Drosophila suzukii; a new pest of cherries

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Drosophila suzukii, male left, female right — Wikimedia Commons, photo by Shane F, McEvey (Australian Museum)

Most species of *Drosophila,* the familiar fruit flies and vinegar flies, feed on rotting or fermenting fruit, but *Drosophila suzukii* feeds and lives upon fresh, unwounded, ripening fruit and has, since 2008, become an important pest of soft fruit and stone fruit world-wide, threatening food supplies and the commercial fruit industry.

Native to southeast Asia, the species was seen in Japan in 1916. By the early 1930s it was widespread in Japan, Korea and China and was described officially by Matsumura in 1931. It was recorded in Hawaii in the 1980s. It first appeared in central California in August 2008. The eastern spread continued through temperate climates, until by 2012 it could be found all over the United States. Records in Europe followed; first in autumn 2008, from Spain and Tuscany, then from 2009 to 2012 a steady spread through France, Germany, Italy, Slovenia, Croatia. By 2017, records extended from Sweden to Brazil and Argentina.

The first British record came on 29th August, 2012, after a search by staff at East Malling Research. (EMR), in Kent. Specimens were found by means of sticky traps placed on wild Blackberry, *Rubus fruiticosus* agg, baited with yeast, sugar and water, (Harris and Shaw, Dipterists Digest, January 2014, 21.). More specimens were found on crops of raspberry and strawberry. In the same publication, records from Norfolk to Dorset during September and October, 2014, suggest that the insect has become widespread in southeast England.

Data on the National Biodiversity Network Atlas gives five records, widely scattered; Suffolk, (24/9/14); Penarth (6/11/15); Anglesey Abbey NT, 2/8/17; Wimborne, 28/9/17; Portishead, (19/12/17). Interestingly there are seven records from the Shrewsbury area; near the foot of Haughmond Hill, [NGR SJ 541 131], (25/9/16), and nearby [SJ53 13](25/9/16); three from Shrewsbury Cemetery, [NGR SJ 491 113], (23/7/17, 10/10/17, 25/10/17); Lanymynech Hill, [NGR SJ 268 218], ((10/10/18); Wrekin, [NGR SJ 63 08], (17/10/18). None of these are near fruit farms. *D.suzukii also* uses blackberry *(Rubus* spp.), *Vaccinium* spp., *Lonicera* spp. as hosts. "Current data suggests that host preference is heavily dependent on the local abundance of host species." The abundance of these three species in Wyre Forest and the proximity of fruit farms in Worcestershire and Herefordshire might make a systematic search for *D. suzukii* worthwhile.

Drosophila suzukii, (Diptera, Drosophilidae) adult flies appear similar to their relatives the familiar vinegar flies. The body is yellowish brown with darker bands

on the abdomen and they have red eyes. There is some variation in sizes, with the body 2-3.5 mm in length and with 5-6.5mm wing span. Males have wing length 2.46mm to 2.85mm (mean 2.67) and females have wing length 2.27mm to 3.20mm (mean 2.69). Larvae are white, reaching 3.5mm long. Pupae are about 3mm with distinctive spiracles.

The males carry a distinctive dark spot near the forward tip of each wing, hence the common name, "Spotted Wing Drosophila", (SWD). This spot develops clearly two days after emergence. Other distinguishing characters are the sex combs on the forelegs, one row of combs on the first and one row of combs on the second tarsal segment.

The females do not have the spotted wing, or sex combs, but do have a distinctive, strong saw-like ovipositor. This penetrates the soft skin of fruits and deposits eggs in the ripening flesh beneath, where the larvae develop and spoil the commercial value. The point of penetration is not conspicuous until secondary infection by fungi, yeasts and bacteria causes a more obvious wound.

The species is extremely fecund. Adults mature 1-2 days from emergence in warm conditions. Mating occurs from day one and egg-laying from day two. Females lay 1-3 eggs per fruit in 7-16 fruits per day. Egg-laying can continue from 10 - 60 days, with 400 days the average. Eggs are laid inside the ripening fruit (several females may lay in the same fruit), and hatch within 2-72 hours. The larvae develop inside the fruit over 3-13 days. Pupae remain in the fruit for 3-15 days. With suitable temperature, a minimum of 8 days from egg to imago is sufficient for a generation. Several generations could be possible during a single fruit crop and 7-15 generations in a year.

Although a temperate species, *D. suzukii* tolerates a wide range of climatic conditions, extending to northern and tropical extremes. Egg deposition can proceed from 10-32˚C and male fertility up to 30˚C. This wide tolerance permits the exploitation of habitats from the hot Mediterranean to the cold high mountains. After September, mated females can overwinter in sheltered places, and are more tolerant of cold than other Drosophilids. The optimum temperature for development is 20-25˚C.

In different parts of the world *D. suzukii* uses a wide range of host plant species, too numerous to list here. In addition the pest is found on commercial crops of soft fruit and stone fruit, such as apricots, blackberries, cherries, currants, grapes, nectarines, peaches, pears, plums, raspberries, strawberries and others. This wide range means that populations can survive almost anywhere in a wide range of habitats using hosts with different ripening times through the year, creating refuge populations and which make discovery and any control measures very difficult.

A great deal of research continues because of the importance of this pest and the severe practical limitations on various methods of control. More research is needed on the pest's life history, biology, and population dynamics so that controls can be devised. Research directed at monitoring populations to provide reliable fundamental details of behaviour and distribution, is required. Modelling is required to permit predictions of infections and management co-ordinated to prevent serious losses of food and livlihoods.

References

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Drosophila suzukii trap in orchard, Great Witley Mick Blythe