

Feasibility of vanilla cultivation with coconut

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Received 25th December, 1998

Abstract

Studies were carried out at Vanilla Planter's Farm at Kallapur Village, Kadur, Chickmagalur District, Karnataka to know the economic feasibility of vanilla cultivation in coconut garden. Data on the cost of cultivation of vanilla over a period of three years (1994-97) indicated that cost of establishment of vanilla including the maintenance cost during gestation period was Rs 1,62,129/ha. The cost of cultivation of vanilla and coconut during bearing period (1997-98) worked out to Rs 30,480/ha and Rs. 9793.50/ha/year, respectively. The average gross Rs 94218.50/ha and net returns (Rs. 36,247.25/ha) and financial feasibility measures namely NPV Rs 61,835.12 and BCR (1.34) indicated the viability of mix cropping of vanilla in the coconut gardens in lower elevations (plains) and low rainfall areas under assured irrigation.

Key words : Vanilla, coconut, mixcropping, feasibility, economics.

Introduction

Coconut (*Cocos nucifera* L.), popularly known as 'Kalpavraksha' is essentially a crop of small and marginal farmers. The average size of a coconut holding is as low as 0.22 hectares and 98% of the holdings are below 2 hectares [5]. One of the feasible ways of increasing the farm level income on such small coconut holdings is to resort to growing of compatible annual or perennial crops in the interspace [1].

The coconut plantations are generally established at wider plant spacings of either 9 m x 9 m or 10 m x 10 m. As such natural plant growth resources especially solar radiation and rain water, are not fully utilised by the coconut plants for a major portion of its growth cycle. This offers an opportunity to some understorey crop in coconut plantation. It has been found that coconut plants at their full growth utilise about 30 or less per cent of solar radiation. Therefore, crop species selected for understorey/intercropping should essentially be a shade loving plant. Vanilla being a shade tolerant crop offers a great scope for cultivation in the coconut gardens. It cannot withstand full sunshine and requires filtered sunshine to the extent of 50% [2].

Vanilla (*Vanilla planifolia* Andrews), is an orchidaceous plant, grown for commercial production of

an aromatic flavour "vanillin". Vanilla is used for flavouring ice creams, bakery products, soft drinks of cola type, beverages, custards, puddings, confectionaries and preparation of vanillin oleoresins. It is a native of Mexico and Central America but now it has spread in tropics. In India, vanilla cultivation can be successfully done in several states, enjoying hot and humid climate conditions which are equally good for coconut cultivation. Since vanilla is also a shade loving crop, it may prove to be a most compatible crop for cultivation with coconut.

As, no information is available on the prospects of growing vanilla as a mixed crop with coconut in the plains of southern parts of India, the present paper is an endeavour to study the economic feasibility of vanilla cultivation in the coconut gardens.

Material and methods

Field data were collected from the research cum demonstration plot at M/S Javed Farm, Kallapur Village near Kadur, Chickmagalur district, which comprises plain areas in Karnataka, to study the feasibility of vanilla cultivation in the coconut garden in an area of 2.4 hectares. Coconut was planted during 1990 at a spacing of 9 m x 9 m. After four years of coconut planting, vanilla was planted during 1994 at a spacing



Vanilla nursery



Coconut and vanilla mixcropping system



Vanilla trained over gly



Well set vanilla beans



Vanilla flower



Hand pollination in vanilla

Table-1. Cost of establishment of vanilla in the coconut garden (Rs/ha)

Sl. no.	Particulars	1994-95	1995-96	1996-97	Total
A. Material inputs					
1.	Seedlings (vanilla)	76,500.00	-	-	76,500.00
2.	Glyricidia cuttings	3,750.00	-	-	3,750.00
3.	FYM/Compost	3,500.00	3,500.00	4,000.00	11,000.00
4.	Fertilizers (RP)	218.75	241.25	255.00	715.00
5.	Plant protection chemicals	310.00	310.00	410.00	1030.00
6.	Mulch material	5,000.00	5,000.00	6,000.00	16,000.00
7.	Forest soil	3,500.00	3,500.00	3,500.00	10,500.00
	Total (A)	92,778.75	12,551.25	14,165.00	1,19,495.00
B. Labour inputs					
1.	Peg marking	180.00	-	-	180.00
2.	Opening of pits for <i>Glyricidia</i> and vanilla	270.00	-	-	270.00
3.	Planting <i>Glyricidia</i>	187.50	-	-	187.50
4.	Planting vanilla	187.50	-	-	187.50
5.	Staking and tying	75.00	-	-	75.00
6.	Weeding	1,500.00	1,700.00	2,000.00	5,200.00
7.	FYM application	150.00	170.00	200.00	520.00
8.	Forest soil application	360.00	400.00	500.00	1,260.00
9.	Application of fertilizers	37.50	42.50	50.00	130.00
10.	Mulching	180.00	204.00	240.00	624.00
11.	Irrigation (Drip Maintenance)	2,628.00	2,920.00	3,212.00	8,760.00
12.	Plant protection measures	72.00	80.00	88.00	240.00
	Total (B)	5,827.50	5,516.50	6,290.00	17,634.00
C. Drip irrigation capital cost					
	Excluding 70% subsidy	25,000.00	-	-	25,000.00
	Total (A + B + C)	1,23,606.25	18,067.75	20,455.00	1,62,129.00

