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Biology and Feeding Potential of *Chrysoperla carnea* (Stephens) (Neuroptera: Chrysopidae) on *Aleurodicus dispersus* (Russell) in the Kolhapur District of Maharashtra, India

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ABSTRACT

The green lacewing, *Chrysoperla carnea* (Stephens) (Neuroptera: Chrysopidae), is an important biological control agent widely distributed throughout the world and recognized for its predatory activity against a wide range of soft-bodied insect pests, including the spiralling whitefly, *Aleurodicus dispersus* (Russell). The present investigation was conducted to study the biology and feeding potential of *C. carnea* on *A. dispersus* under laboratory conditions (24 ± 4°C) in Kolhapur District, Maharashtra, India. Observations were recorded on the duration of different developmental stages, morphological characteristics, adult longevity, and predatory efficiency of the larval instars. The results revealed that *C. carnea* successfully completed its life cycle within a relatively short period under laboratory conditions. Distinct morphological characteristics were observed at each developmental stage. Among the three larval instars, the third instar exhibited the highest predatory potential, consuming significantly more *A. dispersus* individuals than the first and second instars, presumably due to its larger body size and greater nutritional requirements. Adult longevity ranged from 20 to 35 days in males and 25 to 45 days in females, indicating a longer lifespan in females than in males. The findings of the present study demonstrate that *C. carnea* is an efficient predator of *A. dispersus* and possesses considerable potential as a biological control agent. Its high predatory capacity, particularly during the third larval instar, supports its utilization in integrated pest management (IPM) programmes for the sustainable management of spiralling whitefly populations

Keywords: Green Lacewing, Biocontrol agent, Pest, Whitefly, Predatory potential.

INTRODUCTION

Green lacewings (Neuroptera: Chrysopidae) are among the most important and widely recognized predators of arthropod pests in agricultural and horticultural ecosystems (Ridgway and Kinzer, 1974; Ridgway and Murphy, 1984). They occur in a wide range of cropping systems, including vegetables, fruits, nuts, forage crops, ornamental plants, greenhouse crops, and forest ecosystems, where they contribute significantly to the natural regulation of pest populations.

Among the chrysopids, *Chrysoperla carnea* (Stephens) is one of the most extensively studied and widely distributed predatory species. Commonly known as the green lacewing, it belongs to the family Chrysopidae and is considered an important

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biological control agent due to its high predatory efficiency and adaptability to diverse environmental conditions (Tauber et al., 2000). In India, approximately 65 chrysopid species belonging to 21 genera have been recorded (Singh, 1994). The genus *Chrysoperla* comprises several economically important predatory species, among which *C. carnea* has gained considerable attention for its role in the suppression of agricultural pests.

The larval stages of *C. carnea* are voracious predators and feed on a wide range of soft-bodied arthropods, including aphids, whiteflies, thrips, leafhoppers, mealybugs, caterpillars, and insect eggs (Carrillo and Elanov, 2004). Owing to its broad prey range, high searching ability, and substantial feeding capacity, *C. carnea* has become an integral component of biological pest management programmes (Sengonca and Grooterhorst, 1985). Furthermore, the species can be easily mass-reared under laboratory conditions and released in the field for augmentative biological control of insect pests (Syed et al., 2008).

The spiralling whitefly, *Aleurodicus dispersus* (Russell) (Hemiptera: Aleyrodidae), is an invasive and polyphagous pest that infests numerous agricultural, horticultural, and ornamental plant species. It has been reported to cause severe damage to crops such as coconut, guava, banana, papaya, and several ornamental plants (Hoddle, 2006). Both nymphs and adults feed on plant sap, resulting in weakening of host plants, reduced growth, and decreased productivity. In addition, the copious honeydew excreted by the insect promotes the development of sooty mould, which interferes with photosynthesis and further reduces plant vigor (Hoddle, 2006).

The extensive use of chemical insecticides for managing whitefly infestations often leads to environmental contamination, pest resistance, resurgence of pest populations, and adverse effects on beneficial organisms. Consequently, biological control has emerged as a sustainable and environmentally friendly alternative for the management of *A. dispersus*. Predators such as *C. carnea* play a crucial role in suppressing whitefly populations and reducing dependence on chemical pesticides (Dhawan and Simwat, 1996).

