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Influence of weather parameters on incidence of cardamom shoot and capsule borer (*Conogethes punctiferalis* Guenee) on cardamom

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Abstract

The results on cardamom shoot and capsule borer indicated that the peak population was recorded in the month of second fortnight of May on both M-1 and M-2 varieties of cardamom (per cent shoot damage of 24.93 and 26.06, respectively). Whereas, the peak infestation on capsules was recorded in the month of November on both M-1 and M-2 varieties of cardamom (15.0 and 15.80, respectively). The correlation studies indicated that there was a significant positive correlation with relative humidity & rain fall with per cent shoot damage in M-1 and M-2 varieties of cardamom.

Keywords: Cardamom shoot and capsule borer, *Conogethes punctiferalis*, Temperature, Relative Humidity

Introduction

Cardamom, *Elettaria cardamomum* Maton commonly known as “Queen of spices”, belongs to the family Zingiberaceae. It is indigenous to southern states of India and Sri Lanka. At present cardamom crop is facing many distinct problems apart from the natural calamities such as heavy/low rainfall, resulting in lower yield. Among the abiotic and biotic factors affecting the yield and quality of cardamom shoots and capsules, the damage caused by biotic factors viz., insect pests are considered as a major constraint for its successful cultivation and pose greater threat to cardamom production in Karnataka. Among the insect pests recorded on cardamom, the shoot and capsule borer is considered to be an important pest causing damage to the cardamom shoot/suckers as well as capsules. An estimated loss due to Cardamom shoot and capsule borer may goes up to 35-40%. Keeping the above points in view, the present investigations have been conducted to see the Seasonal incidence of cardamom shoot and capsule borer on cardamom varieties viz., M-1 and M-2 (M=Mudigere).

Material & Methods

The experiment was conducted at Zonal Agriculture and Horticulture Research Station (ZAHRS), Mudigere during 2015-16. Mudigere is located in hilly area with on average annual rainfall of 2400mm. In order to study the seasonal incidence of Cardamom Shoot and Capsule Borer (CSCB), *Conogethes punctiferalis* Guenee observations were recorded in cardamom plantation. In the experimental area except plant protection measures all the agronomic practices were followed as per the package of practices. Further, twenty five cardamom clumps were selected randomly in an 0.5ac area of M 1 & M 2 varieties to record the incidence *C. punctiferalis* in cardamom. Further, observations on the per cent shoot and capsules damage due to Cardamom shoot and capsule borer were recorded at fortnightly intervals from January 2015 to December 2015. The per cent shoot and capsule damage due to shoot and fruit borer was calculated by using the formula as follows.

$$\% \text{ shoot damage} = \frac{\text{Total no. of infested shoots}}{\text{Total no. of shoots observed}} \times 100$$

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Further, per cent capsule damage was calculated by

$$\% \text{ capsule damage} = \frac{\text{Total no. of infested capsules} \times 100}{\text{Total no. of capsules observed}}$$

After calculating the per cent shoot and capsule damage, the data obtained were correlated with weather parameters like, temperature ($^{\circ}\text{C}$), relative humidity (%), rainfall (mm) and sunshine hours (lux.).

Results & Discussion

Results on Cardamom shoot and capsule borer revealed that the infestations occurred throughout the year; however their peak infestation varied from season to season. The borer exhibited two peaks infestations *i.e.* first peak during May-June on shoots and on capsules during October-November on both the varieties (M1 & M2). The per cent shoot infestation on M-1 variety was ranged from 5.20 to 24.2% and 1.93 to 15.00% on capsules. Similarly, on M2 variety of cardamom the per cent infestation ranged from 4.6 to 26.06% on shoots and 1.06 to 15.80 on capsules (Table1). There was no much variations were recorded with regard to per cent infestation on M1 and M2 varieties of Cardamom. Infestation of capsules was observed from May to November in both the varieties of Cardamom. However, the peak per cent infestation was noticed during the first fortnight of November.

