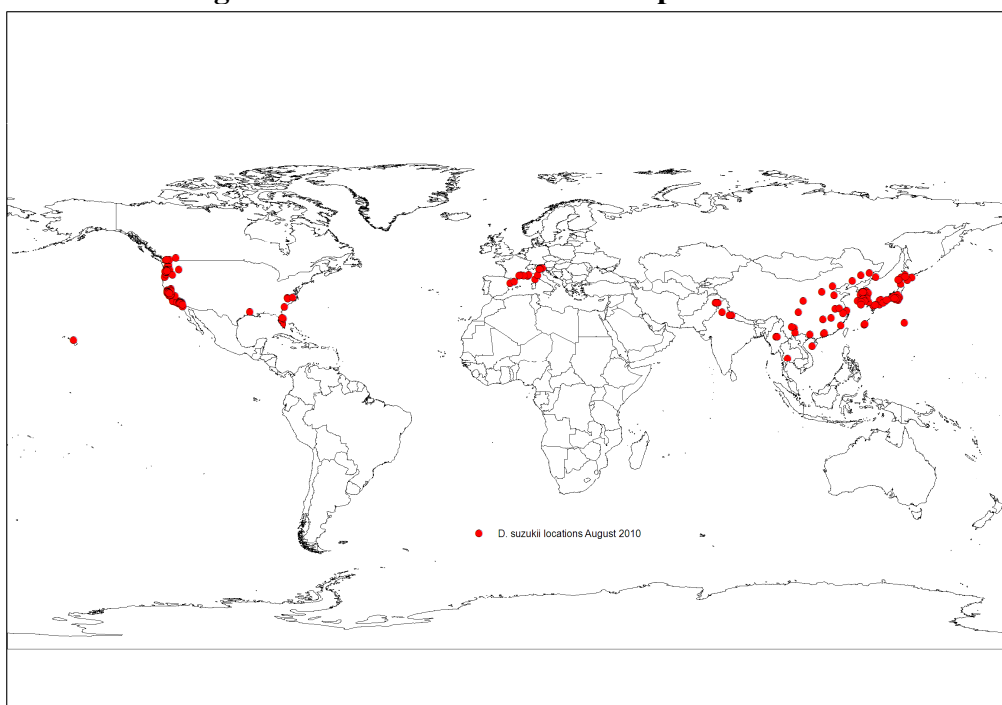


Introduction

In 2009 *Drosophila suzukii* was detected in three European countries (see map below). It was identified as a possible threat to all European and Mediterranean countries and an analysis to determine the potential phytosanitary risk for European and Mediterranean fruit producing areas has been conducted. The Expert Working Group that performed this analysis recommended that information on this pest and its control should be communicated urgently to European and Mediterranean countries so that growers are informed about this important emerging pest.

Fig. 1 Global distribution of *Drosophila suzukii*



D. suzukii is a vinegar fly native to Asia. **It is likely to find large areas with suitable conditions for establishment in our region** although the establishment of *D. suzukii* in more northern parts of the EPPO region is likely to depend on the presence of overwintering sites associated with human habitation. It infests thin-skinned fruit and poses a significant risk to soft fruit and stone fruit.

Most species of vinegar flies are not pests because they infest overripe, fallen, rotting fruit. **However, *D. suzukii* females lay eggs in ripening fruit. Larvae develop in the fruit and cause it to become soft and unmarketable.**

Host range

D. suzukii infests both cultivated and wild hosts.

Crops on which significant economic damage has been reported:

Prunus spp. (mainly sweet cherries, but also on peaches and plums), *Vaccinium* spp. (blueberries), *Rubus* spp. (e.g. raspberries and blackberries), *Fragaria ananassa* (strawberries).

Other recorded hosts include:

Actinidia spp. (hardy kiwis), *Cornus* spp., *Diospyros kaki* (persimmons), *Ficus carica* (figs), *Vitis vinifera* (table and wine grapes).

D. suzukii can be present in already damaged fruits, e.g. *Malus domestica* (apples) and *Pyrus pyrifolia* (Asian pears).

Biology

Under ideal conditions this fly has up to 15 generations per year and its life cycle can be as short as 10 days. The females actively search for ripening host fruits. The eggs are laid in the fruit where the larvae subsequently develop. Pupation occurs in the fruit or in the soil. *D. suzukii* overwinters as an adult in sheltered places but under suitable conditions it can be active all-year-round. Flies are active above 10°C.

Means of dispersal

It is a mobile pest which can fly within a local area. However, long distance spread is likely to be by the movement of infested fruit. Plants without fruit are not expected to carry this fly.

