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Tomato pests at Hazara division, Khyber Pakhtunkhwa, Pakistan

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Abstract

The current research studies were conducted at Hazara division on the tomato crop under the projected venture. Each district was divided into five sites and visited randomly. The collections of pest were done randomly with the help of Ariel net and forceps, then killed into the chloroform socked bottle. The collected species were Green sting bug *Plautia affinis*, *Lygaeus militaris*, Green sting bug *Acrosternum hilare*, Southern green stink bug *Nazara viridula*, Fruit borer *H. armigra*, Cucumber beetles *Acalymna vittatum*, and Tobacco hornworm *Manduca sexta*. The difference in insect population is due to climate condition, temperature, incidence of pests. It is concluded that the rich fauna of insect pests were present in Hazara region, in major scale damage the crop production and spreading diseases.

Keywords: tomato crop, pest, hazara, *Manduca sexta*, *Plautia affinis*

Introduction

Distinctive examples of host-plant utilized by herbivorous insects are identified with contrasts in physiology, morphology, chemical and physical protectors of the plants, with resulting contrasts in the herbivorous life history qualities. Quality and amount of sustenance devoured by herbivores influence the development, survival and fruitfulness of people, and thus their population enhancement. Especially, those populace parameters that express the potential limit of development: natural development rate, net conceptive rate and age time, are identified with the reasonableness of the developed host-plants expended. The comprehension of the host-plant goes and the examples of yield usage, could permit foreseeing the conceivable extension to different harvests, coming about of incredible significance in the Integrated Pest Management [1]. The worldwide biotic fauna and flora is mainly change time to time, the breakdown of natural resources to wild species developments primarily in connection with human exercises. Among the recently presented insects species, some can wind up intrusive, with consequent significant economic effects. The achievement or disappointment of an organic intrusion may rely upon the species' life history parameters, on its reaction to climatic conditions, on the opposition with local species and on the effect of common adversaries [2]. Chemical control of pest cause poison in food, which are harmful for human [3]. The aim of the present study to record the diversity of the tomato pest species at Hazara division.

Materials and Methods

The material used, and methodologies followed in conducting studies on "Seasonal incidence and management of insect pests in tomato are described here as under. The present investigation was undertaken during 2017 in the Hazara region Pakistan.

Survey methodology and Observations

The tomato pests were collected Hazara division, Khyber Pakhtunkhwa, randomly by using sweep net, forceps and naked hands [4, 5], collected species were killed then placed them in chloroform bottle. Specimens were tagged with scientific name and area of collection along with the date, on drying Naphthalene balls were placed in the boxes to keep them safe from the pests [6].

Identification of specimens

The collected species were identified with the help of available keys and already identified

species at National Insect Museum, Islamabad by the literature of Lehr, Blackman and Eastop [7, 8].

Statistical analysis

The collected species were identified and putted for statistical analysis using EXCL and Graph Pad Prism 5 software.

Results

The present research was conducted at Hazara division, Khyber Pakhtunkhwa, Pakistan during 2017. A total of 5 districts (Mansehra, Haripur, Abbottabad, Battagram, and Kohistan) were surveyed during the research study randomly. The average no. of insect pests per 5-meter row of tomato collected from district Mansehra during 2017 were, Green sting bug 0.53 ± 0.36 , Field cricket 0.27 ± 0.20 , Green vegetable bug 0.25 ± 0.24 , Fruit borer 0.23 ± 0.22 , Cucumber beetle 0.43 ± 0.55 , Green sting bug 0.67 ± 0.13 , Tobacco hornworm 0.12 ± 0.13 . This shows that the highest no. was of Green sting bug and the lowest was Tobacco hornworm (Table 1, Fig. 1).

