# Spotted wing drosophila: Exploring biological control

MT18010 'Exploring IPM compatible methods for *Drosophila suzukii* in berry crops'
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If spotted wing drosophila were ever detected in Australia there is a chance (if detection did not occur early, or if the outbreak were widespread) that it would end up becoming a managed pest.

Management overseas follows an integrated approach, with a heavy focus on cultural controls. However, biological control would also be an important element of management planning.

Overseas, naturally occurring biological controls offer the benefit of suppressing spotted wing drosophila populations in non-cropping landscapes (such as woodlands), which have been shown to readily harbour pest populations and provide a reservoir for infestation of farms. Thus, they aid in maintaining area-wide management of the pest.

Based on recent research by Cesar Australia into exotic agromyzid leafminer species, we know there is a chance beneficial species that could confer control benefits may already be in Australia, ready and waiting. If this is the case, there would be no need to import parasitoid wasps or other biological control options into the country, which can be a lengthy and costly undertaking with no guarantee of success.

**SWD on raspberry.** Photo credit: Hannah Burrack.

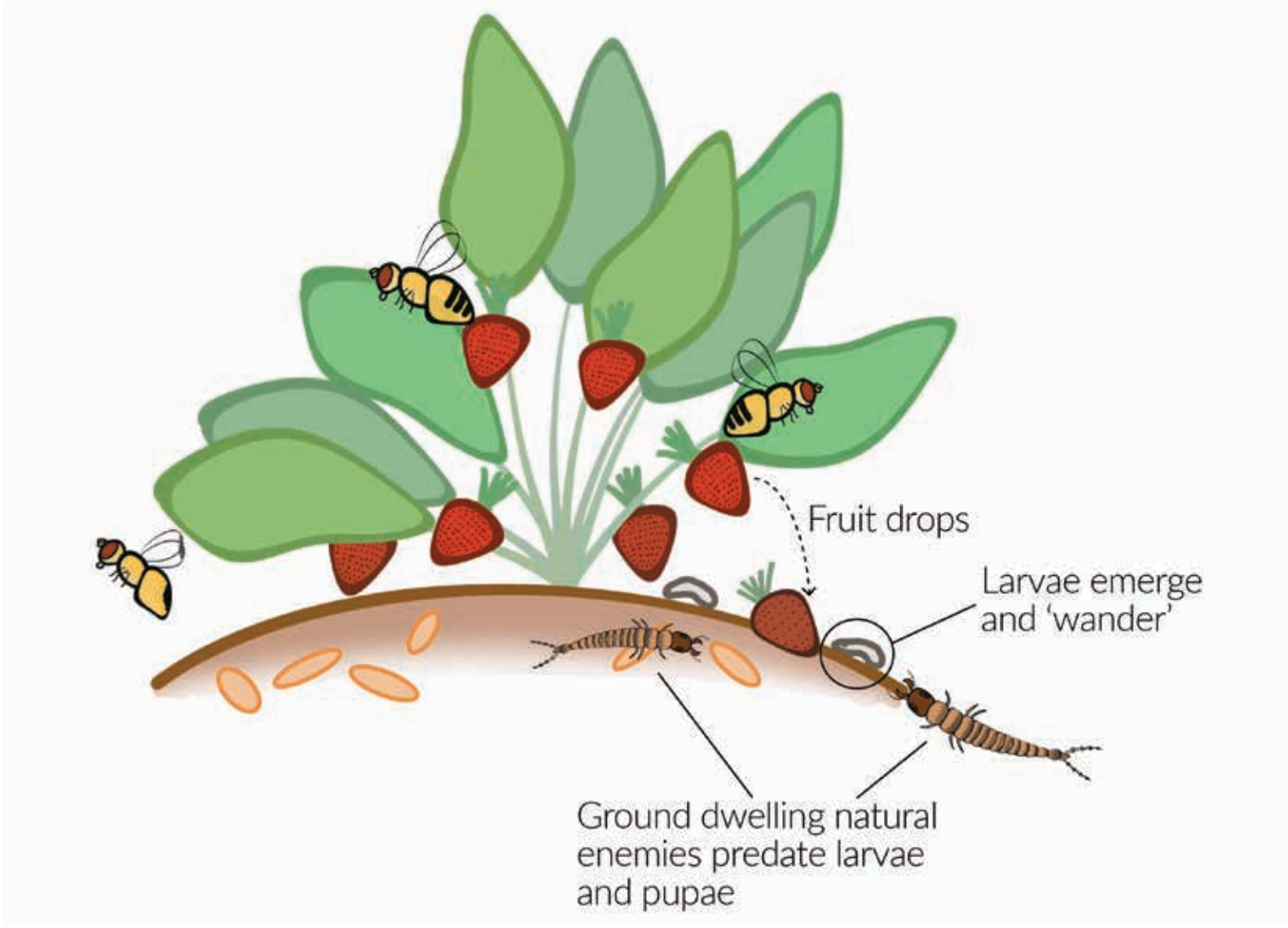
Through Hort Innovation funded research (MT18010) we have been reviewing Australian natural enemy options, including parasitoid wasp species in Australia that use other Drosophila species, such as the vinegar fly, as hosts.

Unfortunately, the spotted wing drosophila immune system is particularly geared towards defense against parasitoid attack. The defense response entails encapsulation of parasitoid eggs or larva in melanised cells, and few larval/pupal parasitoid species can overcome this.

In Europe, North America and the USA, the most abundant indigenous parasitoids reared from spotted wing drosophila are two generalist pupal parasitoids, *Trichopria drosophilae* and *Pachycrepoideus* vindemmiae. From our review we have found no records of *T. drosophilae* from Australia, however *P. vindemmiae* was found in Queensland in the early 1900s.

While this is a tantalising finding, there remains further work to do before we can infer if there may be a potential suppressive benefit offered by endemic wasp species. It is important to note that there have been few surveys of parasitoid wasp species in Australia, and there is much we do not know about their distributions.

Ground dwelling generalists, such as spiders, carabid beetles, ants, damsel bugs, and earwigs, are another group that should be considered for biological control of spotted wing drosophila. They are likely to have a suppressive effect as they can play a role in 'mopping up' pupae and larvae that drop from fruit to the ground.




**Overseas studies show that ground dwelling generalist natural enemies will be important in control of spotted wing drosophila.** Photo credit: Dr Jessica Lye, Cesar Australia

**Generalist natural enemies such as the native common brown earwig (left) and carabid beetles (right) may provide suppressive benefits against spotted wing drosophila.** Photo credit: Cesar Australia

Woltz and Lee (2017) have demonstrated significant reductions in spotted wing drosophila in-crop populations when generalist predators are also in the crop. Infestations were shown to be reduced by 19-34% in strawberries and 28-49% in blueberries as a result of predator foraging. Ants and spiders were common predators observed in these trials, and ants were even observed to actively remove spotted wing drosophila pupae from the soil.

Wolf et al. (2018) has previously shown that 43% of earwigs collected from organic and untreated cherry, blackberry and raspberry fields had ingested spotted wing drosophila (this was demonstrated through molecular analysis of predator gut contents).

If spotted wing drosophila does enter the country and establish, management planning will need to consider how these generalists will need to be protected from off-target insecticide impacts. Species of earwig or carabid often only have one or two generations per year, therefore recovery of resident populations after pesticide impact can take time.

If you are interested in learning more about what ground dwelling generalist predators may be found close to your crop throughout the year we recommend setting up pitfall or shelter traps. Alternately, you can get your torch out for some spotlighting after dark.

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