

STUDY ON THE DISEASE SITUATION AND DIFFERENT AGRONOMIC PRACTICES ON LARGE CARDAMOM IN EASTERN HILLS OF NEPAL

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INTRODUCTION

Large Cardamom is predominantly cultivated in the eastern hills of Nepal. This study was conducted in two eastern hill districts, namely Ilam and Sankhuwasawa. The climate of this area ranges from warm sub-tropical to cool temperate. Frost damage is a problem at higher altitudes. The summer climate is mild and winter is cold, temperature ranges between 4.9-27°C. Northern slopes at higher altitudes receive a very cool climate. The south-west monsoon brings the rain from June to August. The average annual rainfall is 2300 mm (Gautam *et al.*, 1992). Cardamom is generally cultivated on forest and non-arable lands at moderately steep to very steep slopes (4-15 % to > 30 %). Large cardamom growing areas in the eastern hills lie in the middle mountain region. Most of the large cardamom plantations in the hills have an east or south-east aspect and are planted under Utis (*Alnus nepalensis*) trees. Soil types of the study area varies from clay, clay loam and sandy to sandy loam. Large cardamom is growing under the shade trees species and organic material from these trees, from continued falling and decaying of leaves within the year to come, results in loamy soils.

The average overall adult literacy rate in Nepal is 62.3 %, 28.2 % (male, female) in 1999. Farmers of eastern hills are more advance as compared to western part both on the socio-economic status and educational status (Anon, 1999).

The aim of this survey was to investigate large cardamom-growing situations in the study area. Some of the major issues which were taken into consideration during survey were distribution of land holdings and large cardamom plantations, problems associated with large cardamom cultivation (especially diseases-specifically possible causes of disease), varieties of large cardamom, production and productivity, price of dry capsules and marketing situations. The survey was conducted by means of participatory rural appraisals (PRA) and rapid rural appraisals (RRA) adopting group discussions, problem ranking, visual observations, semi-structured questionnaires and problem cause analysis. It is believed that participation of farmers in these processes enhances their understanding and empowers them in the process.

MATERIALS AND METHODS

Site Selection

Survey sites were selected in consultation with the key horticulturists from different participating institutes. By consulting these senior officers from Agricultural Research Station Pakhribas, Cardamom Development Centre Fikkal, Ilam and Agricultural Development Office, Ilam and my own initial field observation, Panchakanya Village Development Committee (VDC) and Fikkal VDC of Ilam district and Madhimulkharka VDC of Sankhuwasawa district were selected for the field survey. These two districts are the main

pockets for large cardamom production in Nepal covering about 50 % of the area and production (Anon, 2000). Among other VDCs, Panchakanya and Fikkal are the dominant VDCs in Ilam and Madhimulkharka is the main pocket within Sankhuwasawa district. Moreover, these VDCs cover the wide range of representative climate (warm sub-tropical to cool temperate), topography, soil types and altitudes zones (1200-2000 masl) for large cardamom cultivation in Nepal. Therefore, the representative five sites were surveyed from three VDCs of these two districts. Three sites, namely high altitude (c. 1700 masl), mid altitude (around 1600 masl) and low altitude (c. 1400 masl) from Panchakanya VDC; one site (c. 1700 masl) from Fikkal VDC of Ilam district and another one site (c. 1800 masl) from Madhimulkharka VDC of Sankhuwasawa district were taken for this study.

Table 1: Survey sites

Name of the VDC		Altitudes (masl)
Panchakanya VDC, Ilam	Site 1	c. 1400
	Site 2	c. 1600
	Site 3	c. 1700
Fikkal VDC, Ilam	Site 4	c. 1700
	Mulkharka VDC, Sankhuwasawa	1800-1950
Site 5		

Farmer Selection

Participatory approaches were used for farmer selection. In each of the three participating villages, farmers were asked to form a group consisting of sixteen members. The only stipulation was that group members actually cultivated large cardamom either on a small or large scale. The survey date, time and venue were fixed in consultation with each group.

Survey Procedures

Participatory Rural Appraisal (PRA), rapid rural appraisal (RRA) following group discussions, problem ranking, field observations, problem cause analysis and semi-structural questionnaire techniques were used for field survey. Five groups of farmers, each consisting of 16 farmers were formed at each site. Survey procedures were explained to the farmers. Farmers were then given a notebook, pencil and pen for writing up. Short semi-structural questions were written on black boards or flip charts. The language of communication was Nepali Bhasha. Farmers were asked to write answers of the given questions based on their knowledge and experiences. Twenty-five questions regarding the different aspects of large cardamom cultivation relevant to diseases were asked on a one to one basis. Assistance was provided for those who had problems in writing.

