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Seasonal incidence of sucking pests of bitter gourd (*Momordica charantia* L.)

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Abstract
The seasonal incidence of sucking pests of bitter gourd was studied during *kharif* 2019. Result revealed that the major sucking pests were thrips (*Thrips palmi* Karny), whitefly (*Bemisia tabaci* Gennadius), aphids (*Aphis gossypii* Glover), jassids (*Amrasca biguttula biguttula* Ishida). The maximum population of *T. palmi* (11.37 thrips/leaf), *B. tabaci* (11.43 whitefly/leaf), *A. gossypii* (12.90 aphids/leaf), *A. biguttula biguttula* (11.19 jassids/leaf) was observed during 40th SMW, 39th SMW, 40th SMW and 41st SMW, respectively. The incidence of sucking pests of bitter gourd was not significantly correlated with weather parameter. The incidence of thrips, whitefly, aphids and jassids showed non-significant positive correlation with maximum temperature and non-significant negative correlation with minimum temperature. Sunshine hours played a major role with non-significant positive influence on the population build up of sucking pests *viz.*, thrips, whitefly and jassids.

Keywords: *Momordica charantia, Thrips palmi, Bemisia tabaci, Aphis gossypii, Amrasca biguttula biguttula*

Introduction
Bitter gourd (*Momordica Charantia* L.), an indigenous vegetable to tropical regions of Asia. Taxonomically bitter gourd is belonging to the Cucurbitaceae. Scholars point out that *M. charantia* rich in term of minerals such as Cu, Fe, Mg, Zn and Ca. Momordicin is the functional components of bitter gourd. Momordicin was found at fruits, leaves, roots. Further components of charantin is reported to be highly effective for controlling the blood glucose in relation to insulin resistance (Goo *et al.*, 2016) [4]. In India, bitter gourd is grown over an area of 97 thousand ha and annual production of 1137 thousand MT. In Maharashtra, bitter gourd is grown over an area of 2.08 thousand ha with the annual production of 21.27 thousand MT and productivity of 11.72 MT per ha (Anonymous., 2017-18) [2]. Bitter gourd like other cucurbits, is attacked by a wide array of insect and non –insect pests, the major being fruit fly, red pumpkin beetle, whitefly, aphids, and thrips. Infestation of these pests is important limiting factor in the commercial cultivation of the crop. Attack of these pests begin at very early stage of crop growth and continues till harvest and degree of infestation depend upon the prevailing agronomic condition (Sunil *et al*., 2017) [11]. *Thrips palmi* Karny has been commonly found on cucumber plants. It is a very serious pest for many vegetable crops such as cucumbers, egg plants, sweet peppers, water melons, and many ornamentals. Nymph and adults of *Thrips palmi* feed on the leaves, stems, flowers and fruits of crops, producing many scars and deformities, thereby decreasing yield and marketability. In addition, they also transmit some plant tospo viruses, such as the Watermelon silvery mottle virus (WSMoV) and the Melon yellow spot virus (MYSV) on cucurbit, and the Calla lily chlorotic spot virus (CCSV) on calla lily which further increases crop damage and economic losses (Huang and Lin 2012) [6]. Aphid suck sap from plants and cause the leaves to appear curled and distorted, especially when the population is high. They excrete honeydew, a sugar-rich substrate that promotes the growth of sooty mold (*Capnodium* spp.) on harvestable plant parts and leaves, lowering their quality. Their most distinct damage to cucurbits is their ability to transmit viruses in a non-persistent manner. This is a mode of transmission that is characterized with a short time of acquisition, inoculation (< 1 min), and retention with brief stylet penetration before the virus is passed on to another host. These viruses include Papaya ring spot virus-Watermelon strain (PRSV-W), Watermelon mosaic virus (WMV), Zucchini yellow mosaic virus (ZYMV) and Cucumber mosaic virus (CMV) (Liburd *et al*., 2015) [9]. The damage of whitefly to cucurbits through direct feeding when they suck sap from the phloem and excreting honeydew, a sugar-rich

