Research Article

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Economics of intercropping vegetables and flowering crops in pre-bearing arecanut garden under Assam condition

A. K. Ray[1], A. S. Borah[2], H. P. Maheswarappa[3] and G. C. Acharya[4]

Central Plantation Crops Research Institute, Research Centre, Kahikuchi, Guwahati - 7810 17, Assam

Abstract

A field trial was conducted at Central Plantation Crops Research Institute, Research Centre, Kahikuchi (Assam) to evaluate the performance of different vegetables and flowering crops in pre-bearing arecanut garden. Two year (2003-05) results indicated that, vegetable crops like radish, cabbage, cauliflower and brinjal performed well and resulted in higher net return and B:C ratio (4.0 to 5.0) and higher return per rupee invested during winter season. Among flowering crops, marigold and chrysanthemum performed well and resulted in higher B:C ratio (2.05 to 2.43) compared to gladiolus.

Keywords: Arecanut, intercropping, vegetable, flowering crops, economics

Introduction

Arecanut (*Areca catechu* Linn) is one of the major cash crops of Assam. Most of the farmers of Assam grow arecanut in their homestead garden. Though Assam contributes a major share in the total arecanut production in the country, its productivity is low. In Assam, the area under this crop is about 0.73 lakh ha, and production of 0.69 lakh tonnes with a productivity of 952 kg per ha. Though Assam contributes significantly to the arecanut sector, the productivity is very low compared to the national average of 1.22 tonnes per ha.

Arecanut as a sole crop does not fully utilize the natural resources such as soil, space and light. The compact nature of arecanut crown, raised well above the ground (10 to 15 m), allows more sunlight to pass down to ground and maintain high humidity which, in turn favour excellent growth of shade loving crops. Studies at CPCRI, RS, Vittal have revealed that orientation and structure of arecanut canopy permits 32 to 48% of incident radiation to penetrate down depending on the time of the day (Muralidharan, 1980). Normally in an areca garden spaced at 2.7 m X 2.7 m the light energy reaches the ground and get wasted. Rooting pattern revealed that arecanut palms planted at 2.7 m X 2.7 m spacing could use effectively only 30% of the land area (Bhat and Leela, 1968). The normal cultural operations are also confined within about 75-80 cm radius from the base.

The arecanut palm has a gestation of 5 to 6 years during which period, farmers do not get any kind of yield and income. In order to utilize the natural resources to the maximum extent, growing different crops as inter/ mixed crops is a common practice. Contrasting to annuals, the potential for increasing the productivity per unit area of land, time and inputs through high density multi species cropping is considerably higher in perennial crops (Bavappa and Jacob, 1982). The only way to enhance the returns per holdings is by intercropping with annuals and perennials (Nelliat, 1973). Evolving a location or region specific profitable or flexible intercrops involving different crops to increase the income of a

[1] Senior Scientist; [2] Research Associate (Agronomy) ; [3] Senior Scientist (Agronomy), CPCRI, Kasaragod ;[4] Sr. Scientist (Hort).

farmer is need of the hour. Hence, an experiment was conducted to study the performance and profitability of vegetables and flowering crops as intercrops in young arecanut garden.

Materials and Methods

The present study was carried out at Central Plantation Crops Research Institute, Research Centre, Kahikuchi during 2003-05. The Research Centre at Kahikuchi is located at 20° 18' N latitude and 91° 78' longitude with mean altitude of 48 m above MSL. The soil of the experimental site was texturally classified as clay loam with a pH of 5.3, organic carbon status of 1.23% and with available N (342 kg/ha), P (22 kg/ha) and K (81 kg/ha) status. The average yearly rainfall in the region ranges between 2500 to 3000 mm with 90 per cent of the total rain received during June to September with occasional showers during April-May and November-December. The experimental site is of three year old arecanut plantation (Mohitnagar variety) spaced at 2.7 m in both the ways. The package of practices recommended for the young arecanut was accordingly followed (Bhat and Leela, 1968). The intercrops were planted in between two rows of arecanut palms with 1.5 m width, which constitutes 44.5% area for intercrops in an arecanut plantation. The details followed against each of the intercrop are given in Table 1. Crops were supplied with recommended fertilizers and other operations were carried out as and when required. The yield, cost of production and B:C ratio of different intercrops were estimated following simple statistical programmes taking into consideration of the prevailing market price.

