

Colorado Insects of Interest

Knab's Willow Leaf Beetle/ Cottonwood Leaf Beetle

Scientific Names: Knab's willow leaf beetle, *Chrysomela knabi* (Linnaeus); cottonwood leaf beetle, *Chrysomela scripta* Fabricius

Order: Coleoptera (Beetles)

Family: Chrysomelidae (Leaf Beetles)

Identification and Descriptive Features:

Knab's willow leaf beetle adults somewhat resemble a large lady beetle. They can have a range of color with most being red or reddish orange, but yellow and light brown forms also occur. They are spotted with black markings, which can be highly variable in number and prominence (Fig. 1). Knab's willow leaf beetle is most commonly associated with certain willows (e.g., peachleaf)



Figure 1. Cottonwood leaf beetle (left) and Knab's willow leaf beetles (right, above) feeding on peachleaf willow.

willows (e.g., peachleaf) but also may feed on aspens.



Figure 2. Late stage larvae of cottonwood leaf beetle.

Adults of cottonwood leaf beetle show a similar range in size. They can be differentiated by having dark markings that are more elongated and the overall coloration is normally light gray or brown, never red (Fig. 1). Plains cottonwood is the most common host of this species, but it feeds on some other *Populus* and may co-occur with Knab's willow leaf beetle on some willows (*Salix*).

Immature stages of both insects are generally similar in appearance. Eggs are yellow and laid in loose clusters on the underside of leaves; the eggs somewhat resemble those of lady beetles but are brighter yellow and more widely spaced within a cluster. Early stage larvae are black and somewhat resemble lady beetle larvae, but move very slowly and feed on leaves. Older larvae have some white markings (Fig. 2).

Pupal stages are attached to leaves and may resemble a miniature resting bat.



Figure 3 (top). Eggs of cottonwood leaf beetle
Figure 4 (bottom). Young larvae of Knab's willow leaf beetle feeding in a group and skeletonizing leaf.

Related Insects: The alder leaf beetle (*Chrysomela interrupta* Fabricius) is found in some higher elevation sites in association with alder. Its appearance is very similar to Knab's willow leaf beetle but can be distinguished by the host plant. *Chrysomela aenicollis* Schaefer is another willow feeding species that occurs at high elevation sites primarily west of the Continental Divide. It also is generally similar to Knab's willow leaf beetle in appearance but is darker.

Distribution in Colorado: Both species occur east of the Continental Divide and can be found in most areas of eastern Colorado where their host plants grow.

Life History and Habits: In Colorado both Knab's willow leaf beetle and cottonwood leaf beetle normally have a single generation/year. Winter is spent in the adult stage in sheltered locations. In early May they begin to emerge and fly to host trees beginning shortly after bud break. The adults will feed for awhile on the leaves, which usually results in small holes in the interior of the new leaves. Females intersperse feeding with egg laying through May and into early June.

Eggs are laid on the underside of leaves in the form of masses, with individual eggs being pale yellow. After a week or so the eggs hatch and the young larvae that emerge are generally black. During early stages the larvae feed in a group and chew the leaf in a skeletonizing pattern, leaving the larger veins so the damaged area looks lacy. As they get older and larger they disperse throughout the plant and chew larger holes in the interior of leaves.

Various compounds found in their host plants are stored by the larvae and are later used for defense to deter predators. This has been most studied with Knab's willow leaf beetle, which uses salicin from willow leaves; various phenolics are also used by cottonwood leaf beetle. These defensive



Figure 5. Defensive glands of cottonwood leaf beetle larva being everted in response to disturbance.

compounds are then released from whitish glands along the side of the body of the larvae; the glands are everted when the larvae are disturbed.

Full-grown larvae stop feeding and attach themselves by the hind end to the leaf. They then molt into the pupal stage, which may hang from the leaf. Within the pupa the insect transforms to the adult form, which emerges 1-2 weeks later.



Figure 6 (top). Pupa of Knab's willow leaf beetle.
Figure 7 (bottom). Pupa and larva of cottonwood leaf beetle.

The adults will then feed on leaves for several weeks, usually chewing along the leaf edges and concentrating feeding on new growth. A single generation is normally produced, with the adults moving to sheltered spots for winter dormancy in midsummer. Where conditions provide continued production of succulent new growth into midsummer, a small percentage of the cottonwood leaf beetles may produce a second generation.

Control. Populations of these insects can fluctuate widely from season to season due to natural controls, with potentially damaging outbreaks being infrequent and normally of short duration. The exact nature of the natural controls affecting Colorado populations is unknown but involves some combination of effects of weather (e.g., severity of winters, incidence of rainfall) and biological controls. Among the latter, a few generalist insect predators will feed on larvae of these beetles, such as certain predatory stink bugs and assassin bugs. At least one parasitoid wasp is known to attack the larvae, killing them in the pupal stage. Some birds have been observed to feed heavily on the adult beetles.

Several aspects of host plants may affect damage by these insects. Some species and perhaps cultivars of different *Salix* and *Populus* can range greatly in susceptibility to Knab's willow leaf beetle and/or cottonwood leaf beetle. Some of this difference can be due to chemicals produced by the plants; willows with high salicin content are preferred by Knab's willow leaf beetle. Leaf moisture levels also are important, with both species preferring to feed primarily on succulent younger leaves.

Insecticides can be used to control leaf beetles. Products that contain pyrethrins or spinosad as active ingredient are likely to be very effective, but have short persistence and may need reapplication if significant new migrations of beetles onto plants is occurring.

Products containing one of the pyrethroid insecticides (e.g., permethrin, cyhalothrin, cyfluthrin, bifenthrin) can be very effective and will kill adults and larvae for several days after application. However, pyrethroids are highly toxic to aquatic organisms, including fish, and cannot legally be applied to any site where drift may occur into fish-bearing waters.