After finishing questions and answers, an informal discussion was conducted. During this discussion, farmer's specific experiences were exchanged within the group and problems prioritised by the individual were cross-checked through informal discussion. Finally, their queries were picked up and tried to make them clear on their queries. Farmers were interested on the aim of these surveys and to know more about improved package of practices, like how to manage diseases and insect pests. The same procedures were followed in all sites.

RESULTS AND DISCUSSION

Land holding size in the survey area

Land holdings of households surveyed varied from 0.25 hectares to 5.0 hectares in size (Table 2). They ranged from 0.25–3.75 hectares at 1400 masl, 0.45–5.00 hectares at 1600 masl and 0.70 – 3.00 hectares at 1700 masl in Pachakanya VDC. In Fikkal VDC of Ilam District at 1700 masl holding size ranged from 0.35 – 2.50 hectares. In Madhimulkharka VDC of Sankhuwasawa at 1800-1950 masl holding size ranged from 0.40 – 4.00 ha. The average holding sizes were 1.67 hectares, 1.78 hectares, 1.45 hectares, 1.29 hectares and 1.42 hectares respectively in the above areas. There appeared no significantly different sizes of holding looked upon the different villages with varied altitudes.

Table 2 : Land holding size in the survey area

Holding size (ha)	No of holdings					Total No of holdings	Number of holdings (%)
	Panchakanya VDC, Ilam			Fikal VDC, Ilam	Mulkharka VDC, Sankhuwasawa		
	1400 masl	1600 masl	1700 masl	1700 masl	1800-1950 masl		
0.05 – 1.00	6	6	7	9	5	33	41.25
>1.00 – 2.00	6	5	6	2	8	27	33.75
>2.00 – 3.00	3	3	3	5	2	16	20.00
>3.00 – 4.00	1	1	0	0	1	3	3.75
>4.00 – 5.00	0	1	0	0	0	1	1.25
>5.00	0	0	0	0	0	0	0.00
Total	16	16	16	16	16	80	100.00

Source: Field Survey, 2001

Table 2 shows the distribution of land holdings size in the study area. It shows that about 41 % farmers surveyed (all sites) have up to a hectare of land, 34 % farmers have 1-2 hectares of land and 20 % of them have 2-3 hectares of land. Only three farmers have 3-4 hectares and only one farmer has more than 4 hectares. It was found that the majority of respondents have 1-2 hectares of land, whereas few have more than 3 hectares. The average land holding size was found to be 1.5 hectares in this study area.

Area under Large Cardamom cultivation

The area under large cardamom cultivation varied greatly among the surveyed households, ranging from 0.05 hectare to 3 hectares (Table 3). The overall average size of large cardamom cultivation was 0.4 hectares. Of the 80 households surveyed, it was found that the majority of farmers (c. 81 %) grew only a small area of large cardamom (< 0.5 ha). Nine percent farmers grew large cardamom in a area ranged from 0.5-1.0 ha and only 10 % farmers were found growing large cardamom in more than 1.0 ha. of their land.

No relationship appeared between altitude and the size of the large cardamom plantation holding. The average plantation holding sizes were 0.35 hectares, 0.50 hectares, 0.21 hectares, 0.39 hectares and 0.53 hectares respectively in the above areas. The pattern of plantation size was found similar in each village and at each altitude.

Table 3: Area under large cardamom grown on holdings in the study area

Holding size (ha)	No of holdings					Total No of holdings	Number of holdings (%)
	Panchakanya VDC, Ilam			Fikal VDC, Ilam	Mulkharka VDC, Sankhuwasawa		
	1400 masl	1600 masl	1700 masl	1700 masl	1800-1950 masl		
>0.05 – 0.50	13	12	15	13	12	65	81.25
>0.50 – 1.00	1	2	1	1	2	7	8.75
>1.10 – 1.50	2	1	0	2	1	6	7.50
>1.50 – 2.00	0	1	0	0	0	1	1.25
>2.10 – 2.50	0	0	0	0	0	0	0.00
>2.50 – 3.00	0	0	0	0	1	1	1.25
>3.00	0	0	0	0	0	0	0.00
Total	16	16	16	16	16	80	100.00

Source: Field Survey, 2001

Table 3 shows the distribution of large cardamom holdings in the studied sites. It shows that majority of cardamom growing households have a small piece of their land for large cardamom cultivation.

Varieties of large cardamom

Large cardamom cvs. Ramsahi, Golsahi, Dambersahi, Chivesahi and Bharlange were the varieties of cardamom grown by the farmers (Fig 1). The most popular and widely grown variety in the study area was cv. Ramsahi followed by cv. Golsahi (Table 4). Large cardamom cv. Ramsahi was found at all altitudes, but it appeared to dominate the higher altitude plantation.