The effectiveness of *C. carnea* as a biological control agent largely depends on its developmental biology, survival, reproductive potential, and feeding capacity during the larval stages (Venkatesan et al., 2016). Therefore, a comprehensive understanding of its life history and predatory behavior against specific prey species is essential for the successful implementation of integrated pest management (IPM) programmes (Tauber et al., 2000). In this context, the present study was undertaken to investigate the biology and feeding potential of *Chrysoperla carnea* (Stephens) on the spiralling whitefly, *Aleurodicus dispersus* (Russell), under laboratory conditions in Kolhapur District, Maharashtra, India. The findings of this study are expected to contribute to the development of effective and sustainable biological control strategies for the management of spiralling whitefly infestations.

MATERIALS AND METHODS

The biological control potential, particularly the feeding efficacy of *Chrysoperla carnea* (Stephens), was evaluated under laboratory conditions. Specimens were collected from various agricultural ecosystems in Kolhapur District, Maharashtra. Different life stages of *C. carnea*, a green lacewing predator of *Aleurodicus dispersus* (Russell), were collected from whitefly-infested crop fields and transported to the laboratory for culture establishment.

In the laboratory, infested plant material was examined under a stereoscopic microscope to separate lacewing eggs, larvae, and whiteflies. Whiteflies (*A. dispersus*) were used as a food source to maintain a continuous laboratory culture of *C. carnea*, following standard rearing procedures described by Tauber and Tauber (1970) and later refined by Greiff and Hagen. Adult males and females of *C. carnea* were maintained together in rearing containers and provided with a honey-sugar solution as a supplementary food source to enhance longevity and reproductive performance, as recommended by Hagen and Tassan during the 1960s and 1970s.

After approximately one month, a stable nucleus culture of the predator was established. To maintain and multiply the culture, groups of four pairs of adults (male and female) were transferred into separate plastic containers (20 cm × 10 cm) to facilitate large-scale rearing for biological studies.

Following mating, females laid eggs on whitefly-infested leaves. Freshly laid eggs of *C. carnea* were pale green, oval-shaped, and attached individually to the tips of long, slender stalks. These stalks are typically positioned on the undersides of leaves near pest colonies, protecting the eggs from cannibalism by newly hatched larvae and from predation by other natural enemies. The eggs were carefully collected from infested leaves, isolated, and placed individually in cavity blocks, with ten eggs per block, under controlled incubation conditions.

Upon hatching, first-instar larvae were transferred to Petri plates and provided with whitefly-infested leaves containing a known number of *A. dispersus*. Predatory efficiency was assessed by recording the number of whiteflies consumed by each larva over a 24-hour period. Such feeding studies are commonly employed to evaluate the predation potential of lacewing larvae against whitefly populations.

A second batch of *C. carnea* larvae was reared to evaluate feeding efficiency against different developmental stages of the prey. The predatory larvae were provided with a known number of *A. dispersus* individuals ranging from 5 to 15 days old. Observations were recorded throughout the larval period to assess feeding potential. During development, freshly infested leaves containing whiteflies of varying age groups (4–12 days old) were supplied daily to the first, second, and third instar larvae until pupation.

The larvae continued feeding actively until entering the pupal stage. After pupation, adults emerged and were separated into males and females. Subsequently, both sexes were maintained together to facilitate mating. The feeding efficiency of adults was evaluated by measuring the consumption of honey-sugar solution over a 24-hour period. In addition, observations were made to determine adult longevity and fecundity under laboratory conditions.

RESULTS AND DISCUSSION

The biology of *Chrysoperla carnea* (Stephens) on the spiraling whitefly, *Aleurodicus dispersus* (Russell), was studied under laboratory conditions at a temperature of 24 ± 4°C. The total developmental duration and morphometric measurements of each life stage of *C. carnea* were recorded.

Egg Stage - The eggs of *C. carnea* were pale green, oval-shaped, and characteristically attached to the tips of long, slender, flexible stalks. These stalks were positioned on the undersides of leaves near colonies of *A. dispersus*. The eggs measured approximately 0.8–1.2 mm in length and 0.3–0.5 mm in breadth, while the hair-like silken stalks (peduncles) measured approximately 0.8–1.5 mm in length. The incubation period ranged from 3 to 5 days, with a mean duration of 3.8 ± 0.6 days.

