



## POPULATION DYNAMICS OF MAJOR INSECT PESTS OF CUCUMBER

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### ABSTRACT

This study on incidence of the jassid *Amrasca biguttula biguttula* in cucumber reveal that the incidence begins from 10<sup>th</sup> standard meteorological week (SMW) (0.56 jassid/ three leaves) with a peak (2.96 jassids/ three leaves) in the 16<sup>th</sup> SMW. Whitefly *Bemisia tabaci* appeared during 11<sup>th</sup> SMW (0.80 whiteflies/ three leaves), increasing to a peak (2.65 whiteflies/ three leaves) during 17<sup>th</sup> SMW. Fruit fly *Bactrocera cucurbitae* infestation on fruit began from the 13<sup>th</sup> SMW (16.35%), with a maximum (45.03%) during the 17<sup>th</sup> SMW. Leaf miner *Liriomyza trifolii* infestation started from the 10<sup>th</sup> SMW (0.66%), with leaf damage being maximum (4.45%) at the 15<sup>th</sup> SMW. Maximum and minimum temperature showed significant and positive correlation with *B. cucurbitae* infestation, whereas the morning and evening relative humidity had non-significant and positive association.

**Key words:** *Amrasca biguttula biguttula*, *Bactrocera cucurbitae*, *Liriomyza trifolii*, *Bemisia tabaci*, cucumber, population dynamics, correlation coefficients, peak incidence, temperature, relative humidity

Cucurbits constitute the largest group of summer vegetables, and in India, it occupies an area of about 82 thousand ha with the production of 1260 thousand mt during 2018 (Anonymous, 2018). Cucumber is one of these, and like other cucurbits, it is infested by a number of insect pests right from the germination up to harvesting stage, but a few of these viz. red pumpkin beetle *Raphidopalpa foveicollis*, fruit flies *Bactrocera cucurbitae* and hadda beetle *Epilachna dodecasigma* are of serious concern (Gupta, 2004). *B. cucurbitae* and *R. foveicollis* caused 100% fruit damage mostly in the pumpkin, cucumber and bitter melon (Jyoti and Rajbhandari, 2015). Yield losses in % due to *B. cucurbitae* in different cucurbits crops is 20-39% in cucumber, 60-80% in bitter melon, 63% in ivy melon and snake melon and 50% in sponge melon. Apart from causing the direct damage, many of them also act as vectors for several viral diseases. This study explores the population dynamics of *Amrasca biguttula biguttula*, *Bactrocera cucurbitae*, *Liriomyza trifolii*, *Bemisia tabaci* on cucumber.

### MATERIALS AND METHODS

Field experiment was conducted during summer 2018 at the Horticultural Instructional Farm,

Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar. The variety Gujarat Cucumber 1 was sown in non-replicated plot design in 12 x 6 m and spacing 120 x 60 cm, with transplanting done on 13.7.2018 and last harvesting, being in fourth week of November, 2018. Ten plants were randomly selected and tagged for recording the observations. Weekly observations were made from one week after sowing till harvest. The number of jassid and whitefly counts was carried out on three leaves (proximal, middle and distal). Leaf miner and fruit fly incidence was recorded on % infestation basis. The data were statistically analyzed using the SPSS software and results cross checked using OPSTAT software.

### RESULTS AND DISCUSSION

The results depicted in Table 1 and Fig. 1 reveal the population dynamics/ incidence of jassid, whitefly, leaf miner and fruit fly correlate with weather parameters viz., temperature, relative humidity, wind velocity, bright sunshine. *Amrasca biguttula biguttula* incidence started from 10<sup>th</sup> SMW (0.56 jassid/ three leaves) and reached its peak (2.96 jassids/ three leaves) in the 16<sup>th</sup> SMW. The correlation coefficient revealed that incidence was positively and non-significantly correlated with morning

Table 1. Correlation between pest incidence and weather parameters (Summer, 2018)

Pests	Weather parameter					
	Temperature (°C)		Relative humidity (%)		Wind velocity (km/ hr)	Bright sunshine (hr/ day)
	Maximum	Minimum	Morning	Evening		
Jassid	0.205	0.142	0.210	0.005	-0.042	0.064
Whitefly	0.490	0.487	0.477	0.363	0.213	0.175
Fruit fly damage (%)	0.705**	0.655*	0.535	0.488	0.355	0.321
Leaf miner damage (%)	0.156	-0.065	-0.042	-0.331	-0.205	0.061

