

Adaptative research for rainfed Direct seeding Mulch-based Cropping systems creation in Cambodia

Boulakia S¹, Kou P², San S³, Leng V³, Chhit K³

¹ CIRAD-PERSYT - UR SIA, Phnom Penh, Cambodia. stephane.boulakia@cirad.fr

² PADAC, Cambodian Rubber Research Institute, Phnom Penh, Cambodia.

³ PADAC, General Directorate of Agriculture, Ministry of Agriculture, Forestry and Fisheries, Phnom Penh, Cambodia.



Objectives

The MAFF Project for Diversification of the Agriculture in Cambodia (funded by the French Agency for Development) is conducting a Research and Development programme aiming at the creation of sustainable DMC based cropping systems to propose adapted solutions to smallholders facing rapid degradation of their soil.

Material and methods

The overall “Creation-Extension-Training” methodology implements a continuous participatory exchange between farmers and researchers through various kinds of plots:

- “Matrix” of cropping systems “crossing”, tested in collection design (only the plow based reference practise is replicated) with contrasted levels of fertilizers (elementary plots of 200 m²);
- Demonstration plots of the best bet systems, on severely depleted soil (plots of 0,5 to 2,0 ha);
- Pilot extension network with voluntary farmers (> 300 ha and 300 families in 2010).

The results presented here focus on the “Matrix” for Soybean and Maize based systems.

Four cropping systems were compared, implemented under contrasted fertilizers levels (table 1):

- Plow x Sesame / Soybean annual succession (1 plowing prior to each cycle - the reference practise)
- DMC “Bio-pump” Millet / Soybean (“Bio-pump” Millet: a 70 days biomass production of *Pennisetum typhoides*)
- DMC *Stylosanthes guianensis* / Maize + Stylo
- DMC Stylo / Maize + cover-crop // cover-crop / Soybean + Stylo (in 2006-07 cover-crop = *Brachiaria ruziziensis* and Stylo from 2008)



Soybean after millet

	Soybean	Maize
F0	23-0-0	23-0-0
F2	23-60-60	92-60-60

Table 1. Fertilizer levels (N-P₂O₅-K₂O in kg.ha⁻¹)

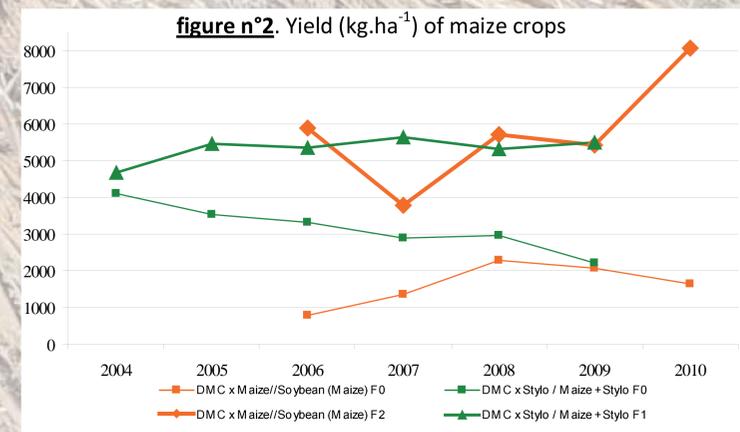
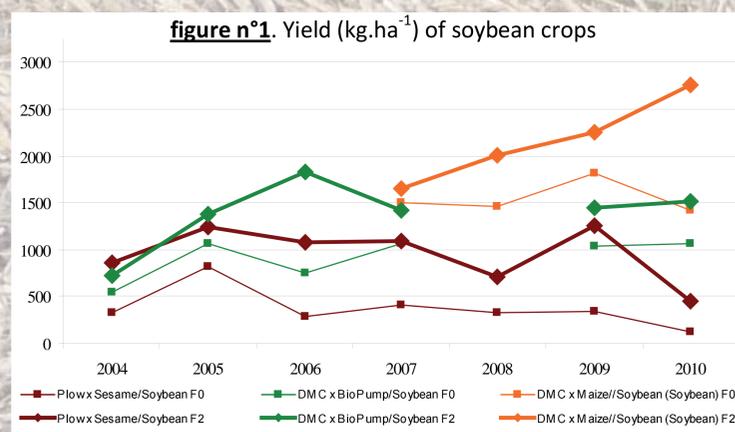


Millet as bio-pump

Results

Results are summarized in figures 1 and 2. They highlight:

- low performance of the plow based system, even with F2 fertilization level
- for DMC, the higher and still improving crops performances of the rotation compared to the annual mono-cropping
- improved efficiency of mineral fertilization under DMC



Conclusions

DMC generates a soil fertility improvement through organo-biological processes as shown by the comparison of crops performances under F0 level.

The agronomic efficiency appears to be correlated to the quantity and diversity of the biomass inputs in the cropping system.

This insight provides new perspectives for a continuous improvement of the cropping systems.