The Pharma Innovation Journal 2023; SP-12(9): 345-348

www.ThePharmaJournal.com

The Pharma Innovation

**ISSN (E): 2277-7695**
**ISSN (P): 2349-8242**
**NAAS Rating: 5.23**
TPI 2023; SP-12(9): 345-348

www.thepharmajournal.com
Received: 15-07-2023
Accepted: 29-08-2023

**Thounaojam Sheileja**
Research Scholar, Department of Entomology, College of Agriculture, Central Agricultural University, Imphal, Manipur, Assam, India

**T Uma Maheswari**
Department of Entomology, College of Agriculture, Professor Jayashankar Telangana State Agricultural University, Hyderabad, Telangana, India

**Corresponding Author:**
**Thounaojam Sheileja**
Research Scholar, Department of Entomology, College of Agriculture, Central Agricultural University, Imphal, Manipur, Assam, India

# Influence of different quantity of castor flower pollen on biological parameters of adult *Chrysoperla zastrowi sillemi* (Esben-Peterson)

**Thounaojam Sheileja and T Uma Maheswari**

**Abstract**
The experiment on influence of castor pollen as floral feed on the biology of *Chrysoperla zastrowi sillemi* (Esben-Peterson) studied at AICRP (All India Coordinated Research Project) on Biological Control of Crop Pests, Rajendranagar, Hyderabad reported that longest oviposition duration of 36.6 days, highest female fecundity with 749.8 eggs/female and maximum of 87.0 percent egg hatchability as well as longest adult period of 28.0 days for males and 41.8 days for females were observed when *Chrysoperla* adults were fed with combination artificial food (Proteinex and glucose) along with 20g flower feed (castor pollen) compared to all the biological characteristics of *Chrysoperla* adults when fed only with artificial food.

**Keywords:** *Chrysoperla*, biology, floral feed, artificial food, fecundity, hatchability

## Introduction
The involvement of biological agents like predators, pathogens, parasitoids in maintaining organism density in a lower level than would increase in their absence is referred to as biological control (DeBach, 1965) [2]. *Chrysoperla zastrowi sillemi* (Esben-Peterson) commonly known as green lacewings or aphid lions, is a worldwide polyphagous predator found in maximum agro-ecosystems, with exceptional searching and feeding abilities. Because a single larva can consume over hundreds of aphids in its life period, it plays a significant role in the biological control of sucking soft bodied insect pests. Hagley and Miles (1987) [4] demonstrated the potential and effectiveness as a bioagent in agro systems, greenhouses etc. Females can deposit thousands of stalked eggs under the leaves or on shoots, which can hatch in 3 to 6 days and moult giving three instars. Predaceous larvae can feed voraciously on eggs, lepidopteran neonates, nymphs as well as adult of soft-bodied insects such as aphids, scales, mealy bugs, and others. Quality and quantity of food offered to *Chrysoperla* larvae and adults play an important influence in their development, metabolism, and reproductive capability. Adults mostly feed on nectar, honeydew, pollen, and other plant materials. As *Chrysoperla* predatory stage can serve as a possible biocontrol agent in most agro-ecosystems, the current experiment was evaluated to check the influence of flower diet on total adult performances.

## Materials and Methods
The biology of adult *Chrysoperla zastrowi sillemi* was studied with castor flower (*Ricinus communis* flower) as flower feed in a completely randomized design replicated five times at AICRP on Biological Control of Crop Pests, Rajendranagar, Telangana. Castor flower from the castor field of the Indian Institute of Oil Seed Research (IIOR) in Rajendranagar, Hyderabad was brought and used in the evaluation of the research. *Chrysoperla* larvae were kept individually in glass vials feeding on *Corcyra cephalonica* eggs and cocoons so formed were kept separated and stored in glass jar of 21×18 cm diamension at a temperature and relative humidity of 25±10 °C and 60±5% respectively. Freshly emerging adult of *Chrysoperla* was provided with artificially prepared diet (proteinex + glucose solution). The morphological differences between male and female adults were used to differentiate them. Each treatment consisted of single pair of freshly emerging adult released in cylindrical glass tube of diamension 3.5×6 cm and tight with bands. Proteinex solution was mixed with various amounts of flower feeds (5g, 10g, 15g, and 20g) in all treatments. For comparison, a control treatment of simply proteinex powder solution was used. Adults were fed on a daily basis until they died.