Figures in parentheses indicate percentage to total.

1.5 m x 1.5 m, leaving apart 3 m radius all around the coconut palms, in order to avoid the competition for nutrients, moisture and light. The details of planting pattern is given in Figure-1. The average annual rainfall in this area is 600 mm. Fertilizer mixture containing DAP, RP and urea @ 400 kg each per hectare was applied to coconut during its bearing period.

Except rock phosphate, no other chemical fertilizer was applied to vanilla. Organic manures prepared from animal sources are being generally used for vanilla. Animal manures of manure are not normally applied. Decomposed manure is the main source of nutrients to the vanilla vines.

Therefore, easily decomposable organic matter would be applied 2 to 3 times in a year [8].

To provide semi moist condition of soil with high humus mulch material (off farm) and forest soil were applied. Drip irrigation was provided for both coconut and vanilla. As vanilla is a vine to provide support for it, *Glyricidia sepium* cuttings were planted simultaneously at the time of planting vanilla (Figures 1-6).

Processing of vanilla beans

After harvesting, vanilla beans were dipped in boiling water (63-65°C) for 2-3 minutes. From next day onwards until 7 to 8 days drying in the open sun, beans were

wrapped in the woollen blankets in the night to maintain continuous fermentation and sweating. During this process beans became dark brown in colour, soft, flexible and loss of 50-60% moisture. Further drying was carried out at ambient temperature in shade on wood material for 17 to 22 days till the moisture loss of beans reached to their size and ends were tied up to prevent splitting and then to bundle the beans. Then wrapped the bundles in woollen blankets and kept in the air tight insulated boxes for 2 months to permit development of aroma and flavour.

Economic analysis

The detailed yearwise cost of cultivation, prices, yield and economic returns for vanilla and coconut were recorded. Analysis was carried out to arrive at cost of establishment, cost of cultivation, gross and net returns of the mix cropping system. The financial feasibility measures viz, Net Present Worth (NPW) and Benefit Cost Ratio (BCR) were computed at 14 per cent discount rate to study the viability of investment.

Net present value

The present value represents the discounted value of the net cash inflows to the project. The investment is said to be worth in NPW is greater than zero.

Benefit cost ratio

It is the ratio of discounted returns to discounted cost. The investment is said to be worth while the BCR is more than one.

Results and discussion

Cost of establishment of vanilla in the coconut gardens

The cost of establishment of vanilla is given in the Table-1. The establishment cost includes the cost on seedlings, drip irrigation and other material and labour input during first year and maintenance cost during the gestation period.

During first year, the cost of material inputs worked out to be Rs 92,778.75/ha accounting for 75.06% of the total. Among the material inputs, the cost of seedlings accounted the major share of 82.45% of material input cost (Rs 76,500/ha) followed by mulch material (Rs 5,000/ha), *Glyricidia* cuttings (Rs 3,750/ha), compost (Rs 3,500/ha) and forest soil (Rs 3,500/ha).

The cost of labour input to carry out various preplanting and post planting operations worked out to be Rs 5,827.50/ha (6.00%). The cost of drip irrigation structure excluding subsidy cost was Rs 25,000/ha (25.75%).

During gestation period of vanilla, in all the years, material input cost (69-75%) was higher than the labour input (4-30%). This is because of higher cost of mulch material, forest soil and farmyard manure to provide congenial soil condition for vanilla. It may also be due to availability of labour resource with lower wage rate in the study area.

The total cost of establishment including three years maintenance cost worked out to be Rs. 1,62,129/ha of which the cost of material inputs was Rs. 1,19,495/ha (73.70%), labour input cost was Rs. 16,634/ha (12.36%) and capital cost of drip irrigation was Rs. 25,000/ha (15.42%).

