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POPULATION DYNAMICS OF INSECT PESTS OF GREEN GRAM, *VIGNA RADIATA* (LINN.) WILCZEK IN SEMI-ARID REGION OF RAJASTHAN

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ABSTRACT

Three insect pests species, *viz.*, jassid, *Empoasca motti* Pruthi; whitefly, *Bemisia tabaci* (Genn.) and thrips, *Caliothrips indicus* Bagnall appeared as major insect pests of green gram, *Vigna radiata* (Linn.) Wilczek in the semi-arid region of Rajasthan. The population commenced from first week of August and remained throughout the crop season. The infestation gradually reached at peak (12.40 jassids, 10.80 whiteflies and 9.40 thrips/three leaves during *Kharif* 2006 and 13.2 jassids, 11.20 whiteflies and 9.87 thrips/three leaves during *Kharif*, 2007) in the first week of September during both the years. Among natural enemies, the populations of *Chrysoperla carnea* (Steph.) and *Coccinella septempunctata* L. were high, whereas, *Monomorium indicum* (Linn.), *Menochilus sexmaculatus* (Fab.) and *Brumus suturalis* Fab. were low. A significant negative correlation of jassid, whitefly and thrips with maximum temperature (r=–0.61, –0.56 and –0.54 in 2006 –0.65, –0.78 and –0.52 in 2007, respectively) and positive significant correlation of thrips with minimum temperature was observed (r=0.67 in 2006 and 0.56 in 2007, respectively). The data indicated a positive significant correlation of jassid, whitefly and thrips with relative humidity (r=0.62, 0.63 and 0.68 in 2006 and 0.70, 0.56 and 0.72 in 2007, respectively).

Key words: Jassid, whitefly, thrips, correlation, temperature, relative humidity.

A meagre amount of work has been done on seasonal incidence of the insect pests and their predatory fauna associated with this crop. The effect of abiotic factors on the incidence of insect pests provide suitable know how about the congenial weather conditions for development of insect pests, thus immensely helpful in formulating the management strategy against them.

MATERIALS AND METHODS

The investigation was carried out at the Agronomy farm of S. K. N. College of Agriculture, Jobner, during *Kharif*, 2006 and 2007 to monitor the insect pests on green gram, *Vigna radiata* (Linn.) Wilczec. The variety RMG-62 was sown on 8th July during both the years (*i.e.*, *Kharif*, 2006 and 2007) in five plots of 3.3 × 2.7 m^{1}, keeping row to row and plant to plant spacings of 30 and 10 cm, respectively. All recommended agronomical practices were adopted to raise the crop in the experimental field. For recording the observations, the crop was exposed to natural infestation. The observations on insect pest population and natural enemies were recorded from five tagged plants at weekly interval from the appearance of insect pests till harvesting of the crop. To interpret the results of seasonal incidence of insect pests of green gram, simple correlation was computed between pest population and abiotic factors, *i.e.*, the minimum and maximum temperature and relative humidity.

RESULTS AND DISCUSSION

Quantitative and qualitative status on insect pests and their natural enemies

From the observations made during the crop season (*Kharif*, 2006 and 2007), it was observed that insect species belonging to different orders appeared at different stages of crop growth. Among these, jassid, *Empoasca motti* Pruthi; whitefly, *Bemisia tabaci* (Genn.) and thrips *Caliothris indicus* Bagnall were found to be the major insect pests attacking the crop (Table-1 and 2). The aphid, *Aphis craccivora* Koch.; semi-lopper, *Plusia orichalaca* (Fab.), green bug, *Nezara viridula* L.; whitegrub, *Holotrichia consanguinea* Blanch.; termite, *Odontotermes obesus* (Rambur); galerucid beetle, *Madursia obscurella* Jac; stem fly, *Ophiomyia phaseoli* (Tryon.); horned caterpillar, *Herse convolvuli* L. and blister beetle, *Mylabris pustulatus* Th. were found attacking the crop at different stages in few numbers. Therefore, population was not recorded. These findings corroborates with the observations made by Sahoo and Patnaik (1994), Borah (1995), Devesthali and Saran (1998) and Dar *et al.* (2002).

