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Growing and Protecting New Zealand

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Spotted Wing Drosophila (Cherry Vinegar Fly) Drosophila suzukii:

Adult flies have characteristic bright red eyes. Males also have a prominent dark spot on the distal margin of the wings. Approx. body length 2.6-2.8mm.

Photo by G. Arakelian, Oregon Dept. of Agriculture

Lifecycle

 1 generation can take 8-10 days at approx. 25^oC and 20-25 days at approx. 15^oC.



Photo courtesy of John Obermeyer, Purdue University.

Native range and global distribution



- Present, no further details
- = Widespread
- = Localised
- = Confined and subject to quarantine
- = Occasional or few reports

Native Distribution

D. suzukii is thought to be native of eastern and southeastern Asia, including China, Japan and Korea (Walsh et al., 2011), although little is known about its geographical origin. According to references reported by Hauser (2011) there is the possibility that the species is not native to Japan, but had been introduced into the country at the turn of the century.

Introduced Distribution

D. suzukii has been introduced to several Hawaiian islands, including Oahu (Hauser, 2011). It has also been introduced into North America and Europe. *D. suzukii* has recently been recorded in Iran, indicating expansion of its territory into the Middle East (Parchami-Araghi et al., 2015).

Economically important Fruit Fly distribution besides *D. suzukii*



Map prepared by MPI PHEL

D. suzukii spread over time

Rapid spread through the EU, US and Canada



How *D. suzukii* is spread

- *D. suzukii* is associated with fresh ripe fruit and, rarely, flowers. Adults oviposit in fruit; larva feed in fruit; pupation can take place both inside and outside of fruit.
- The global fresh fruit trade, with the cryptic nature of larvae hiding inside the fruit undetected until after transportation, facilitates the distribution of this pest.
 With the rapid spread in Europe and North America in recent years, it seems likely that *D. suzukii* will continue to expand its range in these continents to some extent.



Habitat

- *D. suzukii* development is fostered by widespread cultivation of susceptible crops (soft fruits and cherry), distribution over different altitudes (offering an extended fruit ripening period), proximity of forests and uncultivated or marginal areas with susceptible wild fruits.
- *D. suzukii* seems to have important relationships with forests and woodland, where it can find a suitable microclimate and host plants year-round
- The establishment of *D. suzukii* in more northern regions, with harsher winters, is likely dependent on the presence of favourable overwintering sites associated with humans

Category	Habitat	Presence
Terrestrial-managed	Cultivated / agricultural land	Principal habitat
	Managed forests, plantations and orchards	Principal habitat
	Protected agriculture (e.g. glasshouse production)	Principal habitat
	Urban / peri-urban areas	Secondary/tolerated habitat
Terrestrial-natural/semi-natural	Natural forests	Principal habitat
	Scrub / shrublands	Principal habitat

Hosts

Main hosts	Wild hosts/Other
Kiwifruit berry, persimmon, fig,	Mistletoe, fox grape, English yew, snow
strawberry, apple, stone fruit, sweet	berry, bittersweet night shade, elder,
cheery, plum, peach, currents, raspberry,	salmon berry, nectarine, wild cherry,
blackberry, loganberry, boysenberry,	apricot, pokeweed, mulberry, alder
blueberry, grape	blackthorn, tara vine, dogwood, autumn
	olive, Amur amelopsis, arbutus

- *D. suzukii* infests and develops in undamaged, ripening fruit. Fruits become susceptible to *D. suzukii* as they start to change colour, which coincides with softening of skins and higher sugar levels.
- Fruit penetration force is one potential measure of host susceptibility, but host attractiveness will likely depend upon additional factors, such as soluble sugar content
- If no suitable fruit is present, *D. suzukii* will infest fallen, deteriorated or damaged fruit.

Impact of *D. suzukii* to primary industries in New Zealand

• Several industries within New Zealand would be impacted by *D. suzukii*, if established





Impact of *D. suzukii* to kiwifruit industry in New Zealand

- Based on current evidence the impact of *D. suzukii to* the kiwifruit industry is likely to be low.
- Lack of evidence of kiwifruit as a primary host and the abundance of preferred primary hosts (summer fruit) in New Zealand.



Entry pathways and current mitigation measures

- Fresh produce imports from areas where *D. suzukii* is present.
- Fresh produce through the passenger pathway

Mitigation measures

- MPI Import health standards that include treatments, pest free areas and process requirements
- Public awareness, declarations, detector dogs, x-rays, inspections, soft and hard enforcement.





Detections of SWD in NZ, border/post border

- There is no record of *D. suzukii* being intercepted at the NZ border however in 2003 and 2004 there have been interceptions of *Drosophila* sp. detected on sea and air freighted consignments from the US (citrus, nectarine). As well as live larvae of *Drosophila* sp on cherries from Japan and peaches from China.
- These historic samples were sequenced by PHEL and found negative for *D*, *suzukii*
- Although not *D. suzukii*, these interceptions indicate the ability for *Drosophila* sp. life stages to survive in fresh produce from the US and Asia to the NZ







Surveillance and monitoring tools

- Although some trapping protocols exist, there is yet to be an efficient detection or monitoring tool for *D*. suzukii
- It is not known whether this species produces pheromones to attract mates; no specific pheromone lures are currently available for use in detection.
- US/CAN and TAS have carried out *D. suzukii* surveys using apple cider vinegar (ACV). These are very time consuming in the lab, ACV attracts a large number of bycatch, it increases time spent to sort through this.
- Research on lures is promising, a dry lure has been developed however it is not commercially available at present and is said not to be as attractive as ACV.



Generic lures pros and cons

- Usually cheap and effective at attracting pests
- Casts a wide net for numerous species
- A night mare for labs screening for a handful of specific species out of thousands 1\$\$



Control Tools



- A number of registered insecticides have shown high activity on *D. suzukii* in recent trials conducted in western US states. These include organophosphate and synthetic pyrethroid insecticides, with lower activity and residual control from spinosyn and organic pyrethrum class insecticides.
- Since known and potential *D. suzukii* parasitoids are already present in New Zealand, it is likely that some level of parasitism would occur.
- Proposed Ph D. project at the University of Auckland to predict whether any generalist parasitoids of *Drosophila* that occur in New Zealand could provide sufficient biological control of *D. suzukii* if it arrives here as well as to detect incipient populations that are present but so far undetected.

How can industry help?

 Report any suspicious looking flies, oviposition scars or larva damage to fruit through the MPI exotic pest and disease hotline 0800 80 99 66

Photos: G. Arakelia



Spotted Wing Drosophila suzukii; damage to cherry fruit from female oviposition.

In summary

- *D. suzukii* is a risk to primary industries in NZ but kiwifruit is likely to be at lower risk than other crops.
- Controls that are in place to mitigate the risk of economic fruit flies from entering NZ also apply to *D. suzukii*.
- MPI laboratory has the capability to identify any egg, larva or adult *D. suzukii* through a quick molecular technique.
- There are no efficient detection or monitoring tools for *D.* suzukii but generic tools may detect a large population
- There are some management/control tools but prevention is the best medicine!

To report suspected exotic land, freshwater and marine pests, or exotic diseases in plants or animals, call:



Ministry for Primary Industries Manatū Ahu Matua



Visit www.mpi.govt.nz for more information on exotic pests, diseases and biosecurity issues in New Zealand