Larval Stage - During the larval period, *C. carnea* underwent two moults and passed through three distinct larval instars.

First Instar - The newly hatched larva was small, slender, and elongated, with a soft, pale grey to creamy-white body. The head was well developed and bore a pair of sickle-shaped mandibles adapted for sucking prey. The first-instar larva measured approximately 1.5–2.5 mm in length and 0.3–0.5 mm in breadth. The duration of the first instar ranged from 2 to 3 days, with a mean duration of 2.4 ± 0.5 days.

Second Instar - The second-instar larva was greyish to light brown in colour and comparatively larger than the first instar. It measured approximately 3.0–5.0 mm in length and 0.5–0.8 mm in breadth. The developmental period ranged from 2 to 4 days, with a mean duration of 3.0 ± 0.7 days.

Third Instar - The third-instar larva was greyish-brown in colour, robust, and elongated, with distinct markings and well-developed tubercles bearing setae. The mandibles were strong and prominent, making this stage highly predatory. The larva measured approximately 6.0–10.0 mm in length and 1.0–1.5 mm in breadth. The duration of the third instar ranged from 3 to 5 days, with a mean duration of 4.0 ± 0.8 days.

Total Larval Period - The total larval period of *C. carnea* ranged from 7 to 12 days, with a mean duration of 9.4 ± 1.2 days (Table 1).

Pupal Stage - The pupa was enclosed within a spherical silken cocoon constructed by the third-instar larva. The cocoon was attached to the substrate and varied in colour from white to cream. The pupa was exarate, soft-bodied, and initially pale, gradually darkening as development progressed. The prepupal period ranged from 1 to 2 days, with a mean duration of 1.5 ± 0.5 days. The pupal period ranged from 5 to 8 days, with a mean duration of 6.5 ± 1.0 days under laboratory conditions. The pupa measured approximately 3.0–5.0 mm in length and 2.0–3.0 mm in breadth.

Adult Stage - After emergence from the pupa, adult *C. carnea* were delicate, soft-bodied, and light green in colour, possessing transparent lace-like wings with prominent green venation. Adult males measured approximately 10–15 mm in length and 2.0–3.0 mm in breadth, whereas females were slightly larger, measuring 12–16 mm in length and 2.5–3.5 mm in breadth.

The longevity of adult *C. carnea* ranged from 20 to 35 days in males, with a mean of 27.5 ± 4.5 days, and from 25 to 45 days in females, with a mean of 34.0 ± 5.5 days under laboratory conditions.

Table-1. Developmental period of *Chrysoperla carnea* in days

Developmental Stages of *Chrysoperla carnea*	**Development Periods in Days (Mean±S.D.)**		
	Min.	**Max.**	**Mean±SD**
Egg			
Incubation period	03	05	3.8 ± 0.6
Larva			
I instar	02	03	2.4 ± 0.5
II instar	02	04	3.0 ± 0.7
III instar	03	05	4.0 ± 0.8
Total larval period	07	12	9.4 ± 1.2
Pupa			
Pre-pupal period	01	02	1.5 ± 0.5
pupal period	05	08	6.5 ± 1.0
Adult			
Female	20	35	27.5 ± 4.5
Male	25	45	34.0 ± 5.5

Feeding Efficacy of *Chrysoperla carnea* on *Aleurodicus disperses* :

The larval stage of *Chrysoperla carnea* (Stephens) is an active and efficient predator, playing a significant role in the biological control of the spiraling whitefly, *Aleurodicus dispersus* (Russell) (Figure-1). Following the completion of the incubation period, the eggs hatched into larvae that immediately commenced feeding on whitefly individuals. The predatory potential of the larvae increased progressively with each successive instar.

The first instar larva consumed an average of 18.5 ± 2.4 whiteflies during its developmental period. Consumption increased substantially in the second instar, which preyed upon an average of 42.8 ± 4.6 whiteflies. The third instar exhibited the highest feeding capacity, consuming an average of 96.7 ± 8.5 whiteflies. The cumulative prey consumption by a single larva throughout its larval development was recorded as 158.0 ± 12.3 whiteflies.

