

Multicolored Asian Lady Beetle

Harmonia axyridis (Pallas); Family: Coccinellidae

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Fig. 1. *Harmonia axyridis* adult, fully spotted individual.
Photo by J.M. Ogradnick.



Fig. 2. Typical color variation found in *H. axyridis* adult population.
Photo by R.L. Pienkowski.



Fig. 3. Mature larva (fourth instar) of *H. axyridis*.

Photo by M.H. Rhoades.



Fig. 4. Clustering activity of *H. axyridis* adults.

Photo by P. W. Schaefer.

Introduction

The multicolored Asian lady beetle, *Harmonia axyridis* (Pallas) (fig. 1), first found in New York in Chemung County in early 1994, is an introduced biological control agent that is spreading rapidly in the Empire State and throughout New England. It has become a major nuisance to homeowners because of its habit of invading houses and buildings in large numbers in the fall (mid-October to early November) and appearing again on warm, sunny days in February and March. Despite its annoyance value, *H. axyridis* preys upon many species of injurious soft-bodied insects such as aphids, scales, and psyllids and is thus considered beneficial to growers and agriculturalists.

Although "multicolored Asian lady beetle" is the common name officially accepted by the Entomological Society of America, several other common names are also found in the literature: halloween lady beetle (because of its pumpkin orange color and large populations often observed around Halloween), Japanese lady beetle (because Japan was the country of origin for specimens released in the southeastern United States), and Asian lady beetle.

Distribution

The native range of *H. axyridis* encompasses much of Asia, including southern Siberia, Manchuria, Korea, China, Formosa, and Japan. It was first released to control aphids on several agricultural crops in North America: in California in 1916, 1964, and 1965, and in Nova Scotia, Connecticut, Delaware, District of Columbia, Georgia, Louisiana, Maine, Maryland, Mississippi, Ohio, Pennsylvania, and Washington from 1978 to 1982. Despite these releases, there were no subsequent reports of recoveries or establishment of this exotic lady beetle.

Then in 1988 in Louisiana and 1990 in Georgia and Mississippi, entomologists collected specimens of *H. axyridis*. Some researchers have suggested that these lady beetle populations in the South probably originated from an accidental introduction from Asian freighter activity at the port of New Orleans and not from intentional USDA releases. Since the early 1990s, this exotic lady beetle has proliferated and moved rapidly from the Deep South into the northeastern states and eastern Canada. It is now widely distributed across much of the United States east of the Mississippi River and is also found on the West Coast (California, Oregon, and Washington).

Identification Characteristics

Harmonia axyridis is a highly polymorphic (occurring in many color forms) species (figs. 2 and 4). Adults are strongly oval and convex, about 1/4 inch long and 3/16 inch wide. North American populations are comprised of co-occurring individuals that range in color from pale yellow-orange to bright red-orange, with or without black spots on the elytra, or wing covers. The head, antennae, and mouthparts are generally straw-yellow but are sometimes tinged with black. The pronotum is similarly straw-yellow with up to 5 black spots or with lateral spots usually joined to form 2 curved lines, an M-shaped mark, or a solid trapezoid. The wing covers are generally yellow-orange in unspotted individuals. In maculate (fully spotted) individuals, each wing cover has 10 black spots: a faint mark behind the scutellum, 2 spots at one-fifth, 3 spots in a semicircle at two-fifths, 3 spots at three-fifths, and 1 spot at four-fifths (fig. 1). These black spots are variously reduced or even absent in some individuals (fig. 2).

Larvae are elongate, somewhat flattened, and adorned with strong tubercles and spines. The mature larva (or fourth instar) is strikingly colored (fig. 3). The overall ground color is mostly black to dark bluish-gray, with a prominent bright yellow-orange patch extending over the dorsolateral lobes of abdominal segments 1 to 5 on each side.

Life Cycle and Habits

During cool spring weather, development from egg to adult requires about 36 days or longer. Eggs generally hatch in 3 to 5 days. Larvae feed voraciously for about 12 to 14 days on aphids, scale insects, and other soft-bodied invertebrates. The pupal stage lasts about 5 to 6 days. After emergence, adults can live as long as 2 to 3 years under optimal conditions. It is believed that females overwinter unmated, with the majority of the population mating later in the spring.

