

The Spotted Wing Drosophila is Attacking our Berries



Drosophila suzukii

Drosophile à ailes tachetées
(Quebec)

Drosophile du cerisier (France)



- The Spotted Wing Drosophila (SWD) is the only fruit fly in Québec to lay its eggs in healthy ripening fruit (except blueberry maggot).
- The eggs, larvae and some pupae then develop inside the fruit, causing a rapid deterioration. Many larvae can be found in a single fruit.
- Very high multiplication rate, rapid development and many generations per year.
- First observed in Québec in October 2010. Since 2012, first captures of the season have been from early to mid July. Damage has been observed in late berry crops from August to September.

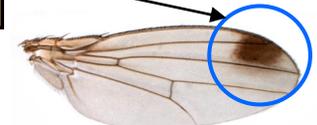
Female ♀
3-4 mm



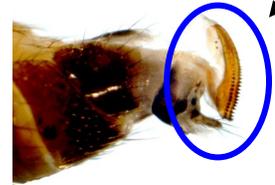
Male ♂
2-3 mm



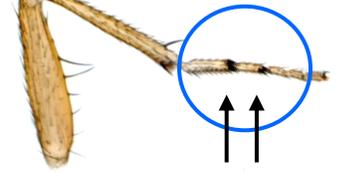
No black spot



1 black spot at the tip of each wing



Saw-like ovipositor for laying eggs



2 black spots on the front legs

Visible with a
30x magnifier

Notes :

- At the end of the season, some adults are smaller
- Some males have no spot on their wings

For more information, [click here](#).

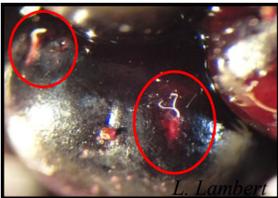
Photos: M. Hauser

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Egg



2-72 hours;
0,6 mm
The two visible
filaments outside
the fruit are
breathing tubes

Life cycle

One generation:
8 to 10 days at 25°C,
21 to 25 days at 15°C.

Adults live for over 60 days

3 larval stages



3-15 days

L. Lambert

Pupae



3-15 days ;
2-3 mm
(outside or
inside the
fruit)

L. Lambert



Male

Adult

Egg

Female

L. Lambert

DO NOT CONFUSE



Prominent
ovipositor for
SWD (left in
picture) and
usually very
small for other
drosophila.



Stripes on the
abdomen are
full lines for
SWD (left in
picture) and
are broken
lines for cer-
tain other
drosophila.

Diptera (Fly family) = No head or legs



Respiratory tubes are a
characteristic for Dro-
sophila, including SWD



Blueberry maggot
(*Rhagoletis mendax*)

Other larvae (head is visible)



Plum curculio

N. Laplante

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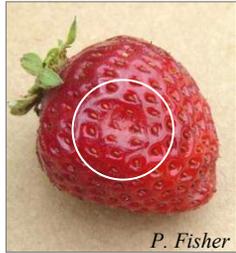
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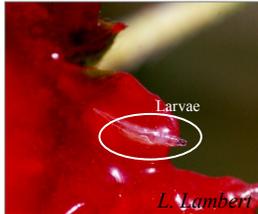
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Damage caused by larvae

In strawberries, slight depressions on the fruit might indicate the presence of larvae.



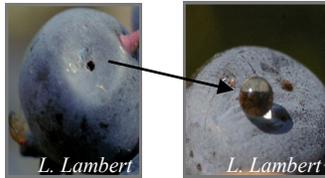
P. Fisher



L. Lambert

The damage is less obvious in strawberries.

In blueberries, the fruit collapses where the larvae are developing.



L. Lambert

L. Lambert



Larvae

L. Lambert

In blueberries, the hole made for laying eggs is visible. By squeezing the fruit a droplet can escape.

In raspberries, a pink receptacle at harvest indicates the presence of larvae.



J. Painchaud

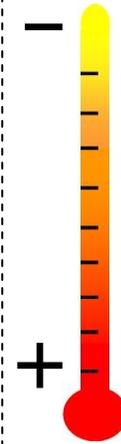


Larvae

L. Lambert

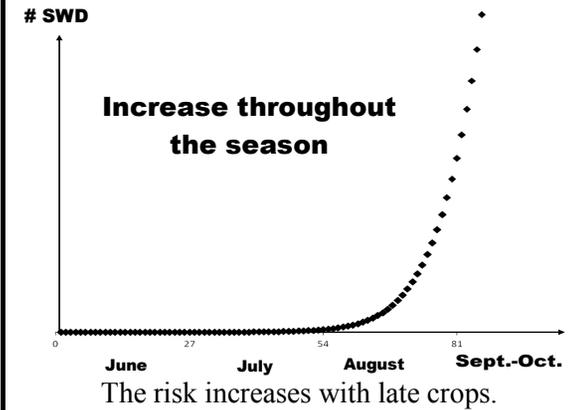
Raspberries are its favorite fruit and the receptacle can contain many larvae.

