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Varietal Preference of Insect Pests on Tomato Crop in District Naseerabad Balochistan Pakistan

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Abstract

Investigation was carried out to record insect pests and predators on tomato varieties. The data were recorded from 20 plants at daily basis from 1st week to 7th week of 2014. The result revealed that the highest population mean of Whitefly *Bemisia tabaci*, followed by the Jassid *Amrasca bigutella bigutella*, Thrip *Scirtothrips dorsalis*, Aphid *Aphis gossypii* Glover and American bollworm *Helicoverpa armigera* were found infesting the crop. Their overall maximum population mean on Hybrid-1000 variety was from 4.45 to 3.02, 2.27, 0.70 and 0.47 while, on Zatooni variety was from 5.30 to 4.28, 2.47, 0.70 and 0.47 Moon Star was from 5.18, 3.91, 2.32, 0.35 and 0.38 respectively. The highest population of whitefly was recorded followed by Jassid, Thrips, Aphid and American bollworm respectively. However infestation of Whitefly was more than other insects' pests on the Zatooni variety followed by Moon star. The variety Hybrid-1000 found more resistant to the insect pest and suggested for better production.

Keywords: Tomato, Varietal Preference, Insect Pests

Introduction

Tomato (*Solanum lycopersicum*) is one of the most important vegetable in the world. Tomato has been widely used not only as food, but also as research material ^[1]. Tomato contains many compounds that play an important role in the prevention of cancer, heart disease, and many other common health problems. It is also rich source of several important nutrients ^[2]. It is a good source of vitamins A, B, and C. It is ranked second important vegetable crop after potato. The fruits are eaten raw or cooked. Large quantities are used to produce soup, juice, ketchup, paste and powder ^[3]. In Pakistan tomato is cultivated on area of 52.3 thousand hectares with total production of 529.6 thousand tonnes, Balochistan is the leading tomato cultivating province with area of 18.4 thousand hectares and producing annually 213.8 thousand tones followed by Sindh and KPK ^[4]. In recent years, sucking insect pests observed become major pests of tomatoes produced in open field and in high tunnels ^[5]. The tomato aphid, are devastating insect pests of tomato in different districts of Punjab which are close to Sindh province ^[6]. *Bemisia tabaci* alone can cause 10–90% damage depending upon the severity of the infestation and crop stage. Currently available cultivars lack sufficient plant resistance to provide protection against aphids. One of the major insect pests of tomato is *Aphis gossypii*. Crop plants attacked by this pest include cotton, citrus, coffee, eggplant, pepper and tomato ^[7]. Whitefly, thrips and aphid host preference of about six tomato varieties, demonstrated that the variety which has a high density of glandular trichomes will decrease the egg laying and feeding of *B. tabaci* nymphs ^[8]. Tomatoes attack by large number of insect pests from emergence in the seed bed until harvest. Aphids, flea beetles, leaf miners, and spider mites threaten young plant-bed tomatoes ^[9]. The control of insect pests by natural enemies presents an environmentally friendly method of controlling pests ^[10]. This involves the activities of predators, parasitoids and pathogens as well as climatic factors in maintaining the population of insect pests below the economic injury level ^[11].

The present research was, aimed to study the insect pests on tomato varieties in the field condition to determine most suitable tomato variety for cultivation.

Materials and Methods

Aim to monitor the population of insect pests and predator of tomato crop. Three tomato varieties viz., Hybrid-1000, Zatooni and Moon Star were screened to evaluate the relative resistance against insect pests. The population of pests and predators were recorded. The pests

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Of crop like Whitefly, Jassid, American bollworm, Thrips, Aphid and their natural enemies Were also observed during 1st week to 7th week of 2014, data recorded from randomly selected 20 plants from each variety. The pests and predators were collected and specimens were preserved in 70% alcohol and subjected to the Plant Protection Section at Directorate of Agriculture Extension for their proper identification. The meteorological data were also taken from Agriculture Extension Department. The data were analyzed by statistics in the form of mean, and standard error of population of insect pests and predators were recorded^[12].

