



# CROPS

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## Cereal Leaf Beetle: Identification, Biology and Management no. 5.596

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### Background

In Europe, the cereal leaf beetle, *Oulema melanopus* (L.), has been known as an occasional pest of small grains for more than a century. The first North American record of this insect was from Michigan in 1962, and it quickly spread to many eastern and midwestern states. It first appeared in the West (Utah) in 1984, and spread to Montana, Idaho, Wyoming, Oregon, and Washington by 1999. Cereal leaf beetle was found in Routt county, Colorado in 2001, and in Boulder, Larimer and Weld counties in the spring of 2002. Up to date distribution maps are available at the National Agricultural Pest Information System (NAPIS) Web site (<http://ceris.purdue.edu/napis/pests/clb/index.html>).

Cereal leaf beetle can cause considerable damage to small grains, especially spring grains. Losses of 23 percent in winter wheat and 75 percent in barley and oat have been reported. Reduction in malt barley quality is of special concern. In addition to crop losses, the California Department of Food and Agriculture has imposed a quarantine on certain agricultural commodities from infested counties. All small grain producers should be aware of cereal leaf beetle, and take appropriate action if populations reach damaging levels.

### Identification and Damage

Adult cereal leaf beetles are about 3/16 inch long, with a metallic blue head and wing covers, a red pronotum (neck) and orange-yellow legs (Figure 1). *Colops* sp. is the most common beetle often confused with cereal leaf beetle. However, it is a dull, dark blue rather than a bright, metallic blue, and is about 1.5 times larger than cereal leaf beetle.

Adult cereal leaf beetles are very active during the cooler parts of the day, and evenings, but may disappear during the heat of the day. They fall off the plant when disturbed. Adults are easily collected from fully tillered or jointing small grains using a sweep net.

Adult cereal leaf beetles prefer to feed on young, actively growing leaves. They chew completely through the leaf, between the veins, resulting in a linear streaking of the leaf. This damage is easily confused with that of flea beetles.

The elliptical eggs (Figure 2) are laid singly or in linear groups of three or more on the upper surface of the leaf, usually near the midrib. The eggs are



Figure 1. Adult cereal beetles are about 3/16 inch in length, metallic blue with red "neck" and legs.

### Quick Facts...

The cereal leaf beetle was found in Routt county in 2001, and in Boulder, Larimer and Weld counties in the spring of 2002.

A single female may lay up to 300 eggs over a six week period.

Cereal leaf beetle can cause considerable damage to small grains, especially spring grains. Losses of 23 percent in winter wheat and 75 percent in barley and oat have been reported.

There is one generation of cereal leaf beetle per year.

Cereal leaf beetle has been controlled biologically in many states, using natural enemies imported from Europe.

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Figure 2. Eggs are yellow when newly laid on the upper leaf surface.



Figure 3. Larvae are slug-like in appearance from a covering of mucus. Damage appears as linear streaks on the upper leaf surface.

less than 1/16 inch long, yellow when first laid, but darkens to yellow-brown when about to hatch. Eggs are easily seen when cereal leaf beetles are abundant.

Cereal leaf beetle larvae appear dark and slug-like. Their skin is yellowish brown, and is covered by a mass of slimy, dark fecal material. This protective coating, which gives the larvae the appearance of a bird dropping, camouflages the larva when it is not on the leaf, guards it from some natural enemies, and prevents desiccation.

Larvae feed only on the upper surface of the leaves. They feed down to the leaf cuticle, staying between the veins, resulting in distinctive linear “window-pane” damage (Figure 3). Larval feeding differs from adult damage in that it is wider and limited to the upper surface of the leaf. Tips of damaged leaves may turn white, and heavily infested fields may have a frosted appearance.

## Life History

Cereal leaf beetle adults spend the winter in protected sites like grass crowns, grain stubble, wooded areas, or under house siding. They become active when air temperatures are above 50 degrees F. They feed on wild grasses and move to small grains when available. Females mate in the spring, and begin to lay eggs about two weeks later. A single female may lay up to 300 eggs over a six week period. The eggs hatch in four to 23 days, depending on temperatures. Larvae feed for 10 to 21 days, depending on temperature, before crawling down the plant to pupate in the upper two inches of soil. The larval feeding period can last up to two months, due to continuous overwintering adult emergence and egg laying. The pupation period lasts two to three weeks.

