

# SEASONAL INCIDENCE OF INSECT PESTS IN CASHEW IN RELATION WITH WEATHER CONDITIONS IN RED AND LATERITE ZONE OF WEST BENGAL

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## INTRODUCTION

Cashew (*Anacardium occidentale* L.) is an important dollar earning crop in India. The productivity of cashew is greatly influenced by many biotic and abiotic factors of which insect pests are one of the major constraints. More than seventy species of insect pests are reported to infest cashew in various stages of crop growth and development (Butani, 1981; Rai, 1984; Sundararaju, 2002, 2004). Cashew insect pests are mainly coinciding with the flushing, flowering and fruiting periods. Some insects like tea mosquito bug (TMB), inflorescence thrips and apple and nut borer cause direct damage to the crop. Therefore, it is necessary to study the seasonal occurrence of those insects as the flowering time fluctuates with the agro climatic zone. Sundararaju (2005) reported highest population abundance of TMB per lateral shoot during October to January in Karnataka; while Sahu *et al.* (2011) reported occurrence of same pest during October to May in Chhattisgarh.

Insect population always fluctuates according to the changing environment. Both physical (abiotic) and biotic factors are believed to be the most important factors responsible for the changes in insect population. Andrewartha and Birch (1954) stated four components of the environment that influenced animal or insect populations, namely weather conditions, food, other insects and organisms causing disease, and the living place. Climatic factors such as rainfall and relative humidity have been known to greatly influence the population change of *Helopeltis* spp. (Pillai *et al.*, 1979; Muhamad and Chung, 1993; Karmawati *et al.*, 1999).

Detailed information on the seasonal occurrence of insect pests of cashew and the extent of their damage in relation to prevailing weather conditions in the red and laterite zone of West Bengal is not available and it is very important to study the trends or emergence of insect pests and nature and extent of their damage caused to the crop before execution of any plant protection schedule. With these background, the present investigation was undertaken to study seasonal occurrence and extent of damage caused by these insects and to correlate their infestation with weather parameters in red and laterite zone of West Bengal.

## MATERIALS AND METHODS

A survey was done at fortnight interval in the Red and Laterite zone of West Bengal during 2014-15 and 2015-16 to find out the major insect pests associated with the cashew, their seasonal incidence and correlation with the weather parameters. During the study period 2000 plants were observed to record the cashew stem and root borer (CSRB) infestation. Observation was recorded from ten randomly selected plants from five locations. The TMB damage was recorded from 52 randomly selected leader shoots of each plant covering east, west, north

## ABSTRACT

An experiment was conducted at Regional Research Station (Red and Laterite Zone), Bidhan Chandra Krishi Viswavidyalaya and West Bengal to observe the seasonal incidence of major insect pests of cashew as influenced by the prevailing weather conditions. Results revealed that cashew stem and root borer, leaf and blossom webber, tea mosquito bug, leaf miner, thrips and apple and nut borer were major pests of cashew causing maximum damage to the tune of 21.5, 18.5, 19.1, 10.0, 18.7, and 17.3%, respectively, in their peak infestation periods. Cashew stem and root borer infesting both in summer and rainy season showed positive correlation with minimum temperature ( $r = 0.780^{**}$ ), rainfall ( $r = 0.943^{**}$ ) and number of rainy days ( $r = 0.927^{**}$ ) while tea mosquito bug had significant negative correlation with all these parameters. Leaf miner registered positive correlation with relative humidity ( $r = 0.713^{**}$ ) and rainfall ( $r = 0.736^{**}$ ) which had negative relation with apple and nut borer damage. Thrips infesting during monsoon and winter season showed negative correlation with all the weather parameters excepting relative humidity. There was hardly any variation in the trend of occurrence of pest infestation but percentage of damage fluctuated based on seasonal variations in weather parameters.

## KEY WORDS

Cashew stems and root borer  
Tea mosquito bug  
Seasonal variation  
Relative humidity

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and south sides of its canopy following the method of Jalgaonkar *et al* (2015). The damage of shoots/panicles were scored using 0-4 scale (0, no damage; 1, 1 to 3 necrotic streaks/lesions; 2, 4 to 6 coalescing or non-coalescing lesions/streaks; 3, above 6 coalescing or non-coalescing /streaks; 4, lesions/streaks confluent or wilting or drying) and percent damage was computed following the method given by Ambika *et al.* (1979).

Leaf miner damage was recorded from leaves of 5 randomly selected shoots from each sides of canopy of each plant where number of healthy leaves and infested leaves were recorded and percent damage was calculated as per the procedure given by Kanhar *et al*, 2016. In case of Leaf webber (LBW), damage was recorded from 52 randomly selected shoots covering all sides of canopy of plant. The number of healthy shoot and webbed shoots were recorded and percent damage was calculated. Apple and nut borer (ANB) damage was recorded from 100 nuts and apples (only at the fruiting period) and percent damage was calculated. Thrips damage was recorded from 20 leaves covering each side of canopy and 50 nuts and apples (only at the fruiting period) and damage was scored using following 0-4 scale (0, no damage; 1, 1 to 25 percent surface damage; 2, 26 to 50 percent surface damage; 3, 51 to 75 percent surface damage; 4, 76 to 100 percent surface damage) and percent damage calculated following the procedure suggested by Navik *et al.*, 2015.

