UTAH PESTS fact sheet
EXTENSION UtahStateUniversity
Published by Utah State University Extension and Utah Plant Pest Diagnostic Laboratory ENT-201-18-PR October 2018

European Cherry Fruit Fly *Rhagoletis cerasi* (Linnaeus)

Lori R. Spears, CAPS Coordinator, and Diane G. Alston, Extension Entomologist

Quick Facts

- European cherry fruit fly (ECFF) is a new invasive cherry-infesting pest from Europe. It was first detected in the U.S. in New York in 2017. It is not known to occur in Utah.
- ECFF is a quarantine pest; its presence can restrict export markets for commercial fruit.
- ECFF is closely related to and resembles western cherry fruit fly, the primary insect pest of sweet and tart cherries in Utah.
- The major host plants are cherry and honeysuckle.
- Larvae of ECFF feed exclusively within fruits, causing them to rot and fall off the tree. In Europe, heavy infestations have resulted in 100 percent fruit loss.
- Cultural controls include orchard sanitation and covering the soil under the tree canopy with ground cover, weed barrier fabric, or mulches.
- Where it occurs, chemical control measures have been highly effective when properly timed and applied.

European cherry fruit fly (ECFF, *Rhagoletis cerasi* Linnaeus) (Fig. 1) is a new invasive insect to North America. It naturally occurs throughout most of continental Europe and central and western Asia, and is the most economically important pest of sweet cherries in Europe. ECFF was first detected in North America in Ontario in 2016, and first detected in the U.S. in New York in 2017. The predicted geographic range of ECFF in the U.S. includes USDA plant hardiness zones 2-10, which spans most of the country, including Utah. Since adults fly only short distances, spread occurs primarily through movement of infested fruit. If you suspect ECFF in Utah, contact the Utah Plant Pest Diagnostic Lab.

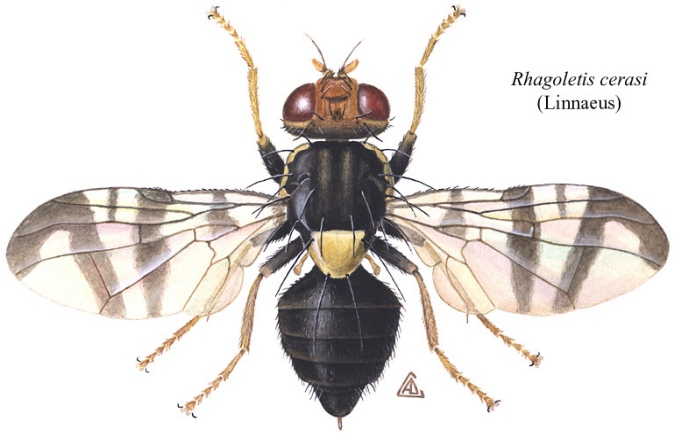


Fig. 1. European cherry fruit fly adult.



Fig. 2. European cherry fruit fly adult.

DESCRIPTION

Adults are about 1/8 to 3/16 inch long, slightly smaller than a house fly. The body is black with yellow markings on the head and thorax (midsection) (Figs. 1-3). Wings are transparent with four characteristic bluish-black bands. ECFF is a close relative of other *Rhagoletis* species in North America, including the western cherry fruit fly (WCFF, *R. indifferens*), which is the primary insect pest of sweet and tart cherries in Utah, and apple maggot (*R. pomonella*), which has also been caught in cherry orchards in Utah. The three species are distinguished by coloration and wing patterns. WCFF is about 1/5 inch long, slighter larger

than the ECFF. It has a black body with white bands on the abdomen, and transparent wings with three dark bands, one of which forms a malformed letter "F" (Figs. 3 and 4). Apple maggot is about 1/4 inch long, the largest of the three species and about the size of a common housefly. It has a black body, a prominent white spot on its lower thorax, white bands on the abdomen, and a bold "F" shaped mark on its wings (Figs. 3 and 4).



Fig. 3. European cherry fruit fly adult (top), western cherry fruit fly adult (bottom left), and apple maggot adult (bottom right).

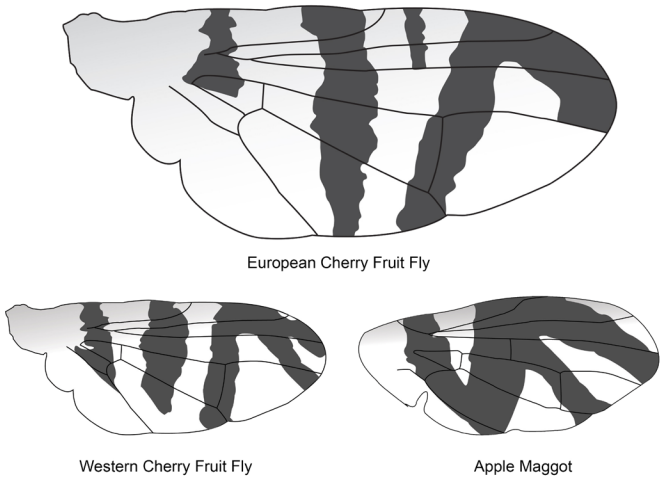


Fig. 4. Wing banding patterns of the ECFF (top), WCFF (bottom left) and apple maggot (bottom right).

