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### Estimation of Producers' Surplus of Large Cardamom in Sikkim: A Value Chain Mapping

Ram Singh<sup>1</sup> • S. Chiphang<sup>2</sup> • N. Anandkumar Singh<sup>3</sup> • S.M. Feroze<sup>4</sup> • A. Anuradha Devi<sup>5</sup> • Shiv Kumar<sup>6</sup>

<sup>1</sup>Professor, <sup>2</sup>& <sup>3</sup>Asst. Prof. SSS, CPGS-AS, CAU, Umiam-793 103, respectively;

<sup>4</sup>Associate prof., CoA, Imphal, Manipur;

<sup>5</sup>Asstt. Prof., CAEPHT, Ranipool, Gangtok, Sikkim and

<sup>6</sup>Principal Scientist, ICAR-NIAP, Pusa, New Delhi-12

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#### ABSTRACT

Study was conducted in East and West districts of the state Sikkim. Present paper demonstrates the producers' surplus of large cardamom in the state of Sikkim. The channel-I was found to be pivot channel through which 74.72 per cent of the quantity of large cardamom has been disposed in the state. The losses incurred at farmers' field and during the marketing of the produce were the main concern and it necessitates for research and development to reduce the losses. Looking the marketable situation of the large cardamom grower, the specific market yard for the produce need to develop in the state at cluster basis. Hence, many opportunities have been identified, and tapping these would prove useful for large cardamom production and its marketing as well as in generating employment in the state.

#### 1. Introduction

India, blessed with varying agro-climatic zones grows different types of spices and holds a prominent position in the world's spice production (Bhardwaj *et al.*, 2011). The country is the home of many spices as out of the 109 spices listed by International Standards Organization (ISO), 52 varieties of spices are under the purview of the Spices Board, Govt. of India (Divakaran *et al.*, 2018). Spices are integral to the Indian community, as not only did it influence the Indian history but also an important additive in all the Indian cuisines. Besides offering culinary value in exquisite aroma, texture and taste, spices also possess tremendous nutritive and therapeutic value (Dini, 2018; Bower *et al.*, 2016; Srinivasan, 2014). Moreover, with the undergoing change in food habits all over the world, spicy food has become the order of the day in most developed and developing countries and are hence the most sought-after globally (Parappurathu and Mathur, 2006). India, the 'land of spice' commercially produce many of the spices which includes seed spice and tree spice such as ginger, black pepper, cardamom (small and large), chilli, turmeric, coriander, garlic, fennel, fenugreek, and cumin. The nation is not only the largest producer of spices but also the

major consumer and exporter of spices in the world (Sugasini *et al.*, 2018).

The North East (NE), green belt of India which comprises of states namely; Assam, Arunachal Pradesh, Meghalaya, Manipur, Mizoram, Nagaland, Tripura and Sikkim harbours a rich flora on account of its varied topography, climate and altitudes and has great potential for the development of horticultural crops including spices. It is the hub of major spices like large cardamom, ginger, turmeric, black pepper, chilli, bay leaf, *etc* which are in great demand and has tremendous potential (Hnamte *et al.*, 2012). Assam is the leading state in spice production in the region followed by Nagaland. The NE region is home to some niche spice crops like *Lakadong* turmeric, *Bird's eye* chilli, *King* chilli and *Nadia* ginger which has high market demand for their unique features (Momin *et al.*, 2018). The region has great prospects for fabricating different value-added products from spices like *oil* and *oleoresins*, powdered form, *paste* from ginger and turmeric; pepper and ginger in *brine*; *curcumin* from turmeric; *capsanthin* and *capsaicin* from chilli *etc*.

\*Corresponding author: [ramsingh.cau@gmail.com](mailto:ramsingh.cau@gmail.com)

