

Green Lacewings

Biological Control Agents of Greenhouse Insect Pests

The green lacewings, *Chrysopa carnea* and *Chrysoperla rufilabris*, are predatory insects released into greenhouse production systems to manage insect pest populations on ornamental and vegetable crops below plant-damaging levels. This publication provides information on the green lacewings related to their biology and behavior, commercial availability, and use in greenhouses as biological control agents.

Biology and Behavior

Green lacewings have four life stages: egg, larva, pupa, and adult. Adults are $\frac{3}{4}$ of an inch (19 millimeters) long, light green, with lacy wings held rooflike over the body when not flying, and two brown eyes (Figure 1). Adults primarily feed on honeydew (clear, sticky liquid produced by aphids during feeding), and the pollen and nectar of flowering plants. Adults fly mostly at night. After mating, females lay eggs on the ends of hairlike, silken stalks attached to the topside or underside of plant leaves (Figures 2 and 3). The stalks protect the eggs from being fed upon

by newly emerged (eclosed) larvae. A female lays between 400 and 500 eggs in three to four weeks. At 75 degrees Fahrenheit (24 degrees Celsius) adults live between 20 and 40 days.

Larvae emerge (eclose) from eggs after approximately five days. There are three larval instars (stages between each molt). Larvae are $\frac{3}{8}$ to $\frac{1}{2}$ of an inch (9 to 12 millimeters) long and light brown (Figure 4). They have white lines or rows of black, brown, or red spots extending the length of the body. Large, sickle-shaped mouthparts protrude from the head (Figure 5). Green lacewing larvae feed on many species of aphids, consuming between 300 and 400 aphids over a two-week period. Although larvae prefer to feed on aphids, they also feed on mealybugs, mites, thrips, whiteflies, small caterpillars, and moth eggs. Larvae grasp prey with their mouthparts, lift them up, and inject a toxic saliva that dissolves the prey's body. The larvae consume the dissolved body fluids. Larvae feed for two to three weeks and will eat (cannibalize) each other if no prey are available. Plant leaves with hairs, or trichomes, impede the ability of green lacewing larvae to locate prey. In addition, larval movement may cause aphids to drop off plants. After two to three weeks, green lacewing third instar larvae construct silken, white cocoons that are attached to the topside or underside of leaves. Adults emerge (eclose) from pupae in 10 to 14 days.



Figure 1. Adult green lacewing (Photo: Raymond Cloyd).



Figures 2 and 3. Green lacewing eggs on silken stalks (Photos: Raymond Cloyd).



Figures 4 and 5. Green lacewing larva (left) and close-up of green lacewing larva (right) (Photos: Raymond Cloyd).

The time required to complete the life cycle, from egg to adult, varies depending on temperature. For example, the life cycle can be completed in 69 days at 60 degrees Fahrenheit (16 degrees Celsius), 35 days at 70 degrees Fahrenheit (21 degrees Celsius), and 25 days at 82 degrees Fahrenheit (28 degrees Celsius). Development slows when the temperature is above 95 degrees Fahrenheit (35 degrees Celsius). The optimal conditions for reproduction are a temperature of 68 degrees Fahrenheit (20 degrees Celsius), relative humidity of 80%, and 15- to 17-hour day length.



Figures 6, 7, and 8. Container of green lacewing eggs and adults (left) and containers of green lacewing larvae (middle and right) (Photos: Raymond Cloyd).



Figure 9. Container of green lacewing eggs and adults placed near aphid infestation (Photo: Raymond Cloyd).

Commercial Availability and Use in Greenhouses

Green lacewings are commercially available from biological control distributors and suppliers as eggs, larvae, or adults in sealed containers (Figures 6 through 8). Place containers with green lacewing eggs or adults near localized aphid infestations (Figure 9) or distribute larvae, mixed with the buckwheat hull carrier material, onto plant leaves (Figure 10). So that green lacewing larvae do not fall off plants, lightly mist plant leaves with water before distributing the larvae. Green lacewing larvae can also be mixed with sawdust or bran and applied with a mechanical blower (Figure 11).



Figure 10. Releasing green lacewing larvae (Photo: Raymond Cloyd).



Figure 11. Mechanical blower used to apply green lacewing larvae throughout the greenhouse (Photo: Raymond Cloyd).

Raymond A. Cloyd

Horticultural Entomology and Plant Protection Specialist

K-STATE
Research and Extension

Publications from Kansas State University are available at bookstore.ksre.ksu.edu.

Date shown is that of publication or last revision. Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit Raymond Cloyd, *Green Lacewings: Biological Control Agents of Greenhouse Insect Pests*, Kansas State University, March 2024.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

K-State Research and Extension is an equal opportunity provider and employer. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Director of K-State Research and Extension, Kansas State University, County Extension Councils, Extension Districts.