substrate that promotes the growth of sooty mold (*Capnodium* spp.), on harvestable plant parts and leaves. They also damage the plant by transmitting viruses and inducing physiological disorders. *Bemisia tabaci* biotype B transmits Gemini viruses to cucurbits in a persistent manner (i.e., once the virus is acquired by the whitefly, they retain the ability to transmit it for a long period). The Cucurbit leaf crumple virus (CuLCrV) is an important gemini virus transmitted by *B. tabaci*, and during periods of high infestations, plants can become stunted and low yield (Liburd *et al*., 2015) [9].

Material and method

The present experiment was conducted at Research Farm of AICRP on Vegetable Crops. Department of Horticulture, Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist. Ahmednagar, Maharashtra during the *kharif* 2019.

Method of Recording Observations

The studies on seasonal incidence of sucking pests of bitter gourd were carried out at AICRP on Vegetable Crops, Department of Horticulture, MPKV, Rahuri. In the field experiment weekly observations were made on five randomly selected plants. Sucking pests such as thrips (*Thrips palmi* karny), whitefly (*Bemisia tabaci* Gennadius), aphids (*Aphis gossypii* Glover), jassids (*Amrasca biguttula biguttula* Ishida) were recorded on three leaves of each selected plant. Weekly counts on pest population were correlated with weekly weather parameters *viz.*, temperature (°C), relative humidity (%), wind (km/hr), sunshine period (hr) and rainfall (mm) in different standard weeks was obtained from the Meteorological Observatory, Department of Agricultural Meteorology, MPKV, Rahuri.

Results and Discussion

Thrips, (*Thrips palmi* Karny)

The incidence of thrips was observed throughout the season with varying degree of intensity. Maximum incidence of thrips was recorded in 40th meteorological week (11.37 thrips/leaf) in the month of October as against lowest (5.26 thrips/leaf) in 34th meteorological week in the month of August.

The correlation studies revealed that, non-significant positive correlation existed between thrips population and maximum temperature (r = 0.170) and non-significantly negative correlation with minimum temperature (r = -0.395). The incidence of thrips was non-significantly positively correlated with morning RH (r = 0.164) as well as evening RH (r = 0.003).

The present investigation is in agreement with the results of Krishna Kumar *et al.* (2006) [8] who reported that the population of thrips increased from three to six weeks after sowing of watermelon. The present investigations are also supporting with findings of Ahir *et al.* (2017) [1] who studied that the peak population of thrips are found in the second week of September and also reported that the population of exhibited a non-significant positive correlation between rainfall and relative humidity, whereas mean atmospheric temperature was found to be non-significant negative correlation.

Whitefly, (*Bemisia tabaci* Gennadius)

The incidence of whitefly was observed in varying degree throughout the season. The maximum build-up of whitefly was found in 39th meteorological week in the month of September (11.43 whitefly/leaf) which was steadily declined afterwards with minor fluctuation till November.

The correlation studies revealed that, a non-significant positive correlation existed between the whitefly incidence and maximum temperature (r = 0.318) and non-significant negative correlation with minimum temperature (r = -0.246). There existed a negative non-significant correlation between the whitefly incidence and morning and evening RH (r = -0.083 and -0.155, respectively).

The results are comparable with the findings of Sunil *et al.* (2017) [11] who reported that that the non-significant negative correlation existed between the thrips incidence and maximum temperature, minimum temperature, maximum RH, and minimum RH.

Aphids, (*Aphis gossypii* Glover)

The incidence of aphids was noticed throughout the season. Maximum number of aphids was recorded in the 40th (12.90 aphids/leaf) meteorological week in the month of October.

The incidence of aphids showed non-significant positive correlation with maximum temperature (r = 0.339) and non-significant negative correlation with minimum temperature (r = -0.326). Also, it showed a non-significant negative correlation with morning (r = -0.037) and evening (r = -0.139) RH.