Surveillance and Monitoring

Distribution in Europe (see map above)

Since 2009 *D. suzukii* has been detected in infested fruits in Italy (Trentino and Calabria) and France (Languedoc-Roussillon, Provence-Alpes-Côte-d'Azur, Corsica). It has been trapped in Tuscany (Italy) and Spain (southern Catalonia), and could be present, but currently undetected in other areas (situation on 2010-07-15).

Trapping

The most efficient method for first detection is by trapping. Any 250-750 ml plastic containers with closely fitting lids can be used as traps. Four 5 mm diameter holes should be made on the side and flies enter the vessel through these holes. Bait is needed to attract the flies to the trap. Apple cider vinegar is considered to be highly effective, and the most practical bait to use.

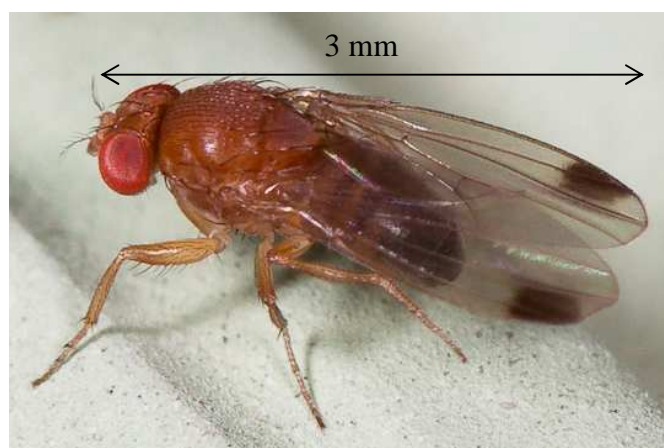


Fig 1 Male *Drosophila suzukii*

(photo courtesy of John Davis, <http://bugguide.net/user/view/4793>)

When and where to locate traps

Place traps when the temperature is consistently over 10°C, and/or when fruit starts to form, at least one month prior to fruit ripening. For first detections, place traps in field edges, hedgerows (i.e. near wild hosts) and amongst crops.

Grower specific information

Hang traps in the plant canopy or set firmly in the ground within the plant row, in a shady location. Place approximately two traps per field. These should be checked at least weekly. Use a magnifying glass for

better viewing of the 3 mm fly. Look for brown flies with red eyes and wing spots (see Fig 1 above) in the bait solution. Retain suspected *D. suzukii* specimens and contact your plant protection service.

Identification

The identification to species level should be performed in a laboratory with appropriate expertise. Female flies do not have spotted wings and may be confused with native vinegar flies.

Damage

D. suzukii is one of the very few *Drosophila* species which are **able to feed on healthy ripening fruit while they are still attached to the plant**. Infestation of fruit therefore reveals small scars ('stings') and indented soft spots or bruising on the fruit surface. Damage is caused by one or more larvae feeding on fruit pulp inside the fruit and berries. Very rapidly, infested fruit begin to collapse around the feeding site. Thereafter, secondary fungal or bacterial infections may contribute to further fruit deterioration (i.e. rotting).

Some pictures of damage are presented below in Appendix I.

Control

There are three component parts to a management program and it is crucial that the timings of these activities are applied in conjunction with the information collected from monitoring activities:

1. Sanitation.

Any fruit that remains in the field or orchard serves as a food source and allows eggs and larvae to fully develop and serves as a fly production source. When feasible, remove all fruit from the crop site and destroy either by burial or disposal in a closed container. This will reduce the pest numbers. Composting is not a reliable way to destroy eggs and larvae in fruit.

2. Area-wide management.

Management practices carried out over a wide area are essential. *D. suzukii* is able to fly some kilometres within a territory. It is important for every grower within and next to a fly-infested area to participate, because a single, unmanaged field or orchard will serve as a source of infestation to nearby susceptible crops. Attention should also be given to meadows with scattered fruit trees, abandoned orchards and private gardens, all of which provide additional hosts.

3. Plant protection products

Active substances such as organophosphates, pyrethroids, and spinosyns have been shown to be very effective in reducing numbers of *D. suzukii* adults and are expected to give coverage for 7-10 days. As always, plant protection products must be used in line with the instructions on the product label.

The fruit is most susceptible to attack after it has coloured and developed some sugar. If monitoring indicates pest presence at this time, apply an insecticide spray to protect the fruit during this time. If monitoring indicates a high population earlier in the season, an earlier spray to reduce populations may be warranted in addition to a pre-harvest application. Consider a post-harvest application to host crops to decrease fly numbers.

