



# Insect and Mammalian Pests of Large Cardamom (*Amomum subulatum* Roxburgh) in Sikkim Himalaya

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### Abstract

Large cardamom is an important cash crop of Sikkim and Darjeeling district of West Bengal. About 3863 MT of large cardamom are produced annually from an area of 26,459 ha in Sikkim region. Insect pests are one of the constraints of large cardamom production. Surveillance was carried out in the major large cardamom growing tracts during 2010 - 12 and incidences of major pests were recorded. Minor insect pests, mammalian pests and new pests in large cardamom ecosystem were documented. Entomopathogens of leaf caterpillar (*Artona chorista*) were identified.

### Keywords

Pests; Large cardamom; *Artona*; Shoot fly; Sikkim Himalaya

### Introduction

Large cardamom (*Amomum subulatum* Roxburgh) belonging to family *Zingiberaceae* is an important spices crop of North East India and often referred as currency crop [1]. Now-a-days neighboring countries of India like Nepal, Bhutan and Myanmar have also started cultivation of large cardamom [2]. In Sikkim Himalayas it is cultivated since time immemorial and believed to be the native of the state [3]. Sikkim has the largest area as well as production of large cardamom in the globe and act as a big player in the world market [4]. It grows well at altitude ranges from 1000 to 2200 m MSL with well distributed rainfall spread around 200 days with a total of about 3000-3500 mm/year [5-7]. Large cardamom is a sciophyte i.e. the plant is grown under shade [8,9]. Crop prefers humid subtropical, semi evergreen forests hills of eastern sub-Himalayan region [10]. It is essentially a cross-pollinated crop due to the heterostyly nature of its flowers. Bumble bee (*Bombus breviceps*) is the major pollinator in large cardamom due to its high pollination efficiency attributed to its big body size and foraging habit [11,12]. In Sikkim the average productivity of large cardamom ranges from 240 to 260 kg/ha [13]. The crop grows somewhat wild in nature and damages due to insect pests are common. It is infested by various pests and diseases causing considerable amount of monetary loss [14-16]. About 3,863 MT of large cardamom are being produced annually from an area around 26,459 ha in Sikkim region [17]. Here we have presented

our observations recorded on insect pests of the crop and their IPM management schedule in Sikkim Himalaya.

### Materials and Methods

Surveillance was carried out in major large cardamom growing tracts of Sikkim and Darjeeling district of West Bengal during 2010-12. Data were recorded based on two different types of surveillance viz., fixed plot and roving surveillance. Fixed plot surveillance was conducted at Kabi (1567 m amsl), North Sikkim and Pangthang (1952 m amsl), East Sikkim at monthly interval.

Roving surveillance was carried out in four districts of Sikkim, Darjeeling and Kalimpong sub division in Darjeeling district of West Bengal. Data recorded in two gardens from each district / sub divisions and per cent incidence were recorded. Roving surveillance was carried out twice in a year in the months of April - May and October - December.

In both the surveillance, twenty five clumps of large cardamom per garden were selected through random sampling and pests of major and minor importance recorded. Numbers of infested tillers per clumps were noted and per cent incidence for important pests was derived. Natural enemies (entomopathogens) associated with *Artona chorista* in field condition were recorded and pathogenicity test was carried out.

### Results and Discussion

In the fixed plot surveillance, occurrence (per cent) of three important insect pests viz., stem borer (*Glyphipterix* sp.), shoot fly (*Merchlorops dimorphus*) and leaf caterpillar (*Artona chorista*) was recorded. *M. dimorphus* was recorded highest among the different pests recorded in the surveyed areas (Table 1). It was 57.00 per cent in Pangthang and 46.30 per cent in Kabi. Roving surveillance was carried out in four districts of Sikkim, Darjeeling and Kalimpong sub division in Darjeeling district of West Bengal. Data on pest incidence and traditional practice of pest management was recorded. Occurrence of shoot fly (*M. dimorphus*) was recorded the highest (44.00 per cent) among the other major pests recorded during roving surveillance followed by leaf caterpillar (*A. chorista*) and stem borer (*Glyphipterix* sp.). From the data it is revealed that occurrence of *M. dimorphus* and *Glyphipterix* sp. was highest in East Sikkim than other districts / sub division of West Bengal. Infestation of *A. chorista* was observed more in Darjeeling district of West Bengal than other surveyed areas (Table 2). In both the surveillance incidence of

Table 1: Incidence of insect pests at fixed plots in Sikkim region during 2010 -12.

| Pests                                   | Incidence percent ( Range) |           |
|---|----------------------------|-----------|
|   | Kabi                       | Pangthang |
| Stem borer ( <i>Glyphipterix</i> sp.)   | 0-16                       | 0-20      |
| Shoot fly ( <i>M. dimorphus</i> )       | 16-64                      | 16-72     |
| Leaf caterpillar ( <i>A. chorista</i> ) | 0-24                       | 0-16      |

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**Table 2:** Incidence of insect pest in large cardamom field in different districts of Sikkim and Darjeeling district of West Bengal during 2010-12.

| Name of the districts/<br>Sub Division | Incidence (percent) – Range              |                                      |  |
|--|--|--------------------------------------|--|
|  | Insect pests                             |                                      |  |
|  | Stem borer<br>( <i>Glyphipterix</i> sp.) | Shoot fly<br>( <i>M. dimorphus</i> ) | Leaf caterpillar<br>( <i>A. chorista</i> ) |
| North                                  | 12-20                                    | 32-40                                | 8-12                                       |
| East                                   | 16-24                                    | 40-48                                | 12-16                                      |
| South                                  | 4-12                                     | 36-40                                | 0-12                                       |
| West                                   | 8-20                                     | 32-40                                | 8-16                                       |
| Kalimpong                              | 4-8                                      | 12-28                                | 0 - 4                                      |
| Darjeeling                             | 4-16                                     | 28-44                                | 16-28                                      |

