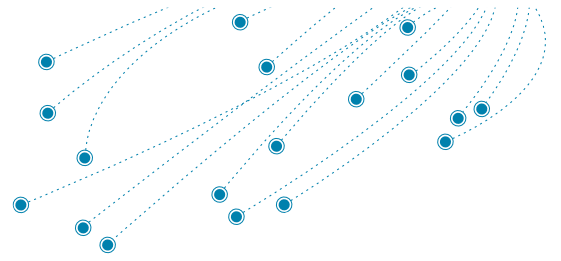


WESTERN YELLOWJACKET



UPDATED: APRIL 2020

Invasive insects are a huge biosecurity challenge. We profile some of the most harmful insect invaders overseas to show why we must keep them out of Australia.

Species

Western yellowjacket / *Vespula pensylvanica*.

Main impacts

Reduces native insect populations, competes with pollinating and predatory insects, disrupts pollination. Damages fruit crops; disrupts fruit, timber and honey industries; stings people.

Native range

Canada, USA, Mexico.¹

Invasive range

Hawaii.¹

Main pathways of global spread

As a contaminant on traded plants and as a stowaway in shipping containers.²

ENVIRONMENTAL IMPACTS OVERSEAS

In Hawaii the western yellowjacket is having dramatic impacts. It preys on a wide range of insects and spiders and can exert very high predation pressure with perennial hives sometimes containing more than half a million wasps (far more than the annual-only hives in their native range)³. In Hawaii Volcanoes and Haleakala national parks, the yellowjackets depress spider densities by 36% and caterpillar densities by 86%³. Endemic picture-wing flies have also declined. Other insects hunted include crickets, bugs, tipulid flies and bees, all in endemic Hawaiian genera, as well as moths, beetles and cockroaches^{3,4} (3, 4).

Western yellowjackets are aggressive 'nectar thieves', reducing seed production by Hawaii's dominant tree, ohia (*Metrosideros polymorpha*), by taking its nectar without spreading the pollen, and by displacing the insects that do provide pollination services^{5,6}. The wasps drain the nectar crop each morning and it remains



WHAT TO LOOK OUT FOR

Western yellowjackets are about 1.5 cm long and have a distinctive, complete yellow eye ring around each compound eye.

Photo: Ken Schneider Flickr CC BY-NC 2.0

'at virtually zero over the course of the day'⁶. As well as competing with bees for nectar, the wasps prey on them at a 'surprisingly high' frequency⁷. Because yellowjackets thermoregulate, they may attack while the bees are sluggish from low temperatures⁷. Native bees (*Hylaeus* species) and introduced honeybees avoid flowers defended by the wasps, their visits to ohia flowers greatly increasing when yellowjackets are removed⁶. Native *Nesodynerus* wasps also suffer from yellowjackets, which compete with them for both ohia nectar and caterpillar prey⁷. The native wasps avoid nesting in areas with yellowjacket nests, becoming far more common when these nests are removed.

HUMAN AND ECONOMIC IMPACTS OVERSEAS

In its native range in the western USA the western yellowjacket is a serious human nuisance. Every few years population outbreaks associated with warm, dry springs create severe problems for people recreating outdoors and harvesting timber and fruit⁸. People are often stung when they disturb nests in houses, gardens and parks and suffer serious swelling and blisters⁸. The wasps gather at picnics and food dispensing facilities to scavenge sweet foods and meat. They can be serious pests in fruit-growing regions, sometimes halting harvesting operations when workers are stung⁸. The wasps also damage fruit, feeding on grapes and removing the juices, and piercing pears, peaches and other fruits. Several growers

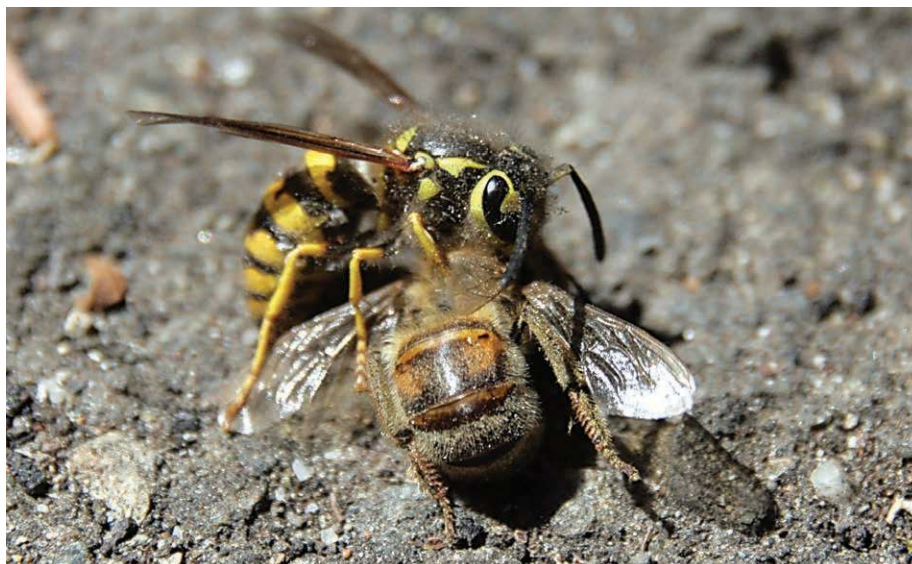
in Oregon and Washington have reported losing nearly half their red grape crop⁸. Beekeepers lose hives to attacks from yellowjackets, which harvest the bees until none remain, and in surviving hives honey harvesting is disrupted by wasp stings⁸.

