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Leaf Beetles – The Beetle Botanists

If you have spent any time in a vegetable garden, you are probably familiar with leaf beetles. Many common garden pests are leaf beetles, for example, the Colorado potato beetle, striped cucumber beetle, and asparagus beetle. Not all leaf beetles are garden pests, however. The majority of these insects cause few problems for humans and carry out their quiet, but fascinating lives in a variety of habitats. In fact, the study of leaf beetles can be challenging and rewarding. The avid student who becomes familiar with leaf beetle food plants, food plant habitats, and beetle identification and biology can become both a competent botanist and entomologist. Moreover, the lives of many leaf beetles are poorly known, so even amateur coleopterists can make a contribution to science. Do you think you may be interested in the challenges and rewards of leaf beetle studies? If so, read on!

The leaf beetles, or Chrysomelidae, are the fourth largest family of the order Coleoptera. There are over 1400 species of leaf beetles in North America. Leaf beetles are diverse in size and shape, but generally are less than 1/2-inch long. They are usually ovoid in shape and bear antennae that are usually half as long as their bodies. Leaf beetles get their name from their food habits: most feed on specific plants which they readily identify--they are indeed beetle botanists.

Life Cycle and Feeding Habits

Leaf beetles have four distinct stages in their life cycle: egg, larva, pupa, and adult. Many leaf beetles lay eggs in groups on the underside of food plant leaves. These egg groups are called eggmasses and may be composed of several dozen eggs. Eggs of leaf beetles are usually yellow-orange and elongate.

Leaf beetle eggs hatch in 2 days to a week, depending on temperature. Shortly after hatching, the tiny larvae (about 1/25-inch long) begin feeding. The first food the larvae consume is their nutrient-rich eggshells. Sometimes this is bad news for larvae that develop more slowly than the rest. They may be eaten by their brothers and sisters!

When all the eggshells are eaten, larvae begin feeding on plant food. For many leaf beetle larvae, leaves are the primary food source. Some leaf feeding larvae feed on the surface of plant leaves, (for instance, larvae of the Colorado potato beetle (Fig. 1), milkweed leaf beetle, and tortoise beetles). Others may "mine" leaves by feeding beneath the leaf surface (for example, larvae of the locust leaf miner). You may have noticed the browning of black locust leaves in late summer caused by locust leaf miner (Fig. 2) feeding. Larvae of still other leaf beetles, such as the spotted cucumber beetle (Fig. 3) and the dogbane beetle, feed on plant roots instead of leaves.

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The dogbane beetle has a unique life cycle. Adult dogbane beetles lay their eggs on the underside of dogbane leaves. The eggs are enclosed in a cone of fecal material which the hatching larvae must chew through to escape (the fecal cone may protect eggs from predators and/or from dry weather). Once freed from the cone, the larvae drop to the ground and burrow into the soil in search of dogbane roots--a fantastic journey for tiny larvae!

Leaf beetle larvae typically go through four to five growth stages or instars. The pupal stage of the life cycle follows the last larval instar. Many leaf beetles pupate in the soil, but other leaf beetles, such as tortoise beetles (Fig. 4), pupate on the underside of food plant leaves.

You can easily investigate the leaf beetle's cycle indoors. You will need some supplies. First, you must acquire "cages" for the beetles. Plastic shoeboxes are inexpensive and work well as beetle rearing cages. However, you should modify the shoebox lids by boring holes in them, or build your own lids from fiberglass window screening (good ventilation provides adequate

oxygen for beetles and prevents moisture buildup within the cages). Cover the floor of the rearing cages with a potting soil mixture to a depth of about 1 inch (most leaf beetles pupate in soil). Next, you will need several aqua-pics, small plastic cylinders with rubber lids, available from most florist shops. Aqua-pics will keep the food plants you collect fresh while beetles feed on them. Once the beetle housing has been completed, collect your beetles.

Collecting and Rearing

Leaf beetles are found almost anywhere there is vegetation. A close search of garden, field, or forest will usually turn up several species. Leaf beetles, like most botanists, can be found near their favorite plants. Some common leaf beetles and their food plants are listed in Table 1.

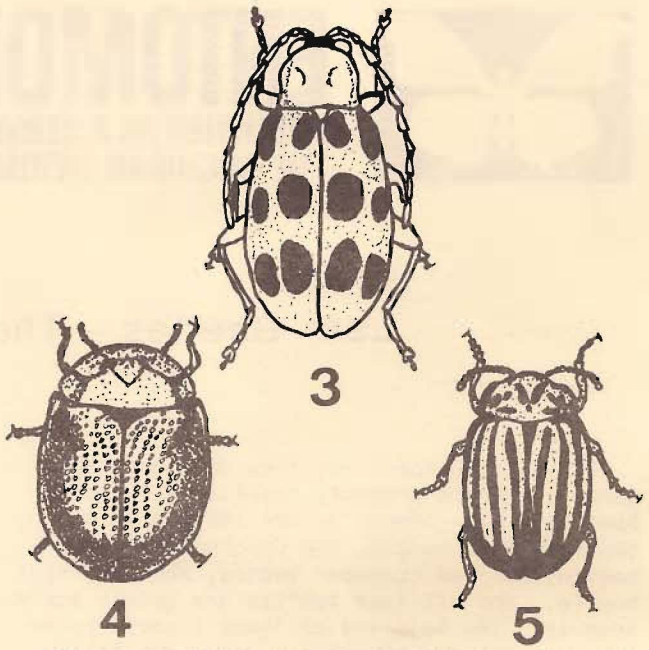
Table 1. Some common leaf beetles and their food plants.

LEAF BEETLE	FOOD PLANT
Striped and spotted cucumber beetles	cucumber, melons
Milkweed Leaf beetle	swamp & common milkweed
Colorado potato beetle	potato, tomato, eggplant
Dogbane beetle	dogbane
Locust leaf miner	black locust
Gold tortoise beetle	morning-glories
Willow leaf beetle	willows

To begin your studies, obtain an easily reared species. The Colorado potato beetle (Fig. 5) is abundant and easily collected from most vegetable gardens. Collect this beetle by examining potato and tomato plants as well as eggplants. Remove adult beetles by hand and place them in a jar with some food plant leaves while you are in the field. (Keep the jar out of the sun or you will fry your catch!) Cut eggmasses from food plant leaves with a pair of scissors and place them in a small container. You can also collect larvae if you wish, although raising them from eggs may be more fun. Remember to collect extra leaves of food plants to feed your catch. Use scissors to cut leaves from plants and place them into plastic bags with water to keep them fresh.

Collect other beetles in a similar way, by beating vegetation with a net, or in the case of small forms (some flea beetles), by using an aspirator.

Take good notes while collecting beetles. For each specimen, record the collection date, location, and the food plant, if known. The food plants of many leaf beetles are unknown, and your information may help clarify the biology of a certain species.



When you return home or to school, stock your rearing cages with your catch. Keep the adult beetles and eggmasses in separate cages--adult beetles may eat the eggmasses. Fill aqua-pics with water, insert food plant stems into the small hole in the rubber lid, and place the aqua-pics into the cages. Attach eggmasses to food plants with insect pins to ensure that young larvae will find their food source after hatching. Keep a close watch on the food plants and replace them with fresh material when needed. Remember that the Colorado potato beetle can be a vegetable pest, so use discretion when you dispose of your beetles after use. Try several experiments with your beetle colony. You may wish to investigate the effects of temperature of different food plants on beetle development. Does temperature or food plant influence development time or beetle size? Design some experiments of your own. There is no limit to what you can do.

The following references provide collecting hints and are helpful in identifying leaf beetles and food plants:

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