Research Article

Feeding Potential of *Chrysoperla carnea* on *Myzus persicae* (Sulzer) under Laboratory Conditions

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Abstract | *Chrysoperla carnea* is a major predator of soft bodies insects like aphid, white fly and thrips. The feeding potential of *Chrysoperla carnea* larvae on different nymphal instars of *Myzus persicae* was investigated in ambient laboratory conditions at University of Agriculture, Faisalabad. *Chrysoperla carnea* was found very active and consumed all stages of aphid. The predation rate of *Chrysoperla carnea* was increased with increase in larval instars (1st to 3rd). Third instar of *Chrysoperla carnea* was very voracious feeder and fed large number of aphid instars nymphs (1st, 2nd and 3rd). The larval predatory potential was 413.9±0.07 aphid per larvae. The current study results revealed that *Chrysoperla carnea* has great potential for biological control of aphid.

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1. Introduction

Biological control is playing key role in insect pests management from last two decades. The biological agents (predators) belong to insect orders like Coleoptera, Diptera, Himeptera, Neuroptera and Hymenoptera that are used exclusively for pest management and feed on larval as well as adult stages. Man is exploiting, commercially rearing these predators and released to the agricultural fields for better efficiency.

Several studies have been conducted on different regions of the world related to biology of *Chrysoperla carnea* (Eraky and Nasser, 1993; El-Hag and Zaitoon, 1996). The biological agents such as *C. carnea* and many others have been released in filed for pest control especially aphid species. Neuropteran predators, *Chrysoperla carnea* is a polyphagous and major predator of soft bodies insects such as aphid, thrips, mealy bug, mites, whitefly and many other orthropods (Carrillo and Elanov, 2004; Shalaby et al., 2008; Yuksel and Goemen, 1992; Singh and Manoj, 2000; Venkatesan et al., 2002, 2000; Zaki and Gesraha, 2001). Adults of *C. carnea* feed on flower nectar, pollen and honey dew excretion during aphid sucking cell sap (Saminathan and Baskaran, 1999; Kareim, 1998). Genus *Chrysoperla* belongs to family, Chrysopidae and order Neuroptera contains many important species of predatory insects of which the green lacewing, *Chrysoperla carnea* (Stephens) is one of them.

C. carnea is now commonly reared in laboratories and used extensively all over the world (Liu and Chen, 2001; Balasubramani and Swamiappan, 1994;

Tauber et al., 2000). It has significant potential for commercialization and use against a variety of crop pests in combination with other insect pest management tactics (Atakan, 2000; Sengonca et al., 1995; Daane et al., 1996; Legaspi et al., 1996). Therefore, the current work was undertaken to check the feeding potential of larvae to prey like aphids.

2. Materials and Methods

2.1 Study area

An experimental study was conducted to check the feeding potential and developmental period of *C. carnea* larvae fed on *Myzus persicae* during 2018 under laboratory conditions at 26±5C° temperature and 60% relative humidity (RH) in University of Agriculture, Faisalabad.

2.2 Culture maintenance of green peach aphid in green houses conditions

Under the glass house conditions, the culture of green peach aphid (*Myzus persicae*) was sustained on okra plants. For aphid culture maintenance the seeds of okra variety sabaz pari were sown, under glass houses. Aphids were collected from nearby okra fields and released on sowing okra plants inside the glasshouse. The aphid population was multiplied freely and the colony was established.

2.3 Mass rearing of chrysoperla carnea under laboratory

For mass rearing purpose, adults of *C. carnea* were collected from nearby cabbage fields. The collected adults of *C. carnea* were reared on artificial diet such as yeast + sugar + honey + distilled water in ratio of 8:4: 2:1. Adults was reared in a rectangular cage with 5cm thick and transparent plastic sheet. A black granulated paper was inserted inside the cage as substrate for oviposition. On daily basis, eggs were collected with the help of razer and placed into plastic jars for hatching.

Newly hatched 1st instars larvae of *C. carnea* were collected from the culture with help of camel hair brush and released into plastic containers containing the counted number of 1st and 2nd instar of *M. persicae* nymphs while 2nd and 3rd instars of *C. carnea* were fed with mixed instars of nymphs. First instar of *C. carnea* was provided 15 green peach aphid nymphs. The number of aphids for *C. carnea* feeding were increase gradually (20, 25, 30…60 and 65 respectively) each day, till the larvae reached to pupal stage. Feeding potential was observed after every 24 hours.