## RESULTS AND DISCUSSION

The experimental result revealed that the pattern of occurrence was identical in both the years while the percent of damage fluctuated. The most important insect observed in the red and laterite zone of West Bengal were CSRB, LBW, leaf miner, thrips and ANB. The CSRB was reported as one of the most damaging insect of this region. The grubs remain hidden inside the bark and cause damage by making tunnel. It was recorded during the study period that the trees of more than ten years old were much prone to the insect attack. A similar observation was also reported by Sundararaju (2005). Minimum one to maximum twenty four numbers of grubs was recorded in a single tree. The trees with higher trunk girth were infested by more numbers of grubs. Maximum 21.5% of damage occurs during 1<sup>st</sup> fortnight of July and there was no infestation observed from November to first fortnight of April. The grubs were initially found in stem and later on moved towards the root. In advance stage of attack the uptake of water and nutrient by the root got stopped; the plant canopy showed yellowing and died. Similar observation was also reported by Mohapatra and Jena (2007). The pest showed significant positive correlation with minimum temperature, rainfall and rainy days (Table 1). However, Vidya

*et al.* (2011) reported that CSRB showed positive correlation with minimum temperature but negative correlation with rainfall which is contradictory to our present finding.

The most important insect in post monsoon season is LBW (Fig. 1), although this insect is considered as a minor insect in the other parts of India but in West Bengal it caused severe foliar damage in the peak period during August to October. The pest emergence was observed with the new vegetative flush of cashew in August and the peak period of damage was marked from September to October. The LBW showed a positive correlation with all the weather parameters studied (Table 1). Maximum 18.5 % infestation was observed in first fortnight of October and then gradually decline.

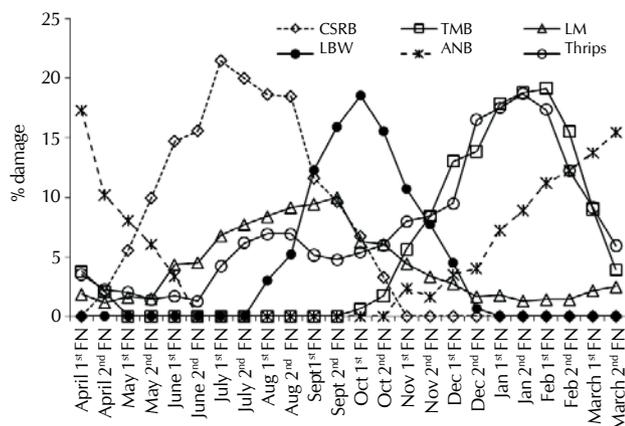
The most important threat of cashew production in India is TMB. The pest incidence was recorded negligible in West Bengal few years back but its infestation was severe during the study period. This pest incidence was observed with vegetative flush before panicle emergence during December and peak infestation was observed during January - February causing, on an average, 17.8% damage to crop and goes down with the onset of summer (Fig. 1). Dense necrotic lesions were observed on small twigs infested with a large population of nymphs and adults. On the shoots, elongate streaks and brownish patches developed due to feeding puncture and the infested regions dried up. Similar observation was also recorded by Naik *et al.* (2012). The TMB showed significant negative correlation with maximum weather parameters studied (Table 1). This finding corroborated with the results reported by Vidya *et al.* (2011); while Bhaskar *et al.* (2011) stated that rainfall showed positive correlation with TMB in Kerala. Again the result is contradictory with Sahu *et al.* (2011) who has reported that rainfall has negative correlation with TMB attack.

The leaf miner was also observed as regular pest of cashew in this region. The pest incidence coincided with the new vegetative flush of cashew during August-September causing an average maximum damage by 9.2% and it remained in the field throughout the year (Fig. 1). The pruned trees having maximum new vegetative flushes were much prone to the insect attack. Four to five number of larva were observed in a single mine. Very low pest incidence was observed during winter months. Leaf miner showed a significant positive correlation with relative humidity and rainfall (Table 1); while Vidya *et al.* (2011) reported that leaf miner has positive correlation with the relative humidity but negative correlation with rainfall. However, Mohapatra and Lenka (2003) reported that the incidence of cashew pests like leaf miner was not influenced by the weather parameters.

The thrips was also recorded as a regular pest in this region

**Table 1: Correlation of weather parameters with pest complex of cashew**

Pest/ Weather parameters	Max. temp (0C)	Min. temp (0C)	RH (%)	Rainfall (mm)	Rainy days
Cashew stem and root borer	0.299	0.780**	0.504	0.943**	0.927**
Leaf and blossom webber	-0.191	0.005	0.476	0.08	-0.16
Tea mosquito bug	-0.626*	-0.889**	-0.216	-0.725**	-0.675*
Leaf miner	-0.178	0.371	0.713**	0.736**	0.546
Apple and nut borer	0.32	-0.203	-0.930**	-0.593*	-0.46
Thrips	-0.874**	-0.895**	0.202	-0.479	-0.436



**Figure 1:** Seasonal incidence of major insect pests of cashew in red and lateritic zone of West Bengal (pooled of two years data)

but peak infestation that caused economic damage (11.8%) was observed from panicle initiation to fruit development. The pest incidence was negatively correlated with all the weather parameters (Table 1) as also observed by Vidya *et al.* (2011).

The ANB infestation was also recorded and it was observed that a huge damage occurred due to this pest during 2015-16. Maximum 17.3% crop damage occurred during 1<sup>st</sup> fortnight of April. The ANB damage showed negative correlation with relative humidity and rainfall (Table 1). The result is in the line of work as reported by Sahu *et al.* (2011).

The study depicted that CSRB, LBW, TMB, leaf miner, thrips and ANB were major insect pests of cashew grown under red and lateritic zone of West Bengal. However, their percentage of damage varied depending on climatic conditions. Maximum insect infestation was recorded from October to February (except CSRB) coinciding flushing, flowering and fruiting periods. The CSRB causing maximum crop damage during both summer and rainy seasons showed positive correlation with minimum temperature, rainfall and number of rainy days. The outcome of this study can aid in planning of insect control by pest monitoring, pest forecasting, biological control studies and chemical control which are important components of Integrated Pest Management.

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