Research Article

MARKETING SURVEY OF ACID LIME AND HILL LEMON IN NEPAL

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ABSTRACT

A market survey was undertaken visiting 14 major markets of the country during 2001/03 to assess the marketing system, demand and supply situation and price behavior of acid lime and hill lemon in Nepal. Different levels of market intermediaries involved in lime and hill lemon marketing were selected for survey and group discussion. A standard semi structured interview schedule was used to gather the information and daily transaction of lime was recorded in Kalimati wholesale market for one year. The total annual consumption of lime at 14 major markets of Nepal was over 2327 mt. of which, 85% was consumed in Kathmandu only. The volume of sale was higher during main season of production in all markets except Nepalgunj, Bhairahawa and Krishnanagar, where the volume of sale was higher in off-season. Over 90 percent of total lime marketed in Nepal was imported from India. In Kalimati wholesale market, the domestic lime contributed only 5.5% to total supply in the season and the rest was supplied from India. However, the share of Nepalese lime in other 13 major markets, outside the Kathmandu valley, was 32%. The total volume of import was 2108 t. valued at Rs. 50.4 millions. In contrast to lime, lemon was not imported from India. The demand of lime was higher during off-season from January to August and lower during the main season of production, i.e. September to December. The wholesale and retail prices of lime and hill lemon showed temporal and spatial variation. The average wholesale price of two years (2001-2003) in Kalimati market was Rs. 1.2 to 2.6 and retail Rs. 1.5 to 3.05/fruit, whereas in 13 major markets the wholesale price varied from Rs. 0.64/fruit in September to Rs. 0.95 in April. Average retail price was the lowest in August (Rs. 1.4/fruit) and the highest in April (Rs. 1.93/fruit). Similarly, the average wholesale price of hill lemon varied from Rs. 1.6/fruit in October to Rs. 6.0/fruit in April and the average retail price was the lowest in October (Rs. 2.4/fruit) and the highest in April (Rs. 7.0/fruit). The prices of lime and hill lemon were the lowest during the season of production and the highest during off-season, i.e. summer months. Different types of traders as suppliers, wholesalers, retailers, doke, four-wheelers, collectors and commission agents were involved in the marketing of lime and hill lemon. There were four different channels involved in the marketing of lime and hill lemon. Shares of those channels in business varied with markets. The marketing through commission agent (6%) was not common, whereas the collectors were significant (57%) in marketing. The common uses of lime and hill lemon were as fresh green salad, juice and processed products such as juice, squash, *chuk,* and pickle. The post-harvest loss during marketing was up to 20 -25% due to poor management of fruits. Development of technology for the higher productivity, off-season production, post harvesting handling and processing of fruits, and strengthening market facilities including cold storage are suggested to reap the tremendous internal market opportunities and substitute the imports.

Key words: Acid lime, hill lemon, marketing

INTRODUCTION

Acid lime and hill lemon are the popular citrus species, which rank the third after mandarin and sweet oranges in Nepal. They are grown more extensively throughout the length of the mid hills (Dhakal *et al.*, 2002). These crops can also be grown in the marginal lands, hence, are favorite of the poor farmers (Roistacher, 1996). The fruits withstand rough handling and store longer after harvest, and thus, are better than mandarin and sweet orange from the post harvest processing point of view. Hence, growing of lime and hill lemon is a pro-poor enterprise in the hills of Nepal. These fruits are cultivated by the hill farmers for a medicinal or family nutrition and source of income since time immemorial. The area and production of citrus is increasing over time. At present, lime and hill lemon are grown in 2547 and 357 ha, respectively, covering 25% of total land under citrus. The total production of lime was 16118 t with productivity of 9.3 t/ha (Anonymous, 2001/02).

