BC CRANBERRY RESEARCH FARM
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BC Cranberry Research Society

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This Field Guide was prepared as a commemorative gift for the Inauguration of the BC Cranberry Research Farm on September 5, 2014

It is our hope that the benefits to the industry from the Research Farm will accrue over many years as current and future generations look to the Farm to keep the cranberry industry growing in our Province.

We hope you keep this Guide close by when you are working in your fields and it becomes your handy reference tool.

With thanks from the BC Cranberry Research Society.
THE BC CRANBERRY RESEARCH SOCIETY WOULD LIKE TO EXPRESS THEIR SINCERE THANKS TO

SHEILA FITZPATRICK, AGRICULTURE AND AGRI-FOOD CANADA AGASSIZ, BC

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ABOUT THIS GUIDE

More detailed information on the biology and management of the pests covered in this Pocket Guide along with other pest management topics for cranberries is available in the manual: IPM for Cranberries in Western Canada. This guide is available on-line via the BC Cranberry Growers Association or BC Cranberry Commission websites.

Guidelines for IPM of cranberry pests are also available on-line in the BC Berries Production Guide.
BLACKHEADED FIREWORM  
(*Rhopobota naevana*)

In spring, newly hatched larvae tunnel into unopened buds or feed inside a “tent” of upper leaves silked together. The first adults (moths) appear in May. Mated females lay eggs on leaf undersides. Second- and third-generation larvae can damage fruit as well as foliage. Eggs overwinter.

Larvae are detected by visual sampling or by sweep netting during the day. Pheromone traps detect adult males. Female activity and egg-laying are inferred from pheromone trap data.

Registered insecticides target the larvae, according to the mode of action of the chemical.
As plants break dormancy, overwintered larvae begin feeding on leaves and buds. Very young larvae can be confused with blackheaded fireworm. Larvae make loose feeding shelters by silking two leaves or several vine tips together, and feed on developing blossoms and foliage. Pupation occurs in late May or early June. Second-generation larvae feed on foliage and within cranberries. A third generation of eggs is laid in late summer and the tiny larvae that hatch from these eggs overwinter.

Larvae are observed during visual sampling for blackheaded fireworm. Pheromone traps detect adult males.

Registered insecticides target the larvae, according to the mode of action of the chemical.
STRAW-COLOURED TORTRIX
(*Clepsis spectrana*)

Adults fly from late March to early August; they are nocturnal and attracted to light sources. Larvae are known to feed on tips of hardhack (spirea) usually found on dykes around cranberry beds. They will roll and tie terminal leaves to form a feeding shelter. There are two to three generations per year in British Columbia.

Larvae will be detected while monitoring for blackheaded fireworm.

There are no insecticides registered for straw-coloured tortrix in cranberries. Insecticides registered for blackheaded fireworm will provide some control.
WINTER MOTH (*Operophtera brumata*)
SPANWORM (*O. bruceata*)

Winter moth and spanworm eggs hatch in March – early April. Larvae feed on leaves, flowers, and buds of deciduous trees. Wind can blow larvae into neighbouring trees and cranberry beds. When the larvae have finished feeding, they pupate in the soil. Male moths fly and mate with flightless females during November through early January. There is one generation per year for both species.

Winter moth and spanworm larvae can be detected during monitoring for blackheaded fireworm. They create tents similar to the blackheaded fireworm. Insecticides used to control blackheaded fireworm will also affect winter moth and spanworm larvae.
FALSE ARMYWORM  
(*Xylena nupera*)

Moths emerge in September, overwinter and fly again in the spring. Eggs are laid in late April to early May then hatch mid-May. Larvae feed nocturnally until they mature in late June. They stay dormant in the ground for two to six weeks before pupating. There is one generation per year.

Young larvae are detected during fireworm monitoring, but the most effective monitoring technique would be night sweeping for older larvae.