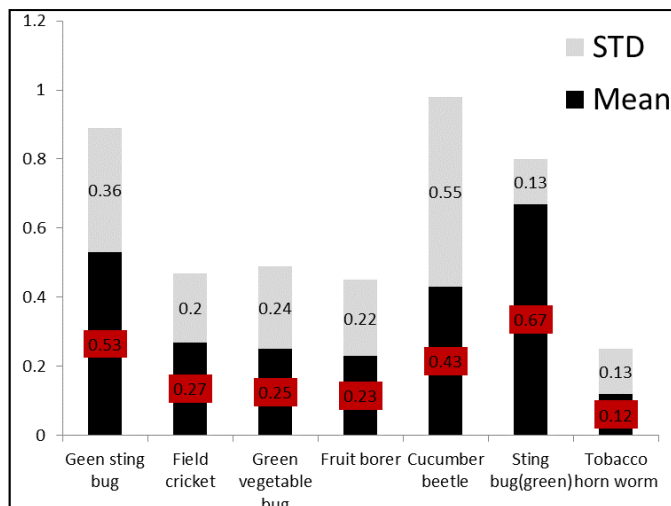


Fig 1: Shows average no. of insect pests per 5-meter row of tomato in Mansehra

Table 1: Shows average no. of insect pests per 5-meter row of tomato in Mansehra

District	Dates	Pests names						
		GSB	FC	GVB	FB	CB	SB	THW
Mansehra	5-5-13	0	0.2	0	0.2	0	0	0
	14-5-13	0.2	0.2	0.2	0.4	0.2	0	0
	24-5-13	0.4	0.6	0.4	0	0	0	0
	3-6-13	0.4	0	0	0	0	0	0
	13-6-13	0.4	0.2	0.4	0.2	0.2	0	0.2
	23-6-13	0.2	0.2	0.2	0	0.2	0	0.2
	4-7-13	0.6	0.4	0.2	0	0.6	0.2	0.4
	14-7-13	0.8	0.4	0.4	0.2	0.4	0.4	0.2
	24-7-13	0.4	0.6	0.8	0.6	0.8	0.2	0.2
	6-8-13	1	0	0	0.4	0.2	0	0
	16-8-13	1.2	0.2	0.4	0.6	0.4	0	0.2
	26-8-13	0.8	0.2	0	0.2	0.4	0	0
Mean and STD		0.53 ± 0.36	0.27 ± 0.20	0.25 ± 0.24	0.23 ± 0.22	0.43 ± 0.55	0.67 ± 0.13	0.12 ± 0.13

GSB Green Sting bug, FC Field cricket, GVB Green vegetable bug, FB Fruit borer, CB Cucumber beetles, SB Sting bug (green), THW Tobacco hornworm.

The average no. of insect pests per 5-meter row of tomato collected from district Haripur during 2017 were, Green sting bug 0.48 ± 0.32 , Field cricket 0.57 ± 0.39 , Green vegetable bug 0.52 ± 0.23 , Fruit borer 0.49 ± 0.66 , Cucumber beetle

0.65 ± 0.57 , Sting bug (green) 0.82 ± 0.75 , Tobacco hornworm 0.63 ± 0.31 . This shows that the highest no. was of the Sting bug (green) and the lowest no. were Green sting bug (Table 2, Fig. 2).

Table 2: Shows average no. of insect pests per 5-meter row of tomato in Haripur

District	Dates	Pests names						
		GSB	FC	GVB	FB	CB	SB	THW
Haripur	6-5-13	0	0.2	0.4	0	0	1	0.6
	15-5-13	0.2	0.4	0.6	0	0.2	0.8	0.4
	25-5-13	0.4	0.8	0.6	0	0.4	1	0.4
	4-6-13	0.6	0.8	0	0.2	0.6	0.8	0.4
	14-6-13	0	1	0.6	0.8	0.4	0	1
	24-6-13	0.4	0.8	0.4	0	0.6	0	0.8
	5-7-13	1	0	0.6	1	1.4	1.6	0.4
	15-7-13	0.4	0.2	0.4	0.6	0.4	0	0
	25-7-13	0.6	1	0.6	0	1.6	2	0.8
	7-8-13	0.6	1	0.6	0	1.6	2	0.8
	17-8-13	0.6	0.6	1	1	0	0.6	1.2
	27-8-13	1	0	0.4	2	0.6	0	0.8
Mean and STD		0.48 ± 0.32	0.57 ± 0.39	0.52 ± 0.23	0.49 ± 0.66	0.65 ± 0.57	0.82 ± 0.75	0.63 ± 0.31

GSB Green Sting bug, FC Field cricket, GVB Green vegetable bug, FB Fruit borer, CB Cucumber beetles, SB Sting bug (green), THW Tobacco hornworm

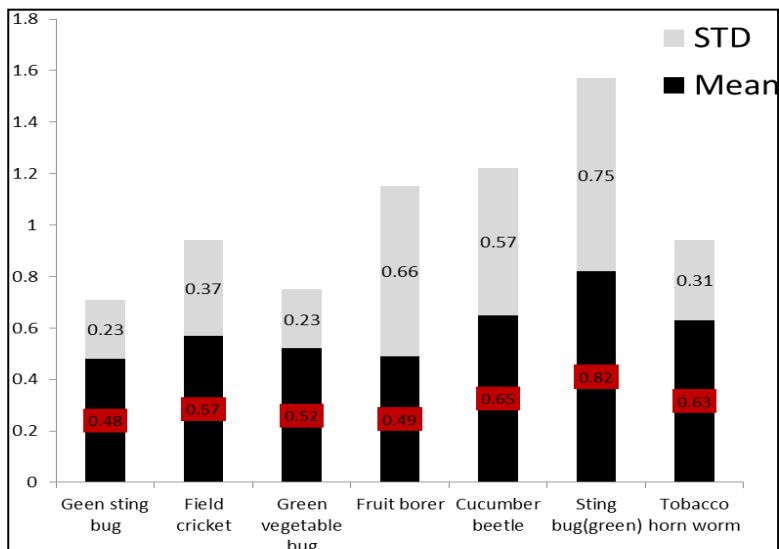


Fig 2: Shows average no. of insect pests per 5-meter row of tomato in Haripur

The average no. of insect pests per 5-meter row of tomato collected from district Abbottabad during 2017 were, Green sting bug 0.63 ± 0.36 , Field cricket 0.92 ± 0.75 , Green vegetable bug 0.78 ± 0.56 , Fruit borer 0.53 ± 0.59 , Cucumber beetles

