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Research Article

POPULATION DYNAMICS OF MAJOR INSECT PESTS INFESTING CHILLY, BOTTLE GOURD AND CUCUMBER

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ABSTRACT

A set of experiments was carried out to investigate the population dynamics of important insect pests that infest capsicum, bottle gourd and cucumber. Results revealed that aphid (*Aphis gossypii* Glover), whitefly (*Bemisia tabaci* Genn.) and leafhopper (*Amrasca biguttula*), and commenced the activity during the second and third week of October and November. The mean thrips peak population find in the second and third week of October in chilly (6.90) whereas third week for bottle gourd as well as cucumber (8.88 and 9.67 respectively). The average white fly density maximum is seen between the second of October in chilly, bottle gourd and cucumber (6.19, 8.88 and 9.67 respectively). Leaf hopper population also heigh in second week of October (5.02, 5.76 and 5.65) for chilly, bottle gourd and cucumber. Second and third week of October had maximum incidence of thrips and white fly population in bottle gourd as compare to chilly and cucumber.

Keywords: Aphid, Whitefly, Leafhopper, Chilly, Bottle gourd and Cucumber.

INTRODUCTION

Pepper (*Capsicum annuum* L.), Cucumber (*Cucumis sativus* L.) and Bottle Guard (*Bactrocera cucurbitae* L.) are the one of the important economic, most popular and highly remunerative vegetable crops grown in most parts of the world; that for the nutritional values of fruits, mainly due to the fact that they are an excellent source of natural colors antioxidant and bioactive nutrients (Ellaithy *et al.,* 2015). Sucking insect pests like aphids, whitefly, thrips and leafhoppers attack the crop throughout the growth period resulting in the reduction of yields (Haque *et al.,* 2011).Unlike many of the field problems, insects and animal pests problems are peculiar to greenhouse cultivation. Aphids, two spotted spider mite, thrips, whitefly, leafhoppers, caterpillars, leaf miner, gall midge, nematodes and snails are serious problems on vegetable crops under protected condition and present the major factor limiting pepper production (Giraddi *et al.,* 2012). These insect pests caused economic damage either directly by sucking the juice of plants or indirectly by transmitted the plant viral diseases (Refaei *et al.,* 2016). Like other cucurbits, bottle gourd is also being subjected to damage by wide array of insect and non-insect pests, major being, fruit fly, red pumpkin beetle, leaf miner, aphids, whitefly and mites (Tiwari *et al.,* 2012) right from the initial stages of the crop to harvest of the products in India. Such pests attacking pointed gourd in other countries have been reported so far by (Hasan *et al.,* 2015). The cucurbits are subjected to damage by a wide array of insect-pests. major being, fruit fly (Rai *et al.,* 2008, Sapkota *et al.,* 2010) Fruit fly, *B. cucurbitae* is one of the most destructive pests often rendering cultivation of bottle gourd unprofitable (Meena et al., 2019). Thrips (*Scirthothrips dorsalis* Hood), whiteflies (*Bemisia tabaci* Genn), aphids (*Aphis gossypii* Glover) and yellow mites (*Polyphagotarsonemus latus* Banks) are the important sucking pests which contributed to reduction in the crop yield (Montasser *et al.,* 2011).

The piercing-sucking pests are very serious problem on pepper where both nymphs and adults suck the cell sap from leaves and tender parts thereby inducing premature senescence; also, excretes honeydew on which sooty mold grows and inhibits the photosynthesis in addition to indirect damage of spread viral diseases (Dogan *et al.,* 2016). So management interventions are required to save the yield loss. Coccinellids are used as an effective eator for sucking insect pest management (Elliottand Kieckhefer, 1990). The

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beetles prey on a number of species of aphids on different host plants (Chowdhury *et al*., 2008). The ladybeetles are predacious both at larval and adult stages and feed on pests such as aphids, brown plant hopper and thrips (Sapkota *et al.*, 2010). This paper deals with the seasonal incidence of sucking insect pests on Pepper, Cucumber and Bottle Guard and determines the role of predatory coccinellid beetles in suppressing sucking pest populations.