Damage will be reduced if larvae are detected soon after hatching and spot-sprayed in the evening with an insecticide registered for climbing cutworms.
ALFALFA LOOPER
(*Autographa californica*)

Alfalfa looper has many host plants. Larvae may be seen in cranberry fields in June and July, usually in dry-pick fields. Adults are active all summer long, because there are multiple overlapping generations per year.

Chemical control is not usually necessary, but if many larvae are detected, an insecticide registered for climbing cutworms will be effective. Damage will be minimized if larvae are detected soon after hatching and if insecticide is applied in the evening.
Overwintering eggs hatch in the spring. Larvae feed on blossoms and tips of uprights for several weeks. In August, moths emerge from pupae. Winged males mate with flightless females that lay overwintering eggs. There is a single generation per year. Infestations are patchy and can occur in the same area year after year.

Larvae are detected during monitoring for second-generation fireworm, or by sweep-net sampling at night. Early detection of young larvae is key because economic damage is caused by older larvae.

Insecticides targeting second-generation fireworm will provide some control of the rusty tussock larvae.
ZEBRA CATERPILLAR  
(Melanchra picta)

Occasionally these larvae are found in cranberries but they prefer to feed on weeds especially blackberry. This cutworm spends the winter as a partially grown larva. There is only one generation per year.

Larvae can be detected while monitoring for blackheaded fireworm

Generally chemical control is not necessary, however, if many larvae are detected on cranberry plants, a registered insecticide for climbing cutworms is recommended. Consider spot-spraying if the infested area can be defined.
Tipworm pupae overwinter on the floor of the cranberry bed. The adults are tiny midges that start emerging in late April. Adults mate and lay eggs (approximately 35-45 per female). There are three larval instars followed by a pupa. There are at least two generations of tipworm per season, with some generations overlapping. Damage from the first generation becomes visible in late May or June. Cupped leaves at upright tips indicate infestation by second or third-instar larvae, or pupae. Monitoring is done by examining through a microscope 50 -100 upright tips and counting eggs, larvae and pupae.

When the majority of the population is in the egg or first-instar stages, registered insecticide can be applied according to directions on the label.
**Ochropleura implecta**

From mid-May until late June moths fly, mate, and lay eggs that hatch after about 10 days. Larvae feed at night in July and August on unripe and ripe berries. There is a second generation of moths from late July to late August.

Sweep-net sampling at night in June is a good indication of pest presence. Moths are also attracted to blackheaded fireworm pheromone traps.

If many larvae are detected during night sweeps then a registered insecticide for climbing cutworms is recommended. Damage to fruit will be reduced if larvae are detected soon after hatching and the insecticide is applied in the evening.
Cranberry fruitworm has been detected in Delta, Richmond and Pitt Meadows. Adults (moths) start to fly in mid-June with peak flight occurring during July. Eggs are laid on the calyx end of berries. Upon hatching, larvae crawl to the stem end where they bore holes then feed inside berries. One larva can eat 3-6 berries before overwintering in the trash layer as a larva. There is one generation per year.

Pheromone traps for male moths should be set out by end of May. If moths are detected, 200 green berries (pinhead or larger) should be collected weekly and viewed under a microscope. If eggs are detected on fruit, a registered insecticide should be applied. Insecticides target newly hatched larvae as they crawl to the stem end of the berry. Once larvae enter the fruit it is too late to spray as larvae are protected inside berries.
FALL FRUITWORM  
(*Lotisma trigonana*)

Fall fruitworm has not caused economic damage to cranberry in BC. However, it is mentioned here because it was a serious pest of fresh fruit in Washington and Oregon in 2000, 2001 and 2002. The only record of this insect in cranberry in BC comes from a berry harvested from a dry-pick farm in 2000.

Adult moths lay eggs on the calyx of Vaccinium fruit such as salal and cranberry in mid- to late summer. Larvae hatch from eggs and tunnel into the berries. Larvae feed on the seeds and pulp of the berry. Infested berries turn black. Once they have finished feeding, larvae pupate in the berry or in the soil.