The present results were partial corroborate with that of Yadav *et al.*, (2007) [12] and Kandakoor *et al.*, (2012) [7] who reported that the incidence of aphid on groundnut remains throughout the crop period with peak population in the fourth week and first week of September, respectively. They also observed that the aphid population had non-significant negative correlation with maximum temperature. The present investigation is in agreement with the findings of Chodhari (2015) [3] who reported that aphid population had non-significant negative correlation with higher temperature, while positively correlated with relative humidity and rainfall. The findings of Ahir *et al.* (2017) [1] who reported that population of aphids had negative non-significant correlation with maximum temperature, rainfall, and sunshine hours whereas, positive non-significant correlation with minimum temperature also support the present investigation. The findings of Nayak *et al.* (2019) [10] who reported that the population of aphid revealed non-significant negative correlation with maximum temperature, mean temperature, rainfall, wind velocity and sunshine hours, while non-significant positive correlation with minimum temperature, morning and evening relative humidity and mean relative humidity.

Jassids (*Amraca biguttula biguttula* Ishida)

The incidence of jassids was noticed throughout the season. Maximum number of jassids was recorded in the 41st (11.19 jassids/leaf) meteorological week in the month of October.

The incidence of jassids showed non-significant positive correlation with maximum temperature (r = 0.190) and non-significant negative correlation with minimum temperature (r = -0.405). Also, it showed a non-significant positive correlation with morning RH (r = 0.149) and non-significant negative correlation with evening (r = -0.023) RH.

The results are confirmatory with the findings of Gupta *et al.* (2015) [5] who reported that the jassids population showed significantly positive correlated with minimum temperature and negatively non-significant correlation with rainfall and non-significant positively correlated with evening relative

humidity. The present results also in agreement with the results of Ahir *et al.* (2017) [1] who studied that the peak population of jassid was found in the second week of September. They also reported that population of jassids showed a non-significant and positive correlation with relative humidity and rainfall while, temperature was found non-significant and negative correlation. The findings of Sunil *et al.* (2017) [11] who stated that, non-significant negative correlation was observed between the infestation of jassids with maximum temperature, whereas non-significant negative correlation with maximum relative humidity.