Eggs are white, oval-shaped, and about 1/32 inch in length. Eggs are deposited under the skin of ripening fruit.

Larvae are creamy-white and translucent, legless, and shaped like a typical fruit fly larva: tapered at the head and rounded at the tail (Fig. 5). Third (last) instar larvae can reach up to 1/4 inch in length.

Pupae are pale yellowish-brown and 1/8 to 3/16 inch in length (Fig. 6). Larvae pupate up to 2 inches deep in the soil under the host plant.



Fig. 5. Larva in cherry fruit.



Fig. 6. Pupae in the soil.

LIFE HISTORY

Like WCFF, ECFF has one generation per year. It overwinters as a pupa in the soil underneath or near the host plant and emerges as the fruit ripens. Adults are most active from late May to early July when conditions are warm and dry, and can live up to 50 days, depending on temperatures. Mated females use their ovipositor to insert eggs into ripening fruit (i.e., fruit that are yellow to pink-yellow in color), but will continue to lay eggs until harvest. Females prefer to lay eggs in fruit that are in full sun, and usually lay only one egg per fruit. They can lay 30 to 200 eggs in their lifetime. Eggs hatch in 1 to 2 weeks. The larvae feed on the flesh of developing fruit for 4 to 6 weeks and progress through three stages. Mature larvae exit the fruit and drop to the ground to burrow into the soil and pupate.

PLANT HOSTS

Cherry (*Prunus spp.*) is the major cultivated host of the ECFF, including tart cherry (*P. cerasus*), sweet cherry (*P. avium*), black cherry (*P. serotina*), and mahaleb cherry (*P. mahaleb*). Honeysuckle (*Lonicera* spp.) is another major host. Minor hosts include barberry (*Berberis* spp.), dogwood (*Cornus* spp.), snowberry (*Symphoricarpos* spp.), and whortleberry (*Vaccinium* spp.).

DAMAGE SYMPTOMS

Injury to fruit is caused by oviposition (egg-laying) scars (Fig. 7), but primary damage is caused by larval feeding, defecation, and tunneling in the fruit flesh. Infested fruit may soften prematurely, develop brown spots (Fig. 8), wilt or shrivel, and fall off the tree. An exit hole may be visible as the single larva vacates the fruit (Fig. 8). Feeding damage can result in fruit losses of up to 100% if left unmanaged.



Fig. 7. Oviposition (egg-laying) scar.



Fig. 8. Damage to cherry fruits. Note the larval exit holes.

MONITORING

An effective monitoring tool is a yellow sticky card baited with an ammonium acetate or carbonate lure (Fig. 9). Traps should be placed in the fruiting canopy of the tree, shortly after bloom and before the fruit start to ripen and become susceptible. Adult captures are higher in traps placed in the sunny or southern part of the tree. Sweep netting can also be used to survey for ECFF in shrubs and shorter growing hosts, such as honeysuckle.



Fig. 9. Yellow sticky card with an ammonium carbonate bait box.

MANAGEMENT

Cultural Control

Cultural control options include early and complete harvest, maintaining a clean orchard floor by removing dropped fruit, removing wild and abandoned host trees, and placing exclusion netting (1.3 mm net) on trees. Additionally, covering the soil under the tree canopy with ground cover, weed barrier fabric, or mulches will help prevent larvae from burrowing into the soil or emerging adults from exiting the soil.

Chemical Control

Insecticide sprays targeting the adult are the primary tactic for controlling this pest. Larvae develop within the fruit where they are protected from most insecticides. Insecticides used for the successful treatment of ECFF in Europe and those currently labeled for use in sweet and/or tart cherry production in Utah are listed in Table 1. Rotate among insecticide classes/modes of action (MoA) to reduce the development of resistance. Do not apply insecticides while pollinators are active.

Table 1. Examples of insecticides that are known to be effective against ECFF. Insecticides are sorted by modes of action (MoA).