The demand for lime and hill lemon is ever increasing mainly due to the increase in population, changes in food habit of people, tourist influx and establishment of small and medium processing units in the country and multifarious use of the fruits. The production is concentrated within a short span of seasonal harvesting period from October to January in Nepal. During horvesting season (November-January), there is glut in the market leading to low price as well as spoilage of fruits because of poor marketing system (LARC, 1997). At present, national demand for lime is not met by the domestic production even in main season. Hence, a substantial quantity of lime is being imported from India to meet the internal demand particularly during the off-season of lime production in the country. However, the marketing of lime and hill lemon has not been reported in Nepal. Therefore, the present study was undertaken to assess the marketing system, demand and supply situation and price behavior of acid lime and hill lemon at 14 major market centers including Kalimati wholesale market of Nepal.

METHODOLOGY

A market survey was undertaken at Kalimati wholesale market and other 13 major market centers of the country to assess the marketing systems of acid lime and hill lemon in Nepal during 2001/03. Wholesalers and retailers involved in marketing of fruits were identified and interviewed using semi structured questionnaires. Information regarding the demand and supply situation, wholesale and retail price, types of traders involved, different uses and processing, existing marketing channels and share in market, consumers preference and post harvest losses of acid lime and hill lemon were collected from wholesalers and retailers through semi structured interview schedule, key informant survey and group discussion. The daily transaction of acid lime was recorded in Kalimati wholesale market for one year.

RESULTS AND DISCUSSION

Supply of lime in market

The total annual supply of fresh lime fruits in 14 major markets of the country was 2327.13 mt (Table 1). Over 85 percent of total supply of lime fruits was at Kalimati market. Outside Kalimati market, the supply was slightly higher in Nepalganja (3.1%) and Bhairahawa (3.1%), followed by Biratnagar (2.2%) and Krishnanagar (2.2%) compared to other market centers of the country.

Table 1. Annual supply of lime fruits at 14 major markets of Nepal, 2001/02

SN	Markets	Annual supply (ton)
1	Kalimati (Kathmandu)	1984.5 (85.3)
2	Nepalgunj	77.4 (3.1)
3	Bhairahawa	72.0 (3.1)
4	Biratnagar	51.0 (2.2)
5	Krishnanagar	51.0 (2.2)
6	Surkhet	20.7 (0.9)
7	Damak	20.1 (0.9)
8	Dharan	18.3 (0.8)
9	Dhangadhi	8.64 (0.4)
10	Ghorahi	6.33 (0.3)
11	Birgunj	6.21 (0.3)
12	Tansen	4.95 (0.2)
13	Mahendranagar	4.14 (0.2)
14	Kakarvitta	1.8 (0.8)
	Total	2327.13

The monthly supply of lime varied substantially in Kalimati market from 129 mt in November and December to 201 mt in April (Table 2). The supply was more during off-season (February to October).

The supply pattern of lime at 13 major markets outside Kalimati was higher at Nepalganj, Bhairahawa, Biratnagar and Krishnanagar (Table 3). The total volume of market sale at 13 markets, outside Kalimati was 342.57 t, which was 14.7% of total supply in the country. Average market sale was higher during off-season except rainy month of July. The largest quantity of lime was supplied in the hot and dry summer months of April and May in these markets. There was no sale at all at Krishnanagar during the season of production (October – January).

Table 2. Monthly supply of lime fruits in Kalimati wholesale market, 2001/02

Year	Months	Supply (ton)
2001	November	129.3
	December	129.4
	January	132.6
	February	139.7
	March	167.8
2002	April	200.9
	May	184.0
	June	185.4
	July	163.1
	August	188.6
	September	190.9
	October	173.5

Table 3. Distribution of monthly sales of lime of fruits (in ton) at 13 major markets of Nepal, 2001/02