To evaluate the efficiency of the flower food supplement, the parameters like pre-oviposition/oviposition, percent egg hatchability, total female fecundity, and adult longevity duration were observed. The time between the adult emergence and the start of oviposition was taken as pre-ovipositional period (days), and the quantity of predator eggs laid by a single female on brown paper and the inner walls of the rearing jar was recorded every day. The oviposition period (days) was defined as the period of egg laying. Twenty eggs deposited on brown paper were counted to study hatchability. The time taken by each male and female adult to survive on varying amounts of floral feed was recorded on a regular basis to calculate adult duration (days), and the total number of eggs laid by a female during her life cycle was taken as total fecundity of the predator.

**Results and Discussion**

The effect of various amounts of flower feed, namely 5g, 10g, 15g, and 20g of castor flower pollen, on biology of *C. zastrowi sillemi* adults, including duration of oviposition, female fecundity, percent hatchability, adult male-female longevity was investigated (Table 1). The maximum oviposition period was 36.6 days when female predators were given a combination diet (proteinex + glucose solution) with different quantity either 20g or 15g floral feed as diet (36.4 days), which remained comparable to each other, followed by combination of artificial food mixed with 10g floral feed with 33.6 days, which was different significantly from other treatments. The oviposition duration was dramatically reduced (30.8 days) when artificial food was combined with 5g floral feed. When females were given only artificial food, the oviposition duration was reduced to 24.2 days (Figure 1). A report by Kumar and Gautam (2007) [5] that resulted in the longest oviposition period of 43.60 days using castor (*R. communis*) floral feed, which was observed in the current study which ranged from 30.8 to 36.6 days, showing that oviposition duration was highly influenced by quantities of floral feeds. However, current research clearly shows that, while castor pollen influences oviposition period, its quantity also plays a significant part.

When females feeding with optimal amount of castor flower feed, there was an overall rise in fecundity. When adults of *Chrysoperla* were fed a mixture of artificial feed combined with 20g floral feed, they produced 749.8 eggs/female, comparable to the combination of artificial feed mixed with 15g floral feed (738.4 eggs/female). Combining artificial feed with either 5g or 10g floral feed resulted in egg-laying potentials of 659.8 and 692.2 eggs per female respectively, which were significantly different from each other as well as the other two combinations (Figure 2). The current findings are consistent to the results of Deotale *et al.* (1998) [3], who reported the increased in egg laying by *Chrysoperla* female with castor pollen by about twofold over the normal diet. Females feeding artificial feed (control) alone had a minimum female fecundity of about 539.4 eggs/ female. Viji and Gautam (2005) [10] found that adults fed honey without supplementation had lower fecundity, concluding that honey could not be a perfect diet of *Chrysoperla scelestes*. According to Nandan *et al*. (2014) [8], the success rate of reproduction of *C. zastrowi sillemi* could reached only when female predator was fed pollen in addition to honey, and either honey or pollen alone could generate less eggs. Reports of Venzon *et al.* (2006) [9] and Murthy *et al.* (2005) [7] showed the superiority of protein-containing artificial diets, such as soyabean-based foods for high levels of egg production.

When artificial feed with 20 g flower feed of castor was provided, the egg hatchability was 87.0 percent, which was comparable to 84.4% when the combination of diet is with 15g flower feed. Artificial feed + 5g floral feed produced 82.2 percent egg hatchability, which was on same level to the combination of artificial food with 10g flower feed (80.4%) on the lower side and combination of artificial food with 15g flower feed (84.4%) on the higher side, compared to the lowest egg hatchability of 78.6 percent when *Chrysoperla* was fed with artificial feed alone (Figure 3). According to Li *et al.* (2010) [6], lacewings given only sucrose solution survived but did not lay viable eggs.