$$\text{B:C ratio} = \frac{\text{Gross Return}}{\text{Total cost incurred in cultivation}}$$

$$\left.\begin{array}{l}\text{Return per rupee}\\ \text{invested on labour}\end{array}\right\} = \frac{\text{Gross Return - (cost of cultivation except that incurred for labour)}}{\text{Cost of labour (Rs.)}}$$

$$\text{Per day return} = \frac{\text{Net Return (in Rs.)}}{\text{Cropping days}}$$

Results and Discussion

Vegetable crops

The yield of seven vegetable crops tried as intercrops in arecanut garden was estimated taking into consideration the yield obtained from the cropped area available in one hectare of arecanut plantation and the data is presented in Table 2. The estimated yield obtained in two consecutive years did not show much variation. It was revealed from the table that the cost of production during 2003-04 ranged between Rs. 6750 to Rs. 12600

Table 1. Details of vegetables and flowering crops grown as intercrops in young arecanut plantation

Crop	Variety	Time of planting		Plot size	Spacing
Radish	Local	3rd week of Oct.,03	4th week of Oct.,04	7 m x 1.5 m	15 cm x 15 cm
Knolkhol	Local	3rd week of Oct.,03	4th week of Oct.,04	7 m x 1.5 m	40 cm x 40 cm
Cabbage	Local	1st week of Nov.,03	1st week of Nov.,04	7 m x 1.5 m	40 cm x 40 cm
Cauliflower	Local	1st week of Nov.,03	1st week of Nov.,04	7 m x 1.5 m	40 cm x 40 cm
Tomato	Local	2nd week of Nov.,03	3rd week of Nov.,04	7 m x 1.5 m	60 cm x 60 cm
Potato	Local	2nd week of Nov.,03	3rd week of Nov.,04	30 m x 2.0 m	40 cm x 15 cm
Brinjal	Local	3rd week of Nov.,03	1st week of Nov.,04	7 m x 1.5 m	60 cm x 60 cm
Gladiolus	Hybrid	2nd week of Oct.,03	2nd week of Oct.,04	7 m x 1.5 m	60 cm x 40 cm
Chrysanthemum	Local	2nd week of Oct.,03	2nd week of Oct.,04	7 m x 1.5 m	30 cm x 30 cm
Marigold	Local	2nd week of Oct.,03	2nd week of Oct.,04	7 m x 1.5 m	60 cm x 40 cm

Table 2. Yield and economics of vegetable crops grown under young areca plantation

Crop	Yield (t/ ha of areca garden)			Cost of production (Rs./ ha of areca garden)			Gross return (Rs./ ha of areca garden)			Net return (Rs./ ha of areca garden)			B:C ratio		
	2003-04	*2004-05*	*Mean*	*2003-04*	*2004-05*	*Mean*	*2003-04*	*2004-05*	*Mean*	*2003-04*	*2004-05*	*Mean*	*2003-04*	*2004-05*	*Mean*
Radish	10.35	8.10	9.225	6750	6950	6850	31050	24300	27675	24300	17350	20825	4.60	3.49	4.05
Knolkhol	4.15	4.27	4.210	7200	7500	7350	14525	14945	14735	7325	7445	7385	2.02	1.99	2.00
Cabbage	22.95	19.80	21.375	9000	9300	9150	45900	39600	42750	36900	30300	33600	5.10	4.25	4.68
Cauliflower	9.00	10.00	9.500	8800	9100	8950	36000	40000	38000	27200	30900	29050	4.09	4.39	4.24
Tomato	6.30	6.80	6.550	12550	12875	12713	31500	34000	32750	18950	21125	20037	2.50	2.64	2.57
Potato	5.72	5.85	5.785	12600	12930	12765	28600	29250	28925	16000	16320	16160	2.26	2.26	2.26
Brinjal	10.40	9.90	10.150	7875	8215	8045	41600	39600	40600	33725	31385	32555	5.28	4.82	5.05

Selling price: Radish: Rs.3/kg, Knolkhol: Rs.3.50/kg, Cabbage: Rs.2/kg, Cauliflower: Rs.4/kg, Tomato: Rs.5/kg, Potato: Rs.5/kg, Brinjal: Rs.4/kg

per ha in case of radish and potato, respectively. Whereas, the cost of cultivation during 2004-05 varied from Rs. 6950 for radish to Rs.12930 for potato. The increased cost of production during the second year of study was due to increased cost of labour and other inputs. The highest gross return per hectare was obtained by growing cabbage (Rs.42750) followed by Brinjal and cauliflower. The poor return from the Knolkhol was attributed to comparatively low production and less demand by the consumers. The benefit cost ratio was maximum (5.28 and 4.82) for brinjal during both the years of study.