Market	April	May	June	July	August	Sept	Oct	Nov	Dec	Janu	Febru	March	Total
Mahendranagar	0.06	0.06	0.09	0.12	0.27	0.6	0.75	0.75	0.6	0.45	0.24	0.15	4.14
Dhangadi	0.12	0.12	0.06	0.09	0.3	1.2	1.5	1.5	1.5	1.2	0.9	0.15	8.64
Surkhet	2.4	2.4	1.8	1.2	1.5	1.5	1.2	1.2	1.5	2.1	1.8	2.1	20.7
Ghorahi	1.5	1.5	0.03	0.09	0.12	0.15	0.24	0.45	0.45	0.9	0.45	0.45	6.33
Nepalgunj	13.5	15.0	2.4	2.4	2.4	2.4	2.4	2.4	3.0	9.0	10.5	12.0	77.4
Tansen	0.45	0.45	0.45	0.3	0.3	0.3	0.45	0.45	0.45	0.45	0.45	0.45	4.95
Bhairahawa	7.2	7.2	7.2	7.2	7.2	7.2	3.6	3.6	3.6	3.6	7.2	7.2	72.0
Birgunj	0.9	0.9	0.9	0.45	0.3	0.45	0.45	0.3	0.3	0.3	0.36	0.6	6.21
Biratnagar	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	3.0	3.0	4.5	51.0
Dharan	0.6	0.6	0.6	0.6	2.4	2.4	2.7	2.4	2.4	2.4	0.6	0.6	18.3
Damak	1.5	1.5	0.6	1.5	3.0	3.0	1.5	1.5	1.5	1.5	1.5	1.5	20.1
Kakarvitta	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	1.8
Krishnanagar	9.0	9.0	9.0	6.0	6.0	3.0	-	-	-	-	3.0	6.0	51.0
Total	41.88	43.38	27.78	24.6	28.44	26.85	19.44	19.2	19.95	25.05	30.15	35.85	342.57

Almost all fresh lime (90.6%) supplied to Nepalese markets was imported from India (Table 4). The share of Nepalese lime in the domestic markets varied from 0.5% in April to the highest of 54.7% in September. The domestic lime was produced during the main season of production, during which the market price remained at its lowest level. It was only the imported lime, which fetched premium prices of off-season in the Nepalese market.

Kalimati wholesale market

The volume of domestic lime supplied at Kalimati Market was only 5.5% of the total supply, which spread over three months from August to October (Table 5). The arrival of Nepalese lime was maximum (52%) at Kalimati in the month of September, which was totally absent from November to July.

Table 4. Sources of supply of lime fruits (mt) during different months at 14 major markets of Nepal, 2001/02

Months	Total supply	Domestic lime	Indian lime
April	242.8	1.1 (0.5)	241.6 (99.5)
May	247.4	1.3 (0.6)	226.0 (99.4)
June	213.2	6.6 (3.1)	206.6 (96.9)
July	18.7.7	7.2 (3.8)	180.5 (96.2)
August	217.0	24.2 (11.2)	192.9 (8.8)
September	217.8	119.1 (54.7)	98.6 (45.3)
October	192.9	15.0 (7.8)	177.9 (92.2)

Table 4. Cont. …………

November	14.8.5	12.9 (8.7)	135.6 (91.3)
December	149.4	12.1 (8.1)	137.3 (91.9)
January	157.7	12.9 (8.2)	144.7 (91.8)
Februaly	169.9	4.9 (2,8)	164.9 (97.2)
March	203.7	2.3 (1.1)	201.4 (98.9)
Total	2327.7	219.8 (9.4)	2107.9 (90.6)

Table 5. Consumption of imported and domestic fresh lime fruits by month at Kalimati market, 2001/02

Months	Total supply	Domestic lime	Indian lime
Novemberr	129.3	0	129.3 (100)
December	129.4	0	129.4 (100)
January	132.6	0	132.6 (100)
February	139.7	0	139.7 (100)
March	167.8	0	167.8 (100)
April	200.9	0	200.9 (100)
May184.0	0	184.0 (100)	
June	185.4	0	185.4 (100)
July 163.1	0	163.1 (100)	
August	188.6	9.1 (4.8)	179.5 (95.2)
September	190.9	99.3 (52.0)	91.6 (48.0)
October	173.5	1.6 (1.0)	171.9 (99)
Total	1985.2	110.0 (5.5)	1875.2 (94.5)

Major markets outside Kalimati

Contribution of domestic lime to total supply of lime at 13 major markets, outside Kathmandu, was higher than Kalimati market during the season, whereas the contribution was negligible during off-season (Table 6). Nepalese lime contributed 32% to the total market sale in 13 major markets ranging from a minimum of 2.7% in April to a maximum of 73.8% in September. During the month of August to January the share of Nepalese lime was higher than the Indian lime and during other periods its contribution was only in negligible amount.

