



Cereal Leaf Beetle

Identification, Control, and California Quarantine Alert

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**OREGON STATE
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The cereal leaf beetle (CLB), a serious pest of cereals and grasses, was found in Oregon in 1999. As a result, California has imposed a quarantine on certain agricultural products from Oregon. CLB can cause considerable damage to small-grain crops. Yield losses of up to 23 percent in winter wheat and 75 percent in barley and oats have been reported.

Quarantine Alert

The following commodities produced in Oregon are restricted from transport to California unless quarantine requirements are satisfied:

- Small grains such as barley, oats, and wheat
- Straw and hay, including marsh hay (pelletized hay not listed)
- Grass sod
- Grass and forage seed
- Fodder and plant litter
- Cut or balled Christmas trees of Scotch, red, and Austrian pine (Adults sometimes overwinter in these trees.)
- Used harvesting equipment and machinery also are under quarantine.

These products may not enter California if they come from any Oregon county infested with CLB unless they are certified to have been treated for CLB. Commodities originating in uninfested counties must be certified as to origin. Note that there are exemptions based on the part of the crop transported, how it is packaged, its previous use (such as for livestock bedding), and even the time of year transported.

For more information regarding treatment, county-of-origin certification, and exemptions, call Mike McAninch at the Oregon Department of Agriculture, 503-986-4644, or the ODA Commodity Inspection office at 503-986-4620. Or, visit the ODA Web site (http://www.oda.state.or.us/Plant/nursery/CA_Quarantine_Alert_CLB.html).

Distribution

Cereal leaf beetle, *Oulema melanopus*, is widely distributed in Europe and Asia and has been a pest of cereal crops on those continents since the beginning of recorded history. It first was found in the United States in 1962 in southwestern Michigan. It has spread to many states in the eastern United States and recently has invaded the West. Found in Utah in 1984, it spread quickly to Montana, Idaho, and Wyoming. It was found in Oregon and Washington in 1999. Consult the National Agricultural Pest Information System (NAPIS) Web site for up-to-date distribution maps (<http://ceris.purdue.edu/napis/pests/clb/index.html>).

Host plants

CLB feeds solely on grasses and cereal crops. Favored host plants are oats and wheat, but hosts also include a variety of other wild and cultivated grasses such as barley, corn, sorghum, timothy, orchardgrass, ryegrass, reed canarygrass, quackgrass, bluegrass, fescue, millet, rice, brome, wild oats, barley, and foxtail grass. Many of these grasses are grown as livestock feed or are weeds in forage. During the summer, adults may feed on succulent wild grasses and young corn.

Neither the larvae nor adults eat grain or seed. However, they have been found in harvested grain. Fortunately, they can survive no more than 14 days in a grain bin.

CLB does not feed on broadleaf plants.

Lynn A. Royce, *insect identification specialist*; Ben Simko, *Extension agent, Malheur County; Oregon State University*

Life history and habits

There is one generation of CLB per year. Adult CLBs overwinter in field debris, grass crowns, wooded areas, and other sheltered places. In spring, they emerge, mate, and are active for about 6 weeks, especially on sunny days. Each female can lay several hundred eggs. The time required for hatching depends on temperature.

Larvae feed on a host plant for as long as 3 weeks. An estimated 90 percent of feeding occurs during the final week. Mature larvae drop to the ground, pupate in earthen cells within the top 5 cm (2 inches) of the soil, and emerge as adults 2–3 weeks later in June.

During June, the new adults feed but don't mate. As summer progresses, they become less active and hide most of the day, often in corn sheaths. In the fall, they head for sheltered field margins, stubble, and postharvest residue, where they remain inactive until spring. In the Midwest, overwintering mortality ranges from 40–70 percent due to extreme temperatures and natural enemies.

Because CLB is relatively new to the intermountain West, its life cycle and level of adaptation in this region have not been well studied and documented.

Signs of damage

CLB larvae and adults prefer seedlings or new growth on older plants. Feeding generally is between leaf veins. Adults eat completely through leaves, but larvae eat long strips of tissue from the upper leaf surface and leave the translucent cuticle of the lower surface intact. This feeding pattern produces a characteristic “window-pane” look (*Figure 1*). Tips of damaged leaves frequently turn white, giving heavily infested fields a frosted appearance.



Figure 1.—CLB damage.

Scouting

Begin scouting for CLB eggs and small larvae when crop plants have two visible stem nodes. Continue for about 10 days. Examine 100 stems per field, avoiding stems from field edges. There may be eggs on leaves near the ground, so careful examination is critical. Because CLB often is distributed unevenly within a field, it's possible that only a portion of a field will be above threshold. In this case, you might need to treat only part of the field.