Further, the correlation studies indicated that, there was a significant and positive correlation was obtained between per cent shoot and capsule damage with per cent relative humidity

($r = 0.509$, $r = 0.624$, respectively). Further, there was negative correlation of temperature on shoot infestation ($r = -0.129$ and $r = -0.0402$ on M1 & M2 varieties, respectively), but positively correlated on capsules ($r = 0.089$ and $r = 0.075$). Whereas, Positive correlation of per cent shoot and capsule damage with rain fall ($r = 0.432$ and $r = 0.054$, respectively). Ballard (1927) ^[1] who reported that the seasonal change affects the shoot and capsule borer population and appearance of shoot borer infestation on crops in New Guinea. While, Ram *et al.* (1977) ^[2] observed *C. punctiferalis* infesting grapes during December to January which was attributed to availability of matured grape berries. Further, Kang *et al.* (2004) ^[3] reported that overwintered generations of *C. punctiferalis* emerged from May 20 to June 28. The deviation in the present study may be to availability of tender parts and weather parameters.

However, the other abiotic factors with per cent shoot and capsule damage was negatively correlated with M-2 variety of Cardamom and they are not significant. Whereas, in M-2 variety the per cent infestation of shoot damage due to capsule borer was positively correlated with rain fall ($r = 0.561$). However, the other parameters *viz.*, relative humidity and sunshine hours were positively correlated with per cent shoot damage and they are non significant with each other. The per cent capsule damage was significantly positive correlated ($r = 0.500$) with per cent relative humidity but negatively correlated with rain fall and sunshine hours ($r = -0.028$ and $r = -0.556$).

Table 1: Per cent infestation by *Conogethes punctiferalis* on M₁ and M₂ variety of cardamom during 2015-16

Months	Fortnights	Per cent infestation on M-1 Variety		Per cent infestation on M-2 Variety	
		Shoot	Capsule	Shoot	Capsule
January	I	08.93	00.00	07.53	00.00
	II	06.66	00.00	06.26	00.00
February	I	06.34	00.00	04.86	00.00
	II	05.40	00.00	04.60	00.00
March	I	06.40	00.00	06.00	00.00
	II	06.90	00.00	07.60	00.00
April	I	12.20	00.00	13.50	00.00
	II	14.93	00.00	17.20	00.00
May	I	21.53	01.93	22.20	01.06
	II	24.93	02.70	26.06	02.60
June	I	20.93	03.13	22.60	03.20
	II	16.53	04.46	20.73	03.33
July	I	17.40	05.46	18.30	04.33
	II	14.66	06.30	12.22	08.20
August	I	12.40	09.40	10.70	09.40
	II	08.06	11.20	09.66	09.46
September	I	05.20	12.50	06.99	11.30
	II	06.20	13.66	05.60	12.60
October	I	08.88	14.00	05.12	13.30
	II	09.50	14.30	06.20	14.13
November	I	11.06	15.00	07.40	15.80
	II	13.40	04.50	12.60	03.60
December	I	15.13	02.30	15.40	02.00
	II	19.80	00.00	18.60	00.00

Table 2: Relation between Cardamoms shoots and capsule incidence (%) and weather parameters during 2015-16

Variety	Parameters	Per cent Infestation	Temperature ($^{\circ}\text{C}$)	R.H (%)	Rain fall (mm)	Sunshine Hours (lux.)
M1	Shoot damage %	12.04	-0.1294	0.509	0.432	-0.030
	capsule damage %	5.42	0.089	0.624	0.054	-0.760
M2	Shoot damage %	11.68	-0.040	0.385	0.561	0.023
	capsule damage %	6.33	0.075	0.50	-0.028	-0.556

Note: table value @ 5% =0.462

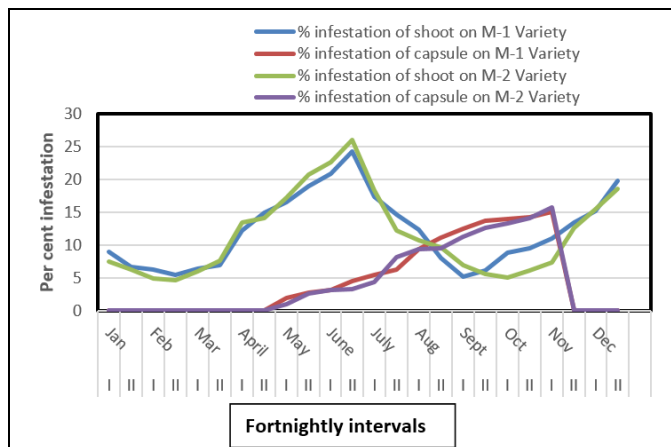


Fig 1: Per cent shoot and capsule infestation by *Conogethes* on M₁ and M₂ varieties of Cardamom.

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