

Carrot Rust Fly

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The carrot rust fly (CRF) is an insect pest that feeds on carrots, parsnips, and celery. The feeding damage caused by carrot rust fly larvae can kill young seedlings, stunt plant growth, and create feeding tunnels that cause deformation of carrot and parsnip roots. This can reduce crop yield and decrease quality and marketability of the crop. 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 flies have:

- Black shiny flies about 6 mm long.
- Transparent wings.
- Long **yellow** legs.
- **Reddish** head.
- Short antennae.
- “Hunchback” thorax (mid-section).



Actual size



Do not have:

- Stinger.
- Long antennae.
- Flat body.



Larvae and root damage:

- White-yellowish maggots 6-7 mm long (wireworm damage is larger and deeper).
- Narrow winding feeding tunnels, found in lower two-thirds of the root.

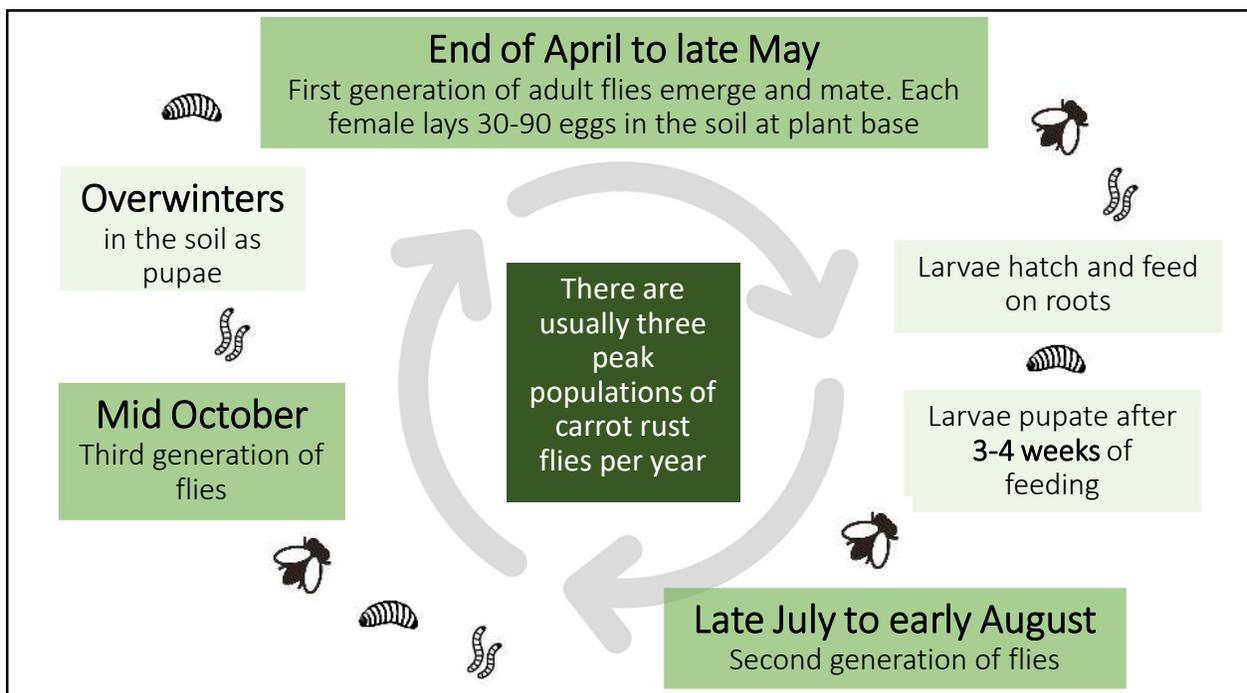
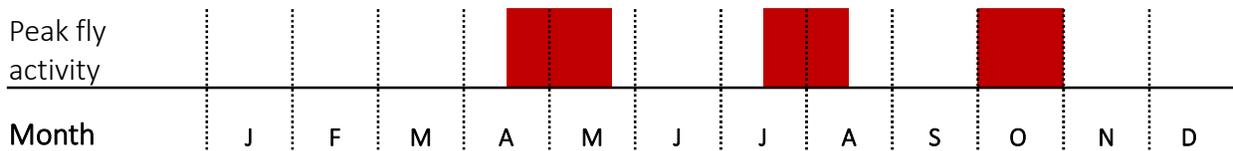


CRF damage can be confused with wireworm damage:

- Wireworm holes are relatively large.
- Holes are often hollow/open.



