Effect of Natural Enemy (*Chrysoperla carnea* Stephens) against Sucking Insect Pests of Okra

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Abstract: An experiment effect of natural enemy (*Chrysoperla carnea* Stephens.) against sucking insect pests of Okra was carried out at Latif Farm, Sindh Agriculture University, Tando Jam during 2014.The results showed that overall maximum mean population of jassids (1009.5 ± 78.12/plant) was recorded in pre-treatment treated plot followed by thrips (706.17 ± 34.26/plant), mites (572.5± 33.00/plant) and whiteflies (209.83 ± 19.76/plant) respectively. Whereas, the overall maximum mean population of jassids (1322.44 ± 8.6/plant6) was recorded in pre-treatment control plot, followed by thrips (828.05 ± 6.77/plant), mites (640.55 ± 5.95/plant) and whiteflies (267.38 ± 4.74/plant) respectively. However, the overall maximum mean of jassids (434.27 ± 4.91/plant) were recorded in post-treatment control plot, followed by thrips (278.11 ± 3.93/plant), mites (134.11 ± 2.63/plant) and whiteflies (18.83 ± 0.99/plant), respectively. The results further revealed that the statistical analysis of data through paired T-test between treated and control plot of jassids, whiteflies, thrips and mites showed significantly different at (*P<0.05*) level. Whereas, the statistical analysis of data through paired T-test between pre-treatment and post-treatment of jassids, whiteflies, thrips and mites also showed significantly different at (*P <0.05*) level.

Keywords: Biological control, *Chrysoperla carnea,* Suckinginsect pestsa, Okra crop.

INTRODUCTION

Okra, *Abelmoschus esculentus* L. (Family: Malvaceae) is a warm-season, annualkharif vegetable of Pakistan. The origin of this vegetable is considered as Africa and Asia. . In the present world, okra is grown in almost all parts of the tropics, and during summer in the warmer parts of the temperate region [1]. Okra is a good source of vitamins, minerals, salts and has good calories values. The edible portion contains 89.8, 0.8 0.2, 7.4 and 1.8 percent water, protein, fat, carbohydrate and ash, respectively. It has 175 calories per pound. It is one of the cash crops of Sindh [2].

Okra is attacked by number of insect pests right from germination to harvest [3]. Sucking pests in the early stage and the fruit borers in the later stage cause extensive damage to fruits and the yield losses have been recorded up to 69 percent [4]. Among these thrips, whiteflies, jassids, aphids, mites are consider as major insect pests of okra [4]. Therefore there is great need to develop alternates strategy for handling such economically important pests approach. Farmers extensively used insecticides for the management of insect pests. Insecticides are costly and indiscriminate use has induced insect resistance to the insecticides and caused environmental pollution [5]. Despite massive applications of broad-spectrum insecticides, the action of natural enemies plays an important role in reducing insect pest infestation, both through inundative releases or as natural control agents [6].

Biological control is often viewed as a promising alternative or complement to pesticides in integrated pest management programs [7]. Green lacewings are proven broad-spectrum biological control agents, devouring eggs and young larvae of Colorado potato beetles, flea beetles, most caterpillar (worm) pests (armyworms, budworms, bollworms, borers, corn earworms, cabbage loopers, codling moths, etc.), aphids, spider mites, scales, psyllids, mealy bugs, whiteflies, thrips, leafhoppers and other pests [8]. Adult green lacewings are pale green, about 12-20 mm long, with long antennae and bright, golden eyes. They have large, transparent, pale green wings and a delicate body [9]. *Chrysoperla carnea* and *C. rufilabris* (Neuroptera: Chrysopidae), are active predators fed on many insect pests infesting field crops [10]. Green lacewings are common in agricultural fields and their adults feed only on nectar, pollen, and aphid honeydew, but their larvae are active predators. *C. carnea* occurs in a wide range of habitats and *C. rufilabris* may be more useful in areas where humidity tends to be high such as greenhouses and irrigated crops [11]. In present study the effect of natural enemy (*Chrysoperla carnea* Stephens.) as biological

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ISSN: 1814-8085 / E-ISSN: 1927-5129/17

controlling agents were released in field against sucking insect pests of okra. This will help to manage sucking insect pests on okra crop.

MATERIALS AND METHODS

The present experiment was conducted at the experimental field of Latif Farm, Sindh Agriculture University, Tando Jam during July to November of 2014 to determine the effect of natural enemy (*Chrysoperla carnea* Stephens) against sucking insect pests of Okra. The experiment was designed in RCBD (Randomized Complete Block Design). The variety (Sabzpari) of okra was sown on area of 106 x 66 ft by drilling method of sowing. All agronomical practices were carried out as usual for this experiment. The observations on Jassids, Thrips, Whiteflies and mites population was recorded at once per week. *Chrysoperla carnea* (Stephens) second in star larvae were released at the rate of 1500 larvae/ acre. The natural enemies were released at the interval of 10 days. Six releases were made during the cropping season. Pre-treatment observation was recorded one day before release and Post-treatment observations were recorded 3 and 6 days after release. The data of pests and natural enemies were also recorded from control plot for comparison. Yield of okra was also recorded from treated and control plots. Finally the data were statistically analyzed by paired T-test method of analysis between pest populations of treated and control plots and also between pest population of pre and post-treatment.