In Japan, *H. axyridis* is considered primarily an arboreal species and is common on various aphid-infested trees and bushes such as maple, walnut, willow, and rose; it is also an important predator of various destructive scales in Japan and mainland China. *Harmonia axyridis* has also been closely associated with harmful aphids and scales on various nursery, ornamental, and field crops in North America, including Christmas trees, apple, alfalfa, wheat, cotton, tobacco, and small grains. The beetles have been released in Georgia (1978-81) and California and Texas (1994) to control pecan aphids and as a result have successfully reduced the use of insecticides by pecan growers. An adult beetle is capable of eating 90 to 270 aphids per day, and each larva can consume 600 to 1,200 aphids during its development.

In New York, these lady beetles have been prevalent on copper beech, honeysuckle, and European spindle tree heavily infested with aphids. Between 1983 and 1986, releases of *H. axyridis* were made in Connecticut for control of red pine scale (*Matsucoccus resinosae*) on red pine. In Pennsylvania, this predator has been observed feeding on the balsam twig aphid (*Mindarus abietinus*) and pine bark adelgid (*Piraeus strobi*) in Christmas tree plantations, and on aphid-infested apple, birch, cotoneaster, and rose.

Economic Impact

The Cornell Department of Entomology and Cornell Cooperative Extension offices have received numerous inquiries about *H. axyridis*, primarily because of its annoying habit of invading houses and buildings in massive numbers. It does so during its search for protected overwintering sites in the fall, and reappears on sunny, warm days in February and March. Although they are primarily beneficial insects, these colorful lady beetles can congregate by the hundreds or even thousands (fig. 4) on outside surfaces as well as indoors on walls, doors, ceilings, and windows, becoming a great nuisance to home dwellers. The beetles seem to prefer light-

colored (particularly white) houses located in open fields. This behavior relates to their natural tendency to fly to rock outcroppings in Asia while searching for overwintering sites.

Indoors, the beetles commonly cluster together in a corner of the ceiling and wall. Homeowners may complain about beetles crunching under foot and crawling on their arms, hands, and legs. They can bite if handled carelessly, but the beetles do not sting or carry human diseases. The beetles do not reproduce indoors, nor do they feed on wood, clothing, food, or houseplants. Growers and agriculturalists consider these lady beetles to be biological control agents of the many different soft-bodied insect pests on a variety of crops, including ornamental trees and shrubs.

Management Recommendations

The use of insecticides for controlling populations of *H. axyridis* indoors is not recommended and is strongly discouraged. The best technique for managing lady beetles is first to prevent their entry into houses and other buildings by sealing cracks and openings around windows, doors, siding, and utility pipes with a quality silicone or silicone-latex caulk. Similarly, repair door and window screens or other openings to the outdoors using regular window screening (about 18-x-16 mesh size). If beetles still gain entry into living spaces, then it is recommended to remove and dispose of them using a broom and dustpan or vacuum cleaner and release them outdoors. When using a broom and dustpan, gently collect the beetles to avoid alarming them. If alarmed, they may discharge a yellow fluid that can stain walls, paint, and fabrics.

Outlook

Despite complaints from homeowners, *H. axyridis* is a promising biological control agent of several insect pests on a wide variety of ornamental and agricultural crops. Its large, and even explosive, populations are probably caused by the massive abundance of prey (predominantly aphids and scales), apparent lack of competition from native lady beetles, and apparent lack of native natural enemies. Scientists predict that multicolored Asian lady beetle populations will become more balanced when its prey numbers decrease and *Harmonia* itself falls prey to native natural enemies. Overall, *H. axyridis* is a welcome addition to the fauna of New York, and it may help reduce farmers' reliance on insecticides to control aphids and other soft-bodied insect pests.

1996, Prepared by: Janet J. Knodel

IPM Support Group

NYS Agricultural Experiment

Station at Geneva

E. Richard Hoebeke

Sr. Extension Associate

Department of Entomology

Cornell University

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