Establishing vegetable agroforestry systems at the World Vegetable Center

AVRDC
The World Vegetable Center

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INTRODUCTION

Fruits and vegetables provide food and increase incomes for small-scale farmers in the tropics. These high-value crops are also important components of home garden agroforestry systems; they contribute to biological stability, enhance crop diversity, conserve soil properties and increase total productivity. Although the benefits of integrating high-value crops into agroforestry systems have been recognized, few studies have been done to quantify and describe tree-crop interactions. A vegetable agroforestry system research project was initiated at the World Vegetable Center to study the relationships between fruit trees and vegetable crops in terms of competition and complementation.

Vegetable Agroforestry System at AVRDC – The World Vegetable Center

OBJECTIVES

- Study tree-crop interactions in alley cropping vegetable crops with tropical fruit trees.
- Investigate influence of tree crops on natural habitat and insect populations in vegetable cropping systems.
- Evaluate total productivity and economic returns from high value horticultural crops in an agroforestry system.

MATERIALS AND METHODS

Seedlings of 12 tropical fruit trees: *Anona reticulata, Artocarpus heterophyllus, Chrysophyllum caimito, Coffea arabica, Eugenia brasliensis, Eugenia uniflora, Pouteria caimito, Pouteria campechiana, Psydium littorale, Rollinia mucosa, Syzygium samarangense* and *Tamarindus indica* were planted in hedgerows in December 2005 in World Vegetable Center organic vegetable research plots. Vegetable crops were sequentially grown in 8 m alleys between tree hedgerows 10 months after establishment. Three sources of organic fertilizer (compost) were applied and evaluated for their effect on growth and yield of vegetable crops. Organic fertilizer (compost) treatments were: 1) rape+soybean+castor seed+sesame (RSCS); 2) castor seed (CS); and 3) combination of 1 and 2 (RSCS+CS). The trial was laid in RCBD with 4 replications.

RESULTS

Establishment and initial growth of tropical fruit trees varied according to species. Outstanding species were *A. heterphyllus, C. caimito, T. indicus* and *A. reticulata*. Yield response of vegetables to organic fertilizer application varied according to species and the type and combination of organic fertilizer applied. In trial 1, significant differences in yield were observed in cucumber and eggplant, but not with lettuce, sweet corn and yard-long bean (Table 1). Yield of cucumber with combination fertilizer was higher than with single-source fertilizers. For eggplant, yield was higher with castor seed compost. In trial 2, yield response was significant for all vegetables except radish and tomato (Table 2). Yield of Chinese cabbage fertilized with the combination fertilizer was higher than the single-source fertilizers, but with common cabbage single fertilizers were better than the combination. Yield of sweet pepper with RSCS was higher than with CS or the combination. In the third trial, yields of lettuce, sweet corn and yard-long bean were not affected by organic fertilizer treatments, but yields of cucumber and eggplant differed with treatments (Table 3). RSCS+CS produced higher cucumber yield than the other treatments. For eggplant, highest yield was obtained with CS.

Table 1. Effect of organic fertilizers on yield (t/ha) of vegetables in hedgerow intercropping. Trial 1-2006.

Vegetable	Organic Fertilizer		
	[1]RSCS	[2]CS	RSCS+CS
Cucumber	19.0 b	20.4 b	25.1 a
Eggplant	26.7 b	39.1 a	29.0 b
Head lettuce	2.9 a	3.1 a	2.9 a
Sweet corn	5.7 a	6.7 a	6.8 a
Yard-long bean	9.4 a	9.5 a	10.0 a

Table 2. Effect of organic fertilizers on yield (t/ha) of vegetables in hedgerow intercropping. Trial 2-2007.

Vegetable	Organic Fertilizer		
	[1]RSCS	[2]CS	RSCS+CS
Chinese cabbage	9.5 a	6.9 b	10.1 a
Common cabbage	40.5 a	40.6 a	35.2 b
Okra	11.5 b	16.3 a	11.0 b
Sweet pepper	9.9 a	5.6 b	6.4 b
Radish	21.9 a	22.9 a	21.5 a
Tomato	48.0 a	50.3 a	47.1 a

Table 3. Effect of organic fertilizers on yield (t/ha) of vegetables in hedgerow intercropping. Trial 3-2007.

Vegetable	Organic Fertilizer		
	[1]RSCS	[2]CS	RSCS+CS
Cucumber	19.0 b	20.4 b	25.1 a
Eggplant	26.7 b	39.1 a	29.0 b
Lettuce	2.9 a	3.1 a	2.9 a
Sweet corn	5.7 a	6.7 a	6.8 a
Yard-long bean	9.4 a	9.5 a	10.0 a

[1]RSCS = Rape+Soybean+Castor seed+Sesame
[2]Castor seed
Means followed with common letter are in the same row are not significantly different (P=0.05).

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