Horticultural Agroforestry Systems in the humid tropics: analysis of a clove tree-based system in Madagascar

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1 Four distinct groups of farming systems

Taking an on-farm survey approach, and using a multivariate analysis of agroeconomic data, we identified four groups of farms.

- **G1 - Young dynamic farm**
  - High educational level
  - High farm managers
  - Young farmer manager
  - Small family
  - Extra-agricultural activity
  - Food self-sufficiency
  - Low rice area
  - Low rice area
  - Low rice area

- **G2 - Farm geared towards livestock farming**
  - Young farmer manager
  - Large family
  - Livestock farming
  - Cash and livestock
  - Labor force
  - Rice production

- **G3 - Old diversified farm**
  - Old farmer manager
  - Large family
  - Potential cash crop
  - Low rice area

- **G4 - Old and poor farm**
  - Old farmer manager
  - Small family
  - Low educational level

This second scale was intended to aim at classifying the different clove croppings systems. These systems were characterized both by (i) spatial organization and structure and (ii) the clove production target, i.e. cloves and/or essential oil.

2 Three crop management types

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- **Monoculture orchards**
  - "Minimizing work"
  - High educational level
  - Old farmer manager
  - No weeding
  - Planted in a monoculture

- **Complexagroforestry**
  - "Diversifying towards food production"
  - Young farmer manager
  - Food production
  - Essential oil production

3 AFS structure

We analysed 16 complex AFS located on 16 different farms in three municipalities. We counted trees, identified species, and classified them according to their use (i.e. clove, coffee, fruit, and forest species for sawlog and firewood). The average percentage of clove trees showed the major position held by this crop in AFS. Considering clove, coffee and fruit trees as cash crops, these systems are considerably income sources for farms. Figure 5 shows the diversity of fruit species. Each plot contained an average total of 5.5 fruit species distributed over an area varying between 0.17 and 1.4 ha.

4 Conclusion

The results revealed the importance of clove-based AFS in the ecological, economic and social balance of the surveyed farms. These systems are resilient to both climatic (cyclone) and economic fluctuations, and are likely to offer important ecological services when compared to traditional "slash and burn" systems on hillsides. The potential of these systems to store carbon remains to be studied and could be a topic of interest for a Clean Development Mechanism (CDM) project. Further studies should be undertaken to gain a better understanding of the ecological and social functioning of such systems.