

## Generation of employment potential in coffee-cardamom based cropping systems

V S KORIKANTHIMATH, G M HIREMATH & M M HOSMANI<sup>1</sup>

Cardamom Research Centre

Indian Institute of Spices Research

Appangala, Madikeri - 571 201, Karnataka, India.

### Abstract

Studies carried out at Chettalli (Karnataka, India) on mixed cropping of coffee (*Coffea robusta*) with cardamom (*Elettaria cardamomum*) in comparison with mono cropping of coffee indicated greater potential of labour employment in mixed cropping system compared to mono cropping system. The mixed cropping system required 237 men and 710 women labourers per ha per year (9 years average) to carry out various operations which was 1.67 times higher than the mono cropping system. The correlation coefficient of yield and labour requirement in both mono and mixed cropping systems were high and significant.

**Key words :** cardamom, *Coffea robusta*, coffee, cropping systems, *Elettaria cardamomum*, labour employment.

### Introduction

In the recent past, growing of low gestation and high value crops like cardamom (*Elettaria cardamomum* Maton) is gaining momentum in many coffee (*Coffea robusta* Linden ex de Wild) plantations in South India. Almost all the operations in these crops (coffee and cardamom) have to be carried out manually as there is hardly any scope for mechanisation. The present investigation was taken up to study the labour use potential in mixed cropping system of coffee and cardamom and mono cropping of coffee.

### Materials and methods

The field experiment was conducted

during 1985-94 (9 year period) in a 38 year old coffee plantation at M/s Chettoli Estate, Chettalli (Karnataka). The average annual rainfall during the experimental period was 1401 mm. The soils were moderately acidic, rich in available nitrogen, low in phosphorus and medium in potash. The treatments consisted of two cropping systems namely, mixed cropping of coffee and cardamom and monocropping of coffee. The treatments were replicated 10 times in a factorial Randomised Block Design with a plot size of 500 m<sup>2</sup> each. The varieties planted were Perindinia in coffee in both the systems and Cl37 (Malabar type) in cardamom. In the monocropping system, coffee was spaced at 2.7 m x 2.7

<sup>1</sup>University of Agricultural Sciences, Dharwad - 580 005, Karnataka, India.

m (1372 plants/ha). In the mixed cropping system an alternate row of coffee (which was planted during 1947 at a spacing of 2.7 m x 2.7 m) was removed during May 1985. Thus, subsequently coffee had a spacing of 5.4 m x 2.7 m. The inter row space of 5.4 m was used for planting cardamom during June 1985 at a spacing of 1.8 m x 1.2 m as a paired row in the middle of coffee rows (Fig. 1).

Regular cultural operations were carried out both in coffee and cardamom as

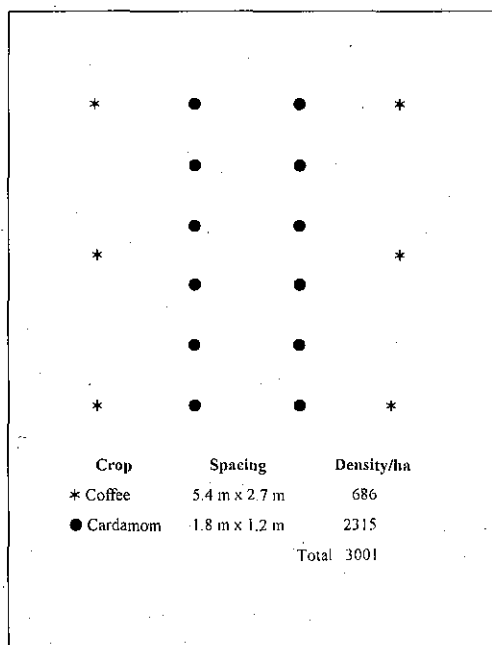


Fig. 1. Planting pattern of mixed cropping of coffee with cardamom (double hedge)

per schedule. Irrigation was commenced during the last week of February till the receipt of regular monsoon showers at an interval of 15 days. Cardamom was harvested from July to January at an interval of 15 days and dried in a flue pipe drying kiln. Coffee was harvested during February and resorted to wet pulping. The pulped beans were dried on RCC drying yard in open sun. The labour requirement for mixed and monocropping systems was worked out separately. Correlation analysis was also carried out to see the relationship between yield and labour requirement.