Large cardamom cv. Chibesahi was only found mixed with cv. Ramsahi at 1400 masl in Panchakanya VDC. Large cardamom cv. Ramsahi was found mixed with cv. Chibesahi and cv. Dambersahi at 1400 masl; mixed with cv. Golsahi, cv. Dambersahi and cv. Bharlangey at 1600 masl; mixed with cv. Dambersahi at 1700 masl in Panchakanya VDC. Five mixed orchards were found in Madhimulkharka VDC of Sankhuwasawa District.

The components of the variety mixes found in orchards in this district were cv. Ramsahi and cv. Golsahi in four orchards and cv. Ramsahi and cv. Dambersahi in one orchard. Farmers were found growing either cv. Ramsahi or cv. Golsahi as a pure variety, or they were found growing variety mixtures. This could be due to the unavailability of pure varieties around the areas or could be due to other factors.

Table 4. Varieties of large cardamom grown in the study areas

Variety of cardamom	No of farmers					Total No of farmers	Number of farmers (%)
	Panchakanya VDC, Ilam			Fikal VDC, Ilam	Mulkharka VDC, Sankhuwasawa		
	1400 masl	1600 masl	1700 masl	1700 masl	1800-1950 masl		
Ramsahi	7	7	10	9	8	41	51
Golsahi	6	5	2	5	1	19	24
Unknown	1	1	3	2	2	9	11
Mixed	2	3	1	0	5	11	14
Total	16	16	16	16	16	80	100

Source: Field Survey, 2001

The distribution of cardamom varieties grown by the farmer from different altitudes in three villages of Ilam and Sankhuwasawa Districts is summarised in Table 4. Out of 80 respondents from all sites, 51 % were found to be growing Large Cardamom cv. Ramsahi and 24 % were found to be growing cv. Golsahi. Approximately 11 % of farmers do not know the name of their varieties and 14 % of the respondents are growing more than one variety mixed together.

Varieties of Large Cardamom

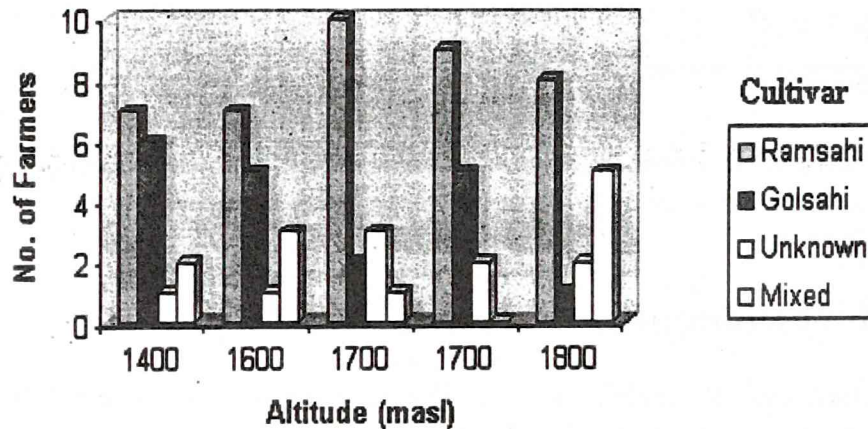


Fig 1: Varieties of large cardamom

Production and Productivity of large cardamom in the study villages 1996-2000

The marketable yield of Large Cardamom from each of the five study sites from 1996-2000 is shown in Fig 2. The average production in 1996 was 648 kg/ha and had lower slightly to 509 kg/ha by 2000. The trend appeared consistent across the five survey sites (Table 5).

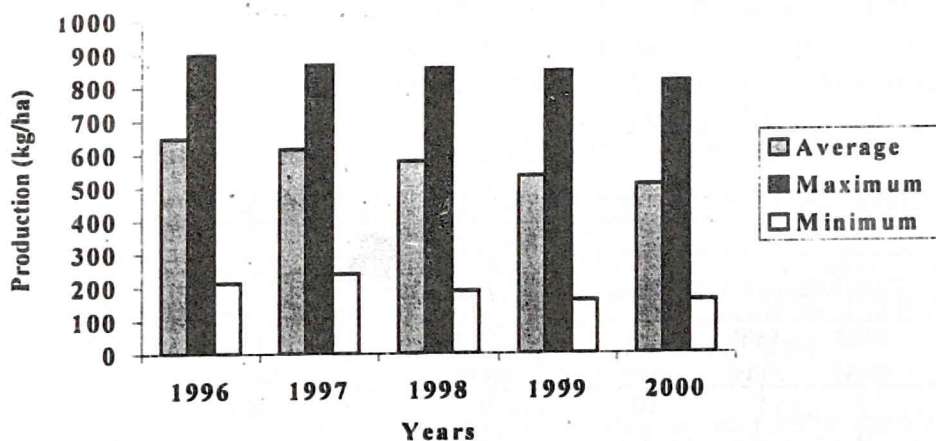


Fig 2: Large Cardamom Production in the study villages (1996-2000)

