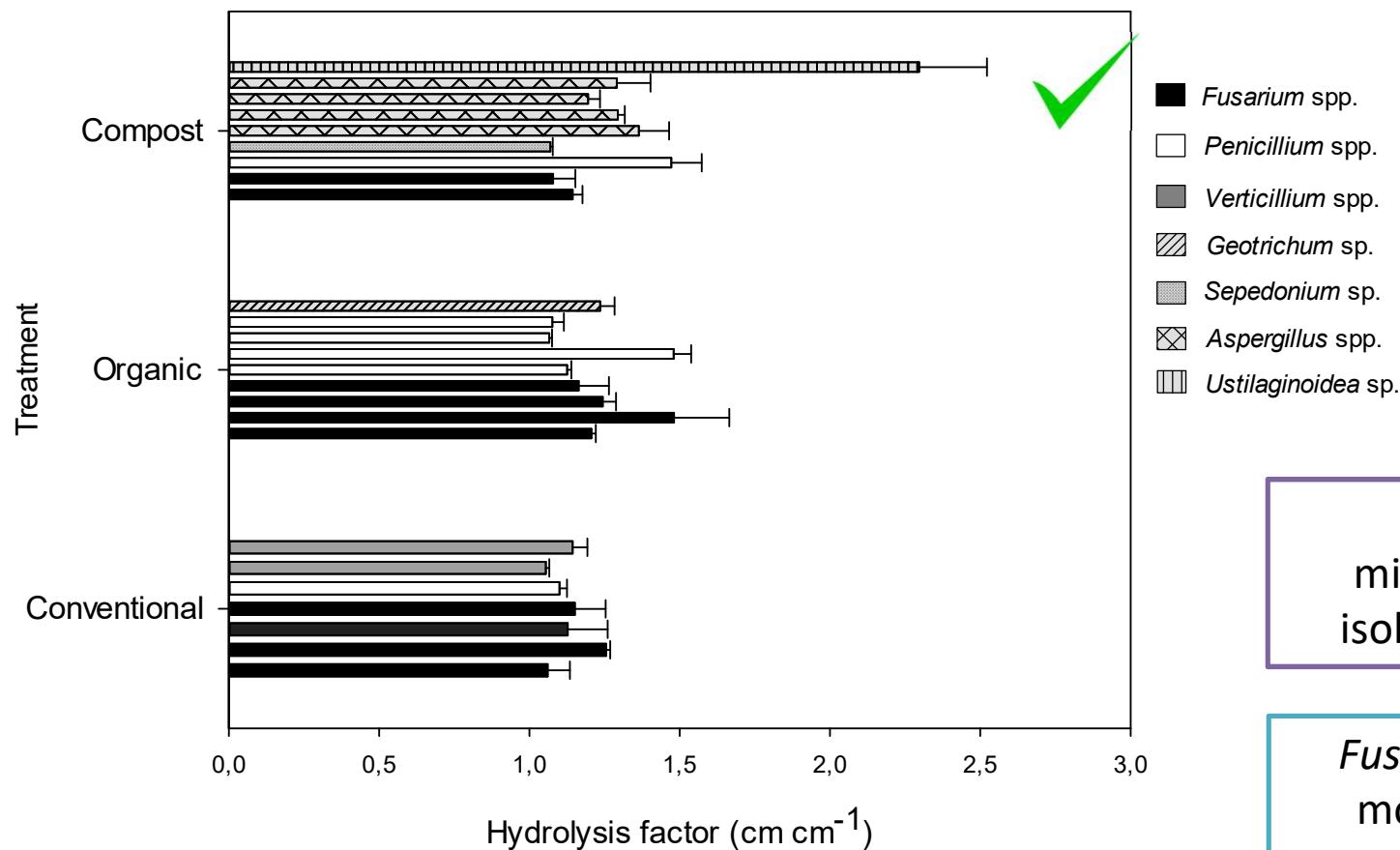
## FUNGI



- There was not significant difference between substrates in the whole abundance of microorganisms studied.
- Organic soil and compost had a higher number of cellulolytic bacteria.
- Conventional P-solubilizing fungi abundance was lower than organic and compost.