2.4 Statistically analysis

The mean data were statistically analyzed using one-way ANOVA and standard error tests.

3. Results and Discussion

The various insect pests such as sucking and chewing attack on the different crops parts from sowing to harvesting. Among them, aphid species are important pest of various crops such as cabbage, cotton and potato etc. (Sattar and Abro, 2011).

Green lace wing is known as aphid lions with golden eyes and widely distributed in all agricultural habitats. Green lace wing, *C. carnea* is consumed soft bodies insects such as all stages of aphid (Hoffmann and Frodsham, 1993). Aphid is the major prey of *C. carnea* (Balakrishnan et al., 2005; Chakraborty and Korat, 2010).

The study revealed that the predatory performance of *C. Carnea* enhanced with the growth of grub. As the grub grew from first instar to third instar, the feeding capacity improved in all the species of aphids used as prey (Saminathan et al., 2003; Jagadish and Jayaramaiah, 2004; Krishnamoorthy and Mani, 1982; Megahed et al., 1984). Rabinder et al. (2008) reported that aphid is the major prey of *C. carnea.* The current study was resulted that all three larval instars of *C. carnea* were good predator of aphids. The results indicate that 3rd instar larvae were more voracious than the first two instars. The mean feeding potential of 1st, 2nd and 3rd instars were 60.80±1.816, 110.09±5.98 and 237.20±19.511 aphids, respectively. The similar findings have been reported by earlier studies (Khan et al., 2013). Feeding Potential of *C. carnea* larval instars on *Myzus persicae* was given in Figure 1.

The first, second and third larval instars of *C. carnea* were fed an average of 11.48, 79.52 and 83.00 aphids respectively (Singh and Manojkumar, 2000) while (Singh and Hamid, 1998) reported that the *C. carnea* consumed an average of 21.68, 76.92 and 160.92 cabbage aphids in its first, second and third instar larva, respectively. The similar findings have been observed by other researchers (Rana and Srivastava, 1998).

Another study was carried out in 2010, to check the effect of different temperatures on the consumption capacity of *C. carnea* on four aphid species such as *Aphis craccivora* Koch, *Aphis gossypii* Glov, *Myzus persicae* Sulz and *Lipaphis erysimi* Kalt (Renu and Pathak, 2010). The study revealed that capacity of feeding varies with respect to different temperatures. The environmental conditions like temperature and relative humidity (RH) were played key role in feeding behavior. The feeding capacity of *C. carnea* was increased with increase and decrease in temperature, prey density and relative humidity (RH) respectively.

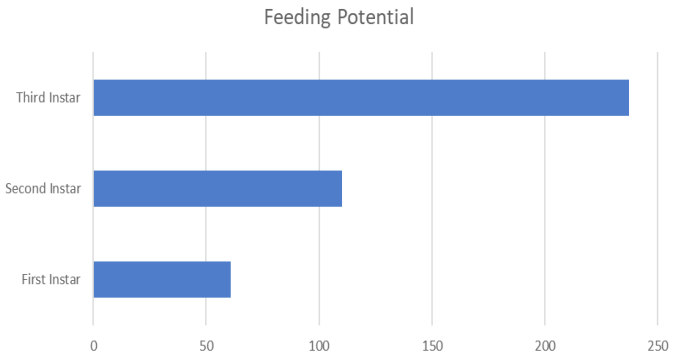

Figure 1: Feeding potential of *C. carnea* larval instars on *Myzus persicae*.

Conclusions and Recommendations

The rearing of green lacewing, *Chrysoperla carnea* (Stephen) is prove an effective strategy for management of many pests such as whitefly, aphids, thrips, coccids, mites, mealy bugs, lepidopteran eggs and a variety of other slow or non-moving soft-bodied arthropods.

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Author's Contribution

MR wrote the manuscript, GM and MF conducted the study, MWS, MAR and SU critically reviewed the manuscript.

Conflict of interest

Authors declared no conflict of interest.

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