

Evaluating the impact of contour bunding technology on runoff, soil erosion and crop yield in southern Mali

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Key messages

- ✓ Contour bunding technology was the preferred land management practice in southern Mali. Farmers are willing to pay 5000 F CFA (app \$USD 10) per hectare to a local NGO named AMEDD to put the contour lines in their farm fields. The structural part of the work and its maintenance was done by farmers.
- ✓ The effects of contour bunding technology on soil and water retention and improved crop establishment was immediately visible in the first year of its implementation (Fig. 1), a situation that motivated farmers for wider adoption.

Objectives and approach

- ✓ The objective of the study was to evaluate the impact of contour bunding technology on runoff, soil erosion and crop yield.
- ✓ Field experimentation (Fig 2) in identified farmers' fields and technology parks where field were divided into two parts: one in Contour Bund (CB) and the other in No contour bund (NCB). The experiment was replicated twice and measurement was performed on runoff, erosion, soil moisture and crop yield. Two equations (Eq 1, Eq 2) were used to determine runoff volume and runoff rate from field measurement.

$$\text{Eq 1: Runoff water} = \frac{\text{Volume of water generated by Runoff water (L)}}{\text{Measurement area (m}^2\text{)}}$$

$$\text{Eq 2: Runoff rate} = \frac{\text{Runoff water (mm)}}{\text{Rainfall received (mm)}}$$

Key results

- ✓ Soil moisture was always higher in the CB fields compared to the NCB fields during the cropping season. Whereas runoff and erosion rates were higher in fields without CB (Fig 3).
- ✓ Runoff rate ranged from 39 to 43% in NCB fields and 24 to 26% in the CB fields.
- ✓ Soil erosion of rain events ranged from 0.329 to 6 t ha⁻¹ in CB and 0.73 to 14 t ha⁻¹ in NCB fields.
- ✓ A yield increase of 381 kg ha⁻¹ (+24%) and 432 kg ha⁻¹ (+49%) were observed for cotton and millet fields treated with CB respectively (Table 1).

Significance and scaling potential

- ✓ The data obtained from experimental plots updated the national hydrological data that stopped measurement at least 15 years ago.
- ✓ Where it was applied the contour bunding technology reduced runoff and erosion rates and increased soil water infiltration, an important phenomenon in the rain fed agriculture system. In addition the increase in crop yield was a key element for farmer's food security, income generation and livelihoods improvement.
- ✓ Capacity building and farmers exchange visits on the benefits of contour bunding technology would help reaching at least 1000 households every year.



Figure 1. Millet field in southern Mali without application of contour bunding (NCB) and with CB



Figure 2. Layout of runoff and erosion measurement in Flola technology park, southern Mali

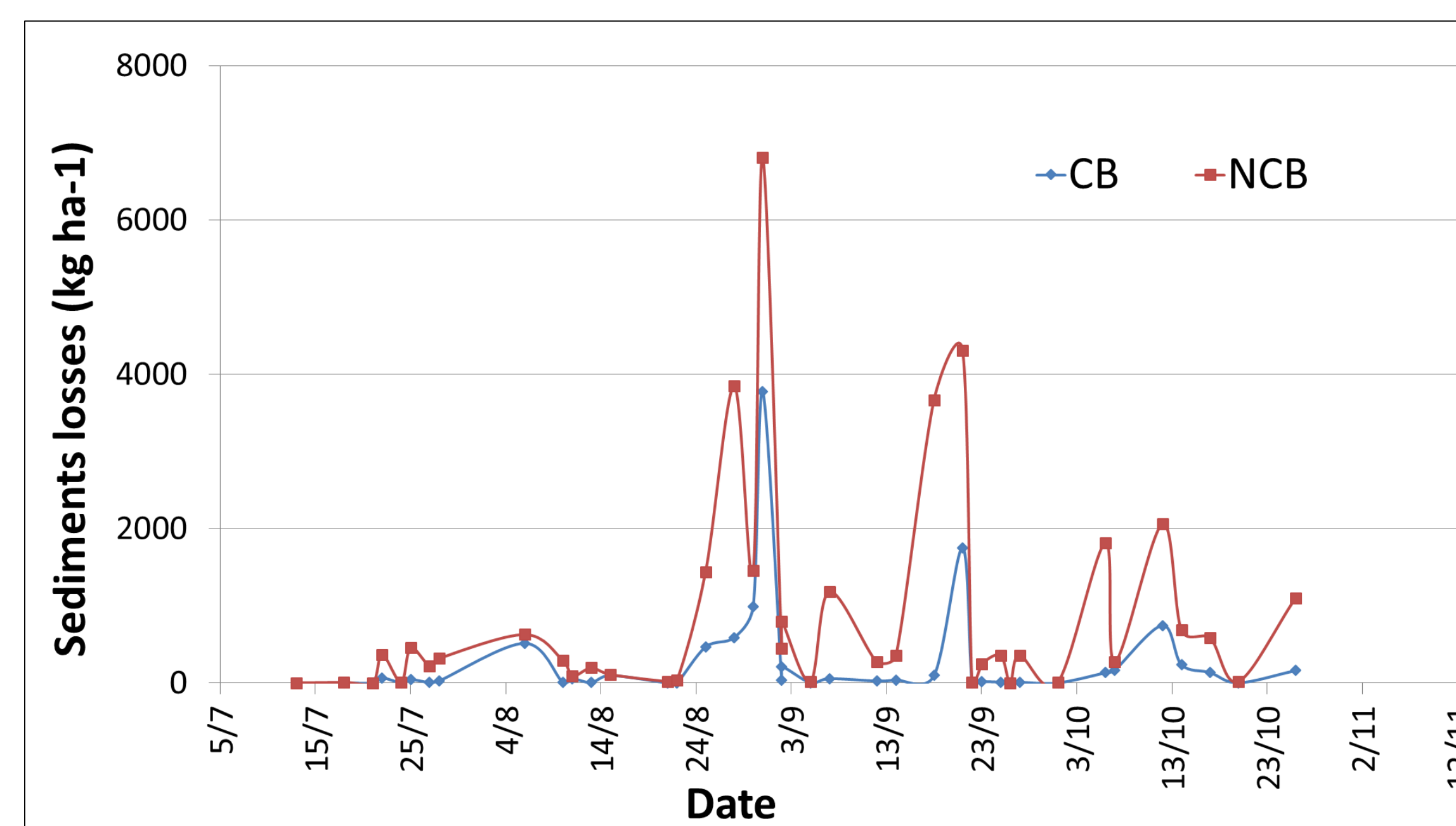


Figure 3. Erosion rates in fields treated with and without CB, Flola technology park in southern Mali

Table 1. Yield of Cotton and Millet in farm fields treated with and without CB

Technique	Crop species	
	Cotton grain (kg ha ⁻¹)	Millet grain (kg ha ⁻¹)
Contour bunding	1998	1322
No contour bunding	1617 *	890 **

* (p<0.05), ** (p<0.01)