Effect of Abiotic and Biotic Factors on Jassid and Fruit and Shoot borer in *kharif* Okra Crop

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SUMMARY

The field density of *Amrasca biguttula biguttula* and *Earias vittella* along with their associated abiotic and biotic factors were observed in okra field at Kanpur. The incidence of jassid, *Amrasca biguttula biguttula* began from July and fruit and shoot borer, *Earias vittella* from August and continued till October. Among the parasitoids, *Anagrus flaveolus* associated with jassid and *Trichogramma chilonis* with *E.vittella* were the most important natural enemies. The percentage of parasitism of *A.flaveolus* ranged from 3 to 9 and of *Trichogramma chilonis* from 10 to 12 per cent. The data revealed a high positive relationship between the pest and parasitoids indicating an important role in suppressing pest population to some extent. Predator, *Chrysoperla carnea* was recorded preying on nymph and adult of *Amrasca biguttula biguttula*. The abiotic factors were closely related with pest population.

Key words : Okra, *Amrasca biguttula biguttula* , *Earias vittella*, Natural enemies

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Okra (*Abelmoschus esculentus)* is an important vegetable crop in India. It is attacked by a number of insect-pests, mites and nematodes (Chaudhary and Dadheech, 1989). Among these pests, the jassids and shoot and fruits borer are the most important.The cost of plant protection with chemical pesticide is very high and it has hazardous chemical effect to the environment (Mukhopadhyay, 2003). Keeping this point in view, a study was carried out in Kanpur, Uttar Pradesh on the occurrence of natural enemies and their role in regulation of host population.

MATERIALS AND METHODS

To determine the seasonal abundance of *Amrasca biguttula biguttula* and *Earias vittella* on okra, the experiments were conducted at Vegetable Research Farm, Kalyanpur, C. S. Azad University of Agriculture and Technology, Kanpur during *kharif* season of 2005 and 2006 as well as in the laboratory of Department of Entomology, C.S. Azad University of Agriculture and Technology, Kanpur for two consecutive years. Okra Azad Bhindi-1 was sown in third week of July in both the crop seasons in an area of 13.45 x8.50 m with a buffer strip of 1.00 m all around the three replications. Crop was cultivated by adopting recommended agronomic practices of this region. Weekly observations on appearance and population build-up of jassid and fruit and shoot borer and their associated natural enemies were recorded on five randomly selected plants from each replication. Immature stage of *Earias vittella* were collected from okra field on every observation date and reared separately in laboratory to record the number of parasitoids emerging from them and to identify the parasitoids. In addition, abiotic factors such as temperature, relative humidity and rainfall were taken from Meteorological Section, C. S. Azad University of Agriculture and Technology, Kanpur, to work out the relationship between pest density and abiotic factors

RESULTS AND DISCUSSION

Incidence of nymphs and adults of *Amrasca biguttula biguttula* was noticed on the crop in the first week of August, 2005. However, in 2006 the pest appeared early during first week of July. The population of jassid remained active throughout the growth stage being low as early and late stage but high at active vegetative growth stage. Initially, the population observed were 7.40 and 7.20 jassid/5 plant in the first week of August and fourth week of July during the crop season, respectively. Then, the jassid population gradually increased to maximum of 30.66 and 26.30 adults /5 plant, respectively in the to crop season during first week in September, 2005 and 2006 and third week in September, 2006 (Fig.1 a and b).

In the investigation, *Anagrrus flaveolus*,

Table 1: Natural enemy complex of *Amrasca biguttula biguttula* and *Earias vittella* on *Kharif* okra

Insects	Order:Family	Period of activity
A. *Amrasca biguttula biguttula* (Jassid)		
Anagrus flaveolus	Hymenoptera :Mymaridae	July-September
Chrysoperla carnea	Neuroptera : Chrysopidae	August-October
Mantis religiosa	Dictyoptera : Mantidae	August-September
B. *Earias vittella* (Fruit & shoot borer)		
Trichgramma chilonis	Hymenoptera : Trichogrammatidae	September-October
Chelonus blackburni	Hymenoptera : Braconidae	August-September

