Intercropping in arecanut gardens of North Eastern Region of India: A brief review of the work done

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In the year 1971 the North Eastern Region comprising Assam, Meghalaya, Nagaland, Manipur, Tripura and the two centrally administered units of Mizoram and Arunachal Pradesh with 8 per cent of India's geographical area was established. Except the Brahmaputra and the Barak valleys of Assam and the plains of Tripura the entire region is characterised by vast stretches of hilly terrain with elevations ranging from 16 m. to over 3000 m. above sea level. Generally the hill areas of this region are subjected to rainfall of medium to high intensity (ranging from 1,500 mm. to 10,000 mm. annually) and the local climatic variations are due to various factors such as altitude, facing and direction of the hills and direction and strength of monsoon current. As a result the entire North Eastern region passes through a typical climatic pattern incomparable to any other region of the country.

Arecanut is one of the most important cash crops of the North Eastern region. It is grown extensively in Assam, Meghalaya and Tripura; and to a considerable extent in the states of Nagaland and Manipur and the Union territories of Mizoram and Arunachal Pradesh. Assam alone contributes to about 75 per cent of the total production of the entire region.

There are distinct variations in the method of cultivation and the time of flowering and harvesting of arecanut within the region. The general method of cultivation of arecanut in all the hilly areas is similar and the crop is grown up to an elevation of 600 m. above sea level. The entire region can be divided into two distinct zones with regard to time of flowering and harvesting of arecanut. In one zone covered by Tripura, Mizoram, parts of Meghalaya and Barak valley of Cachar district of Assam, the duration between flowering to harvest is short, extending from February-March to November-December of the same year (10 months) whereas in the other zone comprising mainly the Brahmaputra valley of Assam and neighbouring areas of Nagaland, Manipur and Arunachal Pradesh, this duration is longer, extending from April-May to July-August of the next year (15 months).

The long pre-bearing age of five to eight years, the poor income in the early period of bearing and the fluctuating trend in the market price have compelled the arecanut growers to take up intercropping in areca gardens. The selection of intercrops differs from tract to tract in the North Eastern region depending on the altitude and agro-climatic conditions. In the hilly tracts of Meghalaya, Mizoram and Tripura, the intercrops are orange (as perennial fruit crop), ginger and turmeric, whereas in the plains of Assam, banana is grown as a main intercrop followed by betelvine, ginger and pineapple.

As there was no authentic information

whether intercropping in arecanut is agronomically and economically suited without affecting the performance of the main crop, a long term field experiment on several intercrops was started in 1961 at the Central Plantation Crops Research Institute, Sub-Station, Kahikuchi, Assam.

The experiment with 5 intercrops was laid out in a simple randomised block design with 4 replications. The intercrops were: (1) Banana: variety: Chenichampa, (2) Pineapple: variety: Giantkew, (3) Fodder grass: variety: Guinea grass, (4) Ginger: variety: Nadia and (5) Betelvine: variety: Garo pan. The individual plot size was 13.5 m. × 10.8 m. Each plot accommodated 20 arecanut trees (experimental) with a spacing of 2.7 m. × 2.7 m. Fertilizer mixture was applied to the arecanut plants from the third year after planting at the rate of 100 g. N, 40 g. P_2O_5 and 140 g. K_2O per tree per year in two split doses (53 g. N + 40 g. P_2O_5 + 53 g. K_2O during September-October and 47 g. N + 87 g. K_2O during February-March). Nitrogen, phosphorus and potash were applied as urea, single super phosphate and muriate of potash respectively. The cultivation and the manurial schedule adopted to different intercrops are given in brief below.

Intercrops.

1. Banana.

Approximately two months old uniform suckers from healthy clumps of banana variety 'Chenichampa' (tall variety) were selected and planted in pits of 60 cm at a spacing of 2.7 m. × 2.7 m. in the interspaces of the arecanut palms. Each plot accommodated 12 banana plants at the rate of 1225 plants per ha. Ten kilograms of cattle manure was applied to each pit as a basal dose before planting. Fertilizer mixture was applied at the rate of 550g. ammonium sulphate + 330 g. super phosphate + 110g. muriate of potash per plant per year in two equal split doses in September-October and February-March respectively. The initial planting of banana suckers was done along with the planting of arecanut seedlings. Thereafter, banana suckers were replanted after every four years with marginal changes in the location of the pits.