Active Ingredient	Example Brand Name	MoA*
Commercial Use		
dimethoate	Dimethoate	1B
malathion	Malathion	1B
phosmet (tarts only)	Imidan	1B
gamma-cyhalothrin	Declare[R]	3A
lambda-cyhalothrin	Warrior[R]	3A
zeta-cypermethrin	Mustang Maxx[R]	3A
acetamiprid	Assail	4A
thiamethoxam	Actara	4A
Home Use		
acetamiprid	Ortho Bug-B-Gon Systemic Insect Killer Concentrate; Ortho Flower, Fruit & Vegetable Insect Killer Concentrate	4A
spinosad	Bonide Captain Jack's Deadbug Brew; Ferti-Lome Borer Bagworm Leafminer & Tent Caterpiller Spray; Monterey Garden Insect Spray[O]; Protector Pro[O]; Spinosad 0.5% SC	5
azadirachtin (neem oil)	Molt-X	other

*Insecticide mode of action (MoA) classification number based on guidelines from the Insecticide Resistance Action Committee: 1B = organophosphate, 3A = pyrethroids and pyrethrins, 4A = neonicotinoid, and 5 = spinosyns.

[O]Organically certified insecticide products; approved by OMRI (Organic Materials Review Institute).

[R]Restricted use products that require an applicator license.

Note: All brand names are registered trademarks. Examples of brands may not be all-inclusive, but are meant to provide examples of insecticides registered on fruit in Utah. The availability of insecticides and active ingredients in brands can change. Always check the label for active ingredient(s), registered uses, application and safety information, and protection and pre-harvest intervals.

REFERENCES AND FURTHER READING

Carroll, L.E., I.M. White, A. Freidberg, A.L. Norrbom, M.J. Dallwitz, and F.C. Thompson. 2002. *Rhagoletis cerasi* (Linnaeus). Pest fruit flies of the world. Version: 8th December 2006.

Canadian Food Inspection Agency (CFIA). 2016. *Rhagoletis cerasi* (European cherry fruit fly) – Fact Sheet.

Daniel, C., and J. Grunder. 2012. Integrated management of European cherry fruit fly *Rhagoletis cerasi* (L.): situation in Switzerland and Europe. Insects 3:956-988.

Molet, T. 2011. CPHST Pest Datasheet for *Rhagoletis cerasi*. USDA-APHIS-PPQ-CPHST. Revised May 2016 and October 2016 by H. Moylett.

Noma, T., M. Colunga-Garcia, M. Brewer, J. Landis, and A. Gooch. 2010. European cherry fruit fly (*Rhagoletis cerasi*). Invasive Species Factsheets, Michigan State University.

Ozdem, A., and N. Kilincer. 2008. The biology of the European cherry fruit fly [*Rhagoletis cerasi* L. (Diptera: Techritidae)]. Acta Horticulture 795, 5th International Cherry Symposium. pp. 897-904.

USDA-APHIS. 2011. European cherry fruit fly. USDA – Stone Fruit Commodity-Based Pest Survey.

USDA-APHIS-PPQ. 2016. *Rhagoletis cerasi* (Linnaeus), European cherry fruit fly, Diptera: Tephritidae. Plant Epidemiology and Risk Analysis Laboratory, Center for Plant Health Science and Technology.

Image Credits

Fig. 1. https://www.delta-intkey.com/ffa/images/rhceras2.jpg

Fig. 2. Henri Koskinen, Shutterstock

Fig. 3. European cherry fruit fly, Rémi Coutin, OPIE; Western cherry fruit fly, Marion Murray, Utah State University; apple maggot, Joseph Berger, Bugwood.org.

Fig. 4. Illustration: Cami Cannon, Utah State University

Fig. 5. Claudia Daniel, Research Institute of Organic Agriculture FiBL

Figs. 6-8. Rémi Coutin, OPIE

Fig. 9. Diane Alston, Utah State University

Precautionary Statement: Utah State University Extension and its employees are not responsible for the use, misuse, or damage caused by application or misapplication of products or information mentioned in this document. All pesticides are labeled with ingredients, instructions, and risks. The pesticide applicator is legally responsible for proper use. USU makes no endorsement of the products listed herein.

Utah State University is committed to providing an environment free from harassment and other forms of illegal discrimination based on race, color, religion, sex, national origin, age (40 and older), disability, and veteran's status. USU's policy also prohibits discrimination on the basis of sexual orientation in employment and academic related practices and decisions. USU employees and students cannot, because of race, color, religion, sex, national origin, age, disability, or veteran's status, refuse to hire; discharge; promote; demote; terminate; discriminate in compensation; or discriminate regarding terms, privileges, or conditions of employment, against any person otherwise qualified. Employees and students also cannot discriminate in the classroom, residence halls, or in on/off campus, USU-sponsored events and activities. This publication is issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Kenneth L. White, Vice President for Extension and Agriculture, USU.