

Caterpillars in Berry Crops

A BC Small-Scale Farmer's IPM Guide- *Guide series, March 2021*

Many caterpillar species are pests in berry crops and can cause direct and indirect damage to all parts of the plant, most notably the fruit, flowers, and leaves. Second generations can also become harvest contaminants. Different caterpillars are active during different times of the year. Leafrollers and spanworms are generally the most common caterpillars to cause damage in berry crops, and this manual focuses on monitoring and management of these species. This manual contains integrated pest management (IPM) guidelines geared towards small-scale production, but they are applicable to any operation wanting to improve pest identification, monitoring and management.

Identification

The eggs (or small larvae for some species) overwinter on trunks or stems of hosts. Larvae feed on newly growing flower buds or shoot tips, and can cause extensive damage. All caterpillars continue to feed on growing tissue throughout the summer until they pupate.

Spanworms (Bruce's, winter moth)

- Light green with pale lines along both sides of body.
- Ranges from very small (3-5 mm) to large (10-12 mm) sizes.
- Emerge in late March-early April to feed on new flower buds and leaf shoots.
- **Key feature:** A gap between prolegs and hindlegs cause the larvae to move by inching forward in a looping motion.



Leafrollers (oblique-banded, European)

- Light-dark green with brown/black heads.
- Ranges from very small (3-5 mm) to large (10-12 mm) sizes.
- First generation emerges in April-May to feed on flower buds and leaf shoots, second generation emerges in late June-early July to feed on leaves and between berry clusters.
- **Key feature:** Have legs all along body, moves by wriggling.



Damage Identification

Rolled leaves



Feeding holes



Webbing



- Rolled leaves.
- Feeding holes in new leaf growing points and leaves.
- Partially eaten flower buds or berries.
- Webbing around feeding sites, may include dead plant tissue and frass.
- Black deposits of excrement (frass).

Other caterpillars and their damage:

Cutworm damage



Cherry fruitworm damage



Tent caterpillar webbing



Summary of species and damage

Main species	Damage type			Other information
	Leaf/ flower	Fruit	Tent forming	
Leafrollers (European, oblique-banded)	✓	✓		Common pests, European leafroller has one generation, oblique-banded has two
Spanworms (Bruce's, winter moth)	✓	✓		Common pests, one generation
Other caterpillar species				
Cutworms	✓			Voracious feeders, eat most of leaf, active at night
Eye-spotted budmoth	✓	✓		Brown caterpillar, one generation
Cherry fruitworm		✓		Only found in select regions, one generation
Strawberry fruitworm (omnivorous leaftier)	✓	✓		One generation
Tent caterpillars (forest and western)			✓	Fully enclose branches with silky tent full of larvae, defoliate leaves, one generation
Fall webworm			✓	Fully enclose branches with silky tent full of larvae, defoliate leaves, one generation

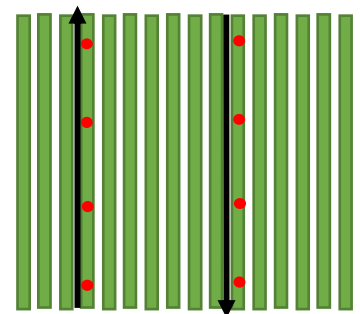
How to Monitor

Monitoring period and frequency

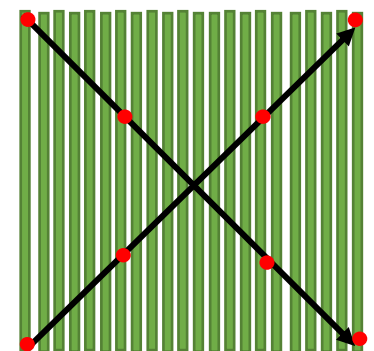
Start in early April and continue monitoring at weekly intervals throughout the growing season. Regular annual monitoring in berry fields can help track where a caterpillar issue, or 'hotspot', may be occurring year after year, and help plan for early and more targeted management.

Blueberries, Raspberries and Blackberries

- Take at least **one to two samples per acre**, with a **minimum of four samples per planting**.
- If a field is smaller than 10 rows just do one pass (walk down a row) stopping along the way to take samples. For larger fields, walk down multiple rows to form a better picture of what is present in the field as a whole.
- At each sample:
 - Check 10 new leaf shoots and 10 flower/berry clusters at different heights in the plant canopy.
 - Use the tip of a pencil to separate plant parts to look for larvae, webbing, and frass.



● Sample locations
↓ Walking direction



Strawberries

- **Make diagonal passes.** Start at one corner of the field and walk in a direct line towards the opposite corner, stopping along the way to take samples. Keep looking for any signs of feeding damage as you walk through the field.
- Take at least **four samples per pass**, checking both **field edges and areas in the middle of the field**.
- At each sample site:
 - Inspect five plants for signs of feeding, webbing, and frass.
 - Use a pencil to separate plant parts to look for larvae.