## Results and discussion

### *Labour requirement in mixed cropping system*

#### Coffee

An analysis of labour requirement in coffee mix cropped with cardamom revealed that, on an average 118 men and 162 women labourers were required per ha per year for various operations (Table 1). Among the various operations in coffee, men labour utilization for pulping/processing constituted 59% of the total men labour requirement. Among the women labour operations, the maximum requirement was for harvesting (85.8%).

#### Cardamom

Establishment period: The total men

Table 1. Labour requirement (per ha) of coffee mix cropped with cardamom (9 years average)

Operation	Men	%	Women	%
Desuckering/handling	25	21.2	-	-
Application of fertilizers	4	3.4	7	4.3
Tracing of shot hole borer	13	11.0	-	-
Harvesting	17	14.4	139	85.8
Gleaning	-	-	16	9.9
Pulping and processing	59	50.0	-	-
Total	118	100.0	162	100.0

**Table 2.** Labour requirement (per ha) of cardamom mix cropped with coffee during establishment period

Operation	Men	%	Women	%
Land preparation (uprooting of alternate rows of coffee and planting shade trees)	13.5	10.7	-	-
Pitting and planting	70.0	55.5	20.0	14.9
Mulching (2 rounds)	-	-	27.5	20.5
Weeding (2 rounds)	-	-	34.0	25.3
Trashing	-	-	17.5	13.0
Cleaning of roads and drains	11.0	8.7	-	-
Application of fertilizers	6.0	4.7	10.0	7.4
Plant protection measures	10.0	7.9	25.0	18.6
Assembling of sprinkler irrigation lines	15.5	12.3	-	-
Total	126.0	100.0	134.0	100.0

and women labour requirement was 126 and 134 respectively, for various operations during the pre-bearing period of cardamom (Table 2). Maximum men labour requirement was for taking pits and planting (70%). Operations like weeding, mulching and trashing were carried out mainly by women labourers constituting 59% of total women labour requirement.

**Bearing period:** During the bearing period, women labour requirement was 7.38 times more than that of men labour (Table 3). Men labour utilization was mainly for earthing up (43.5%) and application of fertilizers and plant protection measures (37.7%). Among the various field operations, harvesting re-

quired 330 women labourers which accounted for 65% of the total women labour requirement.

Harvesting is a specialised and skilled job and is normally done better by women labourers. Delay in harvesting results in over maturity leading to splitting of capsules and damage by rodents and birds which ultimately affects the recovery percentage. Mobilization of women labourers for harvesting is important to obtain maximum crop outturn and returns.

#### Common cultural operations

The mixed cropping system helped to reduce the cost of cultivation of different

**Table 3.** Labour requirement of cardamom mixed cropped with coffee during bearing period (7 years average)

Operation	Men	%	Women	%
Trashing	-	-	77	15.1
Earthing up	30	43.5	-	-
Mulching and demulching	-	-	21	4.1
Fertilizer application	11	15.9	23	4.5
Plant protection measures	15	21.7	39	7.7
Harvesting	-	-	330	64.8
Processing and grading	13	18.8	19	3.7
Total	69	100.0	509	100.0

**Table 4.** Labour requirement (per ha) of common cultural operations in mixed cropping of cardamom with coffee (9 years average)

Operation	Men	%	Women	%
Weeding	-	-	13	33.3
Mulching	-	-	26	66.7
Shade regulation	23	38.3	-	-
Irrigation	21	35.0	-	-
Cleaning of roads/drains	16	26.7	-	-
Total	60	100.0	39	100.0

crops by sharing common cultural operations (Table 4). Common cultural operations like weeding and mulching were carried out by women labourers (39 labour days). The other common operations like shade regulation, irrigation, cleaning of roads/drains required about 50 men labour days.

#### *Labour requirement in monocropping of coffee*

The average men and women labour requirements were 180 and 407 per ha per year, respectively (Table 5). Men labour requirement was higher for pulping and processing (58), followed by desuckering (50). Out of 407 women labour days, harvesting required 293 days accounting for 72% of total women labour days.

#### *Comparative labour requirement in mixed and monocropping systems*

The per hectare labour requirement was 1.67 times higher in the mixed cropping system than the monocropping system (Table 6). Hence, it is quite evident that mixed cropping system fulfills two objectives namely, reducing cost of cultivation by sharing common cultural operations among crops and increased employment opportunity to carry different operations of component crops.