When *Chrysoperla* were given a combination of artificial food with 20g floral feed, adult male had the longest life period of 28.0 days and females had the longest longevity of 41.8 days (Figure 4). Male lifespan of 27.8 days was reported at a diet formed by mixing artificial food along with 10g flower pollen, which can be comparable to artificial feed + 5g floral feed (26.8 days) on the lower end and artificial feed + 20g floral feed (28.0 days) on the higher end. Male longevity was 26.2 days with artificial feed + 15g floral feed, which was comparable to artificial food with 5g flower feed. Longevity of adult female was 35.2 days when artificial food with 5g flower feed was supplied, which was comparable to a period of 36.4 days when feeding artificial food with 10g floral feed. A combination of artificial food with 20g flower pollen resulted in 41.8 days female adult period, comparable to combination of artificial food with 15g flower feed, resulting in 40.6 days period. The current findings contrast with Nandan *et al*. (2014) [8], who found that combining castor flower pollen with honey as natural food had least effect on the adult duration of *C. zastrowi sillemi*. Adane and Gautam (2002) [1] gave a similar viewpoint that adult dietary supplements including castor flower pollen or yeast in combining with honey (50%) had no significant effect on *Chrysoperla*. However, longer adult duration (male & female) in the current study or adult longevity variation with the supplementation of castor flower pollen as floral diet in different quantities may be because of the reason that a small amount of flower feed (5g to 10g) may be adequate in increasing adult longevity period rather than 15g to 20g of pollens with artificial food, which will significantly determine the composition of food. The current finding was validated by Kumar and Gautam (2007) [5], who reported that adult longevity was considerably influenced by diverse floral feeds, with *Ricinus communis* floral feed having 52.80 days for males and 55.90 days for females. The current study shown that the solution of proteinex powder and glucose, could be utilized to boost the function of honey, potentially resulting in lengthy survival of *Chrysoperla* adults.

**Table 1:** Effect on biological parameters of *Chrysoperla zastrowi sillemi* * at different quantity of castor flower pollen

| Treatments | Oviposition period (Days) | Fecundity/female (No. of eggs per female) | Hatchability (%) | Male Longevity (Days) | Female Longevity (Days) |
|---|---|---|---|---|---|
| Artificial Feed + 5g floral feed | 30.8[b] | 659.8[b] | 82.2[bc] | 26.8[bc] | 35.2[b] |
| Artificial Feed + 10g floral feed | 33.6[c] | 692.2[c] | 80.4[ab] | 27.8[cd] | 36.4[b] |
| Artificial Feed + 15g floral feed | 36.4[d] | 738.4[d] | 84.4[cd] | 26.2[b] | 40.6[c] |
| Artificial Feed + 20g floral feed | 36.6[d] | 749.8[d] | 87.0[d] | 28.0[d] | 41.8[c] |
| Artificial feed (Proteinex + Glucose) | 24.2[a] | 539.4[a] | 78.6[a] | 25.0[a] | 32.8[a] |
| C.D (0.05) | 2.08 | 13.33 | 2.66 | 1.13 | 1.42 |
| S.E. m ± | 0.70 | 4.49 | 0.90 | 0.38 | 0.48 |

Means with same alphabet do not differ significantly by DMRT (P = 0.05%)
*: Mean of five replications.