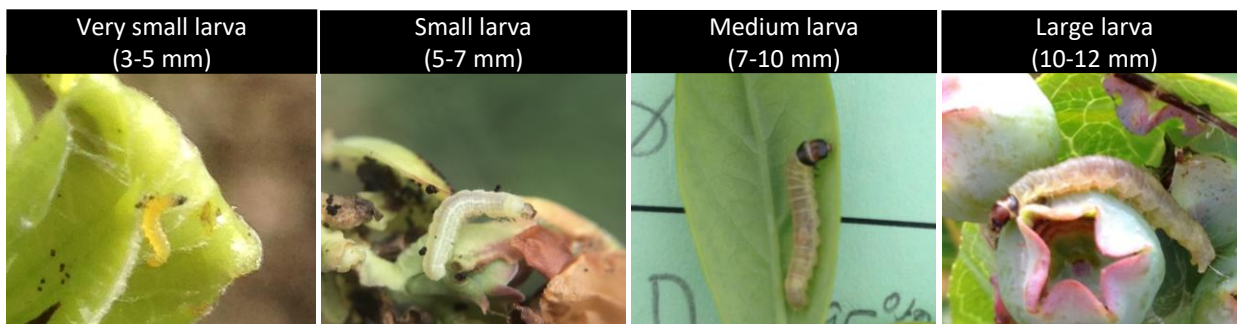
Record

- Use a printout of the data sheet template provided in this guide.
- **Blueberries:** Record the number of leaf shoots and flower/berry clusters with one or more caterpillar larvae.
- **Other berries:** Record the number of plants with one or more caterpillar larvae.
- Larvae are recorded as very small/small or medium/large.
- Calculate % of infestation for each planting (see example page 4).

When to Act

Timing of management

The best time to manage most caterpillars is when they are newly hatched and still small (3-7 mm) rather than targeting older, larger larvae. Sprays should not target the adult moths. The threshold (or percentage of infestation at which action should be taken to avoid economic loss) varies by crop and by plant stage.



Crop	Threshold
Blueberries	Pre-bloom: 5% of leaf shoots/ flower clusters infested Post-bloom: 10% of leaf shoots/ flower clusters infested
Raspberries	Pre and Post-bloom: 10% of plants infested
Blackberries	Pre and Post-bloom: When numbers are increasing
Strawberries	Pre and Post-bloom: 10% of plants infested

Any pesticides that are toxic to bees should NOT be applied during bloom.

Post-bloom management of caterpillars is often more challenging due to the large size of the larvae and the larvae being protected within webbed leaves/flowers/berries (difficult to target with contact sprays). **Therefore it is important to manage this pest in the early spring when possible.**

Example for % leaf shoots and flower/berry clusters:

There were 10 samples taken in Field A with 10 leaves and 10 flower clusters checked at each sample. Caterpillars were found on 3 leaf shoots and 9 flower clusters:

$$\left(\frac{12 \text{ infested leaf shoots and flower clusters}}{200 \text{ total leaves and flower clusters checked}} \right) \times 100 = 6\% \text{ infestation}$$

Damage is increasing but no larvae are found?

Cutworms could be the cause. They are mostly active at night and contact insecticides should be applied at night.



How to Manage

Biological control- *Natural enemies*

- Help the establishment of natural enemies such as parasitoid wasps and predators.
- Plants such as alyssum attract natural enemies and provide pollen and nectar. These can help natural enemies establish earlier in the field, and can be direct seeded or planted along field edges to provide habitat. Other plants attractive to natural enemies include phacelia, yarrow, coreopsis, dill, and rhudbeckia.
- Avoid broad spectrum insecticides to allow natural enemies to propagate.



Biological control- *Release*

- **Trichogramma** - *Trichogramma minutum* is a parasitic wasp of caterpillars and can be effective against multiple species. It lays eggs inside caterpillar eggs.
 - The wasps then develop within the mummified caterpillar eggs and emerge as adults.
 - *T. minutum* can be purchased commercially and applied weekly to the field either by placing parasitized eggs on cards in a grid, or by broadcast applications with a custom applicator.
 - In fields where caterpillars have been known to be a consistent problem, application of this biological control could be considered. Contact your biocontrol supplier for recommendations.

Cultural control

- **Manage weeds** in and around the field. Controlling weeds will reduce habitats and overwintering sites.



Chemical control

- Registered pesticides used in **organic production** for management of caterpillars in berry crops include the active ingredient Spinosad and *Bacillus thuringiensis*. Always check with your organic certification body before using any pesticide products.
- Most products should target minute to small larvae. Keep in mind that caterpillars develop quickly in hot weather.
- Please refer to the **BC Berry Production Guide** for current organic and conventional spray options for caterpillars in berry crops.
- Products should be rotated for resistance management.
- Always read the label prior to applying any pesticide products.



References and Links:

BC Production Guide – Berries

<https://www2.gov.bc.ca/gov/content/industry/agriservice-bc/production-guides/berries>

BCBC Field Guide

<https://fieldguide.bcblueberry.com/>

University of California IPM

<https://www2.ipm.ucanr.edu/agriculture/strawberry/leafrollers/>

<https://www2.ipm.ucanr.edu/agriculture/strawberry/Cutworms/>

WSU Whatcom County Extension

http://whatcom.wsu.edu/ipm/manual/rasp/army_cut_worms.html

Pacific Management Handbooks

<https://pnwhandbooks.org/insect/small-fruit/strawberry/strawberry-omnivorous-leaf-tier>



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