MATERIALS AND METHODS

The study was conducted during the 2019-20 crop season in the study area of Baba Mastnath University, Rohtak, utilizing the varieties Hisar Shakti (HC-44; Chilly), Kashi Ganga (Bottle Gourd), and Pusa Barkha (Cucumber). All of the agronomic techniques that were advised were implemented. Major insect pests were recorded at weekly intervals form five randomly chosen tagged plants per plot during the cropping period. The abundance of insect pests was counted to assess the frequency of various insect pests.The aphid, whitefly, and leaf Hoffer populations were observed by numbering both the nymphs and adults from three leaves (top, middle, and bottom) each plant. The population of leafhoppers was collected using the sweep method and a hand net. Three sweeps per plot were considered and data were recorded in weekly intervals and analyzed by the OP-Stat by CCS Haryana Agriculture, University.

RESULT AND DISCUSSION

Significant different was observed on thrips population in every weeks of each month. The results presented inTable-1revealed that maximum number of thrips incidence was found in second week of October for chilly (9.19), second week of November for bottle gourd and cucumber (11.54 and 12.00) respectively. The population of thrips was found significant at 5% CD level with incidence days, cop and weekly interval as well as interaction effect was also significant in all tested environment. Mean weekly maximum population of thrips was observed in third week for chilly, bottle guard and cucumber. The current findings are consistent with previous observations by Rajput *et al.*, 2017, who noted a greater occurrence of leafhoppers between the months of August and September.

Table 1. Weekly incidence of thrips on chilly, bottle gourd and cucumber.

Incidence Days		August	September	October	November	Mean (W)
Chilly	Week-1	0.00	1.76	2.89	3.16	1.95
	Week-2	4.47	6.06	9.19	7.89	6.90
	Week-3	4.97	6.14	6.36	5.38	5.71
	Week-4	4.44	2.80	2.18	1.82	2.81
Bottle Gourd	Week-1	0.48	1.86	3.54	3.95	2.46
	Week-2	4.96	7.40	10.44	11.54	8.58
	Week-3	8.50	9.37	9.97	7.67	8.88
	Week-4	5.77	4.30	2.86	2.31	3.81
Cucumber	Week-1	0.62	2.14	3.94	4.68	2.85
	Week-2	5.12	8.02	10.81	12.00	8.99
	Week-3	9.15	10.47	10.94	8.13	9.67
	Week-4	5.78	5.62	3.41	3.04	4.46
Mean (C)		4.52	5.50	6.38	5.96	

Factors	C.D.	SE(d)	SE(m)
Crop (C)	0.078	0.039	0.028
Week (W)	0.090	0.045	0.032
Interaction (C×W)	0.156	0.079	0.056
Month (M)	0.090	0.045	0.032
Interaction (C×M)	0.156	0.079	0.056
Interaction (W×M)	0.180	0.091	0.064
Interaction (C×W×M)	0.312	0.157	0.111

Table 2. Weekly incidence of whitefly on chilly, bottle gourd and cucumber.

Incidence Days		August	September	October	November	Mean (W)
Chilly	Week-1	1.52	2.73	3.02	3.63	2.72
	Week-2	4.17	7.07	7.19	6.32	6.19
	Week-3	6.12	5.76	3.53	2.81	4.56
	Week-4	2.16	2.27	2.14	2.01	2.15
Bottle Gourd	Week-1	2.44	4.29	4.76	5.69	4.30
	Week-2	6.56	11.61	11.59	9.59	9.84
	Week-3	9.82	9.09	5.70	4.39	7.25
	Week-4	3.45	3.54	3.43	3.07	3.37
Cucumber	Week-1	2.72	5.46	6.54	7.14	5.47
	Week-2	9.14	11.49	12.11	10.78	10.88
	Week-3	10.49	9.87	7.25	5.58	8.30
	Week-4	4.41	3.76	3.54	3.10	3.70
Mean (C)		5.25	6.41	5.90	5.34	
Factors	C.D.		SE(d)		SE(m)	
Crop (C)	0.067		0.034		0.024	
Week (W)	0.078		0.039		0.028	
Interaction (C×W)	0.135		0.068		0.048	
Month (M)	0.078		0.039		0.028	
Interaction (C×M)	0.135		0.068		0.048	
Interaction (W×M)	0.155		0.078		0.055	
Interaction (C×W×M)	0.269		0.136		0.096	

