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Feasibility of vegetable intercropping in arecanut garden under sub Himalayan terai region of West Bengal

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Abstract

A study was conducted with 25 different vegetable crops during different seasons as intercrops in partial shade of arecanut garden (36 years old) under sub Himalayan terai region of West Bengal. Yield, input, output and benefit cost ratio were calculated for all the crops. B : C ratio of all the crops ranged between 0.37 (bitter gourd) to 3.44 (cabbage). However, all the vegetables tested were found profitable. Crops like palak, cabbage, cauliflower, raddish, carrot, turnip, chilli and capsicum can be taken as winter vegetables and basella, pumpkin, ash gourd, bottle gourd and snake gourd can be taken as summer vegetables in partial shade of arecanut garden.

Key words : Arecanut, intercropping, vegetables, sub-Himalayan, terai, economics

Introduction

In West Bengal, arecanut cultivation is mainly restricted to North Bengal. But due to the fluctuation of arecanut price, people are losing interest in arecanut cultivation. It is a perennial crop. Once it is planted, it can produce fruits up to 40-50 years. It is not desirable to cut the palms during mid age even because of price fluctuation. However, if some others crops are taken in arecanut garden, the uncertainty may be minimized. Intercropping in plantation crop garden helps to meet the food requirement besides increasing the net returns per unit area (Nair and Verghese, 1976). Arecanut based cropping systems have been developed for different places and net returns from the garden have been increased manyfold. The different intercrops raised and their diversity was reported by Bavappa (1951). No deleterious effect on yield and growth of areca palm due to intercropping with tapioca, elephant foot yam, yam; and sweet potato was reported by several workers (Abraham, 1974 and Sadanandan, 1974). Arecanut in general is spaced at a distance of 2.7 m x 2.7 m. It has been found that about 32.7-47 per cent sunlight can penetrate through the 14 years old arecanut canopy (Muralidharan, 1980) and about 70 percent land is unutilized (Bhat and Leela, 1968). To utilize the natural resources (sunlight and space), to minimize the risk of mono-cropping (arecanut) and to maximize the net returns, mixed / intercropping in arecanut garden is recommended. Till date, only perennial crops were tested and it was found that the crop combinations like arecanut, banana, and acid limes as intercrop and black pepper as mixed crop were suitable in this region (Chenchaiah *et al.*, 2003). In case of coconut garden, research has been done on cultivation of vegetables. Nair *et al.* (2000) reported that cucurbitaceous crops can be taken as inter crops in coconut garden under Nicober Islands condition. Cultivation of perennial intercrops in arecanut garden permits only a single return in a year whereas, cultivation of vegetables as intercrops may help one to get frequent returns. Based on these reports, an experiment was conducted to find out the feasibility of vegetable cultivation in arecanut garden under partial shade at

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Materials and Methods

The soil of the garden ispredominantly sandy loam soil. The area receives an annual rainfall of more than 3000-4000 mm. The intensity is the maximum during June-August. The average minimum temperature varies from 8-22 ° C ands maximum temperature varies from 22-37°C. Different summer and winter vegetables were planted in randomized block design with three replications in arecanut garden (about 36 years old) of CPCRI, Research Centre, Mohitnagar during 2001-03 to test the feasibility of different vegetable crops. Different summer vegetables like *Basella*, lady's finger and different types of gourds like ridge gourd, snake gourd, bitter gourd, bottle gourd, pumpkinand ash gourd and different winter vegetables like raddish, carrot, beet, spinach, amaranth, rai sak, cabbage, cauliflower, knolkhol and dolichos bean were raised. Bower was prepared using arecanut palm as pole to reduce the cost of bower preparation. Cucurbitaceous vegetables were in alternate rows with a spacing of 2.7 m plant to plant and 5.4 m row to row. Bowers were made for vine crops using arecanut stem as pole and beds were prepared in between two rows of arecanut (1-1.2 m). The standard recommended agronomic practices were followed for all the crops. Hectare yield was calculated considering the effective area of arecanut garden. Observations on growth of the crops and yield was recorded and input cost, total returns, net returns and benefit cost ratio were calculated.

Results and Discussion

Winter Season Vegetables

Different winter vegetables were planted to see the feasibility of the crops. Table 1 shows the data on crop duration, yield per ha, output, input and benefit cost ratio of different vegetables crops. Among the three winter leafy vegetable like palak, amaranth and rai sak (mustard), maximum yield/ha was obtained from Palak (200 q/ha with a benefit cost ratio of 1.39. The benefit cost ratio of other two leafy vegetables was 0.58 and 0.68, respectively. Spinach crop was also taken as ratoon crops. A total of 4-5 cuts were taken within the same season. The leaf production was more in this crop which may be due to partial shade of arecanut.

