Tuber Flea Beetle

Epitrix tuberis

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

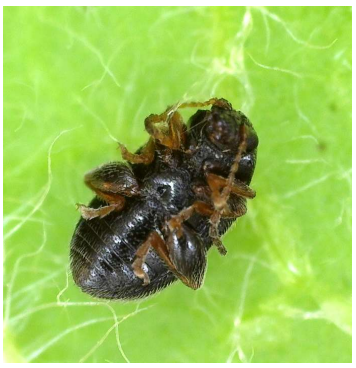
Tuber flea beetles (TFBs) are small black beetles that feed on Solanaceous plants, including potatoes. The most significant damage is done by the larvae, which feed directly on potato tubers and reduce marketability. Damage also creates an introduction point for diseases. Adult beetles cause foliar damage that, if severe, can reduce plant vigour. 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

Adult beetles

- Black, oval-shaped beetle ~2 mm long.
- "Fuzzy" wing covers.
- Thick "thighs" / hind jumping legs.
- Reddish antennae and legs.
- Jumps very easily.

Actual size



Beware of look-alikes

Tuber flea beetles do **not** have:

- Metallic/bronze back.
- Short antennae.
- Teardrop shape.

Springtail

Crucifer flea beetle

Larvae

- Whitish and slender larva (0.8mm wide).
- Up to 5 mm long.
- Brown head.

Damage Identification

Leaf damage

- "Shot hole" feeding damage of multiple small pits/holes.
- **Note:** Other flea beetles may cause similar damage.

"Shot holes" caused by adults

Tuber damage

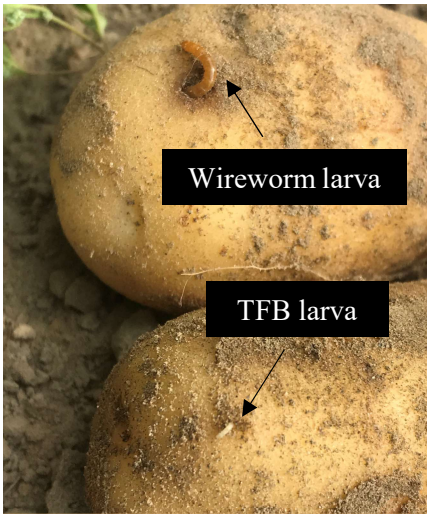
- Small and shallow holes and shallow and narrow tunnels on the potato surface.
- Tissue in holes and tunnels becomes brown/corky.

Tunnels and holes caused by larvae

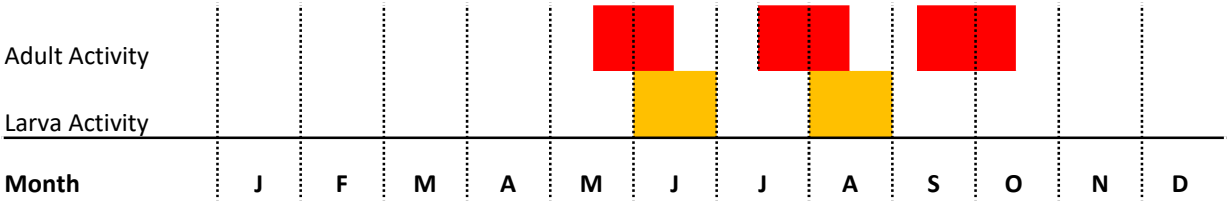
TFB damage can be confused with wireworm damage

- Wireworm holes are relatively large compared to TFB holes.
- Holes are often going directly inward into the potatoes.
- Holes are often hollow.