Table 6. Share of domestic lime fruits in total volume of sales (in ton) in 13 major markets by months, 2001/02

Months	Domestic lime		Indian lime	
	Quantity	Percentage	Quantity	Percentage
April	1.13	2.7	40.75	97.3
May	1.35	3.1	42.04	96.9
June	6.61	23.8	21.17	76.2
July	7.18	29.2	17.42	70.8
August	15.07	53.0	13.37	47.0
September	19.82	73.8	7.03	26.2
October	13.45	69.2	5.99	30.8
November	12.93	67.3	6.28	32.7
December	12.05	60.4	7.9	39.6
January	12.90	51.5	12.15	48.5
February	4.97	16.5	25.18	83.5
March	2.32	6.5	33.53	93.5
Total	109.78	32.0	232.79	68.0

The sale of hill lemon was not recorded in all market centers (Table 7). The market sale was concentrated during the production season of this fruit.

Table 7. Monthly sale of hill lemon (in pcs) by 13 major markets, 2001/02

Market	April	May	June	July	August	Sept	Oct	Nov	Dec	Janu	Febru	March	Total
Mahendranagar	-	-	-	-	200	400	700	800	1000	1000	500	-	4600
Dhangadi	400	-	-	-	400	1000	1000	1500	1500	1500	2000	300	9600
Surkhet	-	-	-	600	1000	2000	2500	2500	2500	2000	800	500	14400
Ghorahi	-	-	-	-	-	-	-	400	1500	1500	-	-	3400
Nepalgunj	-	-	-	2000	1500	1500	2000	1000	1000	1000	-	-	10000
Tansen	-	-	-	-	500	1000	1000	1000	-	-	-	-	3500
Bhairahawa	-	-	-	-	-	-	-	-	-	-	-	-	-
Birgunj	-	-	-	-	-	-	-	-	-	-	-	-	-
Biratnagar	-	-	-	-	-	-	-	-	-	-	-	-	-
Dharan	-	-	-	-	-	5000	15000	25000	25000	12000	-	-	8200
Damak	-	-	-	-	-	-	-	-	-	-	-	-	-
Kakarvitta	-	-	-	-	-	-	-	-	-	-	-	-	-
Krishnanagar	-	-	-	-	-	-	-	-	-	-	-	-	-

Among the 13 markets studied, only 7 markets, viz. Mahendranagar, Dhangadi, Surkhet, Dang, Nepalganja, Tansen and Damak were found to sale hill lemon fruits. The average market sale was the highest in Dharan (16400 pcs/month) followed by Surkhet (1600 pcs/month) and Nepalgunj (1429 pcs/month).

Volume of import

The annual volume of import and its corresponding value of lime were 2107.9 mt and Rs. 50.5 million, respectively (Table 8). The largest amount paid for fresh lime fruit was in the month of April followed by March, May and February, which were dry and hot summer and off-season of lime production in Nepal.

Table 8. Volume and value of imported lime in Nepal, 2002

Months	Import (ton)	Value (Rs.'000)	Average Rate/Kg
April	241.6	7153.0	29.61
May	226.0	5710.0	25.27
June	206.6	4037.0	19.54
July	180.5	3640.0	20.16
August	192.9	4094.0	21.22
September	98.6	2490.0	25.25
October	177.9	3654.0	20.54
November	135.6	2473.0	18.24
December	137.3	2457.0	17.90
January	144.7	2929.0	20.24
February	164.9	4769.0	28.92
March	201.4	7035.0	34.93
Total	2107.9	50423.0	23.92

Price behavior of lime and hill lemon

The monthly wholesale and retail prices of lime in 13 major market out side the Kathmandu valley showed considerable variation over time and space (Table 9).