Crops at risk



Vine
Blackcurrant
Redcurrant
Gooseberry
Plum
Honeyberry
Sea-Buckthorn
Elderberry
Blueberry
Cherry
Peach
Strawberry
Blackberry
Raspberry

Risks for crops



And other wild hosts including dogwood, brambles, nightshade, honeysuckle, pokeweed, viburnum.

ITS PREFERENCES:

Red and black coloring ; shade, coolness, humid conditions ; calm (no wind) ; biodiversity (woods) ; ripening fruit (not before!) ;

Good practices

- Harvest quickly, cleanly and often; the longer ripe fruit stays on the plant, the more they will be infested.
- Prune severely = more light, more air = fruit on the ground dries out faster.
- Do not leave fruit on the ground or overripe fruit on the plant or else SWD will complete its life cycle.
- Blow or send fruit between rows and eliminate them (pick up, bury or crush so they can dry out quickly in the sun).
- Put poor quality fruit in a container with a transparent plastic cover and expose it to the sun (see photo); or bury them at a depth of more than 30 cm.
- Quickly cool the fruit after harvest because the cold kills a portion of the larvae (ideally 1-2°C; younger larvae are more sensitive).
- Cut the fruit-bearing branches of wild raspberry and black berry bushes whenever possible.



N. Roullé

Monitoring

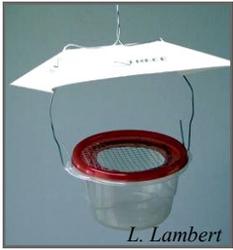
- Shortly before harvest, install 1 trap per acre or a minimum of 1 to 3 traps per field.
- Hang traps where there is fruit, at mid-height (ex.: 1 meter), in the shade and sheltered from the wind.
- Usually, the first catches of the season are a few meters inside the surrounding woods, then around the field and eventually in the center of the field.
- For raspberries, first captures happen simultaneously at the border and in the middle of the field.
- Early in the season, captures have more females than males. Observing the ovipositor with a magnifying glass can help to better detect its presence.

Characteristics of an efficient trap :

- Alternating red and black coloring.
- Openings on the sides or on the bottom.
- Large trap: for the same amount of bait, a large container is more effective
- Many openings (3 to 5 mm in diameter; bigger holes would allow many unwanted insects into the trap).

Pictures on the next page ->

Commercial and home made traps



L. Lambert

Homemade Haviland trap. Plastic container. Netting on the top. Protective roof.



L. Lambert

Homemade MAPAQ trap



R. Cowles

Homemade red cup trap. Plastic cup. Protective roof.



L. Lambert

Droso-trap by Biobest, modified. Adding a separate yeast container (blue).



H. Faubert

Makes holes with a punch. Home-made trap.



P. Fisher

Home madetrap. Peanut butter jar. Netting on the sides. Protective roof.



P. Fisher

Homemade trap. Plastic container. Holes on the sides.



L. Lambert

Dome Rosso trap by Solida

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Screening of larvae in fruit

1st method : Dissolve at least 1/4 cup of salt in 4 cups of water. Add 1 cup of fruit, lightly crush, place on a tray to keep fruit on the bottom. Look for the presence of floating larvae in the next 15 minutes, under a good lighting. A magnifying glass may be useful to see the small larvae.

2nd method : In a see-through plastic bag, add some fruit and the salty mix (see recipe for method 1). Wait 15 minutes and look for larvae in the liquid.

3rd method : Put fruit in a plastic bag, the place in the freezer. Check for larvae 1 or 2 hours later.

Please note that the eggs and young larvae can't be detected through these methods (invisible to the naked eye). Careful not to use overripe or rotten fruit as the SWD targets healthy berries on the plant.



Roullé



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Lures

Commercial lures

NEW : The Pherocon SWD by TRECE is available at Solida. This dual-lure, combining 2 lures, is effective for 30 days.