Wireworm damage



Lifecycle


Adult Activity
Larva Activity
Month
J
F
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J
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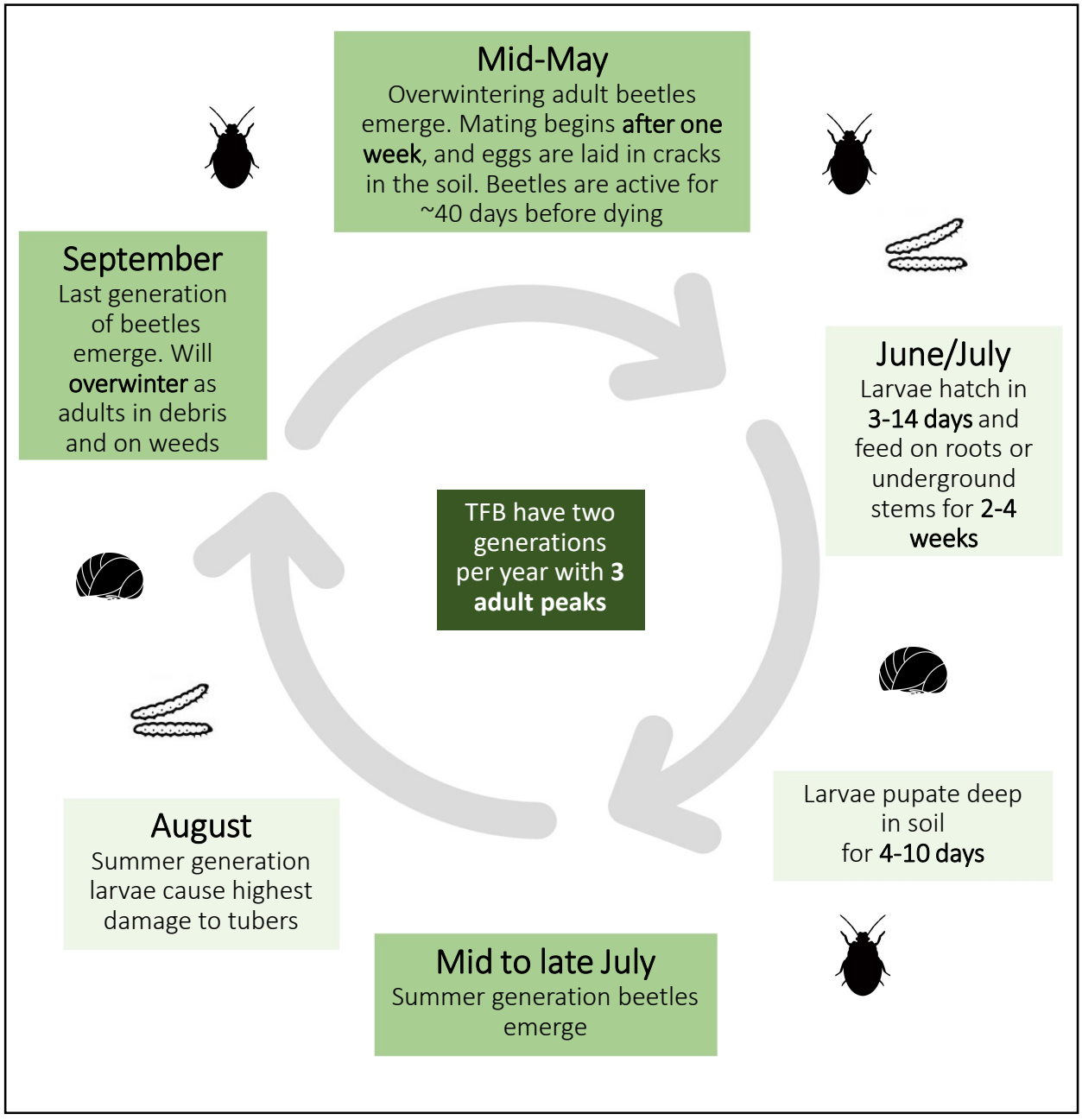

Mid-May
Overwintering adult beetles emerge. Mating begins after one week, and eggs are laid in cracks in the soil. Beetles are active for ~40 days before dying
June/July
Larvae hatch in 3-14 days and feed on roots or underground stems for 2-4 weeks
Larvae pupate deep in soil for 4-10 days
Mid to late July
Summer generation beetles emerge
August
Summer generation larvae cause highest damage to tubers
September
Last generation of beetles emerge. Will overwinter as adults in debris and on weeds
TFB have two generations per year with 3 adult peaks

How to Monitor

TFB adults prefer to jump, but they can fly. Beetles overwinter in weeds and debris on field edges. Therefore, monitoring should prioritize **field edges** and **volunteer potato plants**, especially in un-rotated fields. If rotating the field with other Solanaceous crops (e.g. tomatoes, eggplants), be aware that those crops can also host TFBs.

Monitoring period and frequency

Start as soon as potato plant leaves have emerged from the soil. Monitor once a week until harvest.

Method

Crawling:
For plants less than 30 cm tall:

- Inspect **10 plants per sample.**
- Ensure that the bottoms of leaves are checked for beetles.
- Be aware of your shadow, which can cause the beetles to jump.

Sweep-net:
For plants taller than 30 cm:

- Perform **12 sweeps per sample** across four adjacent rows, that is two rows on either sides (hitting 48 plants).
- Take care to not allow insects to escape when opening the net to check for TFBs.

Record

Record the number of TFB adults per sample. Keep record of the numbers using a printout of the data sheet template provided in this guide, also note any "shot hole" feeding damage.

Note: monitoring and threshold focus on adults but the goal is to reduce the number of larvae and their damage.

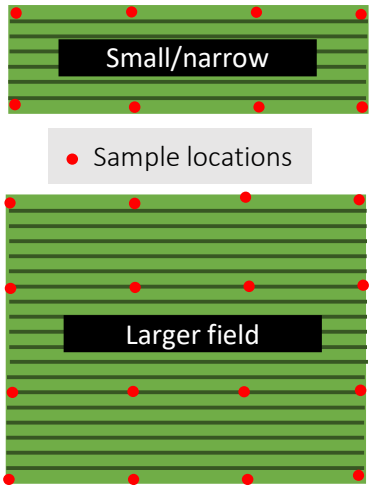
A pass involves moving along a row or edge, stopping to take samples at four to eight locations per pass. For each sample, crawl or sweep depending on plant size. Monitoring by pass will allow for targeted control if TFBs are only present in a section of the field.

