

4. The amount of soil required is less; however the soil is to be ground to very fine particles.

The modified technique is cheaper and also can be done with petridishes. This method can be adopted for reliable estimation of soil available N.

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Long term performance of cardamom - an economic appraisal

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Abstract : Field trials were conducted by adopting High Production Technology (HPT) at Chettalli (Coorg District, Karnataka) to study the sustained yield, various input requirement and the economics in cardamom (*Elettaria cardamomum* Maton) cultivation in the long term. Highest yield of 1,625 kg ha⁻¹ (dry) was obtained during the fourth year of planting. On an average for ten crop seasons, 662.72 kg ha⁻¹ (dry) capsules was obtained in the trials which is almost five times more than the national average yield of 140 kg ha⁻¹. Cultivation of cardamom is found to be highly labour intensive. Out of 729.59 labour days required per ha per year during bearing period, the women labourers constituted a major chunk (64.08 per cent). About 55.56 per cent and 11.01 per cent of labour requirement was for harvesting and trashing operations respectively. A net income of Rs.1,09,147.53/ha (average of 10 crop seasons) was obtained with a production cost of Rs.60.92 per kg (dry). (Key words: Cardamom, Long term performance, Economics).

Cardamom (*Elettaria cardamomum* Maton) known as 'Queen' of spices is native of India which is invariably cultivated in the high ranges of western ghats of South India in a self sustainable forestry system. It is cultivated with least disturbance to the natural forest flora as compared to other plantation crops like tea and rubber which require near clear felling of trees (Korikanthimath, 1993). It was grown in an area of 72,444 ha mainly in Kerala (56.91 per cent), Karnataka (35.96 per cent) and Tamil Nadu (8.13 per cent) during 1998. Due to an intensive competition from Guatemala, India lost its premier position in cardamom production. The rate of growth of cardamom production in Guatemala during the late seventies has been over 14 per cent compared to India's growth rate of 0.7 per cent. Thus India's competitiveness in the world market also suffered (Chandrashekar, 1988). Sixty nine per

cent of cardamom plantations in India are below 2 ha and are the main source of employment to small and marginal farmers (Cardamom Board, 1985). Hence, adoption of intensive cultivation practices for higher yields especially in small holdings and efficient utilisation of labour needs no emphasis (Bavappa 1977; Korikanthimath *et al.*, 1989). Only way out for the stiff international market competition is 'high productivity and low cost of production per unit area' to ensure survival of cardamom industry in India (Korikanthimath, 1990b). This would be of paramount importance to the wide range of users and planners for cost analysis so as to decide upon the long term benefits of cardamom cultivation.

Hence, studies were undertaken at M/S Chettalli estate, Chettalli (Coorg district, Karnataka) from 1982 onwards for evaluating the long term

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Table 1. Labour utilisation during pre-bearing (establishment) period of cardamom (1981-82 and 1982-83).

Operation	(Per ha)			
	Man days	Women-days	Amount (Rs.)	% of expenditure
Land preparation (uprooting and removal of old coffee stumps)	21	152.25	4.84	
Pitting and planting	100.8	10.0	803.30	25.53
Mulching (2 rounds)	-	54.0	391.50	12.44
Weeding (3 rounds)	-	90.0	652.50	20.76
Trashing	-	15.0	108.75	3.46
Cleaning of roads and drains	25.0	-	181.25	5.76
Application of fertilizers	8.2	24.0	233.45	7.42
Assembly of irrigation pipe lines	12.0	-	87.00	2.76
Plant protection	40.0	-	34.0	17.05
Total	207.0	227.0	3146.50	100.00

Table 2. Input utilisation during pre-bearing (establishment) period of cardamom (1981-82 and 1982-83).