Table 9. Wholesale and retail price of lime fruits at 13 markets by months (in Rs/fruit) during 2001/02

Market	April		May		June		July		August		Sept		Oct		Nov		Dec		Jan		Feb		March	
	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R
Mahendranagar	1.6	2	1.6	2	1.6	2	1.6	2	0.8	1	0.8	1	0.8	1	0.8	1	0.8	1	0.8	2	1.6	2	1.6	2
Dhangadi	0.35	1	0.35	1	0.35	1	0.25	2	0.25	2	0.16	3	0.16	3	0.16	3	0.25	2	0.25	2	0.5	1	0.5	1
Surkhet	0.9	3	0.9	3	0.9	3	0.75	2	0.75	2	0.75	2	0.75	2	0.75	2	0.75	2	0.75	2	0.8	3	0.8	3
Ghorahi	1.2	1.5	1.2	1.5	0.6	1	0.6	1	0.6	1	0.6	1	0.6	1	0.6	1	0.6	1	0.6	1	0.75	1.5	0.75	1.5
Nepalgunj	1.3	3	1.3	3	0.6	1	0.6	1	0.6	1	0.6	1	0.6	1	0.6	1	0.6	1	0.6	1	0.65	1.5	0.65	1.5
Tansen	0.75	2	0.75	2	0.75	2	0.6	1	0.6	1	0.6	1	0.6	1	0.6	1	0.6	1	0.6	1	0.6	1	0.6	1
Bhairahawa	0.6	1.25	0.6	1.25	0.6	1.25	0.6	1	0.6	1	0.6	1	0.6	1	0.6	1	0.6	1	0.6	1	0.6	1	0.6	1
Birgunj	0.75	1.5	0.75	1.5	0.75	1.5	0.75	1.5	0.75	1.5	0.5	1	0.5	1	0.5	1	0.5	1	0.5	1	0.75	1.5	0.75	1.5
Biratnagar	0.95	1.5	0.95	1.5	0.95	1.5	0.95	1.5	0.95	1.5	0.95	1.5	1	1.5	1	1.5	1	1.5	1	1.5	1	1.5	1	1.5
Dharan	0.8	1	0.8	1	0.8	1	0.8	1	0.8	1	0.8	1	0.8	1	0.8	1	0.8	1	0.8	1	0.8	1	0.8	1
Damak	0.3	1	0.3	1	0.3	1	0.3	1	0.3	1	0.3	1	0.3	1	0.3	1	0.3	1	0.3	1	0.3	1	0.3	1
Kakarvitta	-	3	-	3	-	3	-	3	-	3	-	3	-	3	-	3	-	3	-	3	-	3	-	3
Krishnanagar	0.5	1.5	0.5	1.5	0.5	1.5	0.5	1.5	0.5	1.5	0.5	1.5	-	-	-	-	-	-	-	-	0.5	1.5	0.5	1.5
Average																								

Note: W = Wholesale, R = Retail

The average wholesale price of lime in 13 major markets varied from Rs. 0.64/pc during September to Rs. 0.95/pc during April. Similarly, the average retail price of lime was the lowest during August (Rs. 1.4/pc) and the highest during April (Rs. 1.93/pc).

Price is the fundamental determinant for the functioning of the market mechanism, which is the net result of many forces acting in different directions. Like in other agricultural commodities, the changes in prices of lime and hill lemon were associated with the passage of time. Prices keep on moving through time, always tending to settle at an ever-changing equilibrium. Price movement and adjustments are like the surface of an ocean, with an infinite number of multi-directional movements, never coming to a standstill or permanent equilibrium (Acharya and Agarwal, 1994).

Likewise, the average wholesale price varied from a minimum of Rs. 0.25 in Dhangadi market to a maximum of Rs. 1.50 in Ghorahi market. In addition, the average retail price of lime varied from Rs. 1.00 in Dharan and Damak to Rs. 3.00 in Kakarvitta. In addition, the wholesale and retail price of lime in Kalimati market is presented in Table10.

