Short Comminucation

Effect of abiotic factors on population dynamics of insect pests in tamarind tree

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Tamarind (Tamarindus indica) is an important tree of semi arid tropical conditions. The fruit pulp, sweetish in taste, is used for serving curries, chutneys, sauces and soups because of its anti ascorbic properties. Tamarind kernel powder (TKP) is used as a sizing material in textile and leather industries. In India, tamarind is found abundantly in Chhattisgarh, Madhya Pradesh, Telangana, parts of Maharashtra, Tamil Nadu, Orissa, Bihar and Bengal. The annual production of tamarind in India is ranging from 2.5 to 3 lakh tonnes. Tamarind tree is attacked by more than 40 species of insect pests, although only few of them are economic importance (Joseph and Oommen, 1960). Among these, fruit borer, Cryptophlebia ombrodelta was categorized as major pest causing 27.95 per cent fruit borer infestation/ tree (Gupta, 2017). Pest populations have a tendency to fluctuate as a result of the influence of the environmental factors. The degree of influence of various environmental factors determined the magnitude of increase or decrease in the number of a pest population. Information on pest complex in particular agro climatic condition is a prerequisite, which helps in designing a successful pest management strategy to know the proper and appropriate ecological requirements. Therefore, the present work is envisaged to study the diversity of pests of tamarind agro ecosystem in relation to environmental factors.

The present investigation was conducted on tamarind tree during the year 2014-15 and 2015-16 in Bastar district of Chhattisgarh state which belongs to sub humid agro climatic region of India. Geographically, Bastar is located at 17' 45' to 20' 34' N and 80' 15' to 82' 15' E longitude with altitude ranging from 550 m to 850 m above mean sea level. For the study of different insect pests associated with tamarind, two blocks of Bastar district namely Jagdalpur and Tokapal were selected. In each blocks, five villages were selected where, eight trees per village were tagged randomly. For the present investigation, one square meter area was marked in all four directions (N, S, E and W) in each selected tree. Fortnightly observations on insect-pests population were recorded on randomly selected trees during the period of fruiting *i.e.* June to September. Number of fruit borer larvae and other insect pests were recorded fortnightly from one square meter area in all directions of selected trees

randomly. Insect pests population data were subjected to simple correlation with weather parameters, such as temperature, humidity and rainfall obtained from the meteorological observatory of College of Agriculture and Research Station, Jagdalpur.

Population dynamics of insect pests

During the course of study, three insect pest species were noticed causing damage at various growth stages of tamarind, namely fruit borer, mealy bug and scale insect were first to infest the crop and recorded as major pest, while, others *i.e.* plant hopper, tree hopper and hairy caterpillar were visitors only. Two years (2014-15 to 2015-16) mean data of fruit borer, Cryptophlebia ombrodelta, mealy bug, Nipaecoccus viridis, and scale insect, Aonidiella orientalis, presented in Fig.1 shows that the incidence of insect pests on tamarind was observed in 27th SMW and continued till 7th SMW of next year under present study. Fruit borer population was found to appear in first week of July (27 SMW) which was found to increase gradually with the rise in morning relative humidity and availability of green fruits. The peak population was attained during 4th week of August (35 SMW) with an average of 19.66 fruit borer larvae m⁻². After that population of fruit borer gradually declined and became very low during 2nd week of February (7 SMW) with an average of 1.47 fruit borer larvae m⁻²). Mealy bug population was first recorded on crop during first week of



Fig.1: Seasonal abundance of fruit borer, mealy bug and scale insect on tamarind tree (Mean of two years, 2014-15 & 2015-16)

Weather Parameters	Correlation coefficient			
	Fruit borer	Mealy bug	Scale insect	
Max. temperature	-0.251	-0.15	-0.28	
Min temperature	0.325	0.251	0.183	
R H morning	0.625**	0.690**	0.716**	
R H evening	0.444*	0.329	0.327	
Rainfall	0.347	0.392*	0.217	

Table 1: Correlation coefficient of insect pests on tamarind with weather parameters (2014-15 & 2015-16)

July (27 SMW). It was active throughout the cropping period. Its population increased suddenly up to 18.53 bugs m⁻² during 4th week of August (35 SMW). The peak activity coincided with the rise in relative humidity and rainfall. Scale insect appeared during first week of July and reached peak level (36.43 scale insects m⁻²) during 4th week of September (39 SMW). Two more peaks of 26.17 and 18.05 scale insects m⁻² were recorded during first week of November (45 SMW) and 1st week of December (49 SMW), respectively. Thereafter, with a slow decline reached an average of 2.01 insects m⁻² during last week of February with the crop maturity. The peak population of the insect pests were attained during 4th week of August (35 SMW) to 4th week of September (39 SMW). These peak activities coincided with available green pod and becoming more pronounced during the period of high morning relative humidity. The one or two factors may be favourable in case of particular insect population but may become unfavourable for another. It is necessary to consider the influence of abiotic factors with respect to a particular pest population (Atwal and Singh, 1990).

Correlation with weather parameters

Correlation was worked out between population of these insect pests infesting tamarind tree and meteorological parameters to study the effect of abiotic factors on insect pest population (Table 1). It was observed that fruit borer population showed highly significant positive correlation (r = 0.625) with morning relative humidity and significant positive correlation (r=0.444) with evening relative humidity. Mealy bug population exhibited significant positive correlation (r=0.690) with morning relative humidity and significant positive correlation (r=0.392) with rainfall. Scale insect showed highly significant and positive correlation ($r = 0.716^{**}$) with morning relative humidity. All these three insect pests were non significant but negatively influenced with maximum temperature. Relative humidity is probably the most important environmental factor influencing the

growth and development of insect pests. Sharma and Chatterjee (1966) reported that the activities of insects tend to become maximum at specific range of humidity. Dabhi *et al.* (2013) reported that the morning and evening relative humidity had significant positive correlation with the incidence of shoot and fruit borer in okra during *kharif* season. The results of the present study are also in accordance with the finding of Karar *et al.* (2013) who reported that relative humidity and rainfall exerted positive correlation with population of mealy bug and scale insects in mango.

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