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ECONOMICS OF INTERCROPPING OKRA WITH COWPEA

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ABSTRACT

Field experiments were carried out to evaluate the economic returns obtainable from the intercrop of okra with cowpea at varying levels of cropping densities. Average of yields over the two – year period covered by the study was used for the measurement of output while the values of input and output were determined by the prevailing market prices. Budgeting was used for the analysis. The three economic indicators employed – Net returns, Benefit – cost ratios and increased net returns showed that the best mix of okra – cowpea which could be recommended to farmers was the intercrop of two rows of okra with one row of cowpea (OC 2:1). The practice gave increased net returns of ₦ 21,052.97 (37.51%) and ₦ 52,197.97 (208.96%) over the sole cropping of cowpea and okra respectively. It also showed an increased return of between ₦ 43,690.44 and ₦ 71,132.78 above other intercrop treatments. This result is in favour of the current moves of agricultural extension agents towards popularizing the practice of alley farming among horticulturists in Nigeria.

Keywords: economic returns, cropping densities, economic indicators, benefit-cost ratio

INTRODUCTION

Optimum utilization of land resources presupposes that soil nutrients at different levels of the top soil are being judiciously used. Aside from the documented advantages of intercropping over mono–cropping (Norman 1968, Ogunfowora and Norman 1973, Vaughan 1987), a well planned intercrop could ensure long use for a particular soil without serious losses in the essential components of its nutrient factors (Okigho and Greenland, 1976; Sharma *et al.*,1979; Remison, 1982). Also, the overall net return from the intercrop could be substantially better than planting both crops sole (Baker, 1979; Dittoh, 1985; Adeniyi, 1988) because of the likely symbiotic association of the two crops in the intercrop (Enyi, 1973, Dalal, 1974; Haizel, 1974, Ahmed and Gunasena, 1979). Information on the economic viability of intercropping cowpea with okra at various densities could guide in formulating appropriate programmes for better horticultural management. Research and experience have shown that farmers respond well to good economic incentives (Ilobinso, 1976; Adeniyi, 1990) and in order to motivate farmers to adopt improved technologies such as intercropping okra with cowpea therefore, the net benefits of such practices should be convincingly promising. In the light of these, agro – economic experiments were conducted to assess the economic viability of intercropping okra with cowpea using varying levels of cropping densities. The specific objectives of the study were, to: identify the effects of intercropping on the individual yields of okra and cowpea at various cropping densities; determine the costs and returns at each level of cropping density; identify the economic pattern of intercropping okra with cowpea, and based on the findings and; make tentative policy recommendation(s) for improvement in the existing practice.

MATERIALS AND METHODS

The site of the experiments was the Agricultural Research farm of Adeyemi College of Education in Ondo (07°05'N, 04°55'E), Nigeria. Two experiments were conducted in the wet seasons of 1997 and 1998 in a randomized block design with five treatments and three replications. Report of similar experiments repeated in 2003 and 2004 seasons to consolidate on the results obtained in the 1997/98 seasons is being reported. The soil of the experimental plot was a well – drained sandy loam with the following characteristics: 1.41% organic matter; 0.268% total N; 6.6 p.p.m. available P(Bray's – P1); 1.14 m .e/100g Ca; 0.31 m .e/100g.K and pH 5.5 (1:1 soil water ratio). Seeds of okra variety V 35 (early maturing type) and cowpea variety TVX 3236 (Semi – determinate early maturing type) were sown simultaneously on April 16th 2003 and May 16th 2004 for the first and second experiments respectively.

In each experiment, the following treatments were tested: Sole Okra (0); Sole Cowpea (C); alternate intercropping row of okra and cowpea at a ratio of 1 to 1 (OC 1:1) a row of okra intercropped with a pair row of cowpea at ratio 1 to 2 (OC 1:2) and a pair rows of okra intercropped with a row of

cowpea at ratio 2 to 1 (OC 2:1). Spacing for the sole and mixture of okra was 60cm by 45cm to give a population density of 37,000 plants per hectare while that of cowpea was 60cm by 30cm to The experimental design was randomized complete blocks with three replications. One plant per stand was allowed for each crop. Weeds were controlled by using hoe two times while insects were controlled with the mixture of Furadan 3G applied at the rate of 0.75kg a.i ha^{-1} and Navacron at 450g a.i ha^{-1}at an interval of one week for five weeks commencing on the 5th day after flower buds formation. No fertilizer was applied. Harvesting of mature okra fruits started on June 8th 2003 and July 6th 2004 for the first and second experiments respectively and this continued at an interval of 5 days till August 10th 2003 and September 14th 2004. Cowpea harvesting started on July 7th 2003 and August 7th 2004 for the first and second experiments respectively at an interval of 5 days till August 20th 2003 and September 16th 2004.

Twenty five plants per replicate were sampled for okra crop yield analysis while forty plants per replicate were sampled for cowpea yield. All plants sampled were taken from the middle of each replicate treatment from where crop component interactions were assumed to be highest.

Partial farm budgeting based on averages of market retail prices for the periods covered by the study was used for the analyses of input and output.