2. Pineapple.

Trenches of 70 cm width and 30 cm depth and 8.1 m length were dug in between the arecanut palms in each plot. Ground suckers of uniform size of pineapple variety "Giant Kew" were selected and planted at 35 cm x 30 cm spacing in double row system in the trenches. The suckers were replanted once in every four years after suitably changing the location of trenches. Initial planting was done along with the main crop of arecanut. Cattle manure at the rate of 25 tonnes per ha. was applied in the trenches as a basal dose. Fertilizer mixture was applied at the rate of 450 kg. ammonium sulphate, 425 kg. super phosphate, 180 kg. muriate of potash per ha. in a single dose.

3. Guinea grass.

The slips of Guinea fodder grass, were planted in a single row in the interspaces of the arecanut palms at a distance of 60 cm. A basal dose of cattle manure at the rate of 10 tonnes per ha. was applied. Only nitrogen was supplied as fertilizer which was top-dressed at the rate of 50 kg. N per ha. per year in the form of Urea before the South West monsoon. The first planting of Guinea grass was taken up along with the arecanut planting But unlike banana and pineapple this crop was allowed to grow without any replanting.

4. Ginger.

Beds of one metre width and 15 cm height and 10.8 m length were made in the

interspaces of the arecanut palms. The selected rhizomes of variety 'Nadia' were planted at a spacing of 30 cm x 15 cm in the beds at the rate of 1500 kg per ha. Cattle manure at the rate of 30 tonnes per ha was applied at the time of preparation of land. Fertilizer mixture was applied at the rate of 100 kg. N + 100 kg. P_2O_5 + 200 kg K_2O per ha. in two equal split doses. The first dose was applied before planting as a basal dressing and the second dose three months after planting at the time of earthing up operation. Green leaf at the rate of 12,000 kg. per ha. was applied on the beds as mulch after planting the rhizomes. Planting and harvesting of this crop was repeated every year beginning from the start of the experiment.

5. Betelvine.

Selected cuttings of the local betelvine variety 'Garopan' at the rate of two were planted at the base of each arecanut palm when the palms attained the bearing age of six years. The cuttings were planted about 30 cm away from the base of the palms and each plot accommodated 20 bushes. Cattle manure at the rate of 10 kg. was applied as a basal dose per vine. No other fertilizer was applied.

Some of the important findings on the investigation are given below.

The major growth and yield attributes of the arecanut crop does not show any significant variation due to the intercropping treatments (Table 1).

Table I. Mean values of yield and yield attributes from plots with different intercrops (1971 – 72).

Intercrop	Mean No. of leaves shed per palm	Mean No. of spadices/ palm	Mean No. of bunches/ palm	Mean No. of nuts/palm	Mean wt. of nuts per palm (kg.)
Banana	6.85	3.58	2.13	216.5	7.91
Pineapple	6.84	3.57	2.17	251.0	8.98
Guinea grass	6.78	3.69	2.60	306.4	10.45
Ginger	6.74	5.56	2.49	290.2	10.28
Betelvine	6.49	3.72	2.34	264.1	9.40
No intercrops (areca only)	6.52	3.54	2.33	249.8	9.04
Mean	6.70	3.61	2.34	263.0	9.34
S. E./Mean	0.22	0.24	0.13	26.85	0.90

The data show that crops like banana, pineapple, Guinea grass, ginger and betelvine can be grown as intercrops in arecanut gardens without any adverse effect to the main crop. Plots intercropped with Guinea grass and ginger have recorded the highest weight of arecanuts per tree. A perusal of Table II shows that all the intercrops except Guinea grass have resulted in profit.

Table II. Economics of cultivation of different intercrops with arecanut per ha. (mean for 3 years, 1969 - 1972).

Treatment (intercrop)	Cost of cultivation of intercrop (Rs./ha).	Yield of intercrops (per ha.)	Gross income from the intercorp (Rs./ha.)	Profit or loss from the intercrop (Rs./ha.)
Banana	2444	122 q.	3172 *	728
Pineapple	8497	157 q.	10876 *	2379
Guinea grass	681	892 q.	533	-128
Ginger	3902	98 q.	4900	998
Betelvine	2789	12,96,000 (leaves)	6480	3691

* Total income from banana and pineapple includes the sale of suckers.

The highest profit per ha. has been recorded from betelvine (Rs. 3691) followed by pineapple (Rs. 2379). Though Guinea grass has recorded a loss of Rs. 128 per ha. it however gets offset by the higher yield of arecanut in the plot.

A consideration of the initial cost of cultivation of various intercrops (Table II) clearly shows that pineapple records the highest cost with Rs 8,497 per ha. followed by ginger, betelvine, banana and guinea grass. Here again betelvine as an intercrop in arecanut will prove more economical due to favourable cost profit ratio.

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