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Short communication

Influence of meteorological parameters on population dynamics of thrips (*Thrips tabaci* Lindeman) and aphid (*Aphis gossypii* Glover) in *Bt* and non *Bt* cotton at Malwa region of Madhya Pradesh

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Cotton (*Gossypium spp*.) is most extensively cultivated commercial cash crop of India and is important of all fiber crops of the Madhya Pradesh, India and world. In Madhya Pradesh cotton is cultivated in 7.06 million ha with production of 17.70 million bales and productivity of 426.20 kg per ha. (Anonymous, 2012).India is only country in the world where all the four cultivated species of cotton, *viz*., *Gossypium arboreum* L.,*G. hirsutum* L., *G. herbaceaum* L. and *G. barbadense* L. along with intra and inter-specifics hybrids are cultivated along the diverse agro-climatic conditions (AICCIP,2011). The insect pests are a major constraint in achieving higher productivity (Shera, 2013).

The cotton thrips (*Thrips tabaci* Lindeman) and aphid (*Aphis gossypii* Glover) are the most limiting factors in achieving higher productivity of cotton. The nymphs and adults lacerate the tissue and suck the sap from upper and lower surfaces of leaves and in cases of severe attack, causes foliar deformity (leaves crinkle and cup upward), plant stunting and delays in maturity. Combined attack by thrips (14.6 /leaf) and jassid (4.6 / leaf) caused a 37.6% loss in the yield of seed cotton (Attique and Ahmad 1990). Aphid (both nymph and adult) suck sap from underside of the foliage causes direct damage to plant and its reduce the yield by feeding and indirect damage causes by lint contamination due to secretion of honey dew and associate fungi. So that quality of lint has deteriorated. It reduce seed cotton yield varies from 25.9% to 48.9% (Rao *et al*, 1989).

The prevalence and build up of thrips (*T. tabaci* Lindeman) and aphid (*A. gossypii* Glover) population on cotton is mostly governed by meteorological parameters like temperature, relative humidity, rainfall, sunshine hours, wind velocity and rainy days. Thus, the knowledge of the influence of meteorological parameters on thrips and aphid of cotton will help to develop a forecasting system which will be helpful in decision making system and timely application of suitable insecticides for effective management of thrips (*T. tabaci* Lindeman) and aphid (*A. gossypii* Glover) in cotton agro-ecosystem. Therefore, the present investigation was undertaken to find out the relationship between the population dynamics of thrips (*T. tabaci* Lindeman) and aphid (*A. gossypii* Glover) on *Bt* & non *Bt* cotton with meteorological parameter in Malwa region.

The experiment was conducted at farm of College of Agriculture, Indore, (M.P.) during 2011-12 *kharif* season, using cotton variety TULSI-171 (BGII *Bt* and non *Bt*) the crop was sown on July 10th in the plots measuring 540×520 cm having row to row and plant to plant distance of 60×45 cm. respectively. All the recommended agronomical practices were followed time to time to raise the crop successfully as per package of practices prescribed for the region. The data regarding the population of cotton thrips and aphid were recorded at weekly intervals, taking two leaves each from top, middle and bottom from five randomly selected plants from each plots. The meteorological factors *i.e.* maximum and minimum temperature (^{0}C), humidity (%), rainfall (mm), wind velocity (kmh^{-1}) and rainy days (nos.) in different meteorological standard weeks (MSW) during the crop season of 2011- 12 were recorded and their relationship with population of thrips and aphid were worked out by using simple correlation.

Population dynamics of thrips and aphid

The thrips occurrence started with peak 9.35 thrips / leaf and 8.33 thrips / leaf in 31th MSW *i.e.* after three week of sowing and its infestation remained throughout the crop growth in both *Bt* and non *Bt* cotton crops (Fig.1). When the meteorological parameters *i.e.* maximum temperature, minimum temperature, humidity, rainfall, wind velocity and

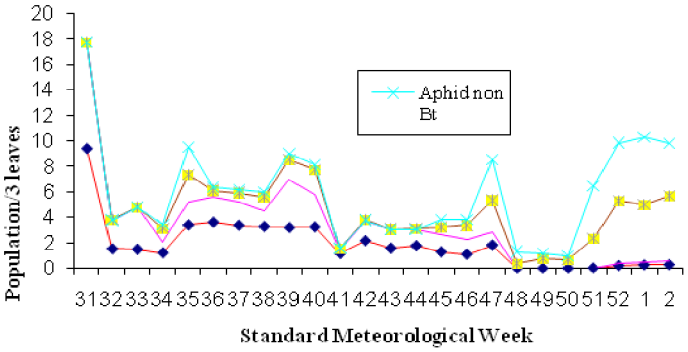

Fig.1 Mean population of sucking insect pest (thrips & aphid)on Bt and non Bt cotton

rainy days were 27.1^{0}C, 22.5^{0}C, 88%, 26 mm, 10.1 and 3 days, respectively.