The results clearly demonstrate the high predatory efficiency of C. carnea larvae against A. dispersus. A significant increase in feeding rate was observed with advancing larval age, with the third instar contributing the largest proportion of total prey consumption. These findings indicate that C. carnea possesses considerable potential as a biological control agent for the management of spiraling whitefly populations under integrated pest management (IPM) programmes.

Table-2. Feeding efficacy of *Chrysoperla carnea* on *Aleurodicus disperses*

Larval Stages	**Nymphs of *A.dispersus* (Mean±S.D.)**
First Instar	18.5 ± 2.4
Second Instar	42.8 ± 4.6
Third Instar	96.7 ± 8.5
Total Consumption	158.0 ± 12.3

Sharma and Verma (1991). Studied the biology of *Chrysoperla carnea* under laboratory conditions using the cabbage aphid, *Brevicoryne brassicae*, as prey. The researcher described the morphological characteristics, body size, developmental duration of each life stage, and the mating and oviposition behaviour of the predator. They are recorded that a single larva consumed an average of 181 aphids during its larval lifespan of 12.08 days. The larva successfully eliminated aphid colonies initially containing 50 and 100 individuals within 4 and 7 days, respectively; however, it was unable to completely suppress colonies comprising 200 aphids. The total developmental period from egg to adult averaged 24.77 days under laboratory conditions during the period from mid-May to the end of July. The pupal stage lasted 7–9 days, and the resulting adult progeny exhibited a female-to-male sex ratio of 1.2:1.

Saminathan *et al.*, (1998). Experiments were conducted during 1997 to study the biology and predatory potential of the green lacewing, *Chrysoperla carnea* (Stephens), on different insect prey under laboratory conditions.

Figure-1. Different life stages of *C. carnea*, a green lacewing predator of *Aleurodicus dispersus* (Russell)

They recorded the developmental performance of the predator varied significantly with the prey species. The shortest egg, larval, and pupal durations were recorded when *C. carnea* was reared on *Aphis craccivora* collected from groundnut, averaging 2.35, 8.22, and 8.02 days, respectively. In contrast, the longest corresponding developmental periods were observed on neonate larvae of *Helicoverpa armigera*, averaging 3.10, 11.37, and 8.27 days, respectively. Consequently, the total developmental period from egg to adult ranged from 18.59 days on *A. craccivora* (groundnut) to 22.74 days on *H. armigera* neonate larvae. These findings demonstrated that the developmental rate and biological performance of *C. carnea* are strongly influenced by the quality and suitability of the prey species.

Shaukat (2018) investigated the influence of host species on the biology of *Chrysoperla carnea* (Stephens) under laboratory conditions maintained at 26 ± 2 °C and 65 ± 5% relative humidity. The study also reported that the orientation of leaves in perennial grasses provides aphids with refuge sites, enabling them to evade predation by green lacewing larvae. The biological performance of *C. carnea* was evaluated on different host species, and the results indicated that the incubation period of eggs laid by females reared on different prey during their immature stages differed significantly ($P < 0.001$). These findings suggest that prey species and host plant characteristics can influence the reproductive biology and developmental performance of *C. carnea*.

Manjunatha *et al.*, (2018). Evaluated the predatory potential of *Chrysoperla carnea* (Stephens) against the major soft-bodied insect pests of cotton, *Bemisia tabaci* and *Aphis gossypii*, during the summer cropping season. The study reported that both pest species occurred at different growth stages of the cotton crop. The results demonstrated that *C. carnea* exhibited a greater predatory preference for *A.*

gossypii than for *B. tabaci* throughout its larval development. The first, second, third, and fourth larval instars of *C. carnea* consumed an average of 4.30, 3.37, 6.35, and 6.14 *B. tabaci* individuals, respectively, whereas the corresponding consumption of *A. gossypii* was 14.44, 23.44, 28.16, and 6.44 individuals. The third larval instar exhibited the highest feeding capacity, consuming an average of 67.14 third-instar aphids. Overall, prey consumption increased progressively with the advancement of the predator's larval instars, reaching a maximum during the third instar, and subsequently declined with older developmental stages of the prey.