Table 5: Production and Productivity of large cardamom in the study villages 1996-2000

Yearly Production (kg/ha) of Large Cardamom in Various altitudes															
Altitudes→ Years ↓	Panchakanya VDC, Ilam						Fikkal VDC, Ilam			Mulkharkha VDC, Sankhuwasawa					
	1400 masl			1600 masl			1700 masl			1700 masl			1800-1950 masl		
	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.
1996	480	890	654	340	900	658	213	844	597	500	840	662	380	900	669
1997	380	800	608	400	860	623	240	822	579	438	870	648	300	870	633
1998	350	850	580	400	850	599	188	800	517	450	800	619	278	860	587
1999	200	700	493	360	800	574	160	800	485	320	800	571	200	850	556
2000	200	660	472	300	800	548	160	778	434	300	830	550	190	820	541
Grand Mean	322	780	562	360	842	601	192	809	523	402	828	610	270	860	597

Yearly Increment / Decrement of Production (%) in Various Altitudes															
Altitudes→ Years ↓	Panchakanya VDC, Ilam						Fikkal VDC, Ilam			Mulkharkha VDC, Sankhuwasawa					
	1400 masl			1600 masl			1700 masl			1700 masl			1800-1950 masl		
	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.
1996 - 1997	-21%	-10%	-7%	+17%	-4%	-5%	+13%	-3%	-3%	-12%	+4%	-2%	-21%	-3%	-5%
1997 - 1998	-8%	+6%	-4%	0%	-1%	-4%	-23%	-3%	-11%	+3%	-8%	-4%	-7%	-1%	-8%
1998 - 1999	-43%	-18%	-15%	-10%	-6%	-4%	-15%	0%	-3%	-29%	0%	-2%	-28%	-1%	-5%
1999 - 2000	-0%	-6%	-4%	-17%	0%	0%	0%	-3%	-6%	-6%	+4%	-8%	-5%	-4%	-3%

Source: Field Survey 2001

Note: + is increasing value, - is decreasing value

Price of Large Cardamom in the study villages 1997-2001

The average price of large cardamom in all the sites from Ilam District were similar, but there were slight differences between the two Districts. Prices in Madhimulkharka VDC in Sankhuwasawa District were an average slightly lower than at other sites (Table 6). The remoteness of the village in Sankhuwasawa district from the major marketing points could be an influencing factor. The average price was \$ 2.0 in 1997, \$ 2.5 in 1998, \$ 3.2 in 1999, \$ 5.9 in 2000 and \$ 3.5 in 2001 in all sites of Ilam district and the price was \$ 1.7 in 1997, \$ 2.0 in 1998, \$ 2.9 in 1999, \$ 5.8 in 2000 and \$ 2.9 in 2001 in Madhimulkharka VDC of Sankhuwasawa district (Table 6). The major marketing points for large cardamom marketing from these two districts are described in the separate sub-headings below.

