

## Evaluation of Intercrops in Arecanut Gardens of South Andaman Island

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### Abstract

Intercropping experiments conducted in arecanut gardens in South Andaman, India revealed the scope of increasing profitability by incorporating suitable crops. Arecanut is an important cash crop grown in Andaman groups of islands wherein, monocropping is a common practice in most of the areas resulting in underutilization of interspaces in land scarce islands. In order to optimally utilize the limited area available for cultivation in the islands and reduce dependence on supplies from mainland India, adoption of intercropping could be a viable option. Results with evaluation of three popular intercrops viz. elephant foot yam, banana and ginger in arecanut gardens under island condition suggested that adoption of intercropping could increase the profitability to the tune of upto Rs. 17,94,000/- as gross returns when intercropping elephant foot yam in arecanut is followed as compared to Rs. 12,63,000/- in arecanut monocropping over a period of two years. Results also suggested that, considering the local demands and duration of crops, banana, ginger and elephant foot yam could be profitably incorporated in the existing arecanut gardens of Andaman islands.

**Keywords:** Island ecosystem, plantation crop, raised cultivation, tropical

### Introduction

Arecanut is the second most commonly grown plantation crop after coconut in the Andaman and Nicobar islands (ANI). Apart from the settler communities of these islands, nuts are also chewed for mastication by native Great Andamanese tribe of these islands (Awasthi, 1991). Tropical conditions of ANI with prolonged rainy spells offer conducive growing environment for arecanut which is evidenced by its nut size. In recent past, cultivation of arecanut has gained popularity in Andaman groups of islands due to limited input requirement for cultivation and remunerative market prices offered to the produce. Absence of major pests/ diseases such as red palm weevil, yellow leaf disease *etc.* in the islands also contribute to the increasing popularity of arecanut in the islands.

The crop is mainly cultivated in the hilly uplands of Andaman group of islands including Middle Andaman, North Andaman, South Andaman and Little Andaman islands. However, in most of the orchards, interspaces remain underutilized as intercropping is rarely adopted. Considering the limited area available for cultivation in

the islands, use of interspaces in the perennial orchards is of prime importance to ensure regular supply of essential horticultural commodities to the island dwellers. In order to identify most suitable intercrops for cultivation in the existing arecanut garden, experiments were carried out with most popular crops of these islands. The present report concerned evaluation of banana, ginger and elephant foot yam as intercrops under island conditions.

### Materials and Methods

An experiment was conducted during 2016-17 and 2017-18 in 11 years old garden of arecanut var. Samrudhi at Horticulture Research Farm, Sippighat located in South Andaman island under ICAR-Central Island Agricultural Research Institute. Terracing was done on hill slopes in arecanut which was planted at 2.7 m × 2.7 m. There were four treatments viz. arecanut alone as monocrop ( $T_1$ ), arecanut + banana ( $T_2$ ), arecanut + ginger ( $T_3$ ) and arecanut + elephant foot yam ( $T_4$ ). The experiment was laid out in randomized block design with five replications under rainfed conditions. Banana var. Cheena (Pisang Awak) was planted at 1.8 m × 1.8 m during 2016 in triangular

system to accommodate two rows in each terrace. Ginger was planted during 2016 and 2017 on raised beds of 10 m length and 0.6 m width at 25 cm × 25 cm spacing. Elephant foot yam was planted during 2016 and 2017 at 1 m × 1 m spacing to accommodate two rows in each terrace. The intercrops were grown using only organic manures (without any fertilizers) and yield data was recorded during both cropping years. Soil samples were collected before and after the experiment and analyzed using established procedures.

### Results and Discussion

The soil and climatic conditions of Andaman and Nicobar islands are highly suitable for cultivation of

banana, ginger and elephant foot yam. These crops are being cultivated under open condition in most parts of these islands. Considering the popularity of these crops, they were included in the experiment and results are presented in Table 1. During first year of evaluation, lowest yield of *chali* (1.11 t/ha) was obtained in arecanut sole cropping (T<sub>1</sub>), which increased to 1.31 t/ha in arecanut + elephant foot yam, 1.49 t/ha in arecanut + banana combination and 1.65 t/ha in T<sub>3</sub> involving arecanut + ginger combination. Additionally, 0.95 t/ha ginger and 2.7 t/ha elephant foot yam was also obtained in treatments T<sub>3</sub> and T<sub>4</sub>, respectively. Banana was in juvenile phase so no yield was obtained in first year.