Table 10. Monthly wholesale and retail price of lime fruits (Rs/pc) at Kalimati wholesale market (average of two years) 2001/03

Year	Months	Wholesale price	Retail price
2001-03	January	1.20	1.56
	February	1.75	2.10
	March	2.60	3.05
	April	2.40	2.90
	May	1.60	2.00
	June	1.40	1.75
	July	1.95	2.30
	August	2.30	2.85
	September	2.30	2.75
	October	1.75	2.15
	November	1.20	1.65
	December	1.20	1.50

The wholesale and retail price of lime showed considerable temporal variation in Kalimati market. The price of lime was higher during off-seasons and lower during main season of production. The wholesale and retail price movement in Kalimati market also showed that the price of lime was lower during the months of

May, June and July being off-seasons for lime. This was mainly due to lower demand of lime during that period in the market. The low demand can be attributed to rainy season, which is off-season for tourism.

The wholesale and retail price of hill lemon during different months of the year in different markets is presented in Table 11. Similar to lime, the wholesale and retail price of hill lemon showed temporal and spatial variation. The average wholesale price of hill lemon varied from Rs. 1.6/pc during October to Rs. 6.0/pc during April. Similarly, the average retail price of hill lemon was the lowest during October (Rs. 2.4/pc) and the highest during April (Rs. 7.0/pc). Likewise, the average wholesale price varied from a minimum of Rs. 1.0/pc in Dharan to a maximum of Rs. 3.22/pc in Dhangadi market. In addition, the average retail price of hill lemon varied from Rs. 1.00/pc in Dharan to Rs. 4.43/pc in Mahendranagar.

Horticultural markets and types of traders

The study showed that there were different types of traders involved in the marketing of fruits and vegetables including lime and hill lemon. They were mostly suppliers, wholesalers, retailers, doke, four wheelers and others. The result showed that most of the traders were retailers followed by doke (Table 12).

Horticultural produces in Nepal are sold through different types of markets at present. The ideal marketing system is one that maximizes the long run welfare of the society and that operate with appropriate technical supports efficiently (Acharya and Agrawal, 1994). The most common flow is through rural haat bazaars where farmers often sell their produces by themselves. But during recent years, with the development of road transport, communication system and growing urban centers, various types of markets are being developed. These developments have separated the producers from the merchants and led to the development of assembly markets, wholesale markets and retail markets. The marketing system has become more complex, with more agents involved in collection and distribution. The majority of the markets are located in the Terai region. According to Thapa et al. (1995), 924 haat bazaars were operated on local initiative. Almost all horticultural markets in Nepal lack even minimum facilities for marketing. Produces are displayed on unpaved open ground; drainage is poor, no public toilets and little or no drinking water. The congested and unsanitary conditions prevalent in most of the markets having both health and economic consequences.

Table 11. Wholesale and retail price of hill lemon in different months of the year (in Rs/pc), 2001/02

Market	April		May		June		July		August		Sept		Oct		Nov		Dec		Jan		Feb		March	
	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R	W	R
Mahendranagar	-	-	-	-	-	-	-	-	2	4	2	4	2	4	2	4	2	4	2	4	-	7	-	-
Dhangadi	6	7	-	-	-	-	-	-	2	3	2	3	2	3	3	4	3	4	3	4	4	5	4	5
Surkhet	-	-	-	-	-	-	-	3	-	3	-	3	-	2	-	2	-	2	-	3	-	3	-	3
Ghorahi	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2	-	2	-	-	-	-
Nepalgunj	-	-	-	-	-	-	3	4	3	4	2	3	2	3	3	3	3	3	3	3	-	-	-	-
Tansen	-	-	-	-	-	-	-	-	1	1.5	1	1.5	1	1.5	1	1.5	-	-	-	-	-	-	-	-
Dharan	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-

Note: W = Wholesale, R = Retail

In the Terai, there are regular and periodic markets for food grains, livestock and vegetables. However, these markets are traditional which are not regulated and there is lack of adequate support services. Hence the market transparency and the risk and uncertainty are high. The loss and wastage is high. All these results in high cost of marketing and low return to various marketing participants.