So far, the large cardamom is concerned India is the second largest producer after Nepal of which the major producing states are Sikkim, West Bengal (particularly Darjeeling), Nagaland and Arunachal Pradesh. A total of 8.67 thousand MT of large cardamom was produced in the country during 2018-19 (Spice Board of India, 2020) with state of Sikkim leads in both area (54.42%) and production (58.02%) of large cardamom in India. The production of large cardamom during 2018 was 5.03 thousand MT (Spice Board of India, 2020). In the different stages of a value chain, different stakeholders add value to the product to increase the end product value. A value chain analysis study helps to map the value chain of a specific product involving various actors (Stein and Barron, 2017). The chain actors, who actually transact a particular product as it moves through the value chain, includes input dealers (*e.g.*, seed suppliers), farmers, traders, processors, transporters, wholesalers, retailers and the final consumers (Hellin and Meijer, 2006). As the product moves from one chain actor to another, it gains monetary value. The identification of how and where value is added in the different activities for a commodity can be done through value chain analysis by assessing the costs of these activities and how they are coordinated (Diebacker, 2000; Azqueta and Sotelsek, 2007). The management through the chain always tries to either reduce the cost or shorten the number of steps in the chain. The success of the value chain depends on how best the actors collaborate, share risks and uncertainties, offer technology and share the benefit (Sahoo, 2010). The value chain map is an analytical tool that helps in understanding policy issues that affects the functioning of the chain and also the institutions and organizations providing the services (market information and quality standards) that the different chain actors need in order to make better-informed decisions (Hellin and Meijer, 2006). Value chain analysis gives profound knowledge on the markets, relationships across the chain, participation of different actors, critical constraints and competitiveness of the farmers (Soosey *et al.*, 2012). Therefore, developing value chains is often about improving access to markets and ensuring more efficient product flow while ensuring that all actors in that chain benefit. Hence, the

main objective of value chain is both maximization of profits and aggregation of revenue (Neven, 2014). Schmitz (2006) explored the power of the global value chain approach in explaining the growth of production capabilities and reported that upgrading opportunities of local enterprises are structured by the relationships in value chain. Producers' surplus and disposal pattern which are immense for developing the policy on production and post-harvest management of the crop (Rajavardhan *et al.*, 2020). Hence, the present paper is an effort to estimate of producers; surplus of large cardamom and mapping its value chain to study its disposal.

## 2. Methodology

The study was conducted in the East and West Sikkim district of the state of Sikkim. As the districts was 2nd and 3rd major contributor of large cardamom in respect to area as well as in production (Table 1). Raktong Tintek and Pakyong block of East Sikkim and Hee Martam and Dentam block of West Sikkim districts were selected for the study. A list of villages of each of selected block was prepared along with the list of large cardamom growers in each of villages. Four villages *viz.*; Lower Raktong, Tumin Borang, of Raktong Tintek block and Namcheybung and Assam Linzey Ward-I of Pakyong block of the East Sikkim; similarly, Barmiok of Hee Martam block and Dentam and Hee villages of Dentam block of West Sikkim district were selected. A sample of 75 numbers of large cardamom growers was drawn proportionately to the population of the large cardamom growers of all selected villages of both the selected districts (Table 2). The data were collected for three year of 2017-20 from the large cardamom producers through well-structured interview schedule comprising of production, consumption, produce sold to different agencies, produce used for different purposes and produce retained at household. Ranipool, Singtam, Naya bazaar (Jorethag), Siliguri market of West Bengal (terminal) were selected to study the mapping of value chain of large cardamom in the state of Sikkim

**Table 1.** District wise area and production of Large Cardamom in Sikkim

| District     | Area ('000 ha) | %          | Production ('000MT) | %          |
|--------------|----------------|------------|---------------------|------------|
| East         | 5.97           | 27.39      | 1.43                | 27.34      |
| West         | 4.96           | 22.75      | 1.19                | 22.75      |
| North        | 6.53           | 29.95      | 1.57                | 30.02      |
| South        | 4.34           | 19.91      | 1.04                | 19.89      |
| <b>Total</b> | <b>21.80</b>   | <b>100</b> | <b>5.23</b>         | <b>100</b> |

**Table 2.** Selection of respondents of large cardamom in Sikkim

| District     | Block          | Total number of villages | Selected villages | Total number of households | Total number of Producers | Selected number of producers |
|--------------|----------------|--------------------------|-------------------|----------------------------|---------------------------|------------------------------|
| East Sikkim  | Rakdong Tintek | 22                       | Lower Rakdong     | 206                        | 61                        | 6                            |
|              |                |                          | Tumin Borang      | 302                        | 82                        | 8                            |
|              |                |                          | Namcheybung       | 1126                       | 172                       | 17                           |
| West Sikkim  | Pakyong        | 52                       | Assam Linzey      | 430                        | 81                        | 8                            |
|              |                |                          | Ward I            |                            |                           |                              |
|              |                |                          | Bermiok           | 405                        | 93                        | 9                            |
| West Sikkim  | Hee martam     | 10                       | Dentam village    | 139                        | 110                       | 11                           |
|              |                |                          | Hee village       | 509                        | 160                       | 16                           |
|              |                |                          | Dentam            | 22                         |                           |                              |
| <b>Total</b> |                | <b>74</b>                |                   | <b>3117</b>                | <b>759</b>                | <b>75</b>                    |

