

EVOLUTION OF CONSERVATION AGRICULTURE (CA) CROPPING SYSTEMS ON UPLANDS IN THE LAKE ALAOTRA AREA SINCE 2003.



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Introduction

A study in 2010 (CIRAD/ESSA/ANR pépites project/EU has been implemented on upland (*Tanety*) CA cropping systems evolution in the Lake Alaotra region from 2003 to 2011 with the development project BV-lac. Farmers move from original dead cover based systems (introduced in 2003) to cover crop based systems in 2006. Since 2009 and the doubling of fertilizers prices, low input systems have emerged (see fig 1).

Material and Methods

The study area is in eastern lake Alaotra zone with current CA adoption at a significant level. The oldest fields under CA (since 2003) have been selected to monitor rotations, practices, yields, strategies and evolution. There are 225 plots with CA: 7 years of CA: 1; 6 years: 4; 5 years: 19; 4 years: 62; and 3 years: 200 - we sampled 139 plots belonging to 86 farmers.

Results and discussion

Figure 1 and 2 display the evolution of main CA adoption of the 140 oldest CA plots around the lake. In 2002-2003, almost all CA crops on *tanety* were systems with imported dead cover of *bozaka* (*Aristida*) or rice straw. In 2003-2004, 34% of plots already had "Cassava + *Brachiaria*" covercrops. Farmers gradually gave up the dead cover based systems (only 7% plots in 2005-2006) due to additional work for biomass). The systems with cover crops thus started to develop in 2005-2006: 42% of the plots had corn + *Dolichos* and corn + cowpea, 7% were pure climbing leguminous plant culture (cowpea) and 29% with cassava + *Brachiaria*. From 2005 to 2010, the "corn + legume // rainfed rice" rotation started. In the meantime, farmers adopted a certain level of intensification (80 kg/ha NPK and 50 kg/ha urea on rice and corn) and discovered that mulching in CA does protect the soil and increase the efficiency of fertilizers. Ecological intensification was on its way. Farmers started to adopt in 2007 systems including *Stylosanthes* (as perennial plant), on an extensive basis (1% of the plots in 2005-2006 to 12% in 2008-2009) with systems based on corn, rice and groundnut.

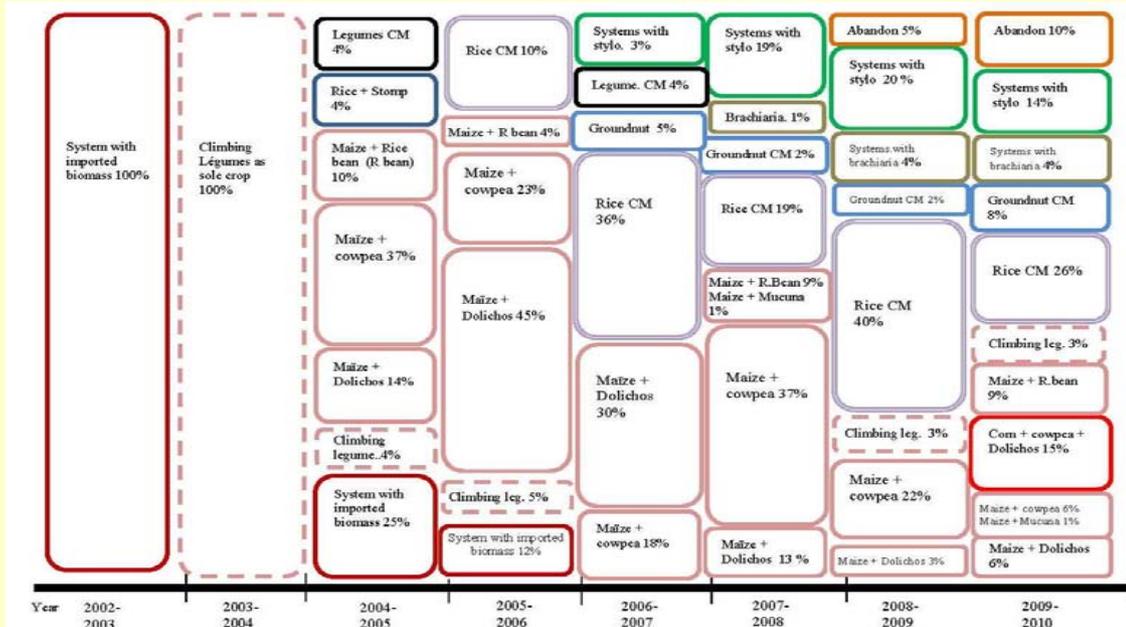


Figure 1 : Main trend of CA cropping systems evolution since 2002 on upland (*tanety*); Lake Alaotra, Madagascar

Figure 2: Evolution of CA systems with planted cover crops on upland (*tanety*), Lake Alaotra.

Stylosanthes is very much appreciated on poor upland soils with large biomass production and easy manual control (100 mandays/ha in the dry season when labor is cheap and plentiful). The "corn + cowpea (*Vigna unguiculata*)" association has been widely adopted as marketing was very favorable in 2004-2005 (37% of the plots). The protein contribution and significant income from cowpea are important components of success. Cowpeas has been gradually replaced by *Dolichos* (45% of the plots in 2007-2008) due to diseases. *Dolichos* is appreciated for its high volume of biomass which more soil moisture, a long cycle protecting the ground and a tolerance to drought. The "corn + *Vigna (umbellata)*" and "corn + *mucuna*" associations are adopted for diversification at a slower rate. In 2006-2007, the 2-year rotation "corn + various legumes // rice" has been widely adopted. The: high biomass in first year boosts rice yields. Farmers' prioritize upland rice and importance and role of biomass

Conclusion

Upland CA extension moves from dead mulch systems to covercrops systems (*Dolichos*, *Mucuna*, *Stylosanthes* and on a lesser extend *Brachiaria*) from 20013 to 2011. Farmers have adopted CA to overcome risk and unsustainability of the traditional "mining" agriculture. So far, the monitoring of CA evolution displays the capacity of farmers to adapt to various types of situation showing that CA practices might be adopted in the long run but requiring a long training (3 to 5 years) .

References

- Harisoa Berthine. Analyse d'évolution des pratiques et des processus d'innovation sur systèmes de culture de type SCV dans la zone de Imerimandroso (Est du lac Alaotra). ESSA, University of Antananarivo, 2010.