RESULTS

The study was carried out the effect of natural enemy (*Chrysoperla carnea* Stephens) against sucking insect pests of Okra at Latif Farm, Sindh Agriculture University, Tando Jam during the winter season of 2014.In the present study, the data shown in Table **1** depicted that maximum jassids, whiteflies, thrips and mites population (1750, 340, 985 and 790/ plant) was recorded in pre-treatment plot during 3rd week of July, respectively. While, the minimumper plant population of Jassids, whiteflies, thrips and mites (521, 95, 420 and 291/plant) was recorded in 4th week of November, respectively. The data (Table **1**) revealed that overall maximum mean population of Jassids (1009.5 ± 78.12)

Table 1: Pre-Treatment Pest Population in Treated Plot from 3rd Week of Aug to 4th Week Nov, 2014, at Latif Farm

Week of Observations	Pre-treatment Pest Population of Treated Plot				Average mean
	Jassid	White fly	Thrip	Mite	
3rd Week July	1750	340	985	790	966.25
4th Week July	1480	320	902	780	870.5
1st Week August	1260	305	870	775	802.5
2nd Week August	1190	302	826	683	750.25
3rd Week August	1150	280	820	680	732.5
4th Week August	1109	260	790	664	705.75
1st Week September	1050	280	780	655	691.25
2nd Week September	1073	250	775	610	677.00
3rd Week September	1020	230	684	620	638.50
4th Week September	960	210	676	552	599.50
1st Week October	930	110	660	558	564.50
2nd Week October	970	128	656	540	573.50
3rd Week October	880	148	660	510	549.50
4th Week October	820	154	530	430	483.50
1st Week November	702	159	550	415	456.50
2nd Week November	705	105	590	405	451.25
3rd Week November	601	101	540	347	397.25
4th Week November	521	95	420	291	331.75
Mean ± S.E	1009.5±78.12	209.83±19.76	706.33±34.26	572.5±33.00	624.54±21.78

was recorded followed by thrips (706.33 ± 34.26), mites (572.5 ± 33.00) and whiteflies (209.83 ± 19.76) respectively.

The results further shown in (Table **2**) indicated that maximum jassids, whiteflies, thrips and mites population (1740, 356, 1021 and 819/plant) was recorded in pre-treatment control plot during 3rd week of July, respectively. While, the minimum population of jassids, whiteflies, thrips and mites (865, 120, 591 and 319/plant) was recorded in 4th week of November, respectively. Overall maximum mean population of Jassids was recorded (1322.44 ± 8.68/plant) followed by thrips (828.05 ± 6.77/plant), mites (640.55 ± 5.95/plant) and white flies (267.38 ± 4.74/plant) respectively (Table **2**). Whereas, the results (Table **3**) examined that maximum Jassids, whiteflies, thrips and mites population (1035, 165, 841 and 257) was recorded in pre-treatment control plot during 3rd week of July, respectively. However, the minimum population of jassids, whiteflies, thrips and mites (51, 0, 87 and 47) was recorded in 4th Week of November, respectively. The date in Table **3** further reported that overall maximum mean population of Jassids was recorded (434.27 ± 4.91) followed by thrips (278.11 ± 3.93), mites (134.11 ± 2.63), and whiteflies (18.83 ± 0.99), respectively.

The statistical analysis of data through paired T-test between treated and control plot of Jassids, whiteflies, thrips and mites showed significantly different at (*P < 0.05*) level. Whereas, paired T-test between pre-treatment and post-treatment of Jassids, whiteflies, thrips and mites showed significantly different at (P =< 0.05) level (Appendix VII-XI).