0.58 ± 0.52 , Sting bug (green) 0.77 ± 0.60 and Tobacco hornworm 0.68 ± 0.68 . This Show that the highest no. was of Field cricket and lowest no. were of the Fruit borer (Table 3, Fig. 3).

Table 3 Shows average no. of insect pests per 5-meter row of tomato in Abbottabad

District	Dates	Pests names						
		GSB	FC	GVB	FB	CB	SB	THW
Abbottabad	7-5-13	0.8	0.4	0.2	0.2	0.8	0.6	1.2
	16-5-13	1	0.6	0	0.6	1	0.6	2
	26-5-13	0.4	2	1.2	0	1.2	2	1.6
	5-6-13	0.8	1	1.6	1	0	1	0.6
	15-6-13	0.8	2	1.4	1.8	1.4	1.4	1.2
	6-7-13	1	2	1	0	0	0	0
	16-7-13	0	0	1	1	0	0	0
	26-7-13	0.4	1	0.2	1	1	0	0
	8-8-13	0.6	0.8	0	0	0.6	1	0
	18-8-13	0	1	0.6	0.8	0.8	1	0.4
	28-8-13	1	0	1.2	0	0	1	0.8
	28-8-13	0.8	0.2	1	0	0.2	0.6	0.4
Mean and STD		0.63 ± 0.36	0.92 ± 0.5	0.78 ± 0.56	0.53 ± 0.59	0.58 ± 0.52	0.77 ± 0.60	0.68 ± 0.68

GSB Green Sting bug, FC Field cricket, GVB Green vegetable bug, FB Fruit borer, CB Cucumber beetles, SB Sting bug (green), THW Tobacco hornworm

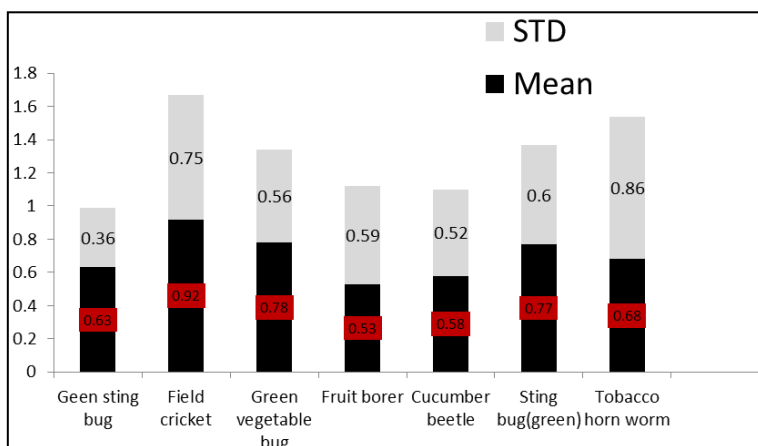


Fig 3: Shows average no. of insect pests per 5-meter row of tomato in Haripur

The average no. of insect pests per 5-meter row of tomato collected from district Abbottabad during 2017 were, Green sting bug 0.35 ± 0.35 , 0.66 ± 0.60 , Green vegetable bug 0.58 ± 0.32 , Fruit borer 0.49 ± 0.49 , Cucumber beetles

0.45 ± 0.49 , Sting bug (green) 0.18 ± 0.33 , Tobacco hornworm 0.55 ± 0.38 . This shows that the highest no. were Field cricket and the lowest no. were of the Sting bug (green) (Table 4, Fig. 4).

