



Blueberry fruit fly: *Rhagoletis mendax* Curran

Economic importance and damage

Regarding Canada, the [blueberry fruit fly](#), or the blueberry maggot, has been reported from the following provinces: Nova Scotia, Prince Edward Island, New Brunswick, parts of southwestern Ontario, parts of southwestern Quebec. The Canadian Food Inspection Agency sets out the requirements for the movement within Canada of regulated commodities, which includes wild (lowbush) blueberry, for the blueberry fruit fly (blueberry maggot, *Rhagoletis mendax*) in order to prevent the introduction and/or spread of this pest into pest free areas. There are also regulations regarding the importation of wild blueberries from the continental United States regarding the blueberry fruit fly. Countries outside Canada also have regulations regarding the importation of wild blueberries from areas infested by the blueberry fruit fly.

The blueberry fruit fly is the most serious pest of wild blueberries. Although larvae damage fruit, the seriousness of this pest results from the presence of larvae in harvested fruit. The larva is not harmful to health, however, its presence makes fresh, canned or frozen fruit unacceptable for marketing. Damage is initiated by the female fly laying an egg under the skin of the berry. The developing larva feeds within the berry destroying the pulp, causing the berry to become shriveled. The infested berry tends to drop off the plant prematurely. Infested berries that remain on the plant and are harvested can result in major losses as there is zero tolerance for larvae in many markets.

Life cycle and description

The blueberry fruit fly has four life stages: egg, larva (maggot), pupa, adult fly. Adult emergence varies according to location and year. In New Brunswick, adult flies begin to emerge from the ground in the last week of June in the south and the first week of July in the north. Almost all the flies emerge over a period of thirty days. A few can, however, be trapped until frost occurs. Adult flies develop for one to two weeks before egg-laying begins. At this time, the first blueberries start to ripen. The female will lay eggs for fifteen to twenty-five days. Egg-laying, however, continues for thirty days as adults emerge over an extended period of time. The female may deposit up to 100 eggs. There is usually one egg per berry.

The white egg hatches in seven to ten days into a [larva](#) (Figure 1) which feeds for two to three weeks. The full-grown larva is 8 mm long, whitish in colour, and is pointed at one end and blunt at the other. In mid to late-August, the larva starts to leave the infested berry and enters the soil to form a pupa, usually 3 to 5 cm below the soil surface.

The pupa is oval, yellowish-brown in colour, and 3 to 4 mm long. Most pupae develop and emerge as adults the following year (typically the sprout year). Approximately 5 to 20 percent remain in the soil for two years and then develop into adults. Approximately one percent remain in the soil for three or four years.

The [adult](#) (Figure 2) is slightly smaller than the house fly and is 3 to 4.75 mm long. The body is dark brown, marked with grey and white. The female has four white stripes across the abdomen, while the male has three. The female has a needle-shaped egg-laying structure that can be extended out from the abdomen, or withdrawn. The abdomen of the male is slightly more rounded than that of the female. The wingspan is about 8 millimetres.

The blueberry fruit fly is identical in appearance to the apple maggot, species: *Rhagoletis pomonella* (Walsh). There are, however, generally few apple trees nearby blueberry fields. The apple maggot will not infest blueberries. The blueberry fruit fly has a distinctive marking on its wings which distinguishes it from other similar species (Figure 3). The dark brown to almost black banding on the blueberry fruit fly wing is F-shaped with a continuous line at the base of the F pattern. The banding pattern is not continuous on the wing of black cherry fruit fly, species: *Rhagoletis fausta* (Osten Sacken).

The blueberry fruit fly attacks other types of berries found on blueberry land, including: huckleberry, shadbush (serviceberry), barrenberry, bunchberry, wintergreen, lingonberry. These weeds may increase infestation levels. Bunchberry may be more of a concern as it can produce fruit on newly pruned land.

Pest management

Cultural. The following cultural practices aid in controlling the blueberry fruit fly: pruning, sanitation, weed control. Pruning fields reduces pest levels as there is no crop available for emerging flies to deposit their eggs. This forces the blueberry fruit fly to fly elsewhere to lay eggs. Pruning practices are more effective in isolated fields that are not divided up into sprout and crop sections. Sanitation practices include: 1) Not leaving unpicked blueberries in infested fields. The field should be completely harvested to prevent reinfestations from unharvested strips or field sections. 2) Debris from winnowing piles should be removed and destroyed as they contain larvae. Weed control is important as weeds provide



Fig. 1. Blueberry fruit fly larvae



Fig. 2. Adult blueberry fruit fly on trap

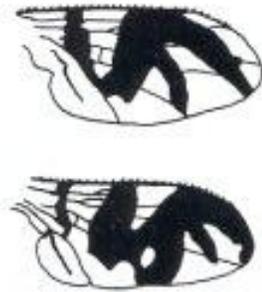


Fig. 3. (Top) Blueberry fruit fly wing. (Bottom) Black cherry fruit fly wing

Wild Blueberry Fact Sheet C2.3.0

sheltered areas for the flies. Some weeds produce berries which serve as alternate hosts for blueberry fruit fly development.

