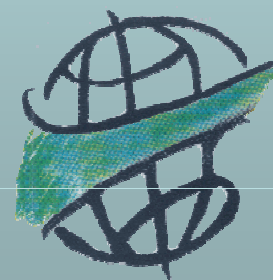


SOIL QUALITY INDICATORS AND WEED INFESTATION IN AN AMAZONIAN LAND-USE SYSTEM AS AFFECTED BY SOIL COVER AND RESIDUE QUALITY

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INTRODUCTION

In humid tropical land-use systems weed diversity and aggressiveness are extremely high, posing serious limitations to no-tillage agriculture.

OBJECTIVE

Investigate the effects of combining low- and high-quality organic residues on weed abundance and biomass and select soil quality indicators

MATERIAL AND METHODS

A field experiment was installed in January 2002 at Maranhão State University, comprising four legume species: *Leucaena leucocephala* (Lam.) De Wit. (**leucaena**), *Cajanus cajan* (L.) Millsp (**pigeon pea**), *Clitoria fairchildiana* R.A.Howard (**sombreiro**) and *Acacia mangium* Willd. (**acacia**), resulting in a completely randomized block design with six treatments and four replicates each, i.e., *sombreiro+pigeon pea*; *leucaena+pigeon pea*; *acacia+pigeon pea*; *sombreiro+leucaena*; *leucaena+acacia* and control (no legumes). Sampling was conducted in 2005 and 2007. We determined weed abundance and biomass. In the topsoil we determined pH, the contents of P, K, Ca and Mg.

RESULTS

Dry biomass applied per treatment, in Mg ha⁻¹, in the second and fourth years

Treatments	2004/2005	2006/2007
Sombreiro+Pigeon Pea	15.70	13.98
Leucaena+Pigeon Pea	12.84	12.52
Acacia+Pigeon Pea	21.29	32.73
Sombreiro+Leucaena	14.48	21.80
Leucaena+Acacia	20.07	37.45

Weed abundance and dry biomass three or five years after the establishment of alley cropping

Treatments	Abundance (number m ⁻²)		Biomass (g m ⁻²)	
	2005	2007	2005	2007
Sombreiro+Pigeon Pea	75 a	100 a	40 a	105 b
Leucaena +Pigeon Pea	28 b	70 ab	24 b	165 a
Acacia+Pigeon Pea	13 b	10 c	14 b	10 c
Sombreiro+Leucaena	25 b	60 b	15 b	75 b
Leucaena+Acacia	20 b	25 c	30 b	11 c
Control	70 a	65 ab	55 a	90 b
CV%	65.4	102.6	69.7	87.8
LSD	16.74	37.82	15.50	30.61

Soil chemical analysis in two depth layers, with different cover plants six years after the establishment of alley cropping

Treatments	pH	P	K ⁺	Ca ²⁺	Mg ²⁺	CEC	BSP
	CaCl ₂	mg dm ³	-----	mmolcdm ⁻³	-----		
----- 0 - 5 cm -----							
Sombreiro+Pigeon Pea	4.5	11	0.4	19 a	3	48.4 a	46 a
Leucaena +Pigeon Pea	4.4	11	0.4	16 a	2	41.4 a	45 a
Acacia+Pigeon Pea	4.7	9	0.4	11 b	2	33.4 b	40 a
Sombreiro+Leucaena	4.5	12	0.4	11 b	3	38.4 b	38 a
Leucaena +Acacia	4.6	10	0.4	18 a	3	43.4 a	50 a
Control	4.3	14	0.4	6 c	1	35.4 b	21 b
F test	1.41 ^{ns}	0.67 ^{ns}	0.23 ^{ns}	*	2.10 ^{ns}	*	*
CV (%)	6	41	36	15	45	12	11
LSD	0.52	5.20	-	4.72	2.38	7.50	12.59
----- 5 -10 cm -----							
Sombreiro+Pigeon Pea	4.3	12 a	0.3	7 b	2	32	29.1 b
Leucaena +Pigeon Pea	4.5	10 a	0.3	13 a	2	39	39.2 a
Acacia+Pigeon Pea	4.4	8 b	0.5	7 b	2	31	30.6 b
Sombreiro+Leucaena	4.3	10 a	0.3	6 b	2	34	24.4 b
Leucaena +Acacia	4.5	14 a	0.3	14 a	2	38	42.9 a
Control	4.1	10 a	0.5	6 b	1	35	21.4 b
F test	1.01 ^{ns}	*	0.77 ^{ns}	*	0.64 ^{ns}	0.81 ^{ns}	*
CV (%)	6	13	63	22	40	12	25
LSD	0.45	2.30	0.29	1.69	1.23	8.68	9.00