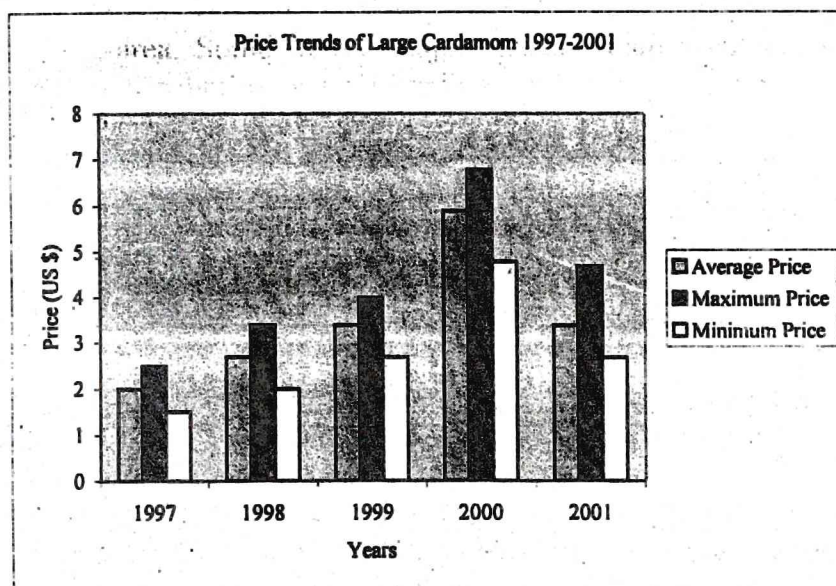


Fig 3: Price of Large Cardamom in the study villages 1997-2001

Table 6: Price of large cardamom during last five years period

Altitudes→ Years ↓	Price (US \$)														
	Panchakanya VDC, Ilam									Fikkal VDC, Ilam			Mulkharkha VDC, Sankhuwasawa		
	1400 masl			1600 masl			1700 masl			1700 masl			1800-1950 masl		
	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.	Min.	Max.	Av.
1997	1.5	2.5	2.0	1.5	2.5	2.0	1.5	2.5	2.0	1.5	2.5	2.0	1.3	2.2	1.7
1998	2.0	3.4	2.5	2.0	3.4	2.5	2.0	3.4	2.5	2.0	3.4	2.5	1.5	2.5	2.0
1999	2.6	4.0	3.2	2.6	4.0	3.2	2.6	4.0	3.2	2.6	4.0	3.2	2.5	3.9	2.9
2000	4.5	6.7	5.9	4.5	6.7	6.0	4.5	6.7	6.0	4.5	6.7	6.0	4.5	6.0	5.8
2001	2.7	4.5	3.4	2.7	4.5	3.5	2.7	4.5	3.5	2.7	4.5	3.5	2.5	4.5	2.9

Source: Field Survey 2001

Main problems of large cardamom cultivation

There are a series of problems faced by the growers of large cardamom. The majority of the respondents (66 %) reported that they are facing many simultaneous problems. Table 7 gives the distribution of problems faced by the growers from each of the participating villages. Four percent of the total respondents were facing abiotic problems e.g. drought and frost and 30 % of them are facing biotic problems caused by insect pests, diseases and vertebrate pests (e.g. monkeys, rodents, *Kala*, squirrel). Among these problems, c. 24 % of the respondents reported disease and insect pest problems and the rest are facing problems from vertebrate pests. More than 66 % of the respondents are facing a range of problems like diseases, insects and vertebrate pests, drought, frost and marketing.

Table 7: Main problems of large cardamom cultivation in the study area

Types of Problems	Number of farmer					Total	Percent
	Panchakanya VDC, Ilam			Fikkal VDC, Ilam	Mulkharka VDC, Sankhuwasawa		
	1400 masl	1600 masl	1700 masl	1700 masl	1800-1950 masl		
A-biotic Problems	1	0	0	1	1	3	4
Biotic Problems	5	3	6	7	3	24	30
Diseases and Pests	4	3	4	5	3	19	24
Vertebrate Pests	1	0	2	2	0	5	6
Multi-Faced problems	10	13	10	8	12	53	66
Total	16	16	16	16	16	80	100

Source: Field Survey, 2001

Note: Multi-Faced problems: -Two or more than two problems Simultaneously

A-biotic Problems: Drought, Frost etc.

Propagation of large cardamom in the study area

Propagation is a vital part of crop production and problems encounter for production. The Cardamom Development Centre, Fikkal, Ilam in connection with Agricultural Research Station Pakhribas, Dhankuta, Nepal recommended that cardamom should be propagation through seedlings (asexual means) as propagation by vegetative means (separated from the mother clumps) transmits infectious viral diseases (Anon, 2000). The majority of farmers (84 %) do not follow recommended techniques for large cardamom propagation. Most farmers propagate their crop by vegetative methods.

Table 8: Types of Propagation followed

Propagation Type	Number of farmer					Total	Percent
	Panchakanya VDC, Ilam			Fikkal VDC, Ilam	Mulkharka VDC, Sankhuwasawa		
	1400 masl	1600 masl	1700 masl	1700 masl	1800-1950 masl		
Asexual / Vegetative	14	13	15	10	14	67	84
Sexual	2	3	1	5	2	13	16
Total	16	16	16	16	16	80	100

Source: Field Survey, 2001

Note: Asexual / Vegetative: Suckers separated from the Clumps

Sexual: Seedlings raised from the seeds

The distribution of propagation methods followed by the farmers interviewed from the different study villages in Nepal is detailed in Table 8. It shows that more than 84 % of the respondents are using vegetative means of propagation and only 16 % of them are propagating by sexual means. Some farmers (6 %) near the Cardamom Development Centre at Fikkal were adopting recommended practice.

Disease Prioritization by farmers in the study area

Rhizome rot was ranked by farmers as the most important as first disease followed by foorkey (a viral disease of large cardamom) at the study site at 1400 masl, in Panchakanya VDC whereas equal scores were obtained for rhizome rot and Foorkey at 1600 masl in Panchakanya VDC. Foorkey was the second most important disease at this location. Foorkey ranked first followed by rhizome rot at 1700 masl in Panchakanya VDC. Foorkey was ranked as first priority disease followed by rhizome rot at Fikkal VDC, Ilam. Almost all the respondents from Ilam ranked Chhirkey (a viral disease of large cardamom) as the third priority disease. In Madhimulkharka VDC, Sankhuwasawa district with altitudes ranging from 1800-1950 masl, foorkey was ranked first and rhizome rot as second priority disease followed by Chhirkey as third (Table 9).