Lifecycle



How to Monitor

Carrot rust flies are weak flyers - they do not fly very far or very high. In early season, flies enter the field via field edges and leave at night to seek shelter in hedgerows. As such, damage to plants is often most prevalent along field edges and this is where monitoring efforts using sticky cards are focused. Stinging nettles, as well as woody and shaded areas, provide preferred carrot rust fly habitats and can be monitored with sticky traps for early detection.

Monitoring period

- Start when plants begin to emerge until plants are harvested.

Method

- Use yellow sticky traps (4" X 6") to catch adult flies.
- For small and narrow plantings (less than 1 ac), place **2-3 traps per planting**.
- For larger and wider fields, place **4-6 traps per field** or use a rate of **2.5 to 5 traps per acre**.
- Place traps on the edge of the carrot planting, at least 100 m apart, prioritizing corners and edges with trees, shrubs, and/or stinging nettle.
- Attach traps facing north/south on stakes positioned directly above the plant canopy. Secure the traps with clips so they can easily be moved up the stakes as plants grow.

Frequency

- Check traps once a week, changing if unable to reuse (surface covered/dirty).
- Once a carrot rust fly is found, begin checking traps twice a week.

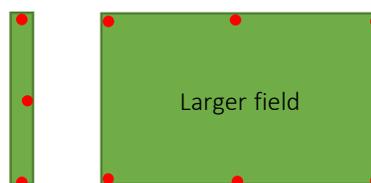
Record

- Count the number of carrot rust flies per card.
- Keep record of the numbers using a printout of the data sheet template provided in this guide.
- Remove flies (and other insects) from the traps if re-used.



Trap placements:

- Sticky trap



When to Act

Threshold

The action threshold (or level at which action should be taken to avoid economic loss) is:

- **0.1 to 0.2 flies/trap per day.**
- Use 0.1 for fresh and 0.2 for processing market.

For example:

- A total of 6 flies were found in a field with 4 traps, and the traps were placed 7 days ago.
= # flies / (# traps X # days) = 6 flies / (4 traps X 7 days)
= 0.21 → Above threshold

Timing of management

- Management of the first generation of flies can help reduce overall populations.
- The maggots from the second generation (mid-July and August) generally cause the most damage.
- Managing flies is not necessary within a few weeks of harvest, as the larvae will not have time to emerge and feed.



If using sticky cards to help time the placement or removal of row covers, use the following **risk factors** to inform management:

- Presence of flies on traps.
- Within fly activity period (first and second generations).
- More than one month before harvest.

How to Manage

Biological control

Minimize tillage to preserve predators such as ground beetles and rove beetles, which feed on the eggs and larvae of carrot rust flies.



Cultural control

- Plan planting and harvest dates to avoid population peaks. Late plantings (after June 1) may avoid the first-generation damage, and early harvest (beginning of September) can minimize the third-generation damage.
- Remove infested carrots from the field to reduce future infestations (i.e. reduce the number of pupae overwintering in the soil).
- Use crop rotation to reduce pest pressure. To be effective, new carrot fields must be planted at a minimum distance of 1,000 m from the previous year's planting, including all carrots and alternate hosts (e.g. celery, parsnips, and parsley).



Physical control

- Properly secured row covers (e.g. anchor edges with sandbags) installed at planting will prevent carrot rust flies from establishing on the crop.
- Manage weeds to prevent interference with the row cover.
- Use trap counts to determine when it is time to put on or remove the row cover on the crop.
- Row covers can be removed for a period when flies are not present.
- Look at fly counts for timing of operational tasks (e.g. weeding and irrigation).



Chemical control

- A spray is not necessary when there are only a few weeks until harvest.
- Use trap counts and thresholds to determine when to spray.
- Please refer to the **BC Vegetable Production Guide** for current spray control options for carrot rust flies.
- Always read the label prior to applying any pesticide products.

References and Links:

BC Production Guide – Carrots

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

Ontario Agriculture - Carrot Insects Factsheet

<http://www.omafra.gov.on.ca/english/crops/facts/93-077.htm>

University of Wisconsin-Extension – Carrot Workbook

<https://cdn.shopify.com/s/files/1/0145/8808/4272/files/A3843.pdf>

Cornell College of Agriculture and Life Sciences – Carrot Rust Fly

<https://nysipm.cornell.edu/agriculture/vegetables/vegetable-ipm-practices/chapter-16/section-16-6-3/>



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