

FOUR-YEARS OF EXPERIMENTATION ON COTTON UNDER MULCH BY NORTH CAMEROONIAN FARMERS

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Figure 1: map of North and Far-North provinces of Cameroon with rainfall

The cotton-cereal rotation

The cotton – cereal rotation is common in northern Cameroon. It was the basis for the first DMC systems. In the first year, cereal (sorghum, maize, millet) is intercropped with a cover crop (*Brachiaria ruziziensis*, *Mucuna pruriens*, *Dolichos lablab*, *Crotalaria retusa*, *Vigna unguiculata*). These combinations make it possible to double the quantity of produced biomass (Naudin and Balarabe, 2005). This biomass is entirely kept on the field, (or partially consumed by livestock) and used as soil cover for cotton the next season (figure 2, picture 1 and 2).

Field experimentation

Farmers fields are 2 500 m² wide. They are divided in 2, 3 or 4 plots. DMC is experimented on one plot (about 200 to 1250 m²) the rest being carried out with conventional methods (either ploughing or direct seeding). All the work is done by farmers, and the project only contributes by advising and, if the need arises, by providing specific herbicides treatment devices

Impact on yield

Between 2001 and 2004 yield was recorded on 123 fields (figure 3) :

- In 1/3 of the fields, yield in the control and the DMC plots is the same. In this case, DMC presents the advantage, sometimes, of being less labour intensive.
- In 1/6 of the fields, yield is lower with DMC practices. It is usually due to bad management, mostly to late weeding.
- In one half of the fields, yield is higher with DMC practices as compared to control. The differences are much higher if the plot has been under DMC for long time or if the rainfall is deficient (Far-North fields or dry year: 2002). In the Far-North , the gain in yield results mostly from a better water balance (Soutou *et al*, 2005) , that derives from a better soil structure (Naudin *et al* 2005), probably thanks to a high biological activity (Brévault *et al* 2005).



Picture 1 and 2 : farmers fields , rotation over 2 years in the Manbang village. 2003 : sorghum, 2004 : cotton. On the left DMC plot : sorghum + *Brachiaria ruziziensis* in 2003 and cotton on mulch in 2004, on the right :control plot: sorghum by direct seeding on bare land in 2003, cotton on tillage in 2004. Note the effect of *Brachiaria ruziziensis* on *Striga hermontica* and the faster development of cotton under DMC as compared to tillage.

Table 2: comparison of major economic indicators between DMC and control. 2004 campaign, in the North and Far-north.

	DMC	Conventional	Number of fields
Net income ha ⁻¹ (euros)	301	225	41
Working days ha ⁻¹ (person-days)	101	109	28
Valorisation of a working day by the farmer or his family (euro / working day ⁻¹)	3,53	2,28	22

Conclusion

On farm trials in DMC proved to be very useful. They provide farmers' opinions on experimented techniques and enable to take them into account when designing DMC systems. But the monitoring is expensive and sometimes fastidious. After these 4 years of trials in farmers' fields, the effort will be focused on training of Sodecoton extension team who will be in charge of DMC extension at large scale. From a research point of view, the remaining topics to be addressed to are:

- selection of adapted fertilisation level according to cover plants used in the rotation
- selection of herbicide treatment to decrease labour in weed-infested fields (North province) when mulching is not sufficient
- production of biomass the same year as the cotton, using the first rains of the season.

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Naudin, K.¹, Balarabe, O. ²

¹ CIRAD-CA, Antananarivo, Madagascar, naudin@cirad.fr

² SODECOTON/IRAD, Garoua, Cameroun, obalarabe@yahoo.fr

Direct seeding Mulch based Cropping systems (DMC) under Eau Sol Arbre (ESA) [1] project

Since 1994 Sodecoton[1], through the DPGT[2] and ESA[3] projects, has popularised several techniques for soil fertility maintenance on over 150 000 ha in the north of Cameroon (Sadou *et al*, 2005). This include anti-erosion management (weeded bands, stone lines and reach,...), leguminous trees planting and preservation in cultivated fields (preservation of *Acacia albida* tree), promotion of organic manure. In addition to these large scale extension actions, conservation agriculture (CA) was experimented through cropping systems improvement approach developed by CIRAD, based on DMC (Direct seeding - Mulch-based - Cropping systems) practices. From 2001 to 2005, DMC techniques were designed and tested by more than 70 farmers in their fields in North and Far North provinces of Cameroon (Figure 1).

[1] Société de développement du coton du Cameroun, [2] Développement paysannal et gestion de terroir, [3] Eau sol arbre.



Figure 2: cereal-cotton rotation on DMC, (Séguy adapted by Naudin). The first year the cereals are combined with cover plants that produce biomass to cover the soil in year 2 and eventually to feed livestock

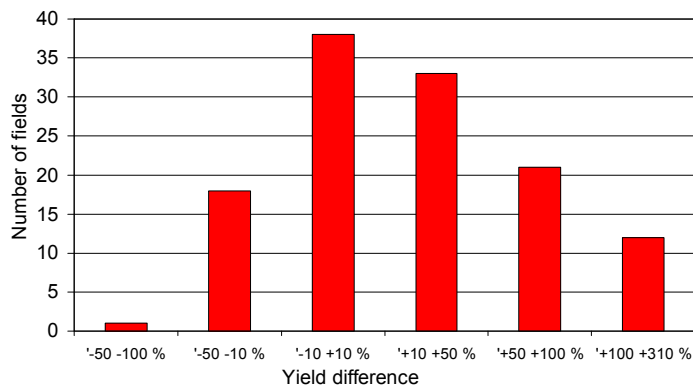


Figure 3: distribution of fields according to differences in yield between DMC and control plot (in %). Years 2001 to 2004, 123 fields (pair of DMC and control plot).

Economic impact

More than long term effects (increase in soil organic matter content, decrease in erosion, improvement of soil fertility, decrease in weed pressure), farmers are looking for short and medium terms economic gains. In DMC main differences with conventional techniques are as follow :

Reduced expenses :

- Tilling
- Ridging
- Weeding (if mulching is sufficient)

Increased expenses :

- Herbicide for localised spraying (if mulching is not sufficient)
- Urea (50 kg/ha) the first 3 years if mulched with grasses and not legumes



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