



Short Communication

Influence of abiotic factors on incidence of apple and nut borer, *Thylocoptila panrosema* Meyrick of cashew

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ABSTRACT

A research was carried out on cashew variety Vengurla-4 at farmer's field in hilly area of the Dangs district, Gujarat, India during 2018 and 2019 to study the association between the incidence of apple and nut borer of cashew and abiotic factors. Regular weekly observations were recorded on the per cent damage of the pest. Apple and nut borer incidence was confined during January to May with maximum damage during April and was negatively influenced by evening and mean relative humidity as well as bright sunshine hours.

Keywords: Abiotic factors, apple and nut borer, cashew, incidence, *Thylocoptila panrosema*

INTRODUCTION

Cashew (*Anacardium occidentale* L.) belongs to the family Anacardiaceae considered to be a native of Eastern Brazil from where it was introduced in India by the Portuguese nearly five centuries ago. The nuts, apples, and other by-products of this crop are of commercial importance. The production and productivity of cashew are influenced by many factors; among them, insect pests is one of the major constraints that causing a crop loss of 30 to 40 percent (Satapathy, 1993). As the area and productivity of cashew increased, the problem of pests is also increased. Around 151 species of insect and non-insect pests were in India (Sundararaju, 1993). Among cashew apples and nuts, borer is one of the important pests of cashew. It causes 10-30 percent yield loss during years of severe infestation in certain cashew growing areas (Dharmaraju et al. 1974).

Recently, much of the emphasis is being given to sustainable agriculture based on suitable integrated pest management strategies. Hence, knowledge of pest population ecology is essential for appropriate control strategies. Further, the pest's interaction with abiotic factors helps in planning the need-based application of insecticides, as it clearly reveals the insect's peak activity periods during crop growth. Hence, information on the seasonal incidence and the influence of weather on the development of pests is of prime importance for forecasting the incidence of pests in a particular region.

MATERIALS AND METHODS

A field experiment was conducted during 2018 and 2019 on cashew variety Vengurla-4 at farmer's fields in the hilly area of the Dangs, Gujarat. The incidence of apple and nut borer in the cashew ecosystem was studied in relation to weather parameters. The observation on the incidence of apple and nut borer of cashew was recorded during fruit setting to harvesting stage at weekly interval. For recording the observations, three cashew trees were selected randomly from the experimental plot area. The whole experimental plot was kept free from any insecticide application.

Thirteen leader shoots in each direction (East, West, North, and South) on three randomly selected trees were observed for the total number of apple and nut and the number of apple and nut infested. The recorded data converted into percentage on the basis of the formula given below,

$$\text{Per cent damage} = \frac{\text{Number of damaged apples/nuts}}{\text{Total number of apples/nuts}} \times 100$$

With a view to studying the impact of different weather parameters on pest incidence, a simple correlation between percent damage and weather parameters was worked out.

RESULTS AND DISCUSSION

The occurrence of apple and nut borer presented in the Table 1 revealed that the percent damage of apple and nut borer ranged from 0.32 to 5.49 percent with an average of 2.36 percent throughout its occurrence

during the year 2018. Furthermore, apple and nut borer incidence started from January and subsequently found increasing and reached a peak (5.49%) in the month of April 14th SMW. Thereafter, it was rapidly declining and remained absent from June to December.

An almost similar pattern of percent damage was observed in the year 2019. It was ranged from 0.55 to 4.25 with an average of 1.61 percent. As high as 4.25 percent damage was recorded in the month of April 14th SMW during the period under report.

Likewise, the same trend of percent incidence was apparently observed from the average data of two years (2018 and 2019). As mentioned individually for two years, the average percent incidence was ranged from 0.16 to 4.87 percent with an average of 1.98 percent (Table 1).

