

Efficiency of *Chrysoperia carnea* (Stephens) to suppress *Myzus persicae* (Sulzer) infesting potato plants in the field

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ABSTRACT

The larvae of the aphid lion, *Chrysoperia carnea* (Stephen) were released on summer potato field to suppress *Myzus persicae* (Sulzer) infestation in two seasons of 2013 / 2014 & 2014/2015 at Gharbia Governorate as well as determine the efficacy of *C. carnea* on green peach aphid population .

The control of these pests includes use 2nd instar larvae. The predator is usually found on different parts of plants together with aphids and this species feeds on adults and immature stages.

C. carnea appears to be a good candidate for use in I.P.M programs

Keywords: Potato, aphid, *Chrysoperia carnea*, efficacy, *Myzus persicae*

Introduction

Potato *Solanum tuberosum* L., Family Solanaceae is a major world food crop and by for the most important vegetable crop in items quantities produced and consumed world wide (FAO, 2004).

It is most popular solanaceous crop used as food in Egypt and it occupies the second export crop to foreign countries. The total area of potato was 88,813 Feddan, which produce 2,139,341 Tons, and total potato export was 3296,287 ton/year. The winter season is considered the main cultivated season in Egypt for exported potato production (FAO, 2006)

The green peach aphid *M. persica* which causes appreciable damage to the crop by two ways: Direct damage, as stunted and weakening their host plants and in direct damage, as vector of various serious virus diseases, result in characteristic deformation of the leaves and stems (Alvarez and Srinivasan, 2005) .

The aim of these experiment is evaluation Efficiency of *C.carnea* to suppress *Myzus persicae* (sulzer) infesting potato plants in the field as biological control.

Materials and Methods

Field experiments were conducted in 2013/2014 and 2014/2015 summer potato seasons at Gharbia governorate to determine the efficacy of *C. carnea* in suppressing green peach aphid population in the field. The expermental area was quarter of feddan and potato cv. Cara was cultivated in this experiment.

Two release of *C. carnea* 2nd in star larvae were done on March 26th and April 11th .The first release with *C. carnea* was done by releasing 1000, 2nd in star larvae randomly into the field on 26th March 2013 and kept another field free from any release to serve as control.

The sequential sampling method was used to evaluate the infestation of potatoes leaves with *M. persicae* therefore, 2 samples of 30 potato leaves were collected randomly from the treated and control field at 5 day intervals, starting from 26th March and up to the end of April.

Statistical analysis

The percentage of reduction in the insect population of tested pest was calculated according to equation of Henderson and Tilton (1955) as following Reduction % = 100X (1-BX^À/AXB[`])

Where

B= No. of individuals in treated sample after release

B`= No. of individuals in treated sample before release

A= No. of individuals in control check after release

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A`= No. of individuals in control check before release

Results and Discussion

Efficiency of *C. carnea* to suppress *M. persicae* infesting potato plants in the field

Data presented in Table (1) indicating the efficiency of 2nd instar larvae as biological agent for controlling *M. persicae* population on potato plants. Five days after releasing, the efficiency of 2nd instar larvae of *C. carnea* was determined in all treatments under investigation before treatment, aphid population was 84 aphid individual / leaf. Aphid population decreased after five days of releasing 2nd instar larvae of *C. carnea* at rates 1000 larvae /1/4 of feddan to reach 19 aphid individual / leaf. However, aphid's population increased in the control treatment to reach 90 aphid individual/ leaf. Five days after predator release , the reduction percentage were 72.1% opposed to the control mean count , while ten days after release, the predaceous larvae which affect aphid population giving reduction percentage as 62.78%. Fifteen days after release of 2nd instar larvae of *C. carnea* the reduction percentage were 66.3%

Table 1: Suppression of *M. persicae* by 2nd instar larvae of *C. carnea* on potato plants in the field during season 2013/ 2014 at Gharbia Governate

Treatments	No. of <i>M. persicae</i> /plant before release	No. of <i>M. persicae</i> /plant after release		
		5 days	10days	15days
First year Release	84	19	33	44
Reduction %		72.1%	62.78%	66.3%
Control	90	73	95	140
Second year Release	44	11	12	15
Reduction%		75.86%	70.4%	67.5%
Control	140	145	129	147

The 2nd release of *C. carnea* was conducted on April 11th .The aphid population was 44 and 140 aphid individual / leaf in treatment and control, respectively before release. Aphid population decreased after Five days of release to reach 11aphid individual / leaf. The reduction percentage in aphid population was 75.86%. After ten days of release the aphid counts were 12 aphid individual / leaf. However aphid's population increased in the control treatment to reach 129 aphid individual / leaf. The reduction percentage was 70.4%. Fifteen days after release the cont of aphids became 15 aphid individual / leaf giving reduction percentage as 67.5%.

Efficiency of *C. carnea* as to suppress (*M.persicae*) infesting potato plants in the field season (2014/2015)

The obtained data presented in Table (2) indicating the efficiency of 2nd instar larvae for controlling aphids population on potato plants the two release of *C. carnea* were done on March 6th and March 20th .