**Table. 1. Yield and gross income of Arecanut and different intercrops under island condition**

Treatment	Crops	Year I		Year II		Cumulative gross income for two years (Rs.)
		Yield (t/ha)	Gross income (Rs.)	Yield (t/ha)	Gross income (Rs.)	
T <sub>1</sub>	Arecanut	1.11	3,33,000/-	3.1	9,30,000/-	12,63,000/-
T <sub>2</sub>	Arecanut	1.49	4,47,000/-	3.1	9,30,000/-	17,43,000/-
	Banana	-	-	12.2	3,66,000/-	
	<b>Total T<sub>2</sub></b>		<b>4,47,000/-</b>		<b>12,96,000/-</b>	
T <sub>3</sub>	Arecanut	1.65	4,95,000/-	3.6	10,80,000/-	17,41,400/-
	Ginger	0.95	76,000/-	1.13	90,400/-	
	<b>Total T<sub>3</sub></b>		<b>5,71,000/-</b>		<b>11,70,400/-</b>	
T <sub>4</sub>	Arecanut	1.31	3,93,000/-	4.3	12,90,000/-	17,94,000/-
	EFY	2.70	54,000/-	2.85	57,000/-	
	<b>Total T<sub>4</sub></b>		<b>4,47,000/-</b>		<b>13,47,000/-</b>	

Selling prices: arecanut *chali* @ Rs. 300 / kg; ginger @ Rs. 80/ kg; banana @ Rs. 30 /kg and EFY @Rs. 20/ kg

During second year, yields of arecanut and component crops were higher in all the treatments when compared with first year of trial. As the experimental garden was unmanaged before the trial, probably due to improved management practices, higher yields were noticed in second year of cropping. *Chali* yield was improved from 3.1 t/ha in arecanut sole cropping to 4.3 t/ha in treatment involving arecanut + elephant foot yam combination. Banana came to harvesting during this year which gave

additional yield of 12.2 t/ha. Additional estimated yields of 1.13 t/ha of ginger and 2.85 t/ha of elephant foot yam was also noticed in T<sub>3</sub> and T<sub>4</sub> respectively.

During both years of study, incorporation of intercrops were found to improve the *chali* yield and no adverse effects were noticed on arecanut, which suggested compatibility of the studied crops with arecanut. Improved *chali* yield due to use of suitable intercrops

have also been reported from Coastal Karnataka (Bhat *et al.*, 1999) and Assam (Hussain *et al.*, 2008) conditions. Further, improvement in yields of component crops over the period could be attributed to the creation of optimal microclimate as reported by previous researchers (Bhat *et al.*, 1999; Hussain *et al.*, 2008; Hussain *et al.*, 2011).

During both the years, gross income was substantially higher in all the intercropping combinations than arecanut monocropping. In case of cumulative gross income from the cropping model over two years, highest gross returns were obtained from T<sub>4</sub> (Rs. 17,94,000/-), followed by T<sub>2</sub> (Rs. 17,43,000/-) and T<sub>3</sub> (Rs. 17,41,400/-), which were substantially higher than arecanut alone. Banana with additional income of Rs. 3,66,000/-, was found to be most profit giving intercrop amongst the three crops studied over two years. However, considering the overall returns and maincrop-intercrop interactions, arecanut + elephant foot yam combination was found to be most remunerative under island conditions. Although the gross returns may vary according to the prevailing price of the produce and the location of production, the additional production and increased productivity are the advantages of the intercropping options. Ensuring inputs, timely harvesting,

intercultural operations, marketing and quality of the produce are the other factors to be considered while going for intercropping.

Effect of intercropping on soil properties was also studied and data is presented in Table 2. Irrespective of the treatment, pH values of the soil increased after the experiment was over, which is in accordance with the earlier report from coastal Karnataka (Bhat and Sujatha, 2007). Although, addition of organic matter through residue tend to increase soil organic carbon content in the system, reduction in organic carbon content was noticed in the present study. This could be because of losses caused due land preparation activities as the area had remained undisturbed for longer times prior to experiment. Over the period, improvement could be expected as organic content is added during subsequent cropping cycles. Available nitrogen content increased after the cropping which indicates the positive effect of organic matter recycling on N content (Bhat and Sujatha, 2007). Available potassium content decreased after cropping, which could be due to the fact that organic recycling alone may not be sufficient to maintain the availability of K in laterite soils to leaching losses and lesser K content in organic residues (Bhat and Sujatha, 2007).

**Table. 2. Pre-experimental and post-experimental soil characteristics of Arecanut based cropping system models under island condition**

Treatment	pH		EC (dS/m)		Organic Carbon (%)		Available N (kg/ha)		Available K <sub>2</sub> O (kg/ha)	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
T <sub>1</sub>		5.75		0.06		0.6		489		115
T <sub>2</sub>	4.64	5.80	0.7	0.13	2.1	0.9	292	533	226	186
T <sub>3</sub>		5.95		0.10		0.9		383		96
T <sub>4</sub>		5.58		0.07		0.8		527		136

In a nutshell, adoption of intercropping was found to be more remunerative than arecanut monocropping under South Andaman conditions and hence, could be recommended for the island farmers so as to improve their profits and reduce the dependence of islanders on external supplies for these commodities.

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