Table 4: Shows average no. of insect pests per 5-meter row of tomato in Battagram

District	Dates	Pests names						
		GSB	FC	GVB	FB	CB	SB	THW
Battagram	8-5-13	0	1	0	1	0.8	0	0.4
	17-5-13	0.6	2	0.6	1	1.4	0	0
	27-5-13	0	1	0.4	0	1.4	0	1
	6-6-13	1	0	0	0	0.2	1	0.6
	16-6-13	0	1	0.6	1	0	0	1
	26-6-13	0.4	0	0.8	0	0	0	0.8
	7-7-13	0.6	1	1	0	0	0.6	1
	17-7-13	0.4	0	0.6	0	0.4	0	0
	27-7-13	0.6	0	0.8	1	0	0	0
	9-8-13	0	1	0.6	0.8	0.4	0	0.8
	19-8-13	0.8	0.2	1	0	0.2	0.6	0.4
29-8-13	0.2	0.8	0.8	1	0.6	0.2	0.4	
Mean and STD		0.35±0.35	0.66±0.60	0.58±0.32	0.49±0.49	0.45±0.49	0.18±0.33	0.55±0.38

GSB Green Sting bug, FC Field cricket, GVB Green vegetable bug, FB Fruit borer, CB Cucumber beetles, SB Sting bug (green), THW Tobacco hornworm

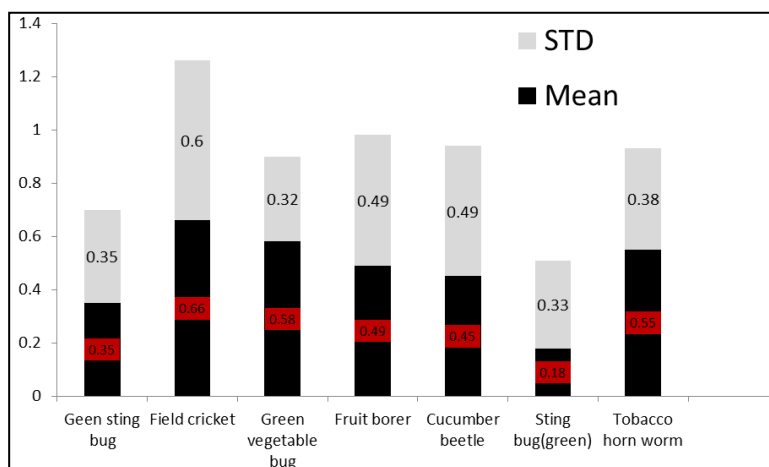


Fig 4: Shows average no. of insect pests per 5-meter row of tomato in Battagram

Discussion

The present research was conducted at Hazara division. The collected species are Green Sting bug, Field cricket, Green vegetable bug, Fruit borer, Cucumber beetles, Stink bug (Green), Tobacco hornworm. The average no. of the fruit borer per 5-meter plants row of tomato in Mansehra, Haripur, Abbottabad, and Battagram 0.23±0.22, 0.49±0.66, 0.53±0.59 and 0.49±0.49 respectively. Our findings somewhat agree with many previous researchers, similarly. Sajjad *et al.* [9] reported that the average fruit borer per plant in agriculture university Faisalabad were 0.90. The average no. of *Nazara viridula* per 5 meters in Mansehra, Haripur, Abbottabad, and Battagram were 0.25±0.24, 0.52±0.23, 0.78±0.56 and 0.58±0.32 respectively. Therefore, both study area was same pest's species, where they cropped same types of vegetables. While from Romania, Grozea *et al.* [10] determine that *N. viridula* is a dangerous pest adult and larval stages. It affects both quantity and quality of tomato fruit. First, yellow smaller spots appear on fruits, with the passage of time these get bigger and may include the entire surface. On young and mature fruits injuries occur. It has been observed that larva of southern green stink bugs prefers especially green tomato stage while the adults of this pest attack more mature tomato. While from the present study area same types of species and their larvae were reported from the study area, because they are having same climatic and environmental conditions. McPherson [11] reported two species, that distributed worldwide and four are in North America, out of six species.

Moreover, the climatic conditions and environmental factors of America and Pakistan are very irregular to each other, therefore the flora and fauna of the species were different from each other. Kamminga *et al.* [12] examined that green sting bug is economic pests of the tomato. When it feeds fruit it injects a toxin, due to which a spongy white area made of fruit. This reduces mark of the tomato. It also caused premature ripening and smaller fruit. Furthermore, from the study area also the same type of species were reported due to the same types of plant crops. Schwertner *et al.* [13] observed that stink bugs causing more damage to spring tomatoes in Virginia than either thrips or lepidopterans [14]. The stink bugs were also reported from present research, where same climatic conditions and environmental factors. In North Carolina green stink bug is one of the most damaging pests of tomato. Edwards [15] reported Tobacco hornworms and cucumber beetles cause very serious damage to tomato and cucumber plants respectively and economic losses to the pests on these valuable crops can be very high in the US. From the present study same types of species were reported from the study area, having same flora and fauna of both areas. Interisland Kaplan [16] found Tobacco hornworms as a pest feed on tomato plants and damage on the leaves. However, from the present study same pests were recorded from Hazara division due to same climatic conditions.

Conclusion

It is concluded that the rich fauna of insect pests was present

in Hazara region, in major scale damage the crop production and spreading diseases. *Plautia affinis* and *Lygaeus militaris* found in all districts of Hazara but there is no information about this whether these are a pest or not.

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