Original Research Article

POPULATION DYNAMICS OF CARDAMOM SHOOT AND CAPSULE BORER, *CONOGETHES PUNCTIFERALIS* (GUENEE) ON CARDAMOM VARIETY M2 UNDER HILL ZONE OF KARNATAKA

ABSTRACT

The experiment was carried out to study the population dynamics of cardamom shoot and capsule borer, *Conogethes punctiferalis*(Guen.) at the Zonal Agricultural and Horticultural Research Station (ZAHRS), Mudigere during 2022-23. Infestation of borer was present throughout the year, but peak infestation on shoot was recorded in the month of December (56.67%). Whereas, infestation on capsules peaked during first fortnight of December (33.65%). The correlation studies revealed that there was a significant positive correlation with maximum temperature and sunshine hours for shoot infestation. While, morning relative humidity had significantly positive correlation with capsule infestation. However, rainfall had significant negative correlation for both shoot and capsule infestation.

Keywords: Cardamom shoot and capsule borer, *Conogethes*, Rainfall, Temperature, Relative humidity and sunshine hours.

UNDER PEER REVIEW

Introduction

Small cardamom, (*Elettaria cardamomum*Maton)(Zingiberaceae) also known as “Queen of Spices” because of its various properties originated in Southern parts India. Among the Indian states, Kerala ranks top in production with 60 per cent followed by Karnataka and Tamil Nadu with 30 and 10 per cent, respectively (Anon., 2021). This crop is the primary provider of foreign exchange for India and can be used in a wide range of products, including food, confectionaries, drinks and alcoholic beverages. It is also a major component of Ayurvedic and Unani therapies (Thyagaraj, 1989). The dry capsules are used in both cooking and medicine. The cardamom seeds have a wonderful aroma and moderately pungent features.

Currently the yield of cardamom is affected by various problems like abiotic and biotic factors. Shoot and capsule borer, *Conogethes punctiferalis* is one of the major biotic factors that causes reduction of the quality and quantity of cardamom. It is a polyphagous insect pest known to cause damage to nearly 30 plant species, including cotton, maize, sorghum, guava, turmeric, ginger, citrus, mango, cocoa, sapota, grapevine, castor and

pomegranate, *etc*. apart from cardamom suckers and capsules that serve as alternate hosts for *C. punctiferalis* and are required for the species survival (Sengupta and Behura, 1955; Lall *et al*., 1980; Thyagaraj, 2003).

Materials and Methods

The experiment was conducted at Zonal Agriculture and Horticulture Research Station (ZAHRS), Mudigere during 2022-23 on variety M2. The plot was divided into four quadrates (25 m × 5 m =125 m^2) and five cardamom clumps were selected randomly from each quadrate to record the observations on the incidence of shoot and capsule borer. So, a total of 20 cardamom clumps were observed for the incidence. All the pseudo stems/ shoots and panicles of clump were observed at fortnightly intervals and the per cent damage on cardamom shoots and capsules was calculated.

The fluctuation of cardamom shoot and capsule borer population was estimated by counting the number of live bored hole (frass coming out from the bored hole or brownish colour markings around the bored hole) and capsules damaged by larva on these randomly selected plant parts. The infestation was expressed in terms of per cent shoot/capsule damage by using formula given below.

$$Shoot\ damage\ (\%) = \frac{Total\ no.\ of\ shoots\ damaged}{Total\ no.\ of\ shoots\ observed} \times 100$$

Further, per cent capsule infestation was calculated by formula

$$Capsule\ damage\ (\%) = \frac{Total\ no.\ of\ capsule\ damaged}{Total\ no.\ of\ capsules\ observed} \times 100$$

The data on rainfall, temperature, relative humidity and sunshine hours for the said study period was collected from District Agro meteorological Unit, Krishi Vigyan Kendra, Mudigere and correlated with cardamom shoot and capsule damage data.

Results and Discussion

The infestation on shoot ranged from zero to 56.67 per cent and on capsules the infestation ranged from zero to 32.26 per cent. However, peak infestation of borer was during

UNDER PEER REVIEW

first fortnight December on shoots and on capsules it was found during first fortnight of October. Further, infestation decreased gradually from January to May (Table 1).