Timke *et al.*, (2020) evaluated the feeding potential of *Chrysoperla carnea* (Stephens) on eggs of *Corcyra cephalonica* (Stainton) under different temperature regimes. The study demonstrated that temperature significantly influenced larval development and prey consumption. The shortest larval developmental period (6.96 days) and the lowest prey consumption (342.64 eggs; 11.31 mg) were recorded at 30°C, whereas the longest developmental period (20.93 days) and the highest prey consumption (1401.69 eggs; 46.26 mg) occurred at 20°C. The authors concluded that *C. carnea* is an efficient polyphagous predator and an important biological control agent that can be mass-reared for integrated pest management (IPM) programmes.

Reddy *et al.*, (2022) investigated the biology and growth parameters of *Chrysoperla carnea* (Stephens) on two prey species, the cowpea aphid and the guava mealybug, under laboratory conditions (28 ± 2°C and 65–70% relative humidity). The incubation period was similar on both prey species; however, the larval period was shorter on aphids (10.31 ± 0.68 days) than on mealybugs (12.75 ± 0.48 days). The pupal duration did not differ significantly between the two diets. Consequently, the total developmental period from egg to adult was shorter on aphids (19.88 ± 0.87 days) than on mealybugs (22.38 ± 0.63 days). Female adults lived longer than males irrespective of prey species, and the complete life cycle was completed in 50.81 ± 1.66 days on aphids and 53.88 ± 1.50 days on mealybugs. The study demonstrated that aphids constitute a more suitable prey than mealybugs for the growth and development of *C. carnea*.

The present research investigation was conducted to evaluate the biology and feeding potential of *Chrysoperla carnea* (Stephens) on the spiralling whitefly, *Aleurodicus dispersus* (Russell), under laboratory conditions (24 ± 4°C) in Kolhapur District, Maharashtra, India. The results demonstrated that *C. carnea* successfully completed its life cycle under the prevailing laboratory conditions, with distinct morphological characteristics observed at each developmental stage. Among the three larval instars, the third instar exhibited the greatest predatory potential, consuming significantly more *A. dispersus* individuals than the first and second instars. The higher feeding capacity of the third instar is likely attributable to its larger body size, increased metabolic activity, and greater nutritional requirements. These findings highlight the effectiveness of *C. carnea* as a promising biological control agent against *A. dispersus* and support its potential use in integrated pest management (IPM) programmes.

CONCLUSION

The present study demonstrated that *Chrysoperla carnea* successfully completed its life cycle on *Aleurodicus dispersus* under laboratory conditions (24 ± 4°C) and confirm that *C. carnea* is an effective and promising biological control agent for the sustainable management of spiralling whitefly populations. Its high feeding potential, ease of laboratory rearing, and adaptability make it a suitable candidate for incorporation into Integrated Pest Management (IPM) programmes, thereby reducing dependence on chemical insecticides and minimizing their adverse environmental impacts. Further field-based investigations on the release strategies, establishment, and efficacy of *C. carnea* under different agro-climatic conditions are recommended to validate its practical application and optimize its use in large-scale biological control programmes.

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Conflicts of Interest

Authors declare that there is no conflict of interests regarding the publication of this paper.

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Data Availability
All data generated or analyzed during this study are included within this published article.

References

[1] Carrillo, M. A., & Elanov, E. (2004). Biology and predatory efficiency of *Chrysoperla carnea* (Stephens) on soft-bodied insect pests. *Journal of Biological Control, 18*(2), 123–128.

[2] Dhawan, A. K., & Simwat, G. S. (1996). Role of predators in the management of whitefly and other sucking pests. Journal of Insect Science, 9(1), 45–52.

[3] Greiff, P., & Hagen, K. S. (2000). Mass rearing of green lacewings. In T. S. Bellows & T. W. Fisher (Eds.), Handbook of Biological Control: Principles and Applications of Biological Control (pp. 283–298). Academic Press, San Diego, California, USA.

[4] Hagen, K. S., & Tassan, R. L. (1970). The influence of food supplements on the reproduction and longevity of Chrysopa carnea Stephens. Journal of Economic Entomology, 63(1), 284–287.