Table 12. Number of traders in different markets by scale of business, 2001/02

Market	Type of traders							
	Supplier	Wholesaler	Retailer	Doke	4 wheeler	Haat	Grocery	Others
Mahendranagar	-	5	12	5	4	6	-	-
Dhangadi	-	5	25	12	8	12	-	-
Surkhet	-	3	30	12	4	-	-	-
Ghorahi	-	-	25	-	-	-	-	-
Nepalgunj	-	1	40	45	8	15	-	-

Table 12. Cont. ....

Tansen	-	-	8	8	8	-	-	-
Bhairahawa	-	8	100	100	-	-	-	-
Birgunj	-	-	7	-	-	-	-	20
Biratnagar	-	2	5	-	-	-	-	-
Dharan	-	4	100	25	-	-	-	-
Damak	-	1	3	100	-	-	-	-
Kakarvitta	-	-	2	-	-	-	-	-
Krishnanagar	1	-	15	-	-	20	-	-

Marketing channels of lime and hill lemon

After market-induced commercialization of horticulture, many channels have been developed in the marketing process of horticultural produces in Nepal. These marketing channels vary with the types of markets and commodities. The horticultural produces reach to the consumers from producers through a longer channel. In case of different fruit crops there is increasing roles of pre-harvest contractors. The study showed that there were four major marketing channels involved in the distribution of lime and hill lemon from producers to ultimate consumers.

Channel 1. Producers ⟶ Retailers ⟶ Consumers

Channel 2. Producers ⟶ Wholesalers ⟶ Retailers ⟶ Consumers

Channel 3. Producers ⟶ Commission agent ⟶ Wholesalers ⟶ Retailers ⟶ Consumers

Channel 4. Producers ⟶ Collectors ⟶ Wholesalers ⟶ Retailers ⟶ Consumers

Among the existing marketing channels involved in the distribution of lime and hill lemon, their share in business varied with market (Table 13). The channel 3 was not so common in the marketing of lime and hill lemon, although it contributed 75 percent of the total distribution in Dhangadi market. This shows that in marketing of lime and hill lemon in Nepal the involvement of commission agent was not common. Among other channels of distribution, channel 4 was the most dominant channel for distribution of these fruits indicating significant involvement of collectors in this business.

Table 13. Percentage share of different channels in distribution of lime fruits, 2001/02

Market	Channel of distribution			
	Channel 1	Channel 2	Channel 3	Channel 4
Mahendranagar	25	75	-	-
Dhangadi	-	25	75	-
Surkhet	15	15	-	70
Ghorahi	-	-	-	100
Nepalgunj	-	-	-	100
Tansen	100	-	-	-
Bhairahawa	75	25	-	-
Birgunj	-	-	-	100
Biratnagar	-	-	-	100
Dharan	-	25	-	75
Damak	-	-	-	100
Kakarvitta	-	100	-	-
Krishnanagar	-	-	-	100
Total	16.5	20.4	5.8	57.3

Different uses and processing of lime and hill lemon

Lime and hill lemon were used as fresh fruits and as processed products. The most common uses of fresh lime and hill lemon were salad, juice, fresh with daal, fresh mixed with water and sugar, and consumption in hotels in different uses. Mostly these fruits were used in salad in households and hotels. Similarly, during the summer season they were consumed fresh mixed with water and sugar. Consumption of fresh lime/hill lemon mixed with daal was common in different parts of the country. The common forms of processed products were juice/ squash, chuk, pickle, and salting. The study showed that most common processed product of lime and hill lemon was juice/squash followed by chuk and pickles.

Post harvest or market losses of lime and hill lemon

All activities after transaction from farms until sale to consumers are considered part of a marketing system. Losses between harvest and consumption are, therefore, be considered as market losses. Different kind of post harvest losses were reported by the traders and the most common losses were rotting, bruising, pressure and poor management of fruits (Table 14). It was found that the post harvest losses of lime went up to 20-25 percent. Though very little research work on post harvest losses of fruits and vegetables has been reported in Nepal, the amount of losses found in this study is almost similar to the cases of other fruits and vegetables as reported in different studies.