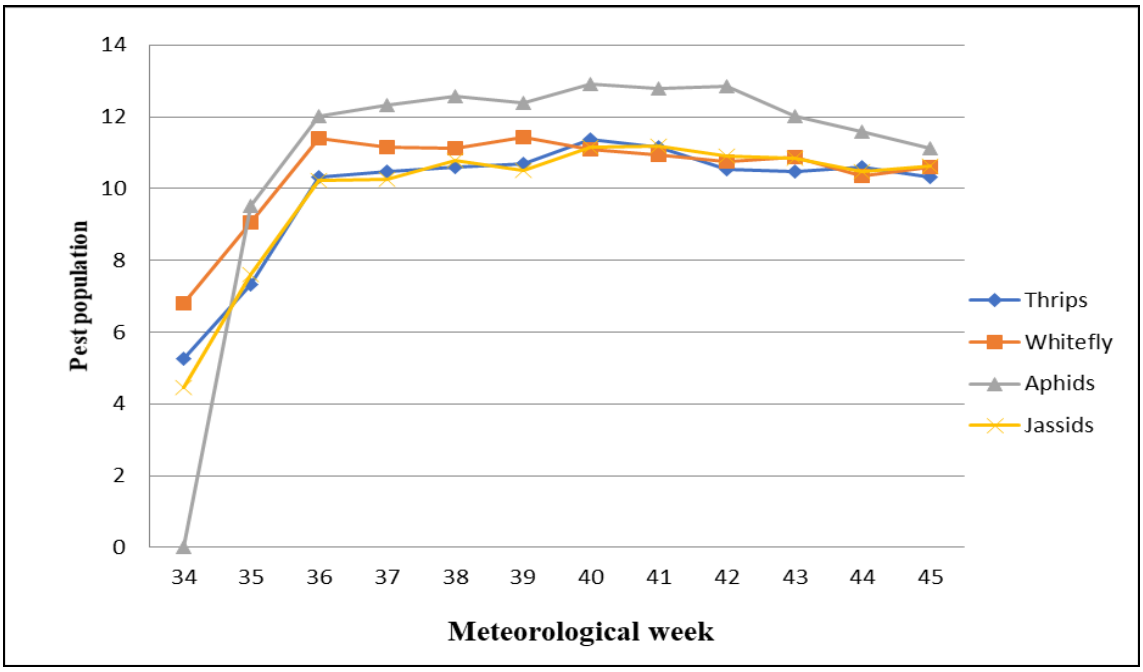

Fig 1: Seasonal incidence of sucking pests of bitter gourd during *kharif* 2019

Table 1: Seasonal incidence of sucking pests (thrips, whitefly, aphids and jassids) on bitter gourd

Meteorological week	Date of observation	Incidence of pest per leaf/plant				Weather parameters						
						Temperature (°C)		Relative Humidity (%)		Wind	Sunshine	Rainfall
		Thrips	Whitefly	Aphids	Jassids	Max.	Min.	Morning	Evening	(km/hr)	(hrs)	(mm)
34	23/08/2019	5.26	6.79	0.00	4.46	28.00	23.3	80.57	68.14	7.0	5.2	0.00
35	29/08/2019	7.33	9.06	9.53	7.59	31.00	22.50	75.14	59.57	7.6	3.4	0.00
36	05/09/2019	10.33	11.40	12.01	10.24	32.50	21.30	72.43	47.57	7.6	3.4	87.2
37	12/09/2019	10.46	11.15	12.34	10.26	32.00	23.0	75.14	55.71	0.9	0.00	3.0
38	20/09/2019	10.59	11.13	12.56	10.79	30.00	23.30	77.57	70.57	4.4	6.6	21.6
39	28/09/2019	10.68	11.43	12.39	10.52	28.80	22.50	78.57	68.43	4.2	6.2	84.2
40	05/10/2019	11.37	11.08	12.90	11.15	29.80	21.70	83.57	71.00	4.0	4.9	36.6
41	10/10/2019	11.14	10.93	12.78	11.19	30.20	21.90	83.43	66.86	0.3	6.1	7.8
42	17/10/2019	10.53	10.74	12.85	10.92	31.10	21.10	80.57	58.71	5.4	4.3	2.8
43	23/10/2019	10.47	10.88	12.03	10.85	31.70	21.10	77.00	50.29	3.6	6.3	52.4
44	03/11/2019	10.61	10.35	11.58	10.46	28.30	18.60	81.57	67.71	2.0	6.5	141.8
45	07/11/2019	10.33	10.61	11.13	10.63	25.70	20.80	87.14	79.57	1.8	9.2	8.0

Table 2: Correlation of weather parameters with incidence of sucking pests

Sr. No.	Weather Parameters	Correlation Coefficient (r)			
		Thrips	Whitefly	Aphids	Jassids
1	Maximum temperature (°C)	0.170	0.318	0.339	0.190
2	Minimum temperature (°C)	-0.395	-0.246	-0.326	-0.406
3	Morning relative humidity (%)	0.164	-0.083	-0.037	0.149
4	Evening relative humidity (%)	0.003	-0.155	-0.139	-0.023
5	Wind (km/hrs)	-0.595	-0.439	-0.441	-0.563
6	Sunshine (hrs)	0.136	0.001	-0.008	0.164
7	Rainfall (mm)	0.344	0.323	0.257	0.290

Note- *Significant at 5% level = 0.575

Conclusion

It may be concluded from the present study that the peak population of sucking pest *viz.* thrips (11.37 thrips/leaf), whitefly (11.43 whitefly/leaf), aphids (12.90 aphids/leaf) and jassids (11.19 jassids/leaf) were seen during 40th SMW, 39th SMW, 40th SMW and 41st SMW, respectively. The incidence of sucking pests of bitter gourd was not significantly correlated with weather parameters.

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