Generally it was obvious that release of *C. carnea* caused remarkable reduction in the population density of *M. persicae*. Five days after releasing, the efficiency of *C. carnea* was determined.Before treatment, aphid population was 49 aphids individual / leaf .Aphid population decreased after five days of releasing to reach 13aphid individual / leaf, however, aphid's population increased in the control treatment to reach 50 aphid individual / leaf.

Table 2: Suppression of *Myzus persicae* by 2nd instar larvae of *Ch.carnea* on potato plants in the field during season 2014/ 2015 at Gharbia Governate.

Treatments	No. of <i>M. persicae</i> /plant before release	No. of <i>M. persicae</i> /plant after release		
		5 days	10 days	15 days
First yearRelease	49	13	12	15
Reduction %		69.85%	76.89%	72.1%
Control	50	44	53	55
Second year Release	15	5	7	10
Reduction %		73.8%	71.4%	63.3%
Control	55	70	90	100

The reduction in aphid counts were 69.85 % opposed to the control mean count. While ten days after release aphid population reached 12 aphid individual / leaf. The reduction in aphid counts was 76.89 %. Fifteen days after release of 2nd instar larva of *C. Carnea*. The correct reduction percentage were 72.1%

The 2nd release, aphid population was conducted on March 20th. Before release; aphid population was 15 aphid individual / leaf. After five days of release the population of aphid decreased to reach 5 aphid individual / leaf. The reduction percentage in aphid population were 73.8%. After ten days of release the aphid counts were 7 aphid individual / leaf, while aphid population increased in the control treatment to reach 90 aphid individual / leaf. And the reduction percentage was 71.4% Fifteen days after release the count of aphids became 10 aphid individual / leaf giving reduction percentage as 63.3%. Results were in agree with Abd-Rabou (2008) who mentioned that the green lacewing *Chrysoperia carnea* (Stephen) is one of the most effective bioagents for the control of aphids. The present work deals with mass production, release and evaluation of this predator on different aphid pests. Experiments were done at four different locations of Egypt including Qalubia, Demmyate, North Sinai and Giza about one million larvae were released at the rate of 100 larvae per tree and 50 larvae per individual plant, during 2005-2006.

The results showed that the populations of the aphid species decreased from 2110 to 77 on potato and was agreed with Faragella (2004) who conducted the predatory effects of major aphidophagous predators on major aphid species in alfalfa agro ecosystem and the effects of strip cutting on the population of both groups at Hada Alsham, Jeddah, Saudi Arabia. Five major aphidophagous predators were recovered. The big – eyed bug *Geocoris siculus* (Fieber) the syrphid fly *Sphaerophoria flavicauda* (Zett.) the aphid lion *Chrysoperia carnea* (Stephen) the assassin bug *Coranus aegyptius* (Fabricius) and the rove beetle *Paederus alfieri* (Koch). Garzon *etal* (2015) evaluated the biological parameters of *Chrysoperla externa* (Hagen) while feeding on *Myzus persicae* (Sulzer) acting as a vector of potato leafroll virus (PLRV). In laboratory experiments, three different diets were offered ad libitum to *C. externa* (Hagen) during the larval period: *M. persicae* fed on PLRV-infected potato leaves, *M. persicae* fed on uninfected potato leaves, and eggs of the factitious prey *Anagasta kuehniella* (Zeller) as the control. adult survival was affected by the prey type, as 75% of *C. externa* control adults remained alive at an age of 30 days compared to 51 and 54% for those fed on PLRV-uninfected and infected aphids.

Reference

- Abd-Rabou, S., 2008. Evaluation of the green lace wing *Chrysoperia carnea* (Stephens) (Neuroptera: Chrysopidae) against aphids on different crops. Jour. Biological control.22:2, 299-310.
- Alvarez, J.M. and R. Srinivasan, 2005. Evaluation of hairy nightshade as an inoculum source for aphid mediated transmission of potato leaf roll virus. Journal of Economic Entomol 98:4, 1101 -1108.
- FAO, 2004. Food and Agriculture Organization of Untided Nations, Rome, Italy
- FAO, 2006. Food and Agriculture Organization of Untided Nations, Rome, Italy
- Faragella, A. A., 2004. The role of some major aphidophagous predators on major aphid species in alfalfa agroecosystem, western Saudi Arabia. Assiut Journal of Agricultural sci; 35:3 261-287.
- Garzon, A., B. C. Freire, G. A. Carvalho, R. L. Oliveira, P. Medina and F. Budia, 2015. Development and reproduction of *Chrysoperla externa* (Hagen) (Neuroptera: Chrysopidae) fed on *Myzus persicae* (Sulzer) (Hemiptera: Aphididae) vectoring Potato leaf roll virus (PLRV) Neotropical Entomology; 44(6):604-609. 39 refs.
- Henderson, C.F. and A.W. Tilton, 1955. Test with acaricides against the wheat mite .J. Econ. Entomol.49:157-161.