DISCUSSION

The present study on effect of natural enemy (*Chrysoperla carnea* Stephens) against sucking insect pests of Okra was carried out at Latif Farm, Sindh Agriculture University, Tando Jam during July to November, 2014. The results of present study agree with those of Rosenheim and Wilhoit [12] who concluded that since one lacewing can produce 40,000 progeny in 60 days, maximum benefits are obtained by starting releases very early in the season. A rough

Table 2: Pre-Treatment Pest Population in Control Plot from 3rd Week of Aug to 4th Week of Nov, 2014, at Latif Farm

Week of Observations	Pre-treatment Pest Population of Control Plot				Average mean
	Jassid	White fly	Thrip	Mite	
3rd Week July	1740	356	1021	819	984.00
4th Week July	1664	330	1015	805	953.50
1st Week August	1589	312	997	801	924.75
2nd Week August	1585	314	992	798	922.25
3rd Week August	1560	316	981	793	912.50
4th Week August	1493	305	963	789	887.50
1st Week September	1446	303	910	733	848.00
2nd Week September	1366	335	885	690	819.00
3rd Week September	1320	295	875	655	786.25
4th Week September	1310	290	856	613	767.25
1st Week October	1271	286	745	603	726.25
2nd Week October	1230	275	725	598	707.00
3rd Week October	1145	245	715	574	669.75
4th Week October	1136	215	693	536	645.00
1st Week November	1101	196	685	498	620.00
2nd Week November	1023	186	649	467	581.25
3rd Week November	960	134	607	439	535.00
4th Week November	865	120	591	319	473.75
Mean ± S.E	1322.44 ± 8.66	267.38 ± 4.74	828.05 ± 6.77	640.55± 5.95	764.61 ± 5.75

Table 3: Post-Treatment Pest Population in Treated Plot from 3rd Week of Aug to 4th Week of Nov, 2014, at Latif Farm

Week of Observations	Post-treatment Pest Population of Treated Plot				Average mean
	Jassid	White fly	Thrip	Mite	
3rd Week July	1035	165	841	257	574.5
4th Week July	835	85	633	213	441.5
1st Week August	612	19	315	112	264.5
2nd Week August	456	15	291	107	217.25
3rd Week August	472	20	265	96	213.25
4th Week August	523	8	260	89	220
1st Week September	522	4	255	90	217.75
2nd Week September	457	0	241	99	199.25
3rd Week September	435	4	232	102	193.25
4th Week September	328	5	237	113	170.75
1st Week October	324	2	227	125	169.5
2nd Week October	351	3	219	150	180.75
3rd Week October	329	1	201	143	168.5
4th Week October	354	2	198	165	179.75
1st Week November	325	4	188	178	173.75
2nd Week November	273	0	195	169	159.25
3rd Week November	135	2	121	159	104.25
4th Week November	51	0	87	47	46.25
Mean ± S.E	434.27 ± 4.91	18.83 ± 0.99	278.11 ± 3.93	134.11 ± 2.63	216.33 ± 3.12

release rate is 5,000 to 50,000 green lacewings per acre per season or 1,000 per 2,500 square feet of garden. At least two early season releases two weeks apart are needed to faster overlapping generations (larvae, the pest-eating stage, are then most likely to be present). Daane *et al.* [13] concluded that lacewing larvae *(Chrysoperla carnea)* could potentially be one of the most important biological control agents for psyllid pests of box plants. Daane and Yokota [14] evaluated three aspects of release strategies used to augment green lacewings (*Chrysoperla* spp.); the delivery system, the release rate and timing, and the lacewing developmental stage released.

The results of present study also agree with those of Yolde *et al.* [15] who released native strain of predator *Chrysoperla carnea* (Stephen.) against whiteflies, spider mites and aphids, respectively. *E. formosa* and *P. persimilis* were found to be effective in a release ratio of 1/5 parasitoid I whitefly and 1/20-40 predator/red spider mite, respectively, on tomatoes and cucumbers, but ineffective on eggplants. *C. carnea* was not able to control aphids. Hochmuth and Davis [16] reported that the effective control of insect pests was achieved with a combination of plastic insect screening materials and the release of biological control agents.

The results of present study are also partially agreed to those of Hassanpour *et al.* [17] who evaluated the response of three larval instars of the green lacewing, *Chrysoperla carnea* (Stephens), preying upon eggs and first instar larvae of the cotton bollworm, *Helicoverpa armigera* Hübner. The present study showed that effect of *Chrysoperla carnea* (Stephen) on suppuration of pest population of okra pests mainly sucking complex proved best in reducing the pest population from the field This shows that this study can be exploited for pest control in different crops, fruits and vegetables. Release of natural enemies against insect pests of okra may be included as best IPM strategy so that adverse effects on pesticides may be excluded for the coming generations.

CONCLUSIONS

It was concluded from the present study that the effect of release of *Chrysoperla carnea* (Stephen) on suppuration of pest population of okra pests mainly sucking complex proved best in reducing the pest population from the field. The Jassid population can be reduced greatly by releasing of *Chrysoperla carnea* (Stephen) predator. This shows that this study can be exploited for pest control in different crops, fruits and vegetables. It was also concluded that due to reduction in pest population after the release of natural enemies, the yield of treated plot was increased thrice than control plot.

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Received on 01-08-2016 Accepted on 23-02-2017 Published on 16-03-2017

https://doi.org/10.6000/1927-5129.2017.13.08