

Computerized Biological Control

A Computer Database

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SAMPLE ENTRY

Note: Numbers in parentheses are code numbers for computerized cross-references (precursors of modern-day hyperlinks) as well as for illustrations in the accompanying booklet.

64) LADYBIRD BEETLES, LADY BEETLES, OR LADYBUGS AND APHIDWOLVES

Description

Often brightly colored and patterned. The oval to almost ball-like body is very bulging on top but very flat below. The short antenna has a three- to six-segmented club. The head is at least partly hidden below the top of the thorax.

The pale- to dark- or brightly-colored larvae look like little alligators.

Range

Widespread.

Habitats

The adults and larvae usually live around their prey (below).

Foods

Ladybugs have hefty appetites—one larva [an "aphidwolf"] can eat over two dozen aphids a day, and one adult can eat over twice that much!

Generally, reddish-orange ladybugs eat aphids; the darker ones more often eat spider mites (6), whiteflies (41), and scale insects (46).

Overall, the prey of ladybugs includes mites (5), spider mites (6), springtails (12), thrips (23), lace bugs (28), chinch bugs (32), leafhoppers (37), perhaps treehoppers (38), psyllids (40), whiteflies (41), aphids (42), gallmaking and/or woolly aphids (43), pine and/or spruce aphids (44), scale insects (46), mealybugs (47), such other ladybugs as the Mexican bean beetle (65) [one of the few plant-eating species of ladybugs], asparagus beetles (70), the Colorado potato beetle (72), perhaps flea beetles (73), the elm leaf beetle (82), weevils (83), perhaps the diamondback moth (105), leafrollers (112), the European corn borer (117), sphinx moths and/or hornworms (130), cutworms and/or related caterpillars (138), the corn earworm (139), the stalk borer (142), and webspinning and/or leafrolling sawflies (157).

Damages/Benefits

Although a very few are important pests (65),

most ladybugs are among the most beneficial of all insects.

In many avocado orchards in Southern California, ladybugs and other beneficial insects control pests so well that virtually no chemical controls have been needed. In addition, the brown and orange "vedalia" lady beetle provided the first, classic example of modern biological control (See scale insects (46)).

Life Cycles

There may be a dozen or so generations a year (below).

Physical Controls

Plantings of yarrow reportedly attract ladybugs. In addition, there are commercially available aphid-scented lures to attract such natural enemies as ladybugs!

Beneficial species of ladybugs have often been intentionally imported into areas plagued by insect pests.

Typically, masses of the overwintering adults are collected in Pacific Coast mountains and are then either distributed in crop areas or kept in captivity for the rest of winter and sold in spring.

Although native ladybugs are usually the most efficient in a given area, imported ladybugs often work well, especially against pests accidentally imported from the same area.

See "Biological Controls" for some commercial

sources of ladybugs, also available at many retail garden shops.

How many ladybugs will you need? Well, the answer varies with the source you consult. Typical answers are: 1/2 pint per one small garden or 1/4 acre; or one quart per acre; or 30,000 ladybugs per 10 acres—once again depending upon who you consult, there are 9,000 ladybugs per pint; 135,000 ladybugs per gallon; or 1,500 ladybugs per one ounce of weight. Follow label directions. Prices are typically reasonable.

There are precautions to take in releasing ladybugs. To prevent starvation in or migration from an area, do not put ladybugs out too early in the season. It is best to keep ladybugs hibernating in their container in the crisper compartment of the refrigerator (not the freezer) until there are enough pests out to keep the ladybugs well fed. Each box of ladybugs should be placed near plants and not too near other boxes of the beetles. If you remove them from the boxes, handle the ladybugs gently, so that they will not instinctively fly away in "fear." To prevent ladybugs from flying away (as they often do, to burn-off excess winter fat after finally being released from hibernation and captivity), release ladybugs late in the afternoon or, better yet, at sundown: They will not fly at night, and many will become established in the release area by the next day. Keep the soil moist, as with a mulch, to give the ladybugs a safe place in which to hide.

Ladybugs can reportedly be "preconditioned" to prevent their flying away. For five days keep the

ladybugs in a 4' x 6' x 4'-high tightly screened cage in the release area and daily spray the plants inside with 1 pound of "wheat" (a high-protein byproduct of the cheese industry, available as "Formula 57") and one pound of sugar in 1 gallon of water (This mixture will also attract native ladybugs and lacewings, but perhaps also ants and, after the cage is removed, wasps and bees—this extreme method should be tested first.).

Another method to prevent losses of ladybugs by their flying away is to release them over wide areas: This, of course, requires cooperation between neighbors or within garden clubs or other community organizations, whose members should all benefit from decreased pest control expenditures, especially in the long-run.

In warm, sunny weather, released adults will mate and lay eggs in a day or two. In about two weeks a new generation of larvae will hatch-out and start eating their insect prey. Winter is spent in the adult stage, usually in groups of up to a million individuals, wherever there is shelter (especially from rain), usually in the mountains. In and around such areas, they eat enough pollen, plant sap, and the like to double their body weight before hibernation: This should be considered before releasing masses of ladybugs near mountainous areas in which valuable fall crops of such products as seed are grown. Overall, ladybugs are valuable garden friends, asking for no more than something to eat—namely, our pests.

Chemical Controls

The use of many insecticides, especially such

chlorinated hydrocarbons as DDT, has unintentionally killed many valuable ladybugs.

Biological Controls

Viruses infecting ladybugs include Iridescent Virus.

Bacillus thuringiensis, widely used vs. caterpillars (100), is reportedly nontoxic to lady beetles.

Fungi infecting ladybugs include *Beauveria bassiana*.

"Nematode" round worms parasitizing ladybugs include *Agamermis decaudata*, *Mermis nigrescens*, and *Steinernema [Neoapectana] carpocapsae*.

Insects etc. parasitizing or preying upon ladybugs include mantids (15), stink bugs (24), damsel bugs (30), minute pirate bugs (31), assassin bugs (33), lacewings and/or aphid lions (48), various beetles (50), tiger and/or ground beetles (51), ladybugs (64), various (true) flies and/or maggots (143), robber flies (146), flesh flies (154), tachinid flies (155), braconids (159), perhaps "chalcidid" chalcids (161), "encyrtid" chalcids (161), "eulophid" chalcids (161), "pteromalid" chalcids (161), and ants (166) [In particular, those ants that carry and "milk" such honeydew-producing insects as aphids (42) will ward off some of the aphidwolves preying on their "livestock herd"!].

In a complex garden ecosystem, low levels of all these organisms could co-exist, keeping pest

levels likewise low.

See Also

Beetles, including grubs and weevils (50), and the Mexican bean beetle (65).