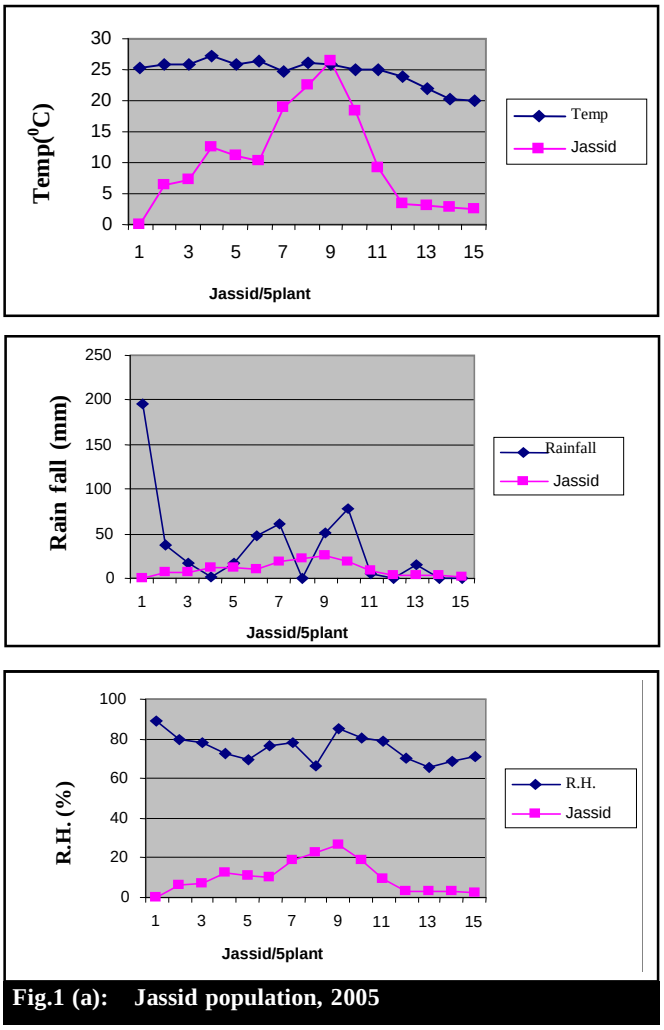


Fig.1 (a): Jassid population, 2005

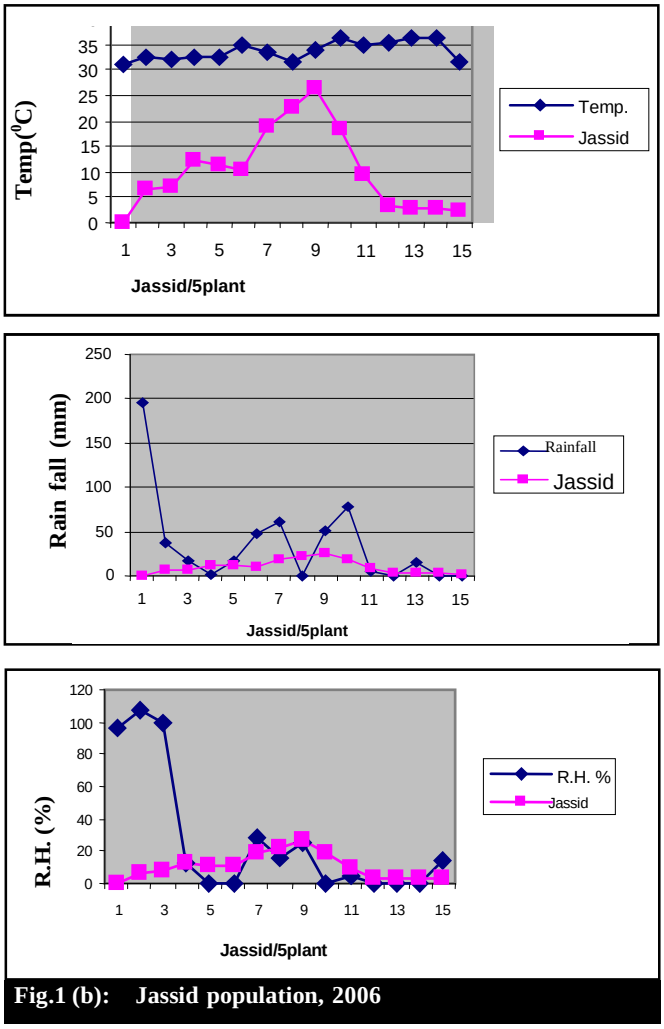


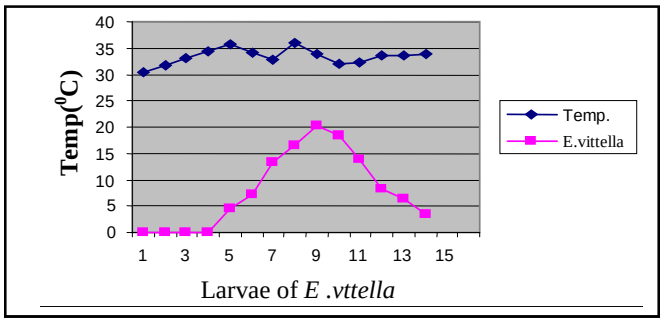
Fig.1 (b): Jassid population, 2006

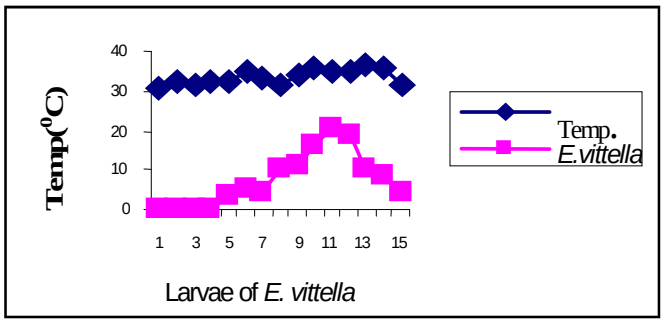
a parasitoid and *Chrysoperla carnea* and *Mantis religiosa* were observed as predator on jassid. Among predators, *Chrysoperla carnea* was noticed as most important natural enemy of jassid. Similar observation was made by Singh *et al.*(1993) who noticed that *Amrasca biguttula biguttula* and *Bemisia tabaci* were preyed by a Neuropteran predator, *Chrysoperla carnea*. The effect of weather parameter during both the years, maximum temperature, minimum temperature played a significant positive correlation in increasing pest population while, maximum relative humidity during 2005 and minimum relative humidity and rainfall during 2006 had significant negative effect on *Amrasca biguttula biguttula* population. The studies on population dynamics revealed that maximum temperature played a significant role in increasing the jassid population. The present finding supports the view of Men *et al.* (1996) who also found a significant positive correlation between jassid population and maximum temperature. Altogether minimum temperature had also played almost positive role in population build up. Goel and Kumar (1982) have also noticed favourable range of mean maximum 36^{0}C and

Table 2 : Correlation coefficient

Pests	Years	Temperature(^{0}C)		Relative humidity (%)		Rainfall (mm)
		Max.	Min.	Max.	Min.	
Jassid	2005	0.2240	0.4724*	-0.0501	0.2621	0.6230*
	2006	0.5892*	0.4532*	-0.0368	-0.0368	-0.3617
Fruit and shoot borer	2005	-0.0165	-0.0380	0.1710	-0.0529	-0.0135
	2006	0.9552*	0.4341*	-0.2497	0.2497	0.3435