Table 9: Prioritisation of disease problems faced by the farmers

Name of Disease	Rankings														
	Panchakanya VDC, Ilam						Fikkal VDC, Ilam			Mulkharka VDC, Sankhuwasawa					
	1400 masl		1600 masl		1700 masl		1700 masl			1800-1950 masl					
1 st	2 nd	3 rd	1 st	2 nd	3 rd	1 st	2 nd	3 rd	1 st	2 nd	3 rd	1 st	2 nd	3 rd	
Rhizome rot	9 ¹	7	-	8	8	-	7	9	-	6	10	-	7	8	1
	(56) ²	(44)		(50)	(50)		(44)	(56)		(37)	(63)		(44)	(50)	(6)
Foorkey	7	9	-	8	8	-	9	7	-	10	6	-	9	7	
	(44)	(56)		(50)	(50)		(56)	(44)		(63)	(37)		(56)	(44)	
Chhirkey	-	-	16	-	-	16	-	-	16	-	-	16	-	1	15
			(100)			(100)			(100)			(100)		(6)	(94)
Other Diseases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Source: Field Survey 2001

1 Number of Farmer

2 Figure within the parenthesis indicates the percentage

Note: Although this survey were carried out during the dry period when rhizome rot disease symptoms were not clearly visible in the field, farmers were giving their views following their experiences.

Farmer perception of production losses due to diseases

The average, minimum and maximum percentage of losses caused by all the diseases as perceived by farmers were 48 %, 25 % and 75 % at the altitude of 1400 masl; 41 %, 10 % and 75 % at 1600 masl; 40 %, 25 % and 65 % at 1700 masl in Panchakanya VDC and 47 %, 20 % and 75 % at 1700 masl from Fikkal VDC of Ilam district and that were 31 %, 10 %, and 50 % respectively were from the Madhimulkharkha VDC of Sankhuwasawa district.

Table 10 indicates the trends of total production losses due all diseases from the villages in the study area. Of the 80 respondents, 19 respondents found more than 60 % and 13 respondents have found less than 20 % losses were due to all diseases. Twenty-two respondents (from all villages) reported that they were loosing 21-40 % and 31 respondents reported loosing 41-60 % of their production as a result of disease attack.

Table 10: Production losses due to all diseases

Total losses due to all diseases	Number of farmer					Total	Percent
	Panchakanya VDC, Ilam			Fikal VDC, Ilam	Mulkharka VDC, Sankhuwasawa		
	1400 masl	1600 masl	1700 masl	1700 masl	1800-1950 masl		
0- 20 %	0	4	1	2	6	13	16.25
21-40 %	5	2	8	2	5	22	75.50
41-60 %	9	8	5	9	5	31	38.75
> 60 %	2	2	2	3	0	19	23.75
Total	16	16	16	16	16	80	100.00

Source: Field Survey, 2001

Of the farmers involved in the study, 9 % were found facing less than 10 % and only 1 % of them reported that they were facing more than 50 % of their production losses due to rhizome rot disease. Majorities (55 %) of these respondents reported that a range of 10- 20 % of their production was lost due to rhizome root rot disease alone (Fig 4).