Among the root crops like radish, carrot and beet, maximum yield (650.5q/ha) was recorded in radish followed by turnip and carrot. Among these three crops maximum crop duration was recorded in turnip, followed by radish and carrot. Arecanut crop is grown under up land conditions. If radish is sown early during the month of August, farmers can get more return by selling radish as leafy vegetable. The benefit cost ratio of radish, turnip and carrot was 2.33, 2.09 and 1.64, respectively.

Different cole crops like cabbage, cauliflower, sprouting broccoli and knolkhol was also tested. Among these four crops, longer (111 days) crop duration was recorded in cabbage whereas in other cole crops it was only 70-80 days. The maximum yield per ha was recorded in cabbage (437.5 q/ha) with a maximum benefit cost ratio (3.44). The benefit cost ratio of other cole crops was more than 1. It may be concluded that these crops can be taken as inter crops in arecanut garden.

Among the solanaceous vegetables (tomato, brinjal, chilli and capsicum) the benefit cost ratio was also more than one. Though they are profitable, they require more attention. Due to shade, the internode of these crops gets elongated (data not shown). So they require proper staking in time to keep the plants erect.

Different pulse vegetables were also planted. Among these crops maximum benefit cost ratio was calculated in dolichos bean (1.39) followed by French bean (1.08) and cow pea (0.15). In case of French bean and cow pea powdery mildew problems were observed.

Summer Season Vegetables

In summer season, different summer vegetables like lady's finger, basella and different gourds were planted. Gourds require bower system to get more yields. Arecanut palms were used as poles. Among the crops, the maximum out put was recorded from pumpkin (Rs. 65480/- per ha) followed by ash gourd (Rs 27225 /- per ha), bottle gourd (25962 /- per ha) and snake gourd (Rs. 24850/- per ha) with a benefit cost ratio of 2.39, 1.59, 1.17 and 1.53, respectively. Different perennial and annual crops were tested by different workers in arecanut garden as well as in coconut garden. Chenchaiah *et al.* (2003) reported that the benefit cost ratio of different annuals and perennials ranged between -0.79 (arrow root) and 5.46 (black pepper). Nair *et al.* (2000) also reported that cucurbitaceous (cucumber and ridge and sponge gourd) crops are profitable in coconut garden under Andaman Nicober Island condition.

Perennial crops as intercrops or mixed crops have been tested in arecanut garden to utilize the natural resources like land and sunlight in a proper way, to maximize the profit per unit area and to minimize the risk and uncertainty of monocrops. Farmers can get return more thanonce in a year by growing these crops. The present study shows that benefit cost ratio of all the

Table 1. Input and output cost of different vegetables grown in arecanut garden.

Crop	Duration (Days)	Yield (q/ha)	Input (Rs./ha)	Output (Rs./ha)	Net return (Rs./ha)	B:C ratio
Winter Season						
Palak	107	200	33500	80000	46500	1.39
Amaranth	135	119.1	30126	47640	17514	0.58
Rai sak	76	175	31250	52500	21250	0.68
Sprouting broccoli	70	97.4	32500	68180	35680	1.10
Knolkhol	80	205.67	32590	82268	49678	1.52
Cauliflower	79	187	35400	74800	39400	1.11
Cabbage	111	437.5	29580	131250	101670	3.44
Raddish	101	650.5	19550	65050	45500	2.33
Carrot	92	148.5	22500	59400	36900	1.64
Turnip	130	207.5	20150	62250	42100	2.09
Tomato	104	182.5	32500	82125	49625	1.53
Chilli	175	180.5	31400	108300	76900	2.45
Brinjal	170	270.5	31050	81150	50100	1.61
Capsicum	120	53.9	35250	80850	45600	1.29
Lab lab bean	190	101.5	21200	50750	29550	1.39
French bean	118	134.2	38800	80520	41720	1.08
Summer Season						
Cowpea	120	42.2	22100	25320	3220	0.15
Basella	80	192.3	21000	76800	55800	2.66
Bhindi	134	150	31000	90000	59000	1.90
Bottle Gourd	142	96.2	22150	48112	25962	1.17
Ash gourd	145	74	17175	44400	27225	1.59
Snake Gourd	137	51.37	16250	41100	24850	1.53
Pumpkin	155	232.2	27400	92880	65480	2.39
Bitter gourd	136	35.6	20800	28480	7680	0.37
Ridge Gourd	142	42.3	16250	33840	17590	1.08

vegetables ranged between 0.37 (bitter gourd) to 3.44 (cabbage) which indicates that the cultivation of almost all the vegetables particularly leafy vegetables like palak, and basella, cole crops, gourds and chilli in arecanut garden is profitable. Farmers can get returns twice or thrice from the same garden by growing summer, rainy and winter vegetables.

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