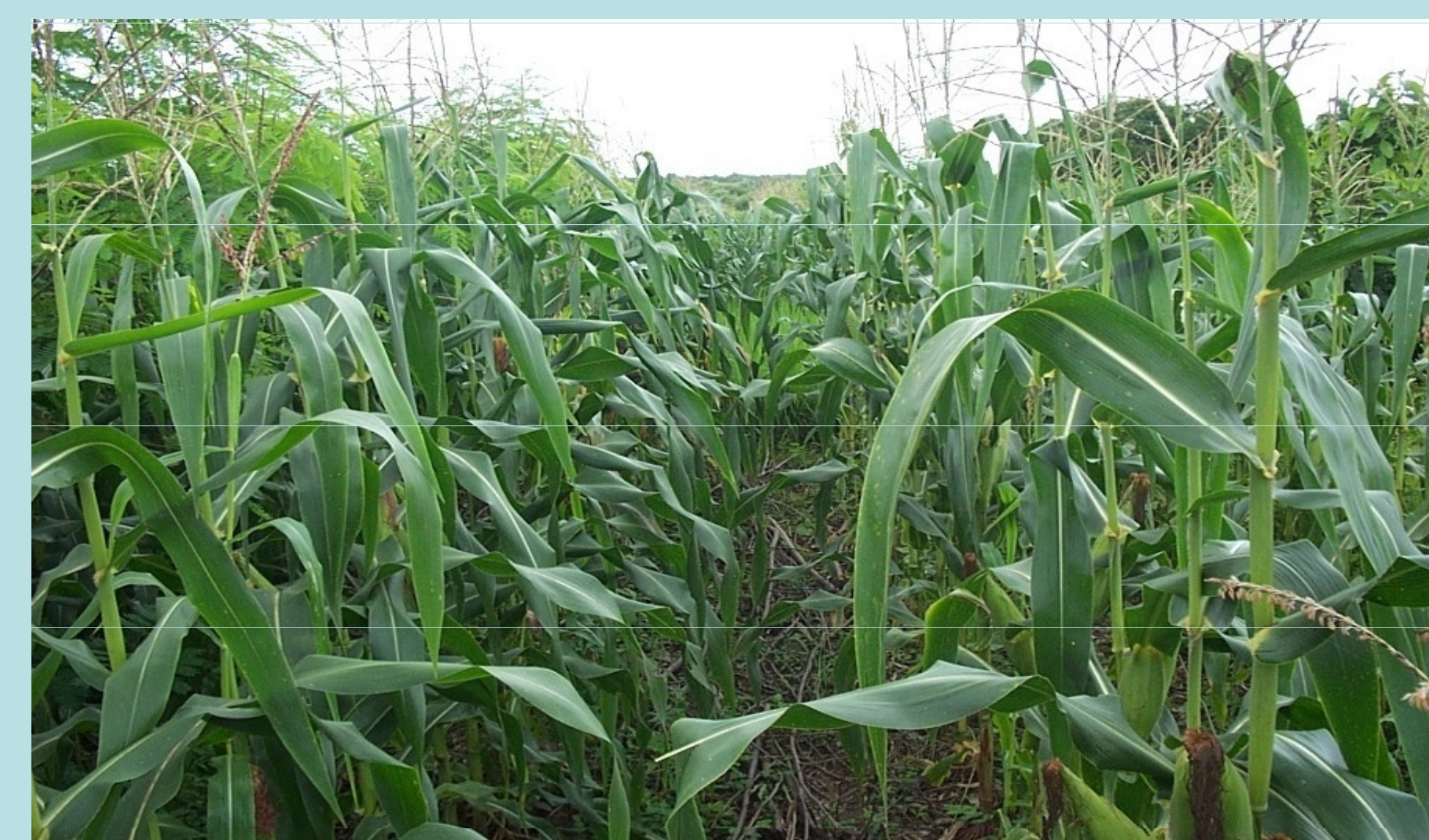
Acacia + Pigeon Pea



Control



Sombreiro + Leucaena



Leucaena + Acacia

We conclude that the aggressiveness of weeds can be reduced and at the same time soil fertility can be improved with alley-cropping systems which contain combinations of both high and low quality residue producing plants.



Sombreiro + Pigeon Pea