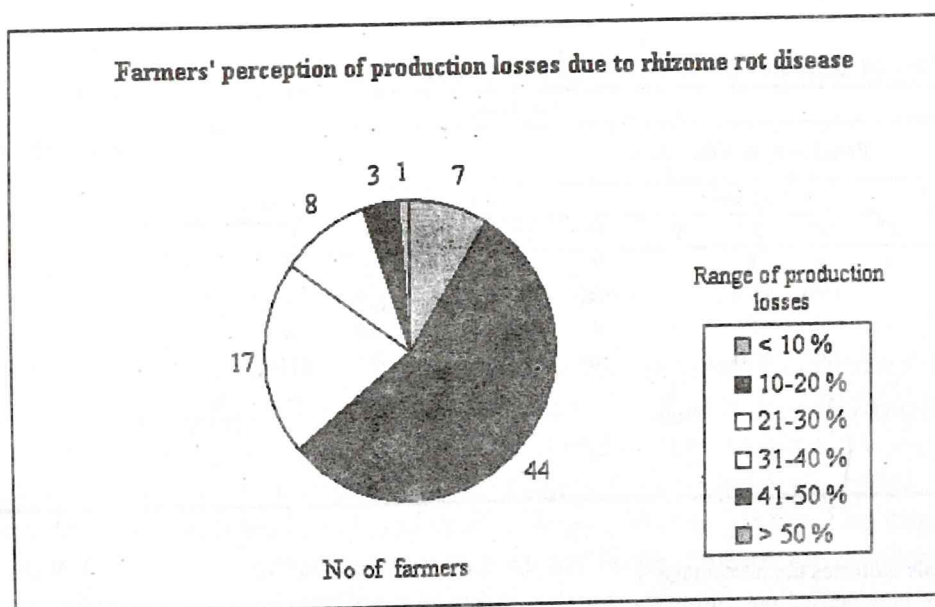


Fig 4: Production losses due to rhizome rot disease in the study area

Farmers perception of the possible causes of diseases in the study area

When farmers were asked what they consider may be the possible causes for the diseases they observed in their large cardamom crops, the majority (74 %) opinionated that they were unknown. Some suggested that disease symptoms were a consequence of growing on unsuitable land (10 %), and a few farmers suggested that they were cultivating unsuitable varieties (1 %). Water logged and poor nutrition was each sited by 3 % of participating farmers. Importantly, only 10 % of farmers suspected that poor crop health was caused by pests and / or diseases (4 % cited disease and 6 % pests as the cause of unhealthy crops.

Marketing System in the study area for large cardamom

It was found that farmers sell their harvest immediately after drying to local traders or store the dried capsules either in their floor in the house, in bamboo basket or in sacks. From the production centres cardamom is sold to local businessmen, who take the large cardamom to the collection centre. From the smaller collection centres the cardamom is sent to the large collection centres from where cardamom is exported to India. The exported cardamom is usually packed in sacks or polywood boxes. The market for cardamom is completely controlled by of private sector and many middlemen appear to be involved. Main trade routes for cardamom in Nepal are as follows:

- From farmers to smaller collection centres
- Small collection centre to main collection centres
- Main collection centres to India

Main collection centres for Ilam districts are:

- Fikkal Bazaar
- Pashupatinagar
- Ilam Bazaar
- Gorkhe and
- Mangalbare

The large cardamom collected from above collection centres is sent to Indian market via Pashupatinagar, an east boarder of India. Main collection centres for Sankhuwasawa districts are:

- Mudheshanishare and
- Hile Bazaars

The large cardamom collected from above collection centres are sent to Dharan, one of the main city of the eastern plain and then sent to Indian market from there. It was found that only 27 % of the households sold their cardamom to wholesalers. The remaining 73 % households sold their crop to local businessmen (middlemen or retailers). Almost 16 % of the total households sold their large cardamom by an advanced payment system called *Dohadani* in the local language. The price in this system was found to be low in comparison with prices negotiated after harvesting and drying payment system. No large cardamom was sold either to the consumer or co-operatives. During the field survey, farmers were asked about the marketing problems of large cardamom. Results were ranked and displayed below in tabular form (Table 11).

Table 11: Marketing Problems faced by farmers in the study area

Main Marketing Problems	Priorities of the Problems			Total
	First	Second	Third	
Lack of awareness of price information	39 (48.75) ¹	34 (42.50)	7 (8.75)	80 (100)
Low market price	27 (33.75)	38 (47.50)	15 (18.75)	80 (100)
Lack of farmer's co-operatives	14 (17.50)	10 (12.50)	56 (70.00)	80 (100)

Source: Field Survey 2001

1. Figure within the parenthesis indicates the percentage

Farmers were asked to rank their marketing problems in terms of their problem priorities. It was found that they were facing marketing lack of awareness of price information, low market price and lack of farmer's co-operatives. Among these problems, 49 % of the respondents ranked first priority for lack of awareness about the price information, 34 % ranked first priority for low market price and 18 % of farmers ranked first priority for lack of farmer's co-operatives.

Cost of Cultivation

Large Cardamom is a perennial crop. Once it is planted, it lives for approximately 20-25 years. Farmers of the study area reported that the plantations of the large cardamom utilise marginal waste and the steep land of hills. Land is prepared by manual labour using tools locally called *kuto/kodalo*. Cultural operations such as earthling up and weeding are not common in this crop once the orchard is established. However, in the first 4-5 years weeding and removal of the non-decayed leaves of the shade tree is conducted twice a year. The first crop of large cardamom becomes ready for harvesting in the fourth year after planting. Harvesting starts in the late August and continues until late October depending upon varieties grown and altitude. No chemical and compost fertiliser is now used for this crop. Although there are diseases and pests problems e.g. rhizome rot, foorkey and chhirkey, farmers do not use any pesticide for these diseases. However, some farmers reported that they sometimes used insecticides to control insect pests. Cost of cultivation of large cardamom for one ropani (0.05 ha) of land is shown in Table 12.