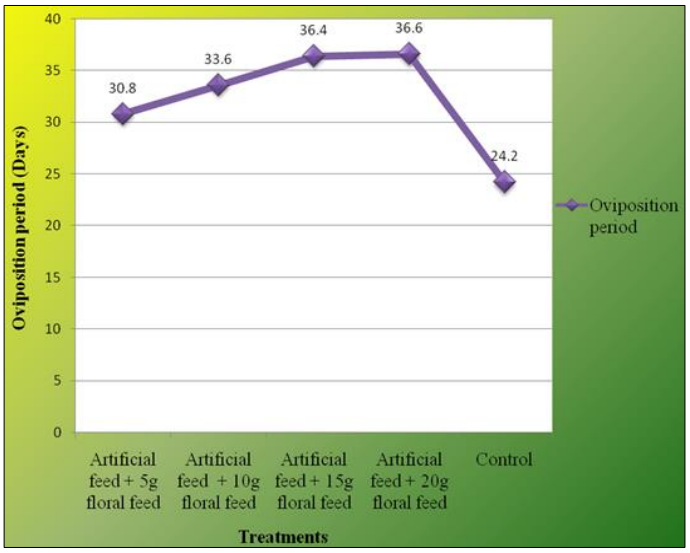


**Fig 1:** Effect of different quantity of castor pollen on oviposition period of *Chrysoperla.*

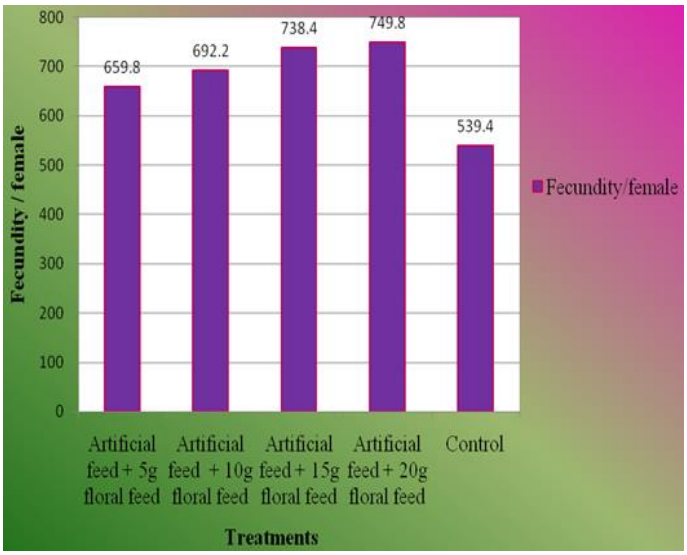


**Fig 2:** Effect of different quantity of castor pollen on female fecundity of *Chrysoperla.*

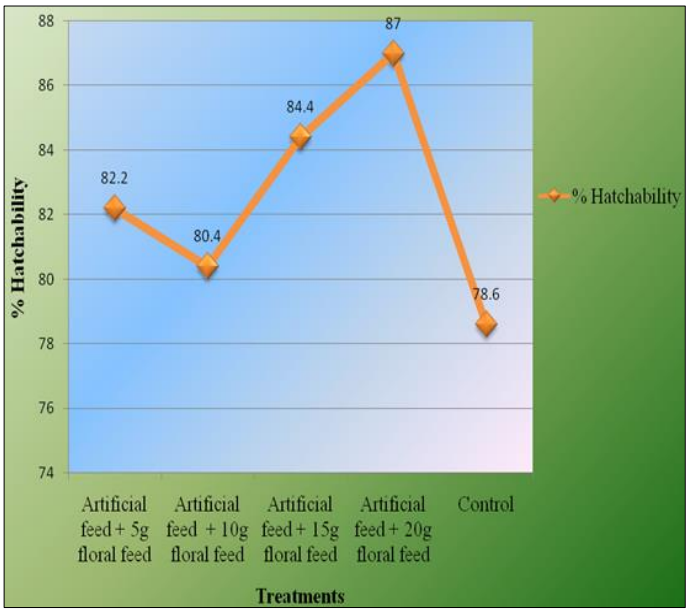


**Fig 3:** Effect of different quantity of castor pollen on egg hatchability of *Chrysoperla.*

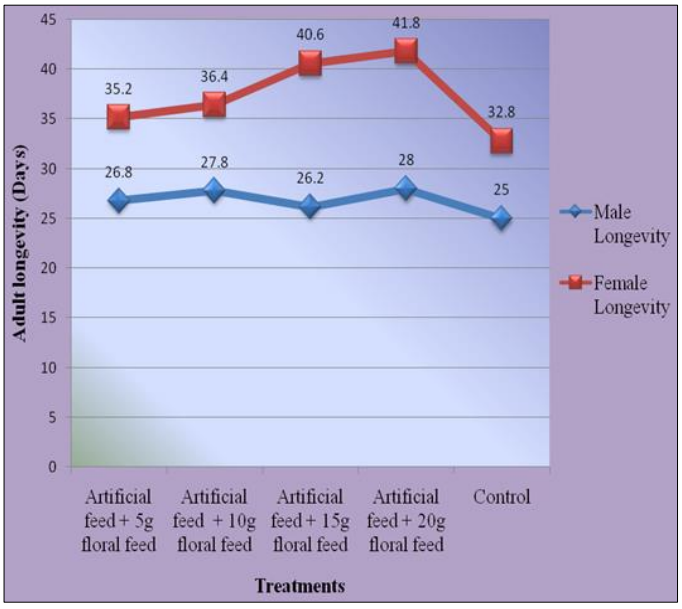


**Fig 4:** Effect of different quantity of castor pollen on adult longevity of Chrysoperla.

## Conclusion

The amount of flower feed in addition with artificial food significantly influenced oviposition period, fecundity, egg hatching, and adult longevity of *Chrysoperla*, indicating that either artificial food or flower feed alone cannot meet the dietary requirements, resulting in poor fecundity and hatchability. Flower pollen with high amount of amino acids are believed to possess higher food and nutritional value, and flower pollens of castor have superior nutritional quality for *Chrysoperla*, which might be used to mass-production of *C. zastrowi sillemi* which could be used in inundative release of biological control programmes.

**References**


1. Adane T, Gautam RD. Effect of adult food supplements on reproductive attributes and longevity of *Chrysoperla carnea* (Stephens). Annals of Plant Protection Sciences. 2002;10(2):198-201.
2. DeBach P. Some biological and ecological phenomena associate with colonizing entomophagous insects. In: Genetics of colonizing species (eds. H. G. Baker and G. L. Stebbins), Academic Press, New York; c1965. p. 287-306.