\*Significant at  $p = 0.05$ ; \*\* $p = 0.01$

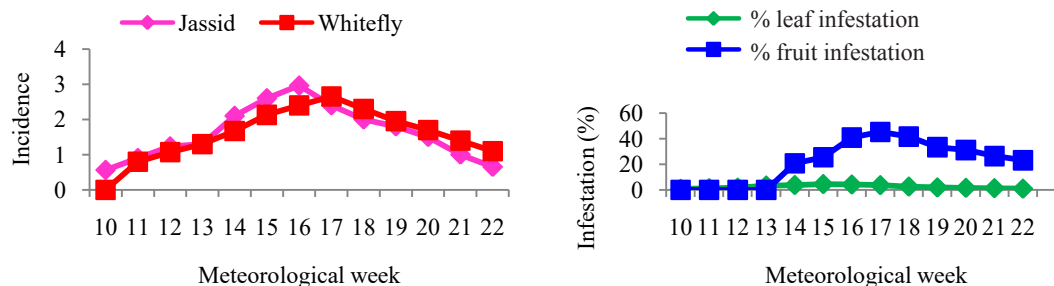


Fig. 1. Incidence of pests on cucumber

and evening relative humidity RH ( $r = 0.210$  and  $0.005$ ) and maximum and minimum temperature ( $r = 0.205$  and  $0.142$ ). Purohit (2010) observed that the incidence of *A. biguttula biguttula* commenced during 38<sup>th</sup> SMW and the peak was during second week of October in cucumber. The incidence of *B. tabaci* started from 11<sup>th</sup> SMW (0.80 whitefly/ three leaves), reached its peak (2.65 whiteflies/ three leaves) in 17<sup>th</sup> SMW; correlation revealed a non-significant and positive correlation with maximum and minimum temperature ( $r = 0.490$  and  $0.487$ ) and morning and evening RH ( $r = 0.477$  and  $0.363$ ). Purohit (2010) observed that *B. tabaci* initiated during 38<sup>th</sup> SMW and the peak was during third week of October at Udaipur. Saha et al. (2018) recorded peak incidence of *B. tabaci* during the last week of May to second week of June. Similarly, positive correlation of *B. tabaci* incidence with maximum and minimum temperature, and negative correlation with maximum and minimum RH had been reported by Sunil (2015); a significant and positive correlation with maximum and minimum temperature was observed by Selvaraj and Ramesh (2012) and Saha et al. (2018); and it was a significant and negative correlation with mean RH (Purohit, 2010), and with evening RH (Selvaraj and Ramesh, 2012). It was a non-significant and positive correlation with mean temperature (Purohit, 2010), and negative and non-significant with morning RH (Selvaraj and Ramesh, 2012 and Saha et al., 2018).

The incidence of *L. trifolii* began during 11<sup>th</sup> SMW

(1.20%), reached its peak (4.45%) in 15<sup>th</sup> SMW; it was observed from second week of March to last week May; its incidence when correlated with weather factors revealed that the morning and evening RH ( $r = -0.042$ ,  $-0.331$ ) and minimum temperature ( $r = -0.065$ ) have a non-significant and negative relationship, but maximum temperature had a non-significant and positive correlation ( $r = 0.156$ ). Variya and Bhut (2014) observed that leaf miner damage on leaves was noticed soon after the 1<sup>st</sup> week of transplanting (40<sup>th</sup> SMW) and remained up to 3<sup>rd</sup> week of January (3<sup>rd</sup> SMW) in tomato. Saha et al. (2018) observed a significant and positive correlation with maximum and minimum temperature, and a non-significant and negative one with RH. About *B. cucurbitae*, incidence in fruits commenced after four weeks of sowing, and ranged from 16.35 (13<sup>th</sup> SMW) to 23.03% (22<sup>nd</sup> SMW), with peak being 45.03% at 17<sup>th</sup> SMW; and there existed a positive and highly significant correlation with maximum temperature ( $r = 0.705^{**}$ ), and with minimum temperature ( $r = 0.655^{*}$ ). These results are in close agreement with the observations of Pareek and Kavadia (1986) on bitter gourd. Its maximum infestation was up to 45.03%, agreeing with that of Kumar (2001) and with those of Sunil (2015) in bitter gourd.

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#### AUTHOR CONTRIBUTION STATEMENT

All authors equally contributed.

#### CONFLICT OF INTEREST

No conflict of interest.

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