Flowering crops

The yield and economics of flowering crops are presented in Table 3. It was evident form the table that the cost of production was exceptionally higher (Rs. 68400 and Rs. 69300 during 2003-04 and 2004-05, respectively) for gladiolus owing to the initial investment for the planting material (corms). The gross return was the highest from gladiolus (Rs. 123089) which is due to the sale of both spikes and corms developed after one season of cropping. The lowest gross return was realized when marigold was grown as an intercrop (Rs.22425). Similarly, the net return was also found to be highest (Rs. 54239) for gladiolus and lowest (Rs. 11475) for marigold. However, the benefit cost ratio was maximum for chrysanthemum (2.43).

The return per rupee invested on labour and per day return was estimated and presented in Table 4 for different vegetables and flowering crops. It was observed that the value for return per rupee invested was maximum (15.77) for brinjal followed by cabbage and radish during 2003-04, among the vegetables. During 2004-05, the value is higher in brinjal followed by cauliflower and cabbage. The mean data revealed higher value for brinjal followed by cabbage and cauliflower suggesting better utilization of labour in above mentioned three vegetable crops. Among the flowering crops it was not varied much and ranged between 4.61 to 6.25 for the mean data of two years. The economic efficiency was estimated as per day return basis and it was found that among the vegetables, the economic efficiency was the highest by growing cabbage (395.28) followed by cauliflower (322.77) and radish (320.35). Among the flowering crops the economic efficiency was found to be the highest (417.21) for gladiolus. Researchers claim that adoption of palm based Farming system (PBFS) is one of the best ways to overcome the various production and price risks in coconut and arecanut cultivation. Das, (1990) and Sairam *et al.*, (2004) have also showed that adoption of PBFS would provide economic stability to the farmers against production and price risk.

The study has clearly indicated that all the vegetables and flowering crops can be grown suitably and profitably under young arecanut plantation. Better labour utilization and economic efficiency could be possible by vegetables like radish, cabbage, cauliflower and brinjal and flowering crops like marigold and chrysanthemum in view of the market demand and higher B:C ratio.

Table 3. Yield and economics of flowering crops grown under young areca plantation

Crop	Yield (t/ ha of areca garden)			Cost of production (Rs./ ha of areca garden)			Gross return (Rs./ ha of areca garden)			Net return (Rs./ ha of areca garden)			B:C ratio		
	2003-04	*2004-05*	*Mean*	*2003-04*	*2004-05*	*Mean*	*2003-04*	*2004-05*	*Mean*	*2003-04*	*2004-05*	*Mean*	*2003-04*	*2004-05*	*Pooled*
Gladiolus	17875* 34550**	18000 34726	17938 34638	68400	69300	68850	122725	123452	123089	54325	54152	54239	1.79	1.78	1.78
Chrysan-themum	5.99	5.95	5.970	12150	12450	12300	29950	29750	29850	17800	17300	17550	2.46	2.39	2.43
Marigold	4.74	4.23	4.485	10800	11100	10950	23700	21150	22425	12900	10050	11475	2.19	1.90	2.05

* Number of spikes; ** Number of corms

Selling price : Gladiolus: Rs. 3/cut flower, Rs. 2/corm, Chrysanthemum: Rs. 5/kg, Marigold: Rs. 5/kg.

Table 4. Return per rupee invested and per day return of different intercrops grown in young arecanut plantation

Name of vegetable/ flowering crops	Return per rupee invested on labour (Rs.)			Per day return (Rs.)		
	2003-04	2004-05	Mean	2003-04	2004-05	Mean
Radish	13.41	9.61	11.48	373.8	266.9	320.35
Knolkhol	4.50	4.42	4.46	91.56	93.1	93.31
Cabbage	14.66	11.86	13.13	434.1	356.5	395.28
Cauliflower	11.30	12.31	11.80	322.2	343.3	322.77
Tomato	6.20	6.65	6.43	222.9	248.5	235.73
Potato	5.37	5.35	5.36	145.4	148.4	146.90
Brinjal	15.77	14.17	14.97	281.0	261.5	271.29
Gladiolus	6.29	6.20	6.25	417.9	416.5	417.21
Chrysanthemum	6.05	5.79	5.92	148.3	144.2	146.24
Marigold	5.11	4.12	4.61	107.5	83.7	95.62

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