The present investigation is partially agreement with Gupta *et al.,* (1997) who observed that the peak population of thrips was recorded during the second fortnight of August to the first fortnight of October with 30^{0}C temperature and 74-85% R.H. on the cotton in MP.

The aphid infestation started with 1.05 aphids / leaf and 0.38 aphid / leaf in 34th MSW *i.e.* after six week of sowing and it remained throughout the crop growth in both *Bt* and non *Bt* cotton crops. During the aphid activity meteorological *i.e.* maximum temperature, minimum temperature, humidity, rainfall wind velocity and rainy days were 27^0 C, 21.8^0 C, 90%, 6.6 mm, 7.7kmh^{-1} and 1 days respectively (Fig. 1). The present studies are corroborates with Soujanya *et al,* (2010) who observed that the initial incidence of aphids was recorded on 34th SMW.

Correlation studies

The correlation workout between meteorological parameters and population of thrips an daphid are presented in table 1. The positive significant correlation was found between thrips population and minimum temperature (*Bt* r = 0.518*) (non *Bt* r = 0.480*), morning humidity (*Bt* r = 0.455*) (non *Bt* r = 0.424*) and rainy days (*Bt* r = 0.409*)(non *Bt* r = 0.440*) in *Bt* and non *Bt* cotton. The present findings corroborated with Gupta *et al.,* (1997) who reported that the positive correlation of temperature with thrips population. It was evident from Table 1 that the positive significant correlation was found between population of thrips and in both the crops. The present findings corroborated with Gupta *et al.,* (1997) who reported that the positive correlation of relative humidity with thrips population.

The present investigations are supported in findings of Khan *et al.,* (2008) who noticed that Incidence of thrips

Table 1 : Correlation coefficient of thrips and aphid population with meteorological parameters on *Bt* and non *Bt* cotton.

Weather parameters	Thrips		Aphid	
	Bt	non *Bt*	*Bt*	non *Bt*
Max . Temperature	0.150	0.034	-0.466*	-0.546*
Min Temperature	0.518*	0.480*	-0.486*	-0.577*
Morning relative humidity	0.455*	0.424*	-0.508*	-0.588*
Rainfall (mm)	0.028	0.006	-0.187	-0.197
Wind velocity	0.260	0.361	-0.193	-0.226
Rainy days	0.409*	0.440*	-0.246	-0.265

* Significant at 5% level

was highly affected by weather factors like mean air temperature; relative humidity and rainfall. They revealed that temperature played a significant and positive role for thrips (r=0.645) population development. Relative humidity and rainfall were also positively associated with thrips population.

It was evident form Table 1 that aphid population in both crop was negatively correlated with maximum temperature (*Bt* r = -0.466*) (Non *Bt* r = -0.546*) in *Bt* and non *Bt* cotton. Similarly it was revealed (Table 1) that the significant negative correlation was found between population of aphid and minimum temperature (*Bt* r = -0.236*)(non *Bt* r = -0.577*) in *Bt* cotton and non cotton crops. Further it was depicted that the significant negative correlation was observed between aphid population and morning humidity (*Bt* r = -0.508*)(non *Bt* r = -0.588*) in *Bt* and non *Bt* cotton crops. The *Bt* and non *Bt*-cotton revealed negative correlation with rain fall. The earlier workers Singh and Paul (2009) who observed that significant negative correlation between population of aphid with minimum temperature and mean per cent relative humidity, which is fully supported to the present findings. Besides this, they had also observed the significant positive correlation was found between population of aphid and maximum temperature which was not agree with present investigations. The present studies are corroborates with Shanthi *et al.,* (2009) who reported that the correlation analysis indicate significant negative influence of temperature on the population buildup of *Aphis gossypii*. Earlier, Jalali *et al.* (2000) from Bangalore conditions had reported that significantly negative

correlation between maximum temperature, per cent relative humidity and aphid population which is conformity with the present findings. Besides this, they had also observed non significant negative correlation between aphid population with minimum temperature and rainfall which was also agree with present investigations. Similarly it is partially supported by Soujanya *et al,* (2010) who observed that all the weather factors except maximum temperature which showed significant negative correlation.

The present findings are contradictory with Tomar, (2010) who observed that weather parameters namely maximum and minimum temperature and relative humidity showed positive correlation with aphid population. It may be due to variation in experiment location. The present findings are in line with Laxman *et al,* (2013) who reported negative correlation with rainfall.

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