Cost of cultivation of vanilla during bearing period

The cost of cultivation of vanilla in the coconut garden worked out to be Rs. 30,480/ha (Table-2) accounting material cost of 62.24% and labour input cost of 37.76% to carry out various cultural operations of vanilla. Among the material inputs, the forest soil

Table-2. Cost of cultivation of vanilla during its bearing period (Rs/ha)

Sl. no.	Particulars	1997-98
A. Material inputs		
1.	Forest soil	3500.00
2.	Mulch material	7500.00
3.	Plant protection chemicals	520.00
4.	Woollen blankets	2450.00
5.	Wooden boxes	3000.00
6.	Insulated boxes	2000.00
	Total	18970.00
B. Labour inputs		
1.	Weeding	2000.00
2.	Mulching	300.00
3.	Application of forest soil	500.00
4.	Plant protection measures	100.00
5.	Drip irrigation	3650.00
6.	Pollination	1800.00
7.	Harvesting	160.00
8.	Processing	3000.00
	Total	11510.00
	Total (A + B)	30480.00

Table-3. Cost of cultivation of coconut during bearing period (Rs/ha)

Particulars no	1994-95	1995-96	1996-97	1997-98	Average of 4 years	
A. Material inputs						
1.	FYM	2625	3000	3000	3375.00	3000.00
2.	Fertilizers	5480	5576	6208	6176.00	5860.00
3.	Plant protection measures	200	250	300	350.00	275.00
	Total (A)	8305	8826	9508	9901.00	9135.00
B. Labour inputs						
1.	Opening of basins	108	120	132	150.00	102.50
2.	Application of FYM	72	80	88	100.00	85.00
3.	Application of fertilizers	180	204	240	240.00	216.00
4.	Plant protection measures	54	60	66	75.00	63.75
5.	Removal of dried leaves	72	80	88	100.00	85.00
6.	Harvesting	90	100	110	125.00	106.25
	Total labour charges (B)	578	644	724	790.00	658.50
	Total (A + B)	8883	9470	10232	10691.00	9793.50

Table-4. Yield pattern cost and returns structure of mixcropping of vanilla with coconut (Rs/ha)

Year	Yield		Price		Gross returns Coconut + Vanilla)	Cost of Cultivation (Coconut + Vanilla)	Net returns
	Coconut (nuts/ha)	Vanilla (kg/ha)	Coconut (Rs/nut)	Vanilla (Rs/kg)			
1994-95	8333	-	3.0	-	24999.00	132489.25	-107490.25
1995-96	12500	-	3.2	-	40000.00	27537.75	12462.25
1996-97	18750	-	4.5	-	84375.00	30687.00	53688.00
1997-98	25000	85	4.0	1500	227500.00	41171.00	186329.00
Total	-	-	-	-	376874.00	231885.00	144989.00
Average	-	-	-	-	94218.50	57971.25	36247.25
NPW = Rs. 61,835.12							
BCR = 1.34							

(Rs 3,500/ha), mulch material (Rs 7,500/ha) and processing materials namely woollen rugs (Rs 2,450), wooden boxes (Rs 3,000) and insulated boxes (Rs 2,000) accounted the major share.

Among the various labour operations, processing (Rs 3,000) weeding (Rs 2,000) and hand pollination (Rs 1,800) were the labour intensive which are to be carried out manually. In vanilla natural pollination is not possible and hand pollination with skilled labour is the essential component because of peculiar structure of

flower [8]. Care should be taken while weeding, roots should not be disturbed as they are mainly confined to the upper and surface layers of the soil.

Processing of vanilla is a laborious and lengthy process which continues upto 3-4 months to prepare cured beans. Artificial methods are employed to cure vanilla in order to develop aroma.

The other labour operations include the application of forest soil (Rs 500), mulching (Rs 300) and harvesting (Rs 160). The maintenance of drip irrigation structure

and watch and ward almost require one labour for 4 hectares. of vanilla plantation, accordingly the labour expenditure was worked out for one hectare.

Maintenance cost of coconut

The cost of cultivation of coconut after the introduction of vanilla is given in the Table-3. The cost of cultivation of coconut on an average (4 years average from 1994-95 to 1997-98) worked out to Rs 9,793.50/ha of which the share of material input was found to be significantly higher of 93.28% and labour input of 6.72%. The cost of fertilizer (Rs 5,860/ha) and FYM (Rs 3,000/ha) was the major component in all the years. The cost of labour charges towards various operations like opening of basin, FYM and fertilizer application, plant protection measure etc, worked out to be Rs 658.50/ha. Some of the common cultural operations of vanilla and coconut namely weeding, maintenance of dripper etc. are accounted in the cost of cultivation of vanilla. One of the advantages of mixcropping has been sharing of labour operation thereby bringing down the cost of cultivation [3]. Small holders constitute 98 per cent of the coconut plantations, most of the labour input was provided by the farmer and his family who in turn are kept meaningfully employed for a greater part of the year by going for mixcropping of coconut with vanilla [3,4,6].