Homemade lures

(change the solution each week)

Mix 1 : 3/4 cup of sugar, 3 tablespoons of yeast + 1 liter of water.

Mix 2 : 400 ml of apple cider vinegar + 2 drops of odorless soap + choice of : [70 ml of ethanol 95% * + 530 ml of water] OU [600 ml of Merlot wine].

Mix 3 : Apple cider vinegar + 2 drops of odorless soap.

Suggestion : For mixes 2 and 3, you can add mix 1 in a separate container covered with a fine netting.



Container with yeast

H. Faubert

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Reasonable chemical control

- Target the adults because only few insecticides have potentially an effect on the eggs and larvae inside the fruit. No product is effective against pupae.
- Spray in the evening or early morning, when the Spotted Winged Drosophila is most active.
- Reach the heart and base of the plant, which is where SWD hide.
- Monitor the dates of first captures in your area and your region (RAP warnings for Quebec).
- It is useless to spray after harvest or in the fall because almost all SWD die during the winter.
- According to American researchers (R. Cowles, UConn), adding regular white sugar to the mix increases the efficiency of insecticide treatments.

IMPORTANT!

GREEN FRUIT ARE NOT AT RISK !

ONLY SPRAY IF =

Fruit is ripe and/or ripening+ adult captures

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Insecticides registered for control

Insecticide	Crops	Dose/ha	DBH (days)	Max./season
Exirel Cg 28	B	1-1,5 l	3	4
Ripcord Cg 3 (less effective if T° exceeds 26 °C)	S-R-Bk	150 ml	2	1
	V	150 ml	7	1
Entrust SC* Cg 5	S	292-364 ml	1	3
	R-Bk	333-444 ml	1	3
	B	333-444 ml	3	3
	V	364 ml	4 / 8**	3
Delegate WG Cg 5	S	280 g	1	3
	R-Bk	315-420 g	1	3
	B	315-420 g	3	3
	V	350 g	4	3
Malathion 85 E Cg 1B (reduced efficiency on hot days)	S	1 l	3	2
	R-Bk	1 l	1	2
	B	1 l	2	3
	V	880 ml	3	1

Key:

-Cg : Chemical group
-DBH : Delay before harvest
-Max./season: Maximum number of applications/season
-Crops: S-Strawberry; R-Raspberry; Bk-Blackberry; B-Blueberry; V-Vine

*Product accepted in organic agriculture

**Mechanical/manual harvesting

Certain products approved for other insects seem to have an effect against SWD. Consult [Sage-Pesticides](#) for new registrations.

NB:

Cover leaves and fruit entirely. A 7 day interval between sprays assures a good control. However, most of the insecticide is washed off after heavy rainfall. For the delays before reentry, read the product label.

Consult the label (blue link) to know how to use these products in lesser known berry crops.



Alternative control methods being tested

- Exclusion nets with a mesh size less than 1mm (ex.: [Ultravent](#), [Proteknnet](#) 80 gr/m²) (photo ; [trials in Quebec](#)).
- Reduced treatment : [spraying every other row](#) (alternating with every treatment) (page 17 of the linked document).
- The [attract-and-kill strategy](#): SWD is attracted by baits and killed by pesticides.
- Reduced treatment : [spraying borders](#) (15 first meters from the edge) (page 18 of the linked document).



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Alternative control methods being tested (continued)

- Trap plants : Raspberries surrounding the field can be sprayed separately (SWD will be attracted to these first).
- [Mass Trapping](#) (See Photo).
- Entomopathogenic fungi : *Beauveria* (trials with Bioceres and Botanigard).
- Garlic based repellent : Garlic juice is a natural repellent used in France (ref: Jacques Bertrand, Martailac Nursery).



Keep a look out !

Another drosophila, *Zaprionus indianus* (African fruit fly), which doesn't target healthy fruit, benefits from the opening created by SWD to lay its own eggs. This opportunistic species probably accelerates the rotting process of fruit infected by SWD ([For more information](#)).



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For more information:

[Pôle d'excellence en lutte intégrée \(see bibliography\)](#) ;
[Réseau d'avertissements phytosanitaires du Québec](#) ;
[Liste d'informations d'Agri-Réseau \(Québec\)](#) ;
[Northeastern IPM Center](#) ;
[Ministry of agriculture, food and rural affairs, Ontario](#) ;
[SCRI Project](#).

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This data file and its hyperlinks is available on the PELI website
www.lutteintegree.com/IMG/pdf/swd_booklet_quebec_2014.pdf

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