Table 1: Effect of abiotic factors on the population of jassid, whitefly and thrips during *Kharif*, 2006

Date of Observation	SMW*	Mean jassid population / 3 leaves	Mean whitefly population / 3 leaves	Mean thrips population / 3 leaves	Mean *Coccinella septempunctata* / 10 plants	Mean *Chrysoperla carnea* / 10 plants	Meteorological parameters		
							Temperature (°C)		Relative humidity (%)
							Maximum	Maximum	
05/8/2006	32	2.20	3.07	1.80	0.00	0.00	37.8	22.4	71.5
12/8/2006	33	3.93	4.00	2.40	0.90	0.80	38.3	21.2	71
19/8/2006	34	7.47	4.93	4.80	1.60	0.90	34.2	24.6	79
26/8/2006	35	10.07	9.40	7.73	2.20	3.60	32.3	25.8	81
02/9/2006	36	12.40	10.80	9.40	2.70	2.90	31.7	22.9	76
09/9/2006	37	8.80	7.07	5.20	1.90	4.10	34.1	22.3	67.5
16/9/2006	38	6.47	5.80	4.07	2.00	3.40	32.2	21.4	69
23/9/2006	39	2.80	2.60	1.00	1.00	2.30	32.2	19.8	56.5
Correlation coefficient with mean jassid population (r)							–0.61*	NS	0.62*
Correlation coefficient with mean whitefly population (r)							–0.56*	NS	0.63*
Correlation coefficient with mean thrips population (r)							–0.54*	0.67*	0.68*

* Significant at 5% level

Table 2: Effect of abiotic factors on the population of jassid, whitefly and thrips during *Kharif*, 2007

Date of Observation	SMW*	Mean jassid population/ 3 leaves	Mean whitefly population/ 3 leaves	Mean thrips population/ 3 leaves	Mean *Coccinella septempunctata*/ 10 plants	Mean *Chrysoperla carnea* / 10 plants	Meteorological parameters		
							Temperature (°C)		Relative humidity (%)
							Maximum	Maximum	
08/8/2007	32	2.93	2.47	1.2	0.00	0.00	35.5	23.3	70.5
15/8/2007	33	4.8	3.2	2.87	1.00	0.00	38.9	23.2	63
22/8/2007	34	6.4	5.2	4.47	1.80	1.00	37.2	25	76
29/8/2007	35	10.6	9.8	6.4	2.00	3.30	30.2	23.6	85.5
05/9/2007	36	13.2	11	9.87	2.30	3.10	32.3	24.3	78.5
12/9/2007	37	9.07	11.2	5.27	1.60	4.30	32.1	22.5	69.5
19/9/2007	38	7.8	8.2	3.53	2.00	3.60	33.2	21.3	65
26/9/2007	39	2.47	3.13	1.07	1.00	2.40	34.2	19.6	59.5
Correlation coefficient with mean jassid population (r)							-0.65*	NS	0.70*
Correlation coefficient with mean whitefly population (r)							-0.78*	NS	0.56*
Correlation coefficient with mean thrips population (r)							-0.52*	0.56*	0.72*

* Significant at 5% level

Some species of natural enemies recorded from the experimental field were *Chrysoperla carnea* (Steph.); *Coccinella septempunctata* Linn.; *Menochilus sexmaculatus* (Fab.); *Brumus suturalis* (Fab.); and black ant, *Monomorium indicum* (Linn.). The populations of *C. carnea* and *C. septempunctata* were abundant, whereas, others were negligible. These findings are in full conformity with the findings of Manjunatha *et al.* (1988) and Sardana and Verma (1986).

Effect of abiotic factors on the incidence of insect pests of green gram

The infestation of insect pests started in the first week of August and increased gradually and reached at peak (12.40 jassids, 10.80 whiteflies, and 9.40 thrips/three leaves during *Kharif* 2006 and 13.2 jassids, 11.20 whiteflies and 9.87 thrips/three leaves during *Kharif*, 2007) in the first week of September during both years of study (Table 1, 2 & Fig. 1, 2) these findings partially corroborates with the findings of Kumar *et al.* (2004) who found highest population of whitefly in second fortnight of September when the maximum and minimum temperature and relative humidity were 32.5°C, 20.8°C and 82.00 per cent, respectively. The infestation of insect pests of *V. radiata* started at 32nd standard meteorological week during both the years of study with significant negative correlation of insect pests (*i.e.*, jassids, whitefly and thrips) with maximum and significant positive correlation of thrips with minimum temperature and significant positive correlation between insect pests (*i.e.*, jassids, whitefly and thrips) and relative humidity during both years of study. These results are in partial agreement with those of Singh *et al.* (1990) who conducted field experiment to determine the effect of temperature, relative humidity, rainfall, wind spread on population build of the *Empoasca kerri* and *C. indicus*, these environmental factors affected the abundance of both insect pests. The thrips, whiteflies and jassids appeared in 35th meteorological week, *i.e.*, from 27th August to 2nd September and remained active till harvest of the crop. The peak period of activity of thrips and whiteflies was recorded in the 40th meteorological week, whereas, maximum population of jassids was observed in the 39th meteorological week (Anonymous, 1999).

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