Input	(Per ha)			
	Ist year (Rs.)	IInd Year (Rs.)	Total (Rs.)	Percentage of expenditure
Cardamom seedlings	1080.00	-	1080.00	6.73
Fertilizers	2208.60	4282.25	6490.85	40.46
Pesticides	85.00	235.00	320.00	1.99
Fuel (diesel) charges for irrigation	90.00	200.00	290.00	1.81
Labour				
Total labour wages (actual daily wages + 63% other benefits)	3214.36	1914.43	5128.79	31.97
Total salary	228.20	391.20	619.40	3.86
Supervisory staff (Salary + 63% other benefits)				
Maintenance of jeep, trailer, irrigation pump, sprayers, etc.	325.00	582.00	907.00	5.65
Depreciation on irrigation pump, sprayers and other farm accessories as accepted by AITO	525.00	683.00	1208.00	7.53
Total	7756.16	8287.88	16044.04	100.00

AITO : Agricultural Income Tax Office

Table 5. Wages paid (per ha/year) for production of cardamom (Bearing period)

Crop/year	No. of labourers	Actual daily wages (Rs.)	Benefits other than actual	Total (Rs.)
1 Crop (1983-84)	471	4,003.50	2,522.20	6,525.70
2 Crop (1984-85)	1398	12,931.50	8,146.85	21,078.35
3 Crop (1985-86)	547	6,509.30	4,100.85	10,610.15
4 Crop (1986-87)	799	10,786.50	6,795.50	17,582.00
5 Crop (1987-88)	847	12,747.35	8,030.33	20,778.18
6 Crop (1988-89)	562	9,554.00	6,019.02	15,573.02
7 Crop (1989-90)	763	12,971.00	8,171.73	21,142.73
8 Crop (1990-91)	578	10,982.00	6,918.66	17,900.66
9 Crop (1991-92)	762	17,388.84	10,954.97	28,343.81
10 Crop (1992-93)	569	14,600.54	9,198.33	23,798.87
Total	7296	1,12,474.53	70,858.94	1,83,333.47
Average	729.6	11,247.45		

Note: Wages paid includes actual wages + other benefits. Other benefits, Bonus 20%, Provident and pension fund 10%, Earned leave 5%, Gratuity 4%, Sickness and Medical expenses 6%. Workmen's compensation (insurance and other welfare schemes) 5%, Housing, fuel and subsidised food grains 13%

Table 6. Partitioning of total input requirement during bearing (yielding) period of cardamom (average of 10 crop season 1983-84 to 1992-93)

Input	Amount (Rs.)	Percentage of expenditure (%)
Fertilizers	4,546.52	12.40
Pesticides	3,472.26	9.47
Fuel (diesel) for irrigation pumpset	856.46	2.34
Labour: Total labour wages (actual daily wages + 63% other benefits)	18,333.35	50.00
Total salary of supervisory staff (Salary + 63% other benefits)	1,937.16	5.28
Maintenance of jeep, trailer, drying kiln, irrigation pump, sprayers etc.	2,010.81	5.48
Depreciation on irrigation pump sets, sprayers and other farm accessories as accepted by AITO	5,514.66	15.03
Total	36,671.22	100.00

yield was recorded during the second crop season (fourth year after planting) which declined drastically by 25 per cent during the following year. One of the reasons for attaining the low yield preceding highest yield may be due to the fact that cardamom is a rhizomatous crop and most of the vegetative buds would have expressed their full potentiality due to conversion of majority (68%) of suckers into bearing suckers in a particular year during

which the highest yield was obtained. Since, the suckers which would have already undergone production decay during the following season by giving rise to sister/daughter suckers and hence the yield drastically comes down subsequently. As there existed a general decline in the yield after 10 crop seasons, it would be worthwhile to resort for regular planting at least in 1/4 th of total area every year so that a better crop

Table 7. Economics of cultivation of cardamom

Expenditure>Returns	Amount/ha (Rs.)
Investment - establishment	16,044.04
Compound interest on investment @ 14%	4,896.39
Total investment	20,940.43
Annuity value @ 14%	3,698.42
Total cost per year	40,369.64
Average production per ha (662.12 kg dry capsules)	1,49,381.77
Net returns	1,09,012.13
Cost of production /kg dry cardamom	60.97

Values are average for 10 crop seasons (1983-84 to 1992-93)

average yield could be obtained over a longer period. Regular replanting after picking 5-6 crops is a common phenomenon in Guatemala whose national average yields are par excellence to India.