#### *Relationship between yield and labour requirement*

##### *Mixed cropping*

Cardamom: The labour requirement and cardamom yield was highly correlated (0.98) indicating the positive rela-

**Table 5.** Labour requirement of monocropping of coffee during bearing period (9 years average)

Operation	Men	%	Women	%
Desuckering/handling	50	27.8	-	-
Application of fertilizers	6	3.3	15	3.7
Tracing of shot hole borer	12	6.7	-	-
Weeding	-	-	8	2.0
Mulching	-	-	35	8.6
Shade regulation	20	11.1	-	-
Irrigation	10	5.6	-	-
Cleaning of roads/drains	15	8.3	-	-
Harvesting	-	-	293	72.0
Gleaning	-	-	41	10.1
Pulping and processing	58	32.2	-	-
Miscellaneous	9	5.0	15	3.7
Total	180	100.0	407	100.0

**Table 6.** Comparative labour requirement in mixed and monocropping systems (per ha)

Cropping system	Men	Women	Total
<i>Mixed cropping</i>			
Coffee	118	162	280
Cardamom	69	509	578
Common cultural operations	60	39	99
Total	237	710	957
<i>Monocropping</i>	180	407	587

tionship between yield and labour requirement (Table 7). However, among the labour groups, the correlation coefficient between yield and women labour requirement (0.98) was higher compared to men labour (0.69). The coefficient of variation for yield (46.27%) and women labour (27.24%) were high which further indicated the direct relationship between women labour requirement and yield. The coefficient of variation for men labour was less (7.73%), whereas for total labour requirement it was high (24.68%).

Coffee: In the mixed cropping system, the correlation coefficients for yield of

coffee and men labour, women labour and total labour requirement were not significant (ranging from 0.42 to 0.44). However, relatively higher correlation coefficient of women labour was attributed to higher coefficient of variation of women labour (36.03%) utilization in tune with coefficient of variation of yield levels (16.05%).

#### *Monocropping system of coffee*

The correlation coefficients of yield and men, women and total labour requirement ranged between 0.62 to 0.65 indicating the positive correlation among both the types of labour requirement

**Table 7.** Relationship between yield and labour requirement in mixed cropping of cardamom with coffee

Year	Coffee yield (kg/ha)	Labour requirement			Cardamom yield (kg/ha)	Labour requirement		
		Men	Women	Total		Men	Women	Total
1985-86	1645	88	120	208	-	-	-	-
1986-87	2480	90	173	263	-	-	-	-
1987-88	1960	95	145	240	500.45	65	432	497
1988-89	1735	129	300	429	1400.50	80	833	913
1989-90	1565	80	94	174	767.35	65	520	585
1990-91	2160	102	192	294	531.75	63	422	485
1991-92	1800	78	127	205	457.80	72	398	470
1992-93	2480	137	271	408	533.60	70	451	521
1993-94	2065	108	188	296	516.65	71	504	575
r		0.42	+0.44NS	0.44NS	0.438	0.69*	0.98**	0.98**
CV (%)	16.05	19.35	36.30	29.90	46.27	7.73	27.24	24.68

r indicates the correlation coefficient of yield and men, women and total labour requirement of respective crops

NS = Not significant; \* = Significant at 10 % \*\* = Significant at 1 %

**Table 8.** Relationship between yield and labour requirement in monocropping of coffee

Year	Yield	Labour requirement		
		Men	Women	Total
1985-86	2445	168	378	546
1986-87	3125	174	389	563
1987-88	2285	173	381	554
1988-89	2750	191	468	659
1989-90	2360	172	322	494
1990-91	2530	181	434	615
1991-92	2575	180	356	536
1992-93	3145	210	528	738
1993-94	2415	177	411	588
r	0.647	0.647*	0.616*	0.632*
CV (%)	11.42	6.70	14.35	11.80

r indicates the correlation coefficient of yield and men, women and total labour requirement

\* Significant at 10%

(Table 8). The high correlation coefficient for men labour may be due to utilization of men labour for pulping and processing. The coefficient variation for yield (11.42) and total labour requirement (11.80) were almost same indicating the relationship between yield levels and requirement of labour.

#### *Staggered generation of employment*

Harvesting of cardamom commences from July onwards and continues up to the end to January at an interval of 15 days; subsequently, coffee is to be harvested during February-March. Thus,

harvesting operations alone (in both the crops) are spread over a period of 9 months, besides other seasonal operations like application of fertilizers/manures, mulching, weeding, irrigation and plant protection measures. Mixed cropping of coffee and cardamom in bigger plantations helped to generate local employment to agricultural labourers in addition to generation of continuous employment to small growers of coffee. The study thus revealed the increased labour employment potential in mixed cropping systems of coffee and cardamom compared to monocropping of coffee.