Identification

Egg



A single yellow, cylindrical egg usually is laid on an upper leaf surface, parallel to the midvein, although groups of two or three eggs occasionally are found.

Eggs are about 1 mm ($<1/16$ inch) long and darken when about to hatch.

Larva



Shaped like a small Colorado potato beetle larva, the CLB larva has a black head and yellow-orange body.

Larvae resemble slugs due to their “slimy backpack.” This backpack, which consists of fecal material and mucus, camouflages the larva and is thought to protect it from natural enemies and from drying out.

Larvae pupate in earthen cells in the soil.

Adult



Adults are slender and 7–9 mm long (about $3/16$ inch). They have metallic, bluish-

black wing covers, black head, orange thorax, and orange legs. Adults fall to the ground when disturbed.

Table 1.—Insecticide control.

Wheat, barley, and oats

Chemical	Rate (per acre)	Rate (per acre)	Notes
Lannate L	0.225–0.45 lb ai	0.75–1.5 pt	24 hrs to reentry 7 days to grain 10 days to graze
Malathion 5EC	0.6–1.25 lb ai	1–2 pt	7 days to grain or graze
Malathion ULV	0.3–0.6 lb ai	4–8 oz	7 days to grain Most effective at temperatures above 70°F

Wheat only

Chemical	Rate (per acre)	Rate (per acre)	Notes
Sevin XLR Plus 4F	1.0 lb ai	2 pt	21 days to grain 0 days to feed
Sevin 80 WSP	1.0 lb ai	1.25 pt	21 days to grain 0 days to feed
Warrior 1EC	0.02–0.03 lb ai	2.6–3.8 oz	30 days to grain Do not apply more than 0.06 lb ai (7.6 oz) per season.

Chemical control

An insecticide application is recommended when there are an average of three larvae or eggs per plant up to the boot stage. After boot, treat when there is an average of one larvae per flag leaf. Recommended insecticides and rates are listed in *Table 1*. One spray is sufficient.

Biocontrol

Before the introduction of parasitic wasps of CLB to the United States, insecticides were the first line of defense against CLB. In 1966, more than 1.6 million acres of small grains were sprayed. Now, where the parasite complex is well established, CLB often is controlled biologically without the use of chemical sprays. In some areas, parasites have reduced CLB populations by 70 percent, and yield losses have dropped to less than 1 percent.

Anaphes flavipes is a tiny wasp, barely visible without magnification, that parasitizes CLB eggs. It is well established throughout the eastern United States and Canada. A female wasp places an egg (oviposits) inside a newly laid host CLB egg. When the parasitoid's egg hatches, the young wasp develops inside the host beetle egg and devours its contents; the CLB egg never hatches. Sometimes more than one *Anaphes* egg is oviposited into a host egg. There can be as many as five generations per year. This parasite works well in combination with larval parasitoids to control CLB in the eastern United States but has not established in the West.

Trastichus julis is a larval parasitoid. Although not as widespread as *Anaphes flavipes*, it has had a greater impact on pest populations where it is established. *T. julis* has become established in the West and was released in

Malheur County in 1999. The female wasp inserts its eggs into a CLB larva. This wasp is gregarious, and several young can complete development within the same larval host. Upon hatching, the parasitoid larvae feed within the CLB larva and destroy it. There generally are two generations per year.

There are two other successful larval parasitoids—*Diaporsis temporalis* and *Lemphogus curtus*. They have been less effective than *T. julis* because they are restricted to one larva per host.

The Oregon Department of Agriculture (ODA) and the USDA Animal Plant Health Inspection Service (APHIS) anticipate importing, rearing, and releasing biocontrol agents in eastern Oregon over the next few years.

Biocontrol information contacts and Web sites

For information on CLB biocontrol or to report new finds, contact:

- **ODA, Plant Division**, 503-986-4644 (Mike McAninch)
- **USDA, APHIS, PPQ**, 503-326-2814 (Gary Carpenter, plant health director)
Web: <http://www.agr.state.nc.us/plantind/plant/bioctrl/biopro/clbinfo.htm>
- **National Agricultural Pest Information System (NAPIS)**:
<http://ceris.purdue.edu/napis/pests/clb/index.html>
- **USDA**: www.aphis.usda.gov/ppq/niles

Use pesticides safely!

- **Wear protective clothing** and safety devices as recommended on the label. Bathe or shower after each use.
- **Read the pesticide label**—even if you've used the pesticide before. Follow closely the instructions on the label (and any other directions you have).
- **Be cautious when you apply pesticides**. Know your legal responsibility as a pesticide applicator. You may be liable for injury or damage resulting from pesticide use.

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