### Analytical Method

#### Producer's surplus

It is the quantity of produce which is, or can be made available by the farmers to the non-farm population. The producer's surplus is of two types:

#### Marketable surplus

$$M_s = P - C$$

Where,

$M_s$  = Marketable surplus

$P$  = Total production

$C$  = Total requirement (family consumption, farm needs, payment to labours, artisans, landlord and payment for social and religious work)

#### Marketed surplus

$$M_t = M_s - L_m$$

Where,

$M_t$  = marketed surplus

$M_s$  = marketable surplus

$L_m$  = physical losses i.e. (i) losses during transportation and marketing (ii) arbitrary deduction or under weighing by traders at the market

### 3. Results and Discussion

#### Mapping of value chain actors of large cardamom

Ranipool, Singtam, Naya Bazar (Jorengtham) and Siliguri market of West Bengal collection were selected purposively to study the disposal (actors map). A total of 9 actors were identified including 2 in Ranipool, 3 in Singtam, 2 in Naya bazaar and 2 in the market of Siliguri. Out of 9 value chain actors; 4, 1 and 4 were identified as primary wholesalers, secondary wholesalers and retailers, respectively in the selected markets (Table 3).

Considering these identified actors, three major marketing chains namely; Channel-I: Producer → Primary wholesaler/Trader → Secondary wholesaler → Retailer → Consumer; Channel-II: Producer → Primary wholesaler/Trader → Delhi and Channel-III: Producer → Retailer → Consumer were identified and selected for

mapping of the produce of large cardamom for its disposal from farm of the producer (Fig 1). The channel-I was found to be a main channel as maximum quantity which constitute 56.50 kg (74.7% of large cardamom was disposed-off and remaining 13.61 kg (18%) through channel-II and 5.51 kg (7.29%) through the channel-III (Table 4). Channel-I was having the huge scope for value addition as well as livelihood generation. Hence, value chain integration of channel-I have scope to generate mutual benefits for smallholder farmers and the business community (Singh et al. 2020).

**Table 3.** Value chain actors of large cardamom in Sikkim

| Major collection centre/ market | (Number)  |          |          |          |
|---------------------------------|---|----------|----------|----------|
|                                 | Actors involved in value chains of large cardamom |          |          |          |
|                                 | PW  | SW       | R        | Total    |
| Ranipool                        | 1   | -        | 1        | 2        |
| Singtam                         | 2   | -        | 1        | 3        |
| Naya bazar (Jorethang)          | 1   | -        | 1        | 2        |
| Siliguri, WB (End market)       | -   | 1        | 1        | 2        |
| <b>Total</b>                    | <b>4</b>  | <b>1</b> | <b>4</b> | <b>9</b> |

*Note:* PW-Primary wholesaler; SW- Secondary wholesaler; R-Retailer

*Source:* Household survey, 2017-20

**Table 4.** Major marketing channels and actors of value chain of large cardamom in Sikkim

| Channels    | Farmers (no.) | Actors  | Quantity (kg) |
|-------------|---------------|---|---------------|
| Channel-I   | 39*           | Producer → Primary wholesaler/Trader → Secondary wholesaler → Retailer → Consumer | 56.50 (74.72) |
| Channel-II  | 39*           | Producer → Primary wholesaler/Trader → Delhi                                      | 13.61 (18)    |
| Channel-III | 7*            | Producer → Retailer → Consumer  | 5.51 (7.29)   |

Note: Figure in parentheses are percentage to the total \* Multiple response

**Disposal of produce:** Most of the farmers are marginal and therefore, the production of crop is very less as it was low volume crop. The farmers after drying disposed the produce to the primary wholesaler in the market at an average price of ₹460.51 to ₹508.57 per kg.

**Selling arrangement:** No pre-arrangement for selling of the Produce and spot payment prevailed Therefore, the farmers sold the produce at any time when they need of finance Wholesalers in Sikkim who are dealing the large cardamom trading outside the state of Sikkim, then transport the produce to the Siliguri and sometimes with little quantity to Delhi market. The wholesaler collects the produce from the farmers in the market yard with an average quantity of 40 to 60 kg per farmers. The primary wholesalers transport large cardamom in bulk quantity with an average selling price of ₹510 to ₹545 per kg. The produce was then handled by the secondary wholesaler on reaching Siliguri before dispose it off to different part of West Bengal. The secondary wholesaler in Naya bazar, Nehru road reported that most of the large cardamom has been collected /imported from Sikkim, Nepal and Bhutan. The secondary wholesaler further disposed the produce at an average price of ₹565 per kg to the retailers. The retailers further, disposed the produce in the local market after packing it in different quantity which enables them to sale the produce at an average price of ₹625 per kg in channel I at Siliguri market of the state of West Bengal and ₹550 to ₹565 per kg in channel II and channel III in Sikkim (Table 5). Thus, many intermediaries involved in movement

of the large cardamom from farmers to the end consumers which reduced the share of producer in consumer's rupee. Hence, there are ample scopes to intervene through opening markets at low level where the large cardamom producer can market large quantity.