Monitoring. Pherocon^R 1 AM traps, (AM = apple maggot) or equivalent blueberry fruit fly traps, baited with ammonium acetate or other suitable bait are used to monitor adult blueberry fruit flies. The trap is rectangular in shape. One side is yellow and sticky since the yellow colour attracts the flies. The trap is suspended, from a stake, in a V-shape with the yellow side pointed downward and outward (Figure 4). The bottom of the trap should be 10 to 15 cm above the top of the blueberry plants. Traps should be placed at a rate of two per hectare, in areas where berries are present, preferably in sheltered areas away from the prevailing winds. Suitable locations include: nearby woods, bushes or rock piles. Traps should also be placed adjacent to sprout fields. In fields larger than 10 hectares, traps should be placed every 100 metres, near the edge of the field. The traps should be placed 10 metres from the edge of the field. Traps should

also be placed in areas known to be infested in previous years. Traps should be set up in the last week of June in southern New Brunswick and in the first week of July in the northern part. Traps should be inspected three times a week. The first spray should be applied within 5 days of the first adult capture. The traps should continue to be inspected to determine whether or not a second spray is required. A second spray will be required if there is an average of one fly caught per trap per day. Flies should be removed from traps when inspected to



Fig. 4. Blueberry fruit fly trap

make it easier to determine fly captures. Data should be recorded for future reference. A second spray should be applied within 7 to 10 days after the first spray, if required. Monitoring is continued until harvest to determine whether or not additional sprays are required. Sprays are not necessary if adults are not captured. Traps should be replaced every 2 to 3 weeks since they will deteriorate in wet weather and get covered with other types of insects. Therefore, two or three traps should be expected to be used per stake per season.

Wild Blueberry Fact Sheet C2.3.0

Monitoring provides information on the relative abundance of flies and their emergence dates. This information allows the grower to use insecticides at the appropriate time and avoid their unnecessary use.

Monitoring Sprout Fields. Some studies have investigated the possibility of controlling blueberry fruit fly adults in sprout fields. The idea is based upon spraying for adults before they fly to crop fields. Both sprout and crop fields are monitored. The sprout field is monitored and sprayed, as previously described for crop field monitoring. The crop field is monitored and sprayed only when the number of fly captures reaches one per trap per day. Greatest control problems occur in the first year of this modified program. It is, therefore, preferable to apply a control measure to both the sprout and crop sections during the first year of using this control method. This method has been successful in the elimination of a spray to nearby crop fields with resulting larval infestations from zero to a few larvae per litre of berries. This program is useful where markets allow for low levels of larval infestations. When successful, the modified program eliminates the need to spray a crop field and avoids the risk of insecticidal residues on fruit. Greatest success is likely to occur in isolated fields where monitored fields cannot be contaminated by high populations of flies from blueberry fields which are not under the grower's control.

Evaluation. Blueberry fruit fly monitoring and the spray program should be evaluated by determining infestation levels of larvae in blueberries. At least two one-litre containers should be taken just before commercial harvest in each field. The method is described in the fact sheet "Detecting blueberry fruit fly larvae in wild blueberry fruits" (C2.4.0). This will aid in locating problem field areas in succeeding crop cycles.

Control. Proper pest management results in the combined use of all the management practices previously described: pruning every second year, complete removal of berries at harvesting, weed control, monitoring, identification of adults, spraying, evaluating. Weedy field border and abandoned field areas may also be sprayed for blueberry fruit flies. If blueberry fruit flies are a consistent problem, control can be best achieved by not dividing up the field into sprout and crop sections.

Insecticide recommendations and rates are listed in the [Wild Blueberry Insect Control Selection Guide](#) (fact sheet C1.6.0) which is updated annually. Further information can be obtained from the NB Department of Agriculture, Aquaculture and Fisheries.

¹ The use of trade names in this publication is solely for identification purposes and does not imply endorsement of the products named or criticism of similar products not mentioned.

References:

- USDA, Tech. Bul. No. 275, 1932;
- Maine Agr. Exp. Sta. Bul. 500, 1952;
- Canadian Insect Agricultural Insect Pest Review, Vol. 64, 1986;
- Atlantic Agriculture, fact sheet ACC.-1018, 1986;
- Univ. of Maine, fact sheet No. 201, 1987;
- Agr. Can. Pub. 1477/E, 1989;

Wild Blueberry Fact Sheet C2.3.0

Agriculture & Agri-Food Canada, Summary of Plant Pest and Disease Situations in Canada, 1994;

NS Dept. Agr. & Marketing, Blueberry Fruit Fly Fact sheet, 1995;

PMAO, The Management of Blueberry Insect Pest Workshop Report, 1995.