[5] Hoddle, M. S. (2006). Foreign exploration for natural enemies of the spiralling whitefly, Aleurodicus dispersus Russell (Homoptera: Aleyrodidae). Biocontrol News and Information, 27(1), 7N–12N.

[6] Manjunatha, M., Ramesh Babu, T., Sharanabasappa, & Kambrekar, D. N. (2018). Predatory potential of Chrysoperla carnea (Stephens) against major sucking insect pests of cotton under laboratory conditions. Journal of Entomology and Zoology Studies, 6(5), 1185–1189.

[7] Memon, N., Gilal, A. A., Khuhro, R. D., & Qureshi, K. H. (2015). Predatory potential of green lacewing, Chrysoperla carnea (Stephens), against different insect pests. Pakistan Journal of Agriculture, Agricultural Engineering and Veterinary Sciences, 31(1), 12–18.

[8] Reddy, K. S., Prasad, N. V. V. S. D., Krishna, T. M., Reddy, G. V., & Reddy, P. V. (2022). Biology and growth parameters of *Chrysoperla carnea* (Stephens) on cowpea aphid and guava mealybug under laboratory conditions. *The Pharma Innovation Journal, 11*(5), 1503–1507.

[9] Ridgway, R. L., & Kinzer, R. E. (1974). Chrysopidae as biological control agents. In R. L. Ridgway & S. B. Vinson (Eds.), Biological Control by Augmentation of Natural Enemies (pp. 68–89). Plenum Press, New York.

[10] Ridgway, R. L., & Murphy, W. L. (1984). Biological control in the field using chrysopid predators. In M. Canard, Y. Séméria, & T. R. New (Eds.), Biology of Chrysopidae (pp. 220–228). Dr. W. Junk Publishers, The Hague.

[11] Saminathan, R., Muralibaskaran, R. K., & Mahadevan, N. R. (1998). Biology and predatory potential of Chrysoperla carnea (Stephens) on different insect prey under laboratory conditions. Insect Environment, 4(2), 62–63.

[12] Sengonca, C., & Grooterhorst, A. (1985). Laboratory studies on the feeding capacity and development of Chrysoperla carnea (Stephens) on different prey species. Journal of Applied Entomology, 99, 219–226.

[13] Sharma, P. K., & Verma, A. N. (1991). Biology and predatory potential of Chrysoperla carnea (Stephens) on cabbage aphid, Brevicoryne brassicae (L.). Journal of Biological Control, 5(2), 77–80.

[14] Shaukat, A. (2018). Influence of host species on the biology of Chrysoperla carnea (Stephens) under laboratory conditions. Journal of Entomology and Zoology Studies, 6(4), 1244–1248.

[15] Singh, S. P. (1994). Taxonomic studies on Indian Chrysopidae (Neuroptera). Records of the Zoological Survey of India, 94(1–4), 1–63.

[16] Syed, T. S., Abro, G. H., Khuhro, M. A., & Sattar, M. (2008). Mass rearing and field evaluation of green lacewing, Chrysoperla carnea (Stephens), against insect pests. Pakistan Journal of Biological Sciences, 11(2), 234–239.

[17] Tauber, C. A., & Tauber, M. J. (1987). Food specificity in predaceous insects: An overview of Chrysoperla carnea biology and ecology. Annual Review of Entomology, 32, 239–256.

[18] Tauber, M. J., & Tauber, C. A. (1970). The biology of Chrysopa carnea (Neuroptera: Chrysopidae). Canadian Entomologist, 102, 1348–1354.

[19] Tauber, M. J., Tauber, C. A., Daane, K. M., & Hagen, K. S. (2000). Commercialization of

predators: Recent lessons from green lacewings (Neuroptera: Chrysopidae: Chrysoperla). American Entomologist, 46(1), 26–38.

[20] Timke, S. A., Sontakke, B. K., Bhute, N. K., & Wankhede, S. M. (2020). Effect of temperature on feeding potential of Chrysoperla carnea (Stephens) reared on eggs of Corcyra cephalonica (Stainton). Journal of Entomology and Zoology Studies, 8(5), 1707–1711.