* indicates significance of value at P=0.05





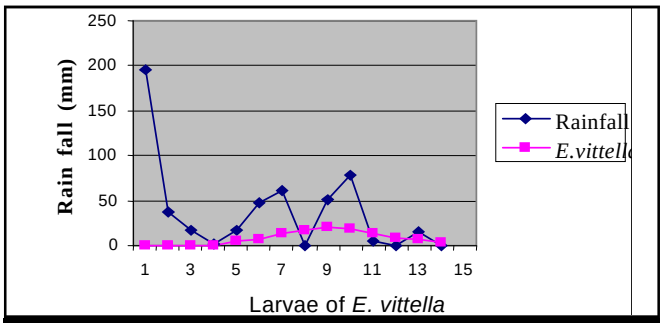


Fig.2 (a) : Fruit and shoot borer, 2005

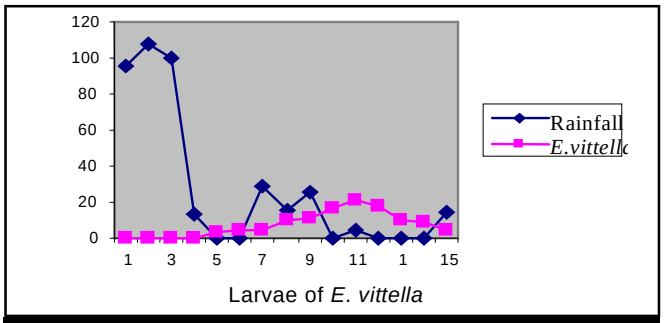


Fig.2 (b) : Fruit and shoot borer, 2006

26^{0}C minimum temperature, coupled with 54 per cent relative humidity providing optimum condition for large insect population of jassid .

The occurrence of *Earias vittella* larvae was recorded on the crop in third week of August in both the years. The larval activity was noticed from flowering to maturity stage. Initially the population was 4.50 and 3.50 larvae per 5 plant in third week of August during 2005 and 2006. Then after the pest population gradually increased to maximum of 24.36 and 20.70 larvae per 5 plant during both cropping season 2005 and 2006, respectively. Thereafter, the population decreased gradually till final picking of the crop (Fig. 1 a and b). As regards the *Earias vittella*, its eggs were parasitized by *Trichogramma chilonis* with 10-15 per cent as well as *Chelonus blackburni* with 15.0-23.4 per cent. This finding has close conformity with Rao *et al*. (1979) who observed higher parasitization (37.80) by *Chelonus blackburni* on the eggs of fruit and shoot borer. Telang *et al*. (2004) also noticed that 9.50 per cent eggs of *Earias vittella* were parasitized by *Trichogramma chilonis*. As far as the effect of physical parameters on larvae of fruit and shoot borer during 2005 and 2006 is concerned, the population fluctuated to a great deal by temperature, minimum relative humidity and rainfall having negative significant reduction in pest population.This observation is in close conformity to Zala *et al*.(1999).

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