For small narrow plantings:

- Make two passes on the **outer-most rows** in each planting.

For larger fields (20+ rows):

- Make passes along the **four outer edges** and **two inside rows.**



Look-alikes: For insects that cause similar feeding holes on the foliage (e.g. crucifer flea beetle) but do not damage the tubers, treatment is rarely required. Potato plants can withstand a significant amount of foliar feeding damage before economic loss is observed. Ensure that the insect causing the damage is identified prior to making management decisions.

When to Act

Threshold: The level at which action should be taken to avoid economic loss is:

Crawling: 0.16 TFB per sample **Sweeping:** 1 TFB per sample

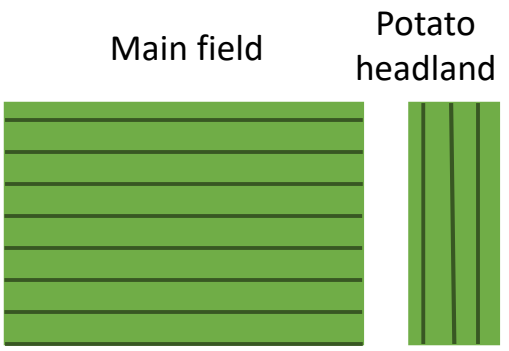
Timing of management

- Controlling the winter-emerging beetles will help reduce beetle numbers for the subsequent generation. Controlling the summer generation of adults will reduce tuber damage by the larvae in August.
- Apply control as soon as levels above threshold are detected to avoid egg laying. If plants emerge prior to mid-May, adults might slowly build up as they emerge from the surroundings and move into the potato planting. In that case it may take a few weeks to reach threshold. If plants emerge after mid-May, it may only take a week for adults to reach threshold.

How to Manage

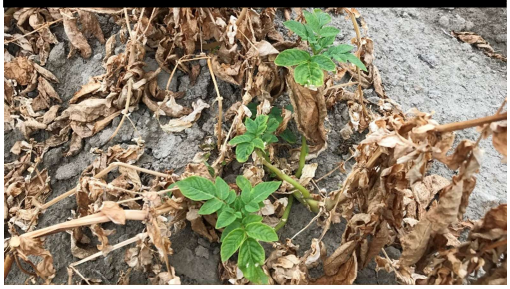
Cultural control

- Use a crop rotation program (minimum 3 years) to reduce populations of TFB.
- In larger fields, use potato headlands (strips of potatoes planted perpendicular and away from the main field rows) as a buffer to minimize movement of TFBs further into the field, or as a trap/sacrifice crop if necessary.
- Remove Solanaceous weeds. TFBs can overwinter along field edges where they can hide or feed on Solanaceous weeds.
- Remove any volunteer potato plants in and around the field. They will act as a TFB reservoir, allowing them to re-infest the potato crop each year.
- Minimize damage to potato tubers by planting and harvesting early to avoid peak larval activity in August.
- Harvest as soon as skin is set if timing of harvest coincides with larval feeding underground.
- Control re-growth after topping, if adult beetles are present.



Control nightshade weed

Control re-growth



Physical control

- Floating row covers prevent adults from colonizing the crop in rotated fields (i.e. fields free of overwintering adults).
- Hilling soil or mulch on the base of the plants may reduce the number of eggs laid.

Chemical control

Organic options:

- Registered pesticides used in organic production for control of tuber flea beetle adults include the active ingredient Spinosad– timing is important due to limited number of allowed sprays.
- Always check with your organic certification body before using any pesticide products.

Conventional options:

- Using a seed treatment will help prevent the establishment of the overwintering population of adults on the crop.

Please refer to the **BC Vegetable Production Guide** for current spray options to control the adults. Always read the label prior to applying any pesticide products.

References and Links:

BC Production Guide – Potatoes
https://www2.gov.bc.ca/gov/content/industry/agriservice-bc/production-guides/vegetables/potatoes
Oregon State University Extension – Flea Beetle Pest Management
https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/em8947.pdf
Nebraska Extension
https://cropwatch.unl.edu/potato/fleabeetle
Colorado State University Extension – Flea Beetles
https://extension.colostate.edu/docs/pubs/insect/05592.pdf

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Tuber flea beetle Data Sheet Template

Date	Planting ID	Pass location	Method used	# samples per pas	Total # TFB per pass	Damage presence	Comment
Example row: 30-May-21	*North Field*	*North edge*	*Crawling*	*6 samples*	*2 TFBs*	*Foliar shot holes*	*Above threshold*