D. suzukii is often not noticed until fruit is being harvested. Sprays at this time will not protect the crop, because larvae are already in the fruit. There are no effective tools for controlling larvae within the fruit (the eggs are laid in the fruit so the larvae are never found outside the fruit).

Table 1: Insecticidal active substances with potential effectiveness against *D. suzukii*. ‘+’ indicates efficacy demonstrated in North America under trial conditions (experiments are still ongoing).

Active substance	Active substance sub-groups	Relevant uses	Comments
Malathion ⁺	organophosphate	Pome fruit, stone fruit, berries and small fruit	Recently approved for use in Europe (Annex I listed), product authorizations expected to be forthcoming.
Diazinon ⁺		Some US fruit crops (no details)	Authorized in the US but did not achieve European authorization.
Dimethoate		Not presently on relevant fruit crops in Europe. May be some scope for testing/extensions of use.	Approved for use in Europe (Annex I listed)
Chlorpyrifos		Pome fruit, stone fruit, berries and small fruit	Approved for use in Europe (Annex I listed)
Spinosad ⁺	spinosyn	Pome fruit, stone fruit, berries and small fruit	Approved for use in Europe (Annex I listed)
Cypermethrin	Pyrethrin/pyrethroid ⁺	Pome fruit, stone fruit, berries and small fruit	Approved for use in Europe (Annex I listed)
Alpha-cypermethrin		Pome fruit, stone fruit,	Approved for use in Europe (Annex I listed)
Deltamethrin		Pome fruit, stone fruit, berries and small fruit	Approved for use in Europe (Annex I listed)
Lambda cyhalothrin		Pome fruit, stone fruit, berries and small fruit	Approved for use in Europe (Annex I listed)

NB: - Approved uses in the EPPO region vary nationally, including rates and timings of use. Contact national regulatory authorities for specific information. Annex I listing does not necessarily mean that the active is supported in each European Member State. Product uses will also vary and must be used according to the nationally agreed, statutory conditions of use on the product label.

- Note that baited formulations of spinosad may have a role to play in IPM situations, although more research will be needed to evaluate its use against this particular species.

Once effective application systems have been defined, a major factor in the use of such products is timing, which should be based upon monitoring information. It should be borne in mind that application difficulties may arise since the ripening of the fruit (the main time for *D. suzukii* activity) may also coincide with the pre-harvest interval of the product; i.e. when its use will be restricted. **Pre-harvest restrictions should be carefully considered when developing control systems. Note that these are nationally agreed (since climate variables affect the residues persistence of the active substances), and will vary between active substances, and product formulations.**

This factsheet was prepared by the Expert Working Group for performing PRA on *Drosophila suzukii*:

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Appendix I: Infestation symptoms



Spotted Wing *Drosophila* oviposition holes in blueberry.
(T. Hueppelsheuser, British Columbia Ministry of Agriculture and Lands) <http://www.agf.gov.bc.ca/cropprot/swd.htm>



Spotted Wing *Drosophila*-infested blueberry fruit with pupae.
(T. Hueppelsheuser, British Columbia Ministry of Agriculture and Lands) <http://www.agf.gov.bc.ca/cropprot/swd.htm>



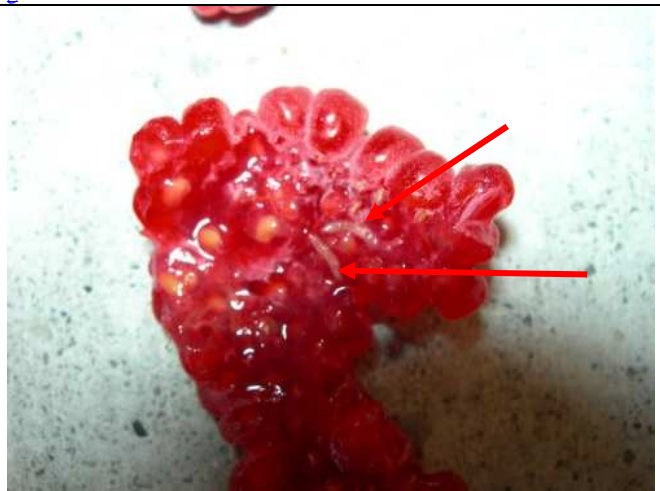
Cherry with oviposition scars:
http://civr.ucr.edu/spotted_wing_drosophila_cherry_vinegar_fly.html



Cherries damaged by *Drosophila suzukii*.
http://www.doacs.state.fl.us/pi/enpp/ento/images/drosophila_Fig_3_large.jpg



Cherry damage <http://cemariposa.ucdavis.edu/files/67726.pdf>



Raspberry damage and larvae:
<http://ucanr.org/blogs/blogcore/postdetail.cfm?postnum=821>