## Results II: Cellulolytic activity



Total: 63 morphotypes

91% of the microorganisms isolated are fungi

*Fusarium* was the most important genera with 11.97% of participation

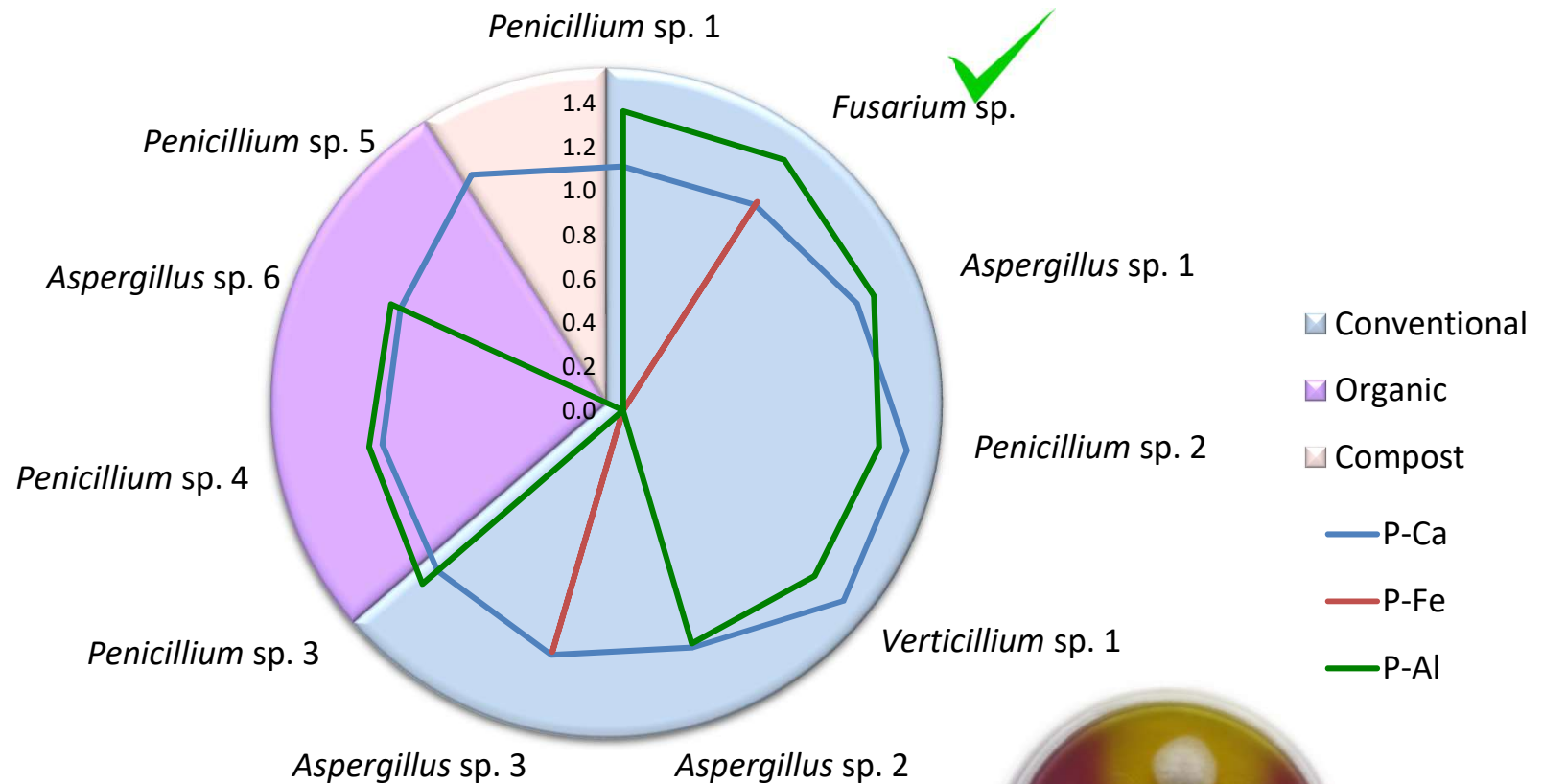
*Sepedonium*, *Aspergillus* y *Ustilaginoidea* were genera found only in compost

*Ustilaginoidea* had 2.3 as hydrolysis factor



# Results III: Phosphates activity

Phosphorus complexes depends on presence of other elements: Al, Fe, Ca



Total: 38 fungi, 21 bacteria







# Conclusions

- ✓ The microbial community diversity is affected by fertilization type.
- ✓ Cacao soils under organic fertilization presents higher abundance of cellulolytic microorganisms than soils under conventional fertilization.
- ✓ Cacao crop shows a beneficial community in soil, associated to cellulose degradation, phosphates solubilization and nitrogen fixation that could be used for biotechnological applications.





# Acknowledgment



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NACIONAL  
DE COLOMBIA



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# Thanks

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