Newly emerged adult beetles feed for two to three weeks on the new succulent growth of a wide variety of grasses, after which they disperse to overwintering sites where they enter dormancy. Winter mortality, due to extreme temperatures and natural enemies, ranges to from 40 to 70 percent. There is one generation of cereal leaf beetle per year.

## Management

Cereal leaf beetle has been controlled biologically in many states, using natural enemies imported from Europe. This is a long-term preventive strategy, however, it will not control an existing infestation. The success of the biological control varies with cropping systems, with greater success in dryland systems than in irrigated systems. The larval parasite, *Tetrastichus julis* (Walker), has been an effective biological control agent in the western states. The egg parasite, *Anaphes flavipes* (Forester), has worked well in combination with larval parasites in the eastern United States, but strains adapted to western conditions have only recently been identified. Biological control will be an important management tool for cereal leaf beetle in Colorado.

Insecticide treatments are used to control existing infestations based on the potential for economic losses greater than the cost of treatment. Cereal leaf beetles prefer barley or oat to wheat, but may damage any small grains. Spring grains and late maturing winter grains are the most susceptible, although early maturing winter wheat can be attacked. Larval feeding in early growth stages reduces general plant vigor. After boot, larvae feed mostly on the flag leaf, which reduces grain yield and quality. Feeding removes chlorophyll and increases plant moisture stress, resulting in lowered test weight, grain plumpness and higher protein. These losses in grain quality are of particular importance in malting barley.

Scout for cereal leaf beetle adults in the spring after air temperatures have exceeded 50 degrees F for several days. Look for adults in actively growing small grain fields, or use sweep nets in standing wild grasses and grass residue on field margins. It is most important to scout for cereal leaf beetle during stem

elongation so that accurate economic threshold information is available at flag leaf emergence. Examine 10 plants for every 10 acres of crop. Count the number of eggs and larvae per plant and base your treatment decision on the average number of eggs and larvae per plant for each field. Do not treat until at least 25 percent of the eggs have hatched. This is to ensure that eggs have not desiccated due to hot, dry weather, which would eliminate the need to treat.

The generally accepted economic threshold is three or more eggs and/or larvae per plant before boot stage. At boot stage the economic threshold is reduced to one larva per flag leaf. However, economic thresholds vary with crop, yield potential, market value, and treatment costs. Thus, feed barley can withstand more damage than malting barley, and treatment thresholds will be higher in dryland wheat production than in irrigated systems. Also, cereal leaf beetle will be less important in oat grown for hay than in oat grown for grain.

Currently registered insecticides for control of cereal leaf beetle are available in the *High Plains Integrated Pest Management Guide for Colorado, Western Nebraska, Wyoming, and Montana* (<http://www.highplainsipm.org/>). Several effective products are available, however, the choice of product may be determined by the crop species involved and preharvest interval limitations.

## Quarantine

In addition to crop losses, the cereal leaf beetle also has an economic impact because its presence can restrict the movement of agricultural commodities. The California Department of Food and Agriculture has imposed a quarantine on the following commodities from cereal leaf beetle infested counties in Colorado:

- Small grains such as barley oats and wheat
- Straw and hay, including marsh hay
- Grass sod
- Grass and forage seed
- Fodder and plant litter
- Cut or balled Christmas trees of Scotch, red or Austrian pine
- Used harvesting equipment and machinery

These products may not enter California if they come from any Colorado county known to be infested with cereal leaf beetle unless they are certified to have been treated for this pest. Commodities originating in uninfested counties of Colorado must be certified as to origin. There are exemptions based on the part of the crop transported, how it is packaged, or previous use, and the time of year transported. For more information, visit the cereal leaf beetle Web site for the California Department of Food and Agriculture at <http://pi.cdfa.ca.gov/pqm/manual/321.htm>.

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