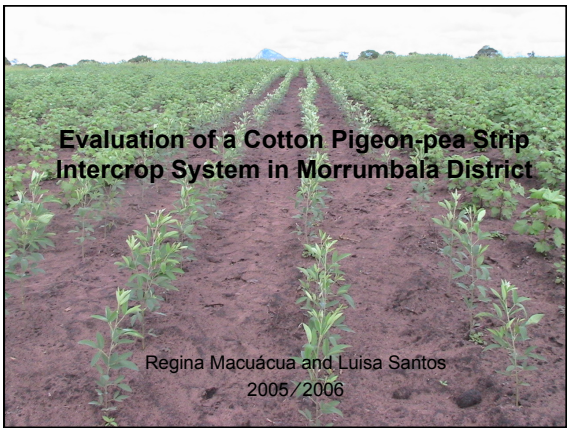

Evaluation of a Cotton Pigeon-pea Strip Intercrop System in Morrumbala District

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BACKGROUND

- Cotton is an important cash crop grown by small-scale farmers under commercial companies contract.
- The northern provinces are the most productive with 78% of the cotton production in the country.
- In the traditional cropping systems cotton is grown intensively as a monoculture.
- The average yield is 500-700 Kg/ha, far below the potential for the varieties used (1200-2000 Kg/ ha).

Problem to be addressed

- The main constrain are pests and farmers use a calendar based spray to control them.
- On the other hand those systems are dependent on natural replacement of soil nutrients.
- Soil degradation and reduced soil fertility, lead to reduced crop yield.
- Consequently affect farmers income and food security for their families.

OBJECTIVE

Overall goal

Evaluate the potential of a Cotton-pigeon pea strip intercrop system in terms of pest incidence, crop yield and net return.

METHODOLOGY

- Augmented factorial experiment with 5 (2x2 +1) treatments and 4 replications was used.
  - Intercrop calendar based spray
  - Intercrop economic threshold based spray
  - Cotton monocrop calendar based spray
  - Pigeon-pea monocrop
  - Cotton monocrop economic threshold based spray
- Cotton variety ISA 205 and Pigeon pea ICEAP-0040
- Pest of both crops were recorded on a weekly basis; only cotton was sprayed.
- ANOVA: done separately for both crops

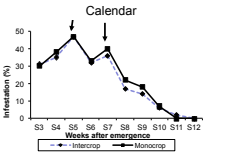
RESULTS

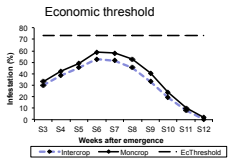
Cotton

- ❖ Pests: Aphids, White fly, American bollworm, Pink bollworm and Red bollworm.
- ❖ Main pests: Aphids and American bollworm.
- ❖ Natural enemies: lace wings, spiders, sirfids and ladybirds.

Aphid

- Arrows indicate spraying
- Both sprayings in calendar treatment could have been avoided
- Economic threshold did not require any spraying
- More beneficial insects in intercrop and economic threshold treatments





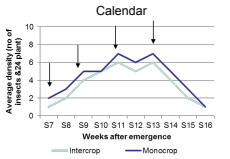
Aphid

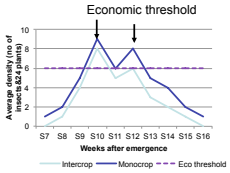
Cropping system		Spraying methode	
Monocrop	28.94	Calender	25.88
Intercrop	26.48	Eco threshold	29.54

- Both the cropping system and the spraying methods caused independently a significant effect on infestation by Aphids
- More diversified cropping systems allows better natural pest control as it also favors occurrence of beneficiary insects
- Although higher infestation on economic threshold treatments, levels were still below acceptable levels that could be tolerated by the crop

American bollworm

- Arrows show spraying
- 4 sprays for calendar 2 for economic threshold
- Some sprayings in calendar treatment could have been avoided
- Pest densities relatively higher in monoculture than in the intercrop





American bollworm

Spraying methode	Cropping system	
	Monoculture	Intercrop
Calendar	4.13 bA	3.43 aB
Economic threshold	3.93 bA	2.88 aA

Values with same mall letter in the row and capital letter in the column are not significantly different as per Fisher-Hayter a P < 0,05

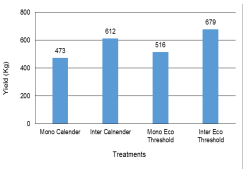
- The interaction of both caused a significant effect on density of American bollworm.
- Although more spraying done on the calendar treatment the densities of the pest were higher if compared with the economic threshold treatment.
- The comparison of the average shows that the best combination is intercrop system treated based on economic threshold.

Cotton Yield Analysis

ANOVA of cotton yield

Source of variation	Yield
Croping system	<0.0001**
Type of application	0.0026**
Interaction (CS x TA)	0.3112

(Significant at α=5%)



- Both the cropping system and spraying method had a significant effect on cotton yield.
- Interaction of the 2 factors did not cause a significant effect on cotton yield.
- Intercrop treatments showed a yield advantage when compared with the monoculture.
- Economic threshold sprays also showed better yield than calendar based sprays.

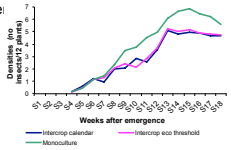
RESULTS

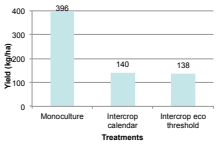
Pigeon pea

- Pests: Jassids, leaf feeder beetles and American bollworm
- Main pests: Jassids
- American bollworm was expected as it is an important pest of pigeon pea.
- Escaped American bollworm, probably because of the long vegetative growth period.

Pigeon pea Analysis

- Monoculture shows higher pest incidence than intercrop.
- Pigeon pea could have benefited from cotton control through pesticide drift.
- Type of cropping system cause significant effect on crop yield.
- Monouculture treatments showed higher yield advantages than intercrop treatments.





Comparison of the cropping Systems

Type of application	Ry Cot	Ry Pp	LER
Calendar	1.29	0.35	1.65
Economic Threshold	1.32	0.35	1.66

- Intercrop more efficient than the monoculture.
- The high share of cotton increased the total yield expressed through the LER.

Economic Analysis

Item	Economic threshold		Calendar	
	Monoculture	Intercrop	Monoculture	Intercrop
Gross product (Mt/ha)	2.838	4.218	2.601	4.340
Production cost (Mt/ha)	1.272	1.363	1.593	1.608
Net return (Mt/ha)	**1.566**	**2.854**	**1.008**	**2.732**

- Intercrop brings higher economic returns than the monoculture
- Higher cost of intercrops compensated by higher yield
- Calendar based spray higher production costs
- Best combination is intercrop sprayed based on economic threshold

CONCLUSIONS

- ✓ American bollworm and aphids were the main pests on cotton and jassids on pigeon pea.
- ✓ Pest densities were relatively higher in the monoculture.
- ✓ Intercrop treatments showed a yield advantage and higher economic returns than monocultures.
- ✓ Economic threshold based sprays showed better yield and lower production costs than calendar based sprays.
- ✓ The intercrop assures a more efficient use of the land.

RECOMENDATIONS

- ➢ The results of this study reflect only the findings of one season, so it is recommended that similar studies should be done to have more accurate conclusions.
- ➢ Further studies to evaluate the potential of the biological and agronomic efficiency built into narrow strips.
- ➢ On farm trials should be undertaken in the district to evaluate the adaptability of these cropping systems under farmers' conditions.

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