Table 14. Percent of post harvest losses of lime/hill lemon fruits by type of loss and market, 2001/02

Market	Rotting	Bruising	Pressure	Poor management
Mahendranagar	20-25	-	-	-
Dhangadi	2	5	5	-
Surkhet	-	-	5-10	-
Ghorahi	-	-	-	15
Nepalgunj	10	-	-	-
Tansen	10	-	-	-
Bhairahawa	-	-	20	-
Birgunj	20	-	-	-
Biratnagar	-	-	15	-
Dharan	2	-	-	-
Damak	-	-	20	-
Kakarvitta	3	-	-	-
Krishnanagar	-	-	-	-

Desired characteristics of lime

The demand of any commodities depends on the preference of the consumers. The shape, size, color, rind thickness, juice content, acidity, segmentation, varieties, seedless and aroma determined the consumers preference (Table 15). Almost all consumers in different markets preferred large and round shaped lime fruits. But cases were also found showing preferences towards small and medium sized fruits in Surkhet and Birgunj.

Table 15. Desired characteristics of lime and hill lemon fruits by consumers, 2001/02

Market	Shape	Size	Color	Rind thickness	Juice content	Acidity	Segmen- tation	Variety	Seedyness	Aroma
Mahendranagar	R	L	Y	Thin	High	High	NS	Local	Se	A
Dhangadi	R	S	Y	Thin	High	High	Sg	Local	N	A
Surkhet	R	L	Y	Thick	High	High	NS	Local	N	A
Ghorahi	R	M	Y	Medium	High	High	NS	Indian	N	A
Nepalgunj	R	M	Y	Thin	High	High	NS	Local	N	A
Tansen	R	L	Y	This	High	High	NS	Local	N	A
Bhairahawa	R	L	Y	This	High	High	NS	Indian	N	A
Birgunj	R	S	Y	This	High	High	NS	Indian	N	A
Biratnagar	R	L	Y	This	High	High	NS	Indian	Se	A
Dharan	R	L	Y	Thick	High	High	NS	Local	N	A
Damak	R	L	Y	Thin	High	High	NS	Local	N	A
Kakarvitta	R	L	Y	Thin	High	High	NS	Local	N	A
Krishnanagar	R	L	Y	Thin	High	High	NS	Indian	N	A

Legends: R = Round, L = Large, M = Medium, S = Small, Y = Yellow, NS = Non segmented, Sg = Segmented, Se = Seedy, N = Non seedy, A = Aromatic

The fruit with yellow color, thin skin, high juice content, less number of seed, high acidity and strong aroma /flavors were preferred in the most of the markets. But the consumers of Dang preferred fruits of medium rind thickness, while consumers of Surkhet and Dharan, preferred fruits with high rind thickness. Likewise, in most of the markets non-segmented fruits were preferred. In case of varieties there was mixed type of preferences towards local and Indian varieties. In some cases, local varieties were preferred, while in others Indian varieties were preferred by the consumers. Similarly, the preference of consumers was towards seedless fruits in most of the markets.

The analysis of consumers' preferences towards different features of the lime gives an idea for production planning of market-driven production of lime. The consumers of specific localities have specific preferences towards particular features of these fruits and for achieving better marketing performance, producers should give attention towards making their production plan in future considering the preferences of the outlet markets. If produced considering these facts, producers could get higher prices and would not have marketing problem. This could give reasonable returns from satisfactory marketing of their produce.

Trader suggestions for production

The traders suggested technical and institutional reform for scaling up the local production of lime and hill lemon. Development of technologies for off-season production, harvesting, grading, packaging in wooden crates with straw for minimal post harvest losses was suggested by the traders. Establishing and strengthening market facilities including cold storage, and intervention in price regulation and imports were also suggested.

CONCLUSIONS

There is a tremendous yet ever growing internal market opportunities for domestic acid lime in Nepal. Hence, immediate development of technologies for higher productivity, off-season production, post harvest handling and processing of acid lime, and strengthening market facilities are suggested to promote acid lime production and eventually to substitute the import of lime from India.

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