**Table 3:** Wild mammalian pests of large cardamom in Sikkim region during 2010-12.

| Name of the pests    | Vernacular name | Period of occurrence | Name of the infested parts | Places                     |
|----------------------|-----------------|----------------------|----------------------------|----------------------------|
| Rodents              | Musha           | Aug-Dec              | Spikes / capsules          | Kabi, Pangthang and Dzongu |
| Himalayan palm civet | Kala            | Aug –Dec             | capsules                   | Kabi and Pangthang         |
| Indian wild boar     | Bongdel         | April- Sept          | Clumps                     | Kabi                       |
| Musk deer            | Kasturi Mirga   | Aug-Dec              | Spikes and capsules        | Dzongu and Kabi            |
| Monkey               | Bandar          | April-Sept           | Clumps                     | Kewzing and Namchi         |

**Table 4:** New pest recorded in the cardamom ecosystem in Sikkim during 2010-12.

| Sl. No. | Pest                                     | Host                             | Remarks   |
|---------|--|----------------------------------|---|
| 1       | Aphid<br>( <i>Mollitrichosiphum</i> sp.) | Utis ( <i>Alnus nepalensis</i> ) | Utis is an important shade tree of large cardamom ecosystem |

**Table 5:** Traditional practices of pest management in Sikkim.

| Sl.No. | Traditional practice   | Against pest                                    |
|--------|--|---|
| 1.     | Collection and burning of infested plant parts                 | Leaf caterpillar, stem borer and shoot fly.     |
| 2.     | Leave extract – Titepati, Chillowney, Indreni and Tobacco      | Chewing and sucking Pests                       |
| 3.     | Field exposures to Sun shine & Bird                            | Soil insects mainly white grub                  |
| 4.     | Application of ash and ash solution                            | Ants and aphids                                 |
| 5.     | Covering of Cardamom clumps with dried leaves / small branches | Mammalian Pests viz., civet, wild boar and deer |
| 6.     | Crop rotation  | White grub and other soil borne insects         |
| 7.     | Drainage / Flooding  | Soil insects – white grubs                      |
| 8.     | Kerosene   | House hold pests / Ants                         |
| 9.     | Mint leaves  | House hold pests / House fly                    |

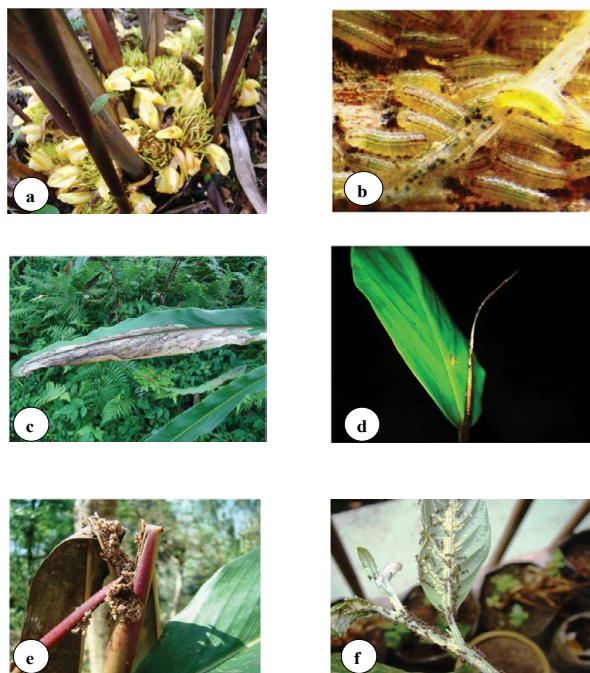
mammalian pests and also a new pest in cardamom ecosystem was recorded. Mammalian pests became a cause of concern in some areas. Presence of five mammalian pests was recorded based on damage caused by them and identified with the help of local farmers (Table 3). Utis (*Alnus nepalensis*) is an important shade tree for large cardamom [18]. An aphid species is commonly observed in the twigs of the tree. The identification of the pest was confirmed from Network Project on Insect Biosystematics-NPIB), Indian Agricultural Research Institute, New Delhi as *Mollitrichosiphum* sp. (Registered in IARI, New Delhi as RRS NO. 2133-2162/11) (Table 4 and Plate 1). Occurrence of some other minor insect pests viz., lace wing bug, fruit borer, aphid, mealy bug, hairy caterpillar, scale insects, grass hopper, rhizome weevil and thrips were also recorded during the surveillance. Attempt was also made to find out the association of natural enemies with these pests. Dead caterpillars of *A. chorista* was observed in the field conditions and collected for isolating the associated pathogens. Four entomopathogens namely *Cladosporium* sp., *Metarrhizium* sp., *Penicillium* sp. and *Verticillium* sp. were isolated and identified. In the pathogenicity test *Cladosporium* sp. was found promising under laboratory conditions. Large cardamom is basically grown organically in the Sikkim Himalayan region. Nine different practices are adopted by the farmers to manage the agricultural and house hold pests in this region (Table 5). These traditional practices may serve as important input for valid scientific investigation, standardization and large scale use in integrated pest management.

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**Plate 1:** Photographs of insect and pests of large cardamom at Sikkim Himalaya. (a) Large cardamom flowering clump; b. Congregation of *A. chorista*; c. Large cardamom leaf damaged by *A. chorista*; d. *M. dimorphus* infested shoot tip; e. Symptoms of *Glyphipterix* sp. infestation; f. *Mollitrichosiphum* sp. on *Alnus* twig.

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