Table 1. Incidence of apple and nut borer in cashew during 2018 and 2019

Month and week	SMW	Per cent damaged apple and nut		
		2018	2019	Average
January	I 1	0.32	0.00	0.16
	II 2	0.65	0.00	0.33
	III 3	0.66	0.00	0.33
	IV 4	1.56	0.55	1.06
February	I 5	1.68	1.21	1.45
	II 6	1.68	1.73	1.71
	III 7	2.15	1.75	1.95
	IV 8	2.25	1.90	2.08
March	I 9	2.30	2.12	2.21
	II 10	3.42	2.36	2.89
	III 11	3.67	2.50	3.09
	IV 12	3.96	3.22	3.59
April	I 13	4.53	4.04	4.29
	II 14	5.49	4.25	4.87
	III 15	5.11	2.15	3.63
	IV 16	1.78	1.12	1.45
May	I 17	1.33	0.00	0.67
	II 18	0.00	0.00	0.00
Mean		2.36	1.61	1.98

Average data of two years on percent damage clearly indicated that the activity of apple and nut borer was started after initiation of fruit setting i.e. in the month of January in the hilly area of the Dangs. It has well coincided with the setting of fruit. Thereafter, percent damage found increasing and it was maximum during April. After the month of April, apple and nut borer went on decreasing quickly and almost absent by the May 18th SMW due to the non-availability of suitable apple and nut in the hilly area of the Dangs.

In earlier studies, the apple and nut borer incidence was observed between January to May by Ramadevi and Radhakrishna (1991) as well as Anonymous (2004) in Andhra Pradesh, Chatterjee (1988) in West Bengal, Thirumalaraju et al. (1991) in Karnataka, Jalgaonkar et al. (2015) in Maharashtra are comparable with the present findings. Furthermore, Naik et al. (2012) reported that percent damage caused by apple and nut

borer was low in coastal and maidan Karnataka is also comparable with the present findings.

However, the incidence period observed between December to March by Zote et. al. (2016 and 2017) in Maharashtra which is slightly different from the present findings may be due to early flowering.

Effect of abiotic factors on apple and nut borer incidence

The relationship between weather parameters and apple and nut damage recorded during 2018 presented in Table 2 revealed that none of the tested weather parameters had significantly influenced apple and nut borer damage under field conditions.

While during 2019 only bright sunshine showed a significant negative correlation with apple and nut borer damage at a 1% level (Table 2).

The average data of two years (2018 and 2019) of apple and nut borer damage (Table 2) correlated with weather parameters indicated that significant negative impact by evening relative humidity, mean relative humidity, and bright sunshine at 5% level. Whereas, other weather parameters did not influence the apple and nut borer incidence.

Table 2. Correlation between weather parameters and apple and nut borer incidence in cashew during 2018 and 2019

Weather Parameters	Per cent damaged apple and nut		
	2018	2019	Average
Maximum temperature (°C)	0.464	0.318	0.439
Minimum temperature (°C)	0.424	0.218	0.338
Mean temperature (°C)	0.455	0.268	0.389
Morning relative humidity (%)	-0.400	-0.158	-0.354
Evening relative humidity (%)	-0.427	-0.177	-0.502*
Mean relative humidity (%)	-0.461	-0.237	-0.481*
Bright sunshine hours (hr/day)	-0.328	-0.644**	-0.525*
Wind speed (km/hr)	0.120	-0.094	0.021
Evaporation(mm/day)	-0.342	-0.259	-0.310

* Significant at 5% level ** Significant at 1% level

In earlier findings, a significantly negative correlation between bright sunshine hours and percent damage was found in the record of Anonymous (2004) in Orissa which is similar to the present investigation results. Furthermore, non-significant relation with temperature and percent damage was reported by Jalgaonkar et al. (2015) in Maharashtra, and Kar and Poduval (2016) in West Bengal are matched with present findings. However, the report of Mohapatra and Lenka (2003) in Orissa and Zote et al. (2017) in Maharashtra differs from the present correlation results.

CONCLUSION

From the present study, it is concluded that, the incidence of apple and nut borer was confined during January to May with maximum damage (4.87%) in the month of April 14th SMW and remained absent during June to December. The pest incidence was negatively influenced by evening relative humidity, mean relative humidity and bright sunshine, whereas other weather parameters did not influence the incidence of apple and nut borer.

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