Acacia senegal fallow,
a tool to restore Sudano-Sahelian landscapes

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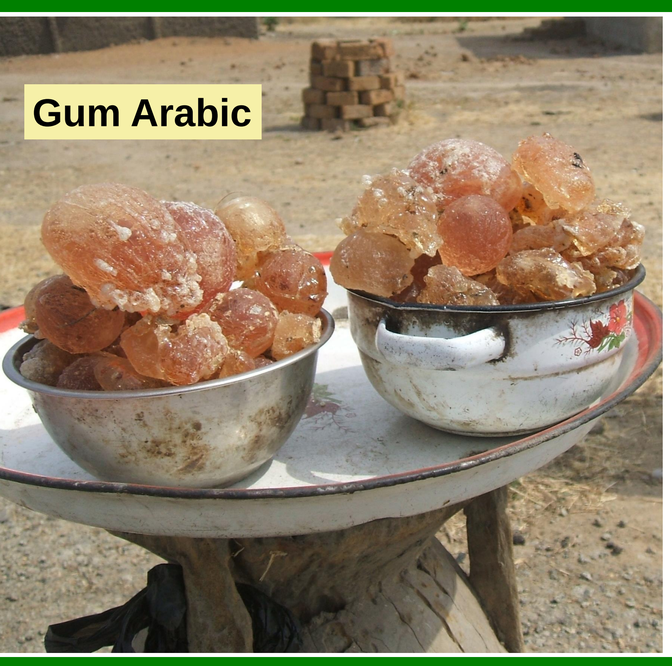
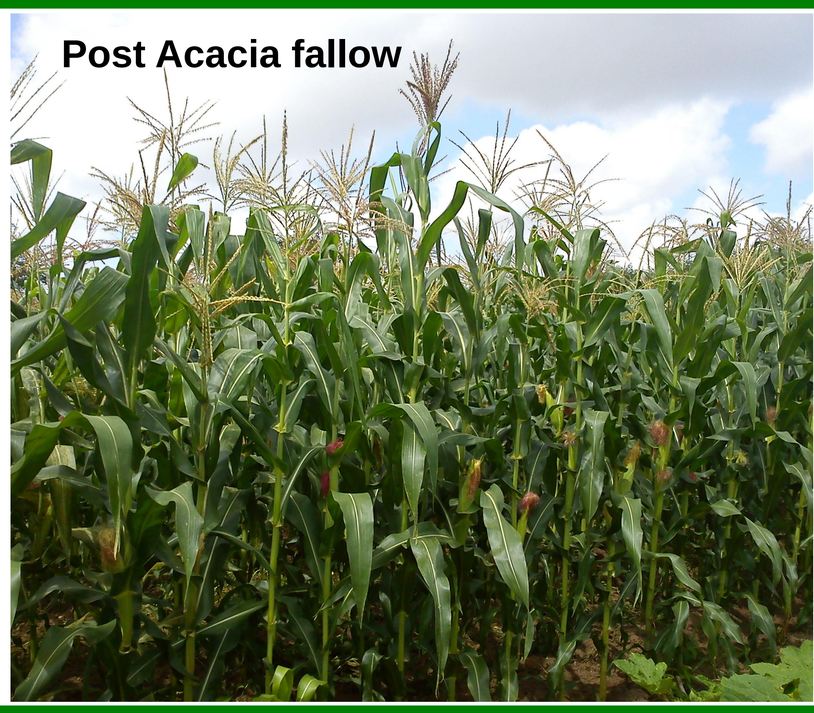
Background and aims



- ✓ In the Sudanian region of North Cameroon, population growth has led to reduced fallow periods, soil fertility and trees (Peltier *et al*., 1993);
- ✓ Since 1984, Cirad, Irad and Sodecoton have been testing techniques for planting tree legumes to restore soil fertility (Harmand *et al*., 2017). A 15-year-old *A. senegal* plot was harvested in 2011;
- ✓ It produced 1200 kg/ha of gum Arabic for 8 years (750 €/ha) and 40 m^3/ha of fuel-wood for 15 years (1100 €/ha) (D'Andous *et al*., 2013);
- ✓ After the *A. senegal* plot was harvested, we studied the evolution of chemical soil properties and the production of successive crops using fertilizer.

Methods

- ❖ On sandy ferruginous acidic soil, with rainfall of 1000 mm / year, the farmer planted successive crops of maize, cotton and groundnuts over three years;
- ❖ In 2011 and 2015, the surface soil was analyzed on two plots (144 m^2 each) of land reclaimed after lying fallow under *A. senegal* (Post-fallow = Pf), and on two neighboring control plots that had been continuously cultivated (Cc);
- ❖ Crop production was measured from 2011 to 2013.



Results

Crop production was much higher for 3 years and soil chemical properties (C, N, pH, CEC) were higher in plots after *A. senegal* fallow than in the control continuously cultivated plots (Table 1).

Year of Cultiv-ation	Crop	Yield (kg ha^{-1})		Soil analysis							
				C (g kg^{-1})		N (g kg^{-1})		pH in water		CEC (cmolc kg^{-1})	
		Cc	Pf	Cc	Pf	Cc	Pf	Cc	Pf	Cc	Pf
2011	Corn	2582	6600	2.7	4.4	0.2	0.3	5.8	7.5	1.1	2.3
2012	Cotton	592	1647								
2013	Peanuts	461	838								
2015				2.5	4.7	0.2	0.4	6.1	6.7	1.2	2.3

Table 1: Crop production and soil analysis at a depth of 0-20 cm, in two control continuously cultivated plots (Cc) and in two plots after the fallow of a 15-year-old *A. senegal* plantation (Pf); the values are means of two replications.

Discussion

- ➢ The continuously cultivated plots produced little, and were no longer worth cultivating;
- ➢ In contrast, the neighboring plots after *A. senegal* fallow produced gum Arabic, then wood and profitable crops, while improving some soil chemical properties;
- ➢ Further studies are needed to determine for how long crop cultivation remains profitable after trees are cut (Dubiez *et al*. 2018).

Conclusion

- ❖ This result will pave the way for farm and landscape management, that will include plots planted with tree legumes of varying ages alongside cultivated plots;
- ❖ This is likely to greatly improve biodiversity, carbon storage, wood energy production, food and cash crops (gum, cotton, maize, etc.) of the territories;
- ❖ while limiting population migration and the destruction of the last Sudanese natural ecosystems.

References

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