Insecticides recommended for blackheaded fireworm will probably provide control of fall fruitworm.
DEARNESS SCALE
(Rhizaspidiotus dearnessi)

The armored females overwinter, and the eggs within them are usually formed in spring. Depending on spring temperatures, crawlers (first-stage immatures) begin hatching from eggs during late May to mid-June. Crawlers are bright yellow-orange and tiny: about 0.25 - 0.33 mm long. Crawlers wander or are dispersed by wind, and settle to begin feeding on plant stems within one to three days of hatch.

Scale mapping can be done in early April by looking for overwintering females in areas with dead vines. A microscope is needed to dissect females and determine egg hatch. Insecticides are timed to begin at 30% egg hatch in order to target crawlers.
Adults (weevils) feed by cutting notches from foliage for 4-6 weeks before laying eggs in July. Larvae emerge from eggs and feed on rootlets, roots and crowns until cold weather renders larvae inactive. Pupation occurs in spring. There is only one generation per year.

In April, look for larvae in the top 5 cm of soil in areas of damaged/weak-looking vines. Monitor for adults by sweep-net sampling after dusk in late June to early July.

Registered insecticides target feeding adults before eggs are laid. Nematodes can be applied to target larvae in the soil. Flood harvesting kills most larvae.
STRAWBERRY ROOT WEEVIL
*(Otiorhynchus ovatus)*

Strawberry root weevil has a life cycle similar to that of black vine weevil. In mid to late June, adults (weevils) emerge from pupal cells in the soil and feed on foliage, creating notches, for 4-6 weeks before laying eggs in July. Larvae feed on rootlets, roots and crowns from July through to the following spring. During cold periods in winter they become inactive. Pupation occurs in spring. There is only one generation per year.

Larvae are detected by examining the top 5 cm of soil around damaged/weak-looking vines. Monitor for adults by sweep net sampling after dusk in early July. Registered insecticides target the adults. Nematodes can be applied to target weevil larvae in the soil.
Damage done by clay-coloured weevils occurs earlier than damage by black vine and strawberry root weevils. Adults (weevils) emerge and are active from mid-April through June, with egg-laying occurring from May onwards. Like other weevils, the larvae feed on cranberry roots and adults feed on foliage, creating notches. Non-feeding soft-bodied adults are the overwintering stage. There is one generation per year.

Adults can be detected by sweep-net sampling after dusk in mid-April through June.

Registered insecticides target the adults. Nematodes can be applied to target weevil larvae in the soil.
CRANBERRY GIRDLER  
(*Chrysoteuchia topiaria*)

Adults (moths) emerge during June through mid-July from pupae in the soil. Eggs are dropped into the trash layer and hatch 4-14 days later. Larvae feed on roots of grass and cranberry. Damage becomes visible in late August, when cranberry vines die from water stress. Usually there is only one generation of girdlers per year.

Pheromone traps and “girdler walks” are used to detect adults. High moth counts during walks indicate “hotspots” for egg laying. Two to four weeks after peak flight in pheromone traps, nematodes can be applied to target young girdler larvae. Flooding the field for 24-48 hours in August will drown larvae, but the risk of fruit rot is considerable. Sanding deprives young larvae of food and promotes root growth.
MARSH CRANE FLY (*Tipula oleracea*)  
EUROPEAN CRANE FLY (*T. paludosa*)

In late August through September, European crane flies emerge, mate and lay eggs. In the fall, eggs hatch into larvae that feed on the roots and crowns of turf. Larvae overwinter and continue to feed in the spring. Pupation occurs around mid-May. This species will only be observed flying in late summer and fall.

Marsh crane flies emerge in April and again in the fall. Following emergence, egg laying and larval development occur. Marsh crane flies can be observed flying over the cranberry vines in spring, early summer, and fall.

Young vines are at risk if they are in fields with grasses and sedges. If crane fly populations are high, larvae can be killed by flooding before removing grasses.
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