Results and Discussion

Insect pest like Whitefly *Bemisia tabaci*, Jassid *Amrasca bigutella bigutella*, Thrip *Scirtothrips dorsalis*, Aphid *Aphis gossipii* Glover and American bollworm *Helicoverpa armigera* were found infesting the crop. Negligible numbers of *crysoperla carnae*, ladybeetls were also recorded associated with insect pests (data not given). The results regarding weekly mean population of, Whitefly *Bemisia tabaci*, Jassid *Amrasca bigutella bigutella*, Thrip *Scirtothrips dorsalis*, Aphid *Aphis gossipii* Glover and American bollworm *Helicoverpa armigera* are given in table 1 to 5 and revealed that their respective maximum population mean recorded on Hybrid-1000 variety was 5.90 (aphid) in 1st week of February, 4.30 (jassid) in 1st week of January, 2.50 (thrip) in 4th week of January, 1.40 (aphid) in 2nd week of February, 0.08 (American bollworm) in 1st week of January respectively.

However weekly maximum mean population of these insect on Zetooni variety were, 7.40 (whitefly) in 2nd week of January, 7.40 (jassid) in 2nd week of January, 5.80 (thrip) in 1st week of January, 0.7 (aphid) in 2nd week of January, 0.90 (American bollworm) in 1st week of January,

Weekly maximum mean population of insect pests were recorded on Moon Star were, 6.70 (whitefly) in 2nd week of January, 5.7 (jassid) in 2nd week of February, 4.50 (thrip) in 1st week of January, 0.08 (aphid) in 1st week of January, 0.70 (American bollworm) in 1st week of January respectively. The highest infestation of the highest population of whitefly was recorded followed by Jassid, Thrips, and Aphid respectively. It was observed that the infestation rate was higher in the month of January. However the American bollworm infestation was lower than other insect pest observation recorded during study. The observations were recorded by Lucatt *et al.*^[13] examined the relative resistance of tomato varieties to insect pests and characterized 12 accessions of *S. galapagense*, 22 of *S. cheesmaniae*, and one of *S. lycopersicum* as reference for whitefly resistance using no-choice experiments.

Results also support Usman *et al.*^[14] conducted screening of tomato genotypes to devise an integrated pest management strategy against tomato fruit worm, *Helicoverpa armigera*. Fourteen commercially available tomato genotype *viz.* Mission 102, Sultan, 027, Chinar, GS 5575, Sourabh, T 7008, R 165, RK 101, Riogrande, Roma, Bambino, Super Classic and Roma VF were tested for resistance against *H. armigera* infestation under field conditions at the New Developmental Farm (NDF) of the University of Agriculture, Peshawar during 2009 and 2010. Similar Evidence support by Masoomah *et al.*^[15] evaluated the resistance of 8 tomato varieties to cotton white fly, *Bemisia tabaci* (Genn) (Hemiptera: Aleyrodidae) in four greenhouse experiments.

Table 1: Population of whitefly recorded on tomato crop

Weeks	Varieties		
	Hybrid-1000	Zetooni	Moon Star
1 st	4.40±0.75	6.40±0.95	5.70±0.85
2 nd	5.20±0.89	7.40±1.11	6.70±1.01
3 rd	4.00±0.44	6.50±0.76	5.70±1.09
4 th	4.00±0.83	4.30±0.97	5.00±1.11
5 th	5.90±1.03	4.00±1.25	5.50±1.14
6 th	4.50±0.92	4.90±0.84	4.00±0.96
7 th	3.20±0.38	3.60±0.80	3.70±0.70
Mean±SE	4.45±0.33	5.30±0.55	5.18±0.39