Cost of cultivation for this crop was found to be very low. Farmers prepared land with the help of locally available tools like *kuto / kodalo* and transplanted the seedlings themselves. The average labourers wage per day was \$ 0.81 and cost of saplings is c. \$ 0.02 per sapling. They need 550 seedlings to transplant in a ropani (0.05 ha). So the cultivation costs are \$ 12.26 for seedlings, \$ 8.91 for labour cost, \$ 3.38 for irrigation (sprinklers and pipes) and \$ 2.7 for drying (firewood). Farmers did not use any chemical and compost fertiliser.

Table 12: Farmers estimates of cost of cultivation of large cardamom per ropani (0.05 ha) in the study area

Activity	Labour cost (US \$) (Rate x No)	Firewood cost (US \$)	Other cost * (US \$) (Rate x No)	Total cost (US \$)
Land Preparation	0.81 x 3 = 2.43			2.43
Seedling			0.02 x 500 = 12.26	12.26
Transplanting	0.81 x 2 = 1.62			1.62
Irrigation	0.81 x 1 = 0.81		3.38 x 1 = 3.38	4.19
Weeding	0.81 x 2 = 1.62			1.62
Harvesting	0.81 x 2 = 1.62			1.62
Drying	0.81 x 1 = 0.81	2.70		3.51
Total	0.81 x 11 = 8.91	2.70	15.64	27.25

Source: Field Survey 2001 (NB: \$ 1 = Nepalese Rupees 74)

* Pipes and sprinkler, seedlings etc.

CONCLUSIONS

Most of Nepalese farmers in the study are medium scale farmers having 1-2 hectares of land. Size of land holdings varied ranging from 0.25 hectares to 5 hectares and with an average of 1.5 hectares per household. Area under large cardamom plantation also varied greatly, ranging from 0.05 hectares to 3 hectares. More than 73 % of farmers grow large cardamom in a small piece of land i.e. less than 0.5 hectares. The average size of a large cardamom plantation is 0.4 hectares.

The common varieties of large cardamom are grown by the farmers in the study area are cv. Ramsahi, cv. Golsahi, cv. Chivesahi, cv. Dambersahi and cv. Bharlange. Among these varieties, cv. Ramsahi is the most popular and widely grown variety followed by cv. Golsahi. Some farmers are found growing cardamom by mixing two or more varieties. Some farmers have no idea of the variety of large cardamom, which they are growing. Farmers are found propagating large cardamom mostly by vegetative means (separating suckers from the mother clumps). The recommended practice of propagation is sexual propagation. Propagation of large cardamom by means of asexual means prevent from infectious viral diseases.

The production and productivity of large cardamom are decreasing (1996-200). This decrease in production and productivity are the combined effect of biotic (insect pests and diseases, vertebrate pests e.g. rodents, *Kala*, squirrels and monkeys) and abiotic (drought, frost) factors as well as poor orchard management (nutritional management, shade management, irrigation management and other intercultural operations such as earthing up, weeding, gap filling etc.).

The price of the large cardamom crop varied greatly in each year between 1996-200. This is due to the lack of awareness of the price information in the Indian market and the poor marketing system. Farmers do not have strong co-operation for large cardamom marketing.

The study showed that rhizome rot was ranked by farmers as the most important disease problem in terms of production losses at present, but Foorkey (a viral disease of large cardamom) was the most serious problem in terms of its long-term effect on large cardamom plantations.

Plantations have decline and production losses are the most serious problem for large cardamom cultivation in Nepal. Although there are many factors responsible for these problems, diseases are becoming most serious constraint for large cardamom production (1996-2000). The average losses were 44 %, caused by all the diseases on large cardamom. Rhizome rot alone can causes up to 75 % losses. The study showed that the majority of the farmers are not aware about the causes of these diseases. A number of the farmers considered that diseases may be caused either by unsuitable planting environments (drought, water logged soil, high or low temperature), unsuitable planting materials or by poor orchard management, whereas others feel this may be due to biotic factors such as pathogens or insects.

The lack of price information, remoteness of the villages from the major marketing points and the lack of strong co-operative for the large cardamom marketing are the major problems faced by the farmers in the study area.

The price of large cardamom cultivation in a unit area of the land (0.05 ha) is estimated as \$ 27.25 by the farmers from the study area which is many fold lower than the actual price they are fetching from the same piece of land even though, there are many production constraint to this crop.

From the agronomic survey works done in the three VDC of the two district of the eastern hills of Nepal on this high value cash crop commodity, the growers are facing a series of production constraints which should be taken into consideration to develop improve package of practices on this crop.

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