3. Deotale VY, Nimbalkar SA, Shamagat BK, Nandanwar VN. Effect of feeding different pollen grains on fecundity of *Chrysoperla carnea* (Stephens). Journal of Soils and Crops. 1998;8(2):223.
4. Hagley EAC, Miles N. Release of *Chrysoperla carnea* Stephens (Neuropteran: Chrysopidae) for control of Tetranychus urticae Koch on peach grown in a protected environment structure. The Canadian Entomologist. 1987;M119:205-206.
5. Kumar MS, Gautam RD. Influence of Different Floral Feeds on the Biological Attributes of *Chrysoperla carnea* (Stephens). Annals of Plant Protection Sciences. 2007;15(1):4-7.
6. Li Y, Meissle M, Romeis J. Use of maize pollen by adult *Chrysoperla carnea* (Neuroptera: Chrysopidae) and fate of Cry proteins in Bt-transgenic varieties. Journal of Insect Physiology. 2010;56:157-164.
7. Murthy KS, Venketesan T, Jalali SK. Development of Plutella xylostella on semi-synthetic diets and durability of diet reared host to larval parasitoid. Annals of Plant Protection Sciences. 2005;13:355-359.
8. Nandan N, Korat D, Dabhi MR. Influence of different pollen grains on biological parameters of Chrysoperla zastrowi sillemi (Esben-Peterson) adults. Insect Environment. 2014;20(2):45-49.
9. Venzon M, Rosado MC, Euzebio DE, Souza B, Schoereder JH. Suitability of leguminous cover crop pollens as food source for the green lacewing Chrysoperla external (Hagen) (Neuroptera: Chrysopidae). Neotropical Entomology. 2006;35(3):371-376.
10. Viji CP, Gautam RD. Mass multiplication of *Chrysoperla carnea* (Stephens) on non-traditional hosts. Annals of Plant Protection Sciences. 2005;13(1):123-128.