Yield, costs and returns of mixcropping of vanilla with coconut

The details of yield, cost and returns of mix cropping of vanilla with coconut are given in Table-4. The coconut which was planted in 1990 started bearing in 1994-95 just within four years of planting. During the first year of its bearing, the yield was 60 nuts/palm (8333 nuts/ha) and during subsequent years the yield showed an increasing trend. During 1997-98 almost 200 nuts/palm was harvested (25,000/ha). The yield of coconut was high and comparable to pure cropping, indicating that vanilla has no negative impact on coconut growth and production. Vanilla started bearing during 1997-98 with cured bean yield of 85 kg/ha.

The average of four years gross (Rs 94,218.50) and net (Rs 36,247.25)/ha returns indicated the viability of introducing vanilla in the coconut garden even by just adding one year return in the mixcropping system. It is also clear that mix cropping of shade tolerant perennials

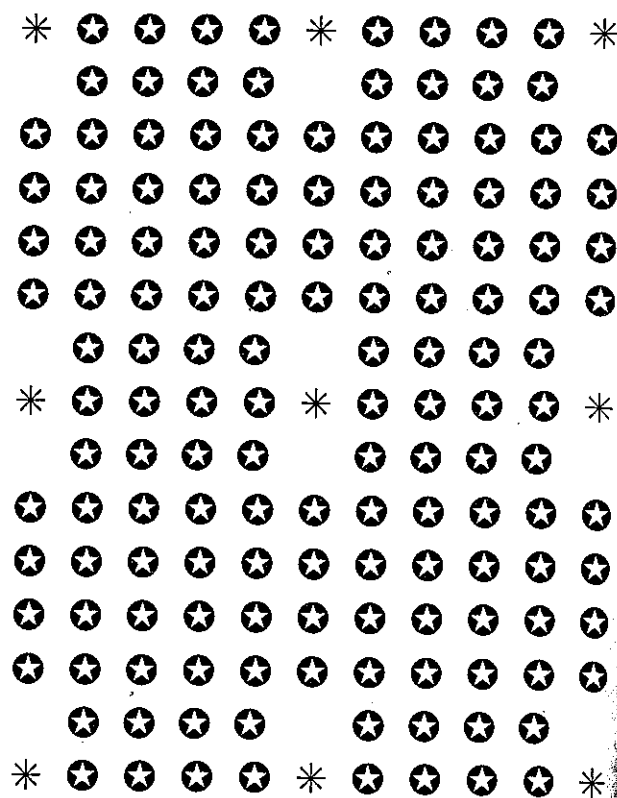


Figure 1. Planting pattern of mixcropping of coconut with vanilla

Index to the crops	Spacing	Density/ha
* Coconut	9 m x 9 m	123
★ Vanilla	1.5 m x 1.5 m	3825 (4444-6150)
		3948

like vanilla is a profitable proposition which increased the return per unit area.

The financial measures like NPW (Rs 61,835.12) and BCR (1.34) also justified the suitability and viability of vanilla in the coconut garden.

The above study indicates that, mixcropping of coconut with vanilla, apart from utilizing the natural resources (solar energy and land space) effectively, it is possible to increase the returns per unit area. India is bestowed with ideal tropical climate suitable for the cultivation of vanilla. It is a labour intensive crop. Pollination, processing and other operations are done manually and India has the advantage of plenty of labour force even now available at an affordable rate. Traditional method of sun drying is possible because abundant sunshine is available. Hence, vanilla can be

grown successfully as an intercrop in the coconut garden even in the plains under assured irrigation.

Acknowledgements

The authors are grateful to Shri Javed Asghar, Proprietor and Shri Mohammed Aslam and Shri N.N. Somaiah, Managers of M/S Javed Farm, Kallapur, Kadur Taluk, Chickmagalur District, Karnataka for their sustained interest in the study and providing all facilities during the course of investigation. The financial assistance provided by Indian Council of Agricultural Research, New Delhi, under the Adhoc project "Investigation on Cardamom Based Cropping Systems" is sincerely acknowledged.

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