Table 3. Weekly incidence of leafhopper on chilly, bottle gourd and cucumber.

Incidence Days		August	September	October	November	Mean (W)
Chilly	Week-1	1.17	1.55	1.87	2.15	1.68
	Week-2	3.31	5.93	5.71	5.11	5.02
	Week-3	4.93	4.21	2.17	1.99	3.33
	Week-4	1.89	1.45	1.05	0.61	1.25
Bottle Gourd	Week-1	1.96	2.35	2.65	2.82	2.44
	Week-2	4.07	6.71	6.40	5.84	5.76
	Week-3	5.58	5.06	2.87	2.84	4.09
	Week-4	2.64	2.18	1.84	1.37	2.01
Cucumber	Week-1	1.85	2.24	2.54	2.71	2.34
	Week-2	3.96	6.60	6.29	5.73	5.65
	Week-3	5.47	4.95	2.76	2.73	3.98
	Week-4	2.53	2.07	1.74	1.26	1.90
Mean (C)		3.28	3.77	3.16	2.93	
Factors	C.D.		SE(d)		SE(m)	
Crop (C)	0.038		0.019		0.014	
Week (W)	0.044		0.022		0.016	
Interaction (C×W)	N/A		0.039		0.027	
Month (M)	0.044		0.022		0.016	
Interaction (C×M)	N/A		0.039		0.027	
Interaction (W×M)	0.088		0.045		0.031	
Interaction (C×W×M)	N/A		0.077		0.055	

The white fly population in chilly commenced the activity second weeks of August, September, October and November whereas third week of August, September, October and November for bottle gourd and cucumber

(Table-2). The peak population (7.19: chilly and 11.59; bottle gourd) was observed during the second week October and 12.11 in cucumber at second week of November. The mean population was recorded minimum (6.19, 9.84, 10.88) in chilly, bottle gourd and cucumber respectively in second week of every month. The population of thrips was found significant at 5% CD level with incidence days, cop and weekly interval as well as interaction effect was also significant in all tested environment. The findings are consistent with those of Patnaik *et al.,* 2004; Alim *et al.,* 2012 and Meena *et al.,* 2019 who indicated that the highest occurrence of this pest occurred in September to November in chilly, bottle gourd and cucumber respectively.

The leafhopper population in Chilly started activity in the second, third, and fourth weeks of August, September, October, and November, respectively, for bottle gourd and cucumber (Table-3). The highest population was 5.71 for chilly, 6.40 and 6.29 for cucumber. In the second week of each month, the mean population was observed as low as (5.02, 5.76, and 5.65) in chilly, bottle gourd, and cucumber. The thrips population was shown to be non-significant at the 5% CD level with incidence days, cop, and weekly intervals, as well as an interaction effect in all examined environments. The findings of Solangi *et al.,* (2008) and Deepika *et al.,* (2013) that leafhopper population was substantially and positively connected with session in chilly, bottle gourd, and cucumber are identical.

CONCLUSION

Population density, crop and week incidence showed significant association with each other in all tested crops. The data revealed that maximum population of Aphid, whitefly, and leafhopper was recorded on bottle gourd followed by cucumber, respectively. It is also concluded that based on population density of different insect pest of chilly, bottle gourd and cucumber second and third week of October thrips, white fly and leaf hopper population destruction is maximum.

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