Table 2: Population of jassids were recorded on tomato crop

Weeks	Varieties		
	Hybrid-1000	Zetooni	Moon Star
1 st	4.30±0.78	6.80±1.17	5.40±0.87
2 nd	2.60±0.65	7.40±1.06	4.30±0.98
3 rd	2.40±0.52	4.20±0.67	3.50±1.19
4 th	3.10±0.50	3.10±0.78	3.40±1.03
5 th	3.00±0.89	3.00±0.90	2.50±0.93
6 th	3.50±0.96	2.70±0.90	5.70±1.12
7 th	2.30±0.49	2.80±0.38	2.60±0.26
Mean±SE	3.02±0.26	4.28±0.75	3.91±0.48

Table 3: Population of American bollworms recorded on tomato crop

Weeks	Varieties		
	Hybrid-1000	Zetooni	Moon Star
1 st	0.80±0.32	0.90±0.34	0.70±0.26
2 nd	0.20±0.13	0.60±0.22	0.60±0.22
3 rd	0.30±0.15	0.60±0.22	0.40±0.16
4 th	0.30±0.15	0.40±0.16	0.50±0.22
5 th	0.30±0.15	0.20±0.13	0.20±0.13
6 th	0.30±0.15	0.20±0.13	0.00±0.00
7 th	0.30±0.15	0.40±0.16	0.30±0.15
Mean±SE	0.35±0.07	0.47±0.09	0.38±0.09

Table 4: Population of thrips recorded on tomato crop

Weeks	Varieties		
	Hybrid-1000	Zetooni	Moon Star
1 st	2.20±0.51	5.80±1.19	4.50±0.70
2 nd	2.70±0.88	1.90±0.56	2.60±0.93
3 rd	1.70±0.65	2.30±0.89	4.40±1.32
4 th	2.50±0.77	3.10±0.92	1.80±0.62
5 th	2.10±0.73	1.20±0.62	0.70±0.26
6 th	1.70±0.51	0.50±0.16	0.90±0.34
7 th	1.80±0.41	2.50±0.40	1.40±0.47
Mean±SE	2.10±0.14	2.47±0.64	2.32±0.59

Table 5: Population of aphids were recorded on tomato crop

Weeks	Varieties		
	Hybrid-1000	Zetooni	Moon Star
1 st	0.50±0.22	0.40±0.22	0.80±0.32
2 nd	0.80±0.24	0.70±0.26	0.20±0.13
3 rd	0.20±0.13	0.50±0.22	0.30±0.15
4 th	1.00±0.29	0.30±0.15	0.30±0.15
5 th	0.30±0.15	0.30±0.15	0.40±0.16
6 th	1.40±0.33	0.30±0.15	0.20±0.13
7 th	0.70±0.26	0.50±0.22	0.30±0.15
Mean±SE	0.70±0.15	0.42±0.05	0.35±0.07

Correlation

The most of insect pest *population* showed negative and non-significant relationship with temperature but significant and negative for relative humidity was noted for Whitefly, Jassid, American bollworm, and Thrip respectively.

While positive correlation of Aphid was found with temperature and humidity. Data shown in table 6.

Table 6: Correlation insect pests with abiotic factors

Correlation variable	Whitefly	Jassid	American bollworm	Thrips	Aphid
Temperature	-0.0239 NS	-0.0258 NS	-0.3532 NS	-0.4247 NS	0.5178 NS
Relative humidity	-0.8527 *	-0.8974 **	-0.7880 *	-0.7226 NS	-0.1365 NS

NS = non-significant
 * = significant
 ** = highly-significant

Conclusions

Environmental variables have no significant correlation with most of insect population. Only the Aphid showed a positive correlation with environmental factors. Maximum insect pest population was recorded in the month of January, low populations of predators were found. The variety zatooni was found highly susceptible to the insect pest. The variety hybrid-1000 found more resistant among the varieties was studied. On the basis of finding the variety hybrid-1000 is suggested grown at field condition to avoid the insect pest burden and achieved the maximum growth and yield of tomato crops.

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