The experimental results indicated that, damage of borer was recorded throughout the year; however, the highest infestation of borer on shoot and capsules was observed from September to December, it may be due to presences of emergence of new tillers which are commonly preferred by the shoot borer to feed.

These results was in slight conformity with the findings of Hanumantharaya (2015) who reported that the peak population of shoot and capsule borer occurred during June to July on cardamom capsules while it peaked during October to January on cardamom shoots and the findings are also similar to Shambhavi *et al*. (2023) also reported peak activity of capsule borer during 29th SMW on castor.

The fluctuation in the population of shoot and capsule borer is dependent on many factors *viz*., biotic and abiotic factors. Weather parameters play a significant role on borer infestation in cardamom. The current study attempted to demonstrate a relation between meteorological conditions such as rainfall, maximum and minimum temperature, morning and evening relative humidity and sunshine hours with shoot and capsule borer infestation. The results of the present study indicated that, the rainfall (r=-0.835), minimum temperature (r=-0.882), morning relative humidity(r=-0.723) and evening relative humidity (r=-0.874) negatively impacted the borer damage on shoots and it was non-significant. While, maximum temperature (r=0.868) and sunshine hours (r=0.659) positively impacted the shoot infestation by borer and it was highly significant indicating that as the temperature and sunshine hours increased, the infestation by the borer also increased.

Further, the capsule infestation was significantly and positively correlated with morning relative humidity (r=0.501) while it was non-significantly related with all other parameters. However, the capsule infestation was negatively correlated with rainfall (r=-0.108) and sunshine hours (r=-0.222) while it was positively correlated with minimum temperature (r= 0.016), maximum temperature (r=0.146) and evening relative humidity (r=0.250) indicating that an increase in temperature, relative humidity and sunshine hours triggered the increase in its population while the increase in rainfall decreased the population of the borer (Table 2). The results of the present study are in accordance with the findings of

UNDER PEER REVIEW

Kasareddy *et al*. (2018) on cardamom, Manjunatha *et al*. (2018) on castor, Momin *et al*. (2018) on ginger, Devi *et al*. (2021) on guava and Yadav *et al.* (2022) on castor who reported that *Conogethes* population on these crops increased with increase in temperature and relative humidity. While the findings were in conflict with the findings of Shambhavi *et al.* (2023) who reported that maximum temperature was negatively correlated with the capsule borer on castor.

UNDER PEER REVIEW

Table 1: Population dynamics of cardamom shoot and capsule borer, *Conogethes punctiferalis* during 2022-23 on variety M2

Month and Year	Fortnight	Infestation (%)	
		Shoot	Capsule
September 2022	I	25.68	18.95
	II	31.68	25.74
October 2022	I	45.62	38.89
	II	49.85	35.67
November 2022	I	52.41	23.41
	II	49.35	21.65
December 2022	I	56.67	19.67
	II	48.92	8.97
January 2023	I	31.21	0.00
	II	26.57	0.00
February 2023	I	11.68	0.00
	II	8.33	0.00
March 2023	I	8.56	0.00
	II	7.89	0.00
April 2023	I	7.53	0.00
	II	7.25	0.00
May 2023	I	6.59	0.00
	II	9.63	0.00
June 2023	I	26.85	12.68
	II	32.33	15.89
July 2023	I	0.00	0.00
	II	0.00	0.00
August 2023	I	0.00	0.00
	II	0.00	0.00

Table 2: Relation between Cardamoms shoots and capsule incidence (%) and weather parameters during 2022-23.

Damage	Rainfall (mm)	Temperature (°C)		Relative humidity (%)		Sunshine hours
		Maximum	Minimum	Morning	Evening	
Shoot	-0.835**	0.868**	-0.882**	-0.723**	-0.874**	0.659**
Capsule	-0.108	0.146	0.016	0.501**	0.250	-0.222

UNDER PEER REVIEW

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UNDER PEER REVIEW

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