RESULTS AND DISCUSSION

The costs of production, yield response and economic performance associated with the production of okra – cowpea intercrop at varying cropping densities are as shown in Tables 1, 2 and 3 respectively. As shown in table 1, about 72.08 percent of the total production cost was incurred on labour in all the experiments while cost of insecticides which was constant for all the treatments took an average of abut 23.19 percent. give a population density of 56,000 plants per hectare. Mixtures were achieved by "replacement series" technique of De Wit (1960).

Cost of seeds vary from ₦800 per hectare for sole okra to ₦ 3,600 for sole cowpea and the least among the intercrop was ₦ 1,716.00 for okra – cowpea planted at ratio 2 to 1 respectively. After allowing five percent for harvesting/handling loss, the average yield of sole okra and sole cowpea were 7,590.41kg and 1,850.53kg respectively (see Table 2).

For the intercrop, the yields of okra were 2,501.67kg; 3,733.05kg and 5,227.33kg for OC 1:2, OC 1:1 and OC 2:1 respectively while those of cowpea ranged from 590.61kg for OC 1:2 to 1,273.42kg for OC 2:1. The yield response for both crops was best for the intercrop of a pair row of okra with a row of cowpea. Using the average market prices of N9.10 per kilogramme of okra and ₦ 62.44 per kilogramme of cowpea, the economic returns for the various treatments were shown in Table 3.

The net returns per hectare ranged between ₦ 24,979.70 to ₦ 56,124.70 for sole crops while for the intercrop, okra/cowpea planted at the ratio of one row to two rows respectively (OC 1:2) performed least with a net return of ₦ 6,044.89 per hectare while OC 2:1 performed best with ₦ 77,177.67. As the okra component of the mixture increased, net returns also increased. The Benefit cost ratio was highest (2.5:1) for OC 2:1 and least (1.1:1) for OC 1:2. Although the ratio was fairly high (1.9:1) for sole cowpea cropping, the fact that highest production cost was incurred and the enormous risk taken in terms of total crop failure with monocropping, renders it cautionable for practical adoption. The increased net return was most favourable for both okra and cowpea only when two rows of okra were intercropped with one row of cowpea.

Table 1. Cost of Production of Okra – Cowpea intercrop at various cropping densities (Naira per hectare): Average of 2003 – 2004 Experiments

TREATMENTS* (in Naira per hectare N/ha)					
COST ITEM	Control		OC 1:1	OC 1:2	OC 2:1
	Sole Okra	Sole Cowpea			
Rent on Land	250:00	250:00	250:00	250:00	250:00
Farm Labour	31,043.00	43,563.50	37,318.00	38,672.00	35,936.75
Variable Costs					
Seeds	800.00	3,600.00	2,200.00	2,676.00	1,716.00
Insecticides	12,000.00	12,000.00	12,000.00	12,000.00	12,000.00
TOTAL	44,093.00	59,413.50	51,768.00	53,598.00	49,902.75

Note: N means Naira (Nigerian Currency);
S1 is equivalent to N115.95 as at the time of study
* The total crop population density for monoculture and mixtures of okra and cowpea was 56,000 plants per hectare.

Table 2. Yield Response of Okra – Cowpea intercrop at various cropping densities (2003 – 2004 Experiments)

	YIELD (kg/ha)					
TREATMENT	1997		1998		AVERAGE	
	O	C	O	C	O	C
Control: Sole okra (O)	7,277.57	-	7,903.25	-	7,590.41	-
Sole Cowpea(C)		1,754.67	-	1,946.39	-	1,850.53
OC 1:1	3,584.41	784.00	3,881.68	858.67	3,733.05	821.34
OC 1:2	2,394.25	558.56	2,609.09	622.65	2,501.67	590.61
OC 2:1	4,916.66	1,224.00	5,537.99	1,322.87	5,227.33	1,273.41
LSD(P = 0.01)	146.26	52.01	301.34	131.49	262.30	100.01

Source: Field experiments 2003 – 2004 and computations therefrom.

Table 3. Economic Performance of Okra-Cowpea intercrop at various cropping Densities (Average of 2003 – 2004 Experiments)

ITEM	TREATMENTS (N/ha)				
	O	C	OC 1:1	OC 1:2	OC 2:1
Value of Yield	69,072.70	115,538.20	85,255.23	59,642.89	127,080.42
Cost of production	44,093.00	59,413.50	51,768.00	53,598.00	49,902.75
Net Returns	24,979.70	56,124.70	33,487.23	6,044.89	77,177.67
Increased Net Returns:					
Cowpea based			-22,637.47	-50,079.81	21,052.97
Okra based			8,507.53	-18,934.81	52,197.97
Benefit / Cost Ratio	1.6:1	1.94:1	1.6:1	1.1:1	2.5:1

Source: Field Experiment 2003 – 2004 and computations therefrom

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APPENDIX. Average Price of input and output used 2003 – 2004

Item	Unit	Price / Unit (N)
Okra Seeds (Planted)	Kg	80.00
Cowpea seeds / planted	Kg	120.00
Furadan 3G insecticide	Litres	1,200.00
Navacron 40 FC insecticide	Litres	1,200.00
Labour	Man hours	50.00
Okra fruit (sold)	Kg	9.10
Cowpea seeds (sold)	kg	62.44

Source: Agricultural Development Project (ADP): Ministry of Agriculture, Agric Input Supply Company (AISC) Zonal Office, Ondo, Price