Labour utilisation pattern

For carrying out various cultural operations, an average of 729.59 labour days ha⁻¹ was required during ten crop seasons (1983-84 to 1992-93). The requirement of women labour was greater (64.08 per cent) when compared to that of men (35.92 per cent). A similar feature was noticed in coffee based black pepper cropping systems also which was revealed by Korikanthimath and Peter, 1992. A major share of 55.56 per cent of labour utilisation was observed for harvesting followed by trashing (11.01 per cent) and for plant protection (7.84 per cent) (Table 4).

Since harvesting is a skilled and specialised job, it is normally done better by women labourers. It involves picking of mature (ripened), physiologically mature (*karikai*) fruits from panicles. Normally 6-7 rounds of picking is done in a crop season. Delayed harvesting results in splitting up of capsules and damage by rodents and birds. Korikanthimath and Naidu (1986) viewed that the percentage of recovery was 29 when harvested at ripened stage and 24 at physiologically mature stage as against 14 at immature stage. Thus, it is better to pick cardamom capsules at a mature stage at an interval of 10-12 days to minimise splitting of capsules thereby to obtain high crop recovery and returns.

Partitioning of input requirement

Of the various inputs used, the labour cost accounted highest. On an average 729

Table 8. Financial feasibility measures (1984-85 to 1993-94)

Sl. No.	Particulars	Value
1.	Discounted returns @ 14% (Rs.)	7,94,702.90
2.	Discounted costs @ 14% (Rs.)	2,85,406.45
3.	Benefit Cost Ratio (BCR)	2.78
4.	Pay Back Period (Years)	2.15
5.	Internal Rate of Return (IRR)	121 %

labourers per ha. were required during bearing period. The requirement of labour was maximum during highest crop season (1984-85) to an extent of 1398/ha. The average labour wages paid per year for the cropping season was Rs.11,247.45 ha⁻¹. Other benefits paid in the form of bonus, provident fund accounted for 63 per cent of the actual wages paid was Rs.7,085.89 ha⁻¹ (average of 10 crop seasons). (Table 4 and Table 5). Out of Rs.36,711.22 ha⁻¹ per year incurred on an average for ten crop seasons (1983-84 to 1992-93), major expenditure was towards labour i.e. 18,333.35 (50 per cent) which included actual daily wages and other benefits.

Economic analysis

The total investment towards establishment was Rs.22,331.00 ha⁻¹ which includes Rs.16,044 ha⁻¹ in the form of actual investment and Rs.6,295.35 ha⁻¹ made towards compound interest on investment @ 14%. The annual maintenance cost during the bearing period was Rs.36,671.22 ha⁻¹ and total cost per year which includes annuity value of Rs.3,698.41 (@ 14% of the maintenance cost to the maximum limit of 12 years of cardamom plantations was Rs.40,369.61/ha.

On an average 662.72 kg dry capsules/ha was obtained for the crop seasons 1983-84 to 1992-93 accounting to Rs.1,49,513.14/ha gross income. The cost of production of cardamom was Rs.60.92/kg. A net return of Rs.1,09,147.53/ha was obtained. The higher yields are known to bring down the cost of production in cardamom (Korikanthimath, *et al.* 1989). It was observed that about Rs.8.78 (BCR) is the profit margin obtained from every rupee invested as per discounting cash flow measures @ 14% with a discounted net returns of (NPW) of Rs.5,09,296.45 and ability

to get back the amount invested within 2.15 years (PBP). It also showed that about 121 per cent more of benefit (Rs.221) could be expected for every Rs.100 investments in the cardamom cultivation in the long term in comparison to the interest which the farmers could likely to get from the deposits in any of the financial institutions is represented by Internal Rate of Return (IRR) in Table 8.

Therefore, the study revealed that the long term cultivation of cardamom is highly remunerative and labour intensive. To obtain higher yields and income the farm operations and input management are to be monitored regularly at appropriate periods since sucker production and bearing period (initiation of panicles and development of capsules) is spread over a period of 8-9 months in a year (Korikanthimath, 1990a). In the recent years, an increased adoption of HPT in cardamom coupled with encouraging prices has not only brought more areas under its cultivation but also made a dent in existing coffee plantations as a mix crop.

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