**Institutional arrangements:** Functionaries at the facilitator's level in NEH region such as District Horticulture Office, Agricultural Institutes, KVK, Spice Board *etc.* sometimes provided services in the form of financial assistant, providing of sapling (suckers), training programme on packages of practices and methods of control of pest and diseases through farmer's school particularly in Sikkim, during production, storage, *etc.* But, assistance for on-farm input production, infrastructure and for development of facilities for bio-fertilizers, marketing, storage and transportation facilities was still not in proper shape and functioning to cover each and every farmer of the region. Hence, policy implication on production and marketing was needed to enforce the farmers to keep continue their farming so that they can increase the production on a large scale and better marketing facilities to receive better prices.

#### **Producer's surplus of large cardamom**

Production of large cardamom in household level was estimated to be of 77.59 kg per annum in the state of Sikkim. Out of the total production of large cardamom, the losses at farmers field and loss during marketing were observed to be of 0.91 per which was a serious matter of concern (Singh *et al*, 2020) for further research and development to develop the

**Table 5.** Marketing costs and margins of large cardamom in Sikkim

₹/qtl

| Particular                            | Channel-I | Channel-II | Channel-III |
|---------------------------------------|-----------|------------|-------------|
| Selling price of producer             | 460.51    | 460.51     | 508.57      |
| Cost incurred by producer             | 1.13      | 1.13       | 0.97        |
| Net price received by producer        | 459.38    | 459.38     | 507.60      |
| Cost incurred by primary wholesaler   | 1.54      | 1.68       | -           |
| Price paid by secondary wholesaler    | 510       | 545        | -           |
| Primary wholesaler's margin           | 47.97     | 82.81      | -           |
| Cost incurred by secondary wholesaler | 0.92      | -          | -           |
| Price paid by retailer                | 565       | -          | -           |
| Secondary wholesaler's margin         | 54.08     | -          | -           |
| Cost incurred by retailer             | 0.68      | -          | 0.82        |
| Price paid by consumer                | 625       | 550        | 565         |
| Retailer's margin                     | 59.32     | -          | 55.61       |

**Table 6.** Producer's surplus of large cardamom in Sikkim

| Particular                | Quantity (kg) | %           |
|---------------------------|---------------|-------------|
| <b>Total production</b>   | <b>77.59</b>  | <b>100</b>  |
| a) Consumption            | 0.56          | 0.72        |
| b) Loss at farmer's field | 0.71          | 0.91        |
| c) Loss during marketing  | 0.71          | 0.91        |
| <b>Total (a+b+c)</b>      | <b>1.97</b>   | <b>2.54</b> |
| Marketable surplus        | 77.03         |             |
| Marketed surplus          | 75.62         |             |

tool/implement (Singh *et al*, 2020 and Singh *et al*, 2019) of harvesting of large cardamom with minimum loss as well as packaging material after harvesting to dispose it to ultimate consumers. As the large cardamom growers of the state of the Sikkim were resource poor consequently, they were unable to afford such type of tools and techniques, hence, state government should come forward to manage such type of machinery at cluster level for the large cardamom growers of the state to avoid such losses. Small quantity was retained for home consumption and it was estimated of 0.72 per cent. The people of the state of Sikkim have habit to take large cardamom in their vegetables and curry. The marketable surplus was worked out to be of 77.03 kg for the producers of large cardamom in the state of Sikkim. Whereas, the marketed surplus has been worked out to be of 75.62 kg in the state. Hence, the marketable surplus was observed to be at higher side as there was no distress sell of the commodity (Table 6).

#### 4. Conclusion

The analysis of producers' surplus and mapping of large cardamom produce has given in-depth policy implication. The channel-I: Producer → Primary wholesaler/Trader → Secondary wholesaler → Retailer → Consumer need to make more efficient through technical and administrative interventions. Losses at farmers' field and during marketing

of large cardamom were major concern found through producers' surplus estimation which necessitates developing tool to harvest the large cardamom with minimum harvesting loss and mechanism of proper transport as well as packaging of the produce to minimize its loss.

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