AUSTRALIAN CONCERNS

Australia already has two invasive *Vespula* wasps, the European wasp (*V. germanica*) and the English wasp (*V. vulgaris*), and the impacts of these are sufficient reason to fear a third. In Tasmania's highlands they threaten the endangered Ptunarra brown butterfly (*Oreixenica ptunarra*), which declined when the wasps invaded their habitat, and recovered slightly at sites where wasps were poisoned⁹. Scientists fear the wasps are the breaking point for this species⁹. In one area near Hobart the wasps have greatly reduced all insects¹⁰. They successfully invade native forests¹¹. In New Zealand, English wasps are implicated in the decline of common native birds in New Zealand honeydew beech forest¹². Sustained by honeydew from a scale insect, the wasps in these forests can achieve a biomass four times greater than the combined biomass of birds and introduced rodents and stoats (also predators) and outnumber native wasps by one or two orders of magnitude¹³.

Vespula wasps are pests on Australian fruit farms. A strawberry farmer reported losing 20% of his crop, and winegrowers have reported losses of 10–25%¹⁴. The wasps also sting fruit pickers and harvesters, and rob commercial beehives and kill bees¹⁴. They aggregate in fruit-processing plants and in fruit and confectionary shops¹⁴. They are a serious concern for the Tasmanian forestry industry, for they attack and disrupt work when nests are disturbed by bulldozers or workers¹⁵. Backpackers in Southwest National Park have complained of large numbers of wasps at remote campsites¹⁴.

The two species of *Vespula* in Australia to some extent complement each other, with European wasps favouring open and partly shaded sites and English wasps also occupying shaded forests¹⁴. The arrival of English wasps in Tasmania some decades after the appearance of European wasps prompted the comment that the 'additive effects of the arrival of a second species of social wasp in Tasmania will dramatically increase the potential for ecological damage, particularly in World Heritage Areas'¹¹. The western yellowjacket would be an additional source of ecological harm.



Western yellowjackets are aggressive hunters. Here, one has captured a honey bee.
Photo: TJ Gehling | Flickr CC BY-NC-ND 2.0

The ohia trees whose nectar it depletes in Hawaii are in the same family as Australia's eucalypts, paperbarks and teatrees. Its overseas distribution, from northern Mexico to Canada and including Hawaii, suggests that a wide distribution could be achieved in Australia.

SOURCES

1. Global Invasive Species Database (2009): *Species profile: Vespula pennsylvanica*. Invasive Species Specialist Group, IUCN. Retrieved from <http://www.iucngisd.org/gisd/species.php?sc=174>.
2. *Invasive insects: risks and pathways*. Unpublished data (2019): Monash University and Invasive Species Council.
3. Wilson EE, Mullen LM, Holway DA (2009): Life history plasticity magnifies the ecological effects of a social wasp invasion. *Proceedings of the National Academy of Sciences*. 106: 12809–12813.
4. Gambino P (1992): Yellowjacket (*Vespula pennsylvanica*) predation at Hawaii Volcanoes and Haleakala national parks: identity of prey items. *Proceedings, Hawaiian Entomological Society*. 31: 157–164.
5. Hanna C, Foote D, Kremen C (2013): Invasive species management restores a plant-pollinator mutualism in Hawaii. *Journal of Applied Ecology*. 50: 147–155.
6. Hanna C, Foote D, Kremen C (2014): Competitive impacts of an invasive nectar thief on plant-pollinator mutualisms. *Ecology*. 95: 1622–1632.
7. Wilson EE, Holway DA (2010): Multiple mechanisms underlie displacement of solitary Hawaiian Hymenoptera by an invasive social wasp. *Ecology*. 91: 3294–3302.
8. Akre RD, Greene JF, MacDonald PJ, Landolt PJ, Davis HG (1980): *Yellowjackets of America North of Mexico*. U.S. Department of Agriculture Handbook No. 552.

9. Potter-Craven J, Kirkpatrick JB, McQuillan PB, Bell P (2018): The effects of introduced vespoid wasps (*Vespula germanica* and *V. vulgaris*) on threatened native butterfly (*Oreixenica ptunarra*) populations in Tasmania. *Journal of Insect Conservation*. 22: 521–532.

10. Spradbery J, Maywald G (1992): The distribution of the European or German wasp, *Vespula germanica* (f) (hymenoptera, Vespidae), in Australia – past, present and future. *Australian Journal of Zoology*. 40: 495–510.

11. Matthews RW, Goodisman M a. D, Austin AD, Bashford R (2000): The introduced English wasp *Vespula vulgaris* (L.) (Hymenoptera : Vespidae) newly recorded invading native forests in Tasmania. *Australian Journal of Entomology*. 39: 177–179.

12. Elliott GP, Wilson PR, Taylor RH, Beggs JR (2010): Declines in common, widespread native birds in a mature temperate forest. *Biological Conservation*. 143: 2119–2126.

13. Thomas CD, Moller H, Plunkett GM, Harris RJ (1990): The prevalence of introduced *Vespula vulgaris* wasps in a New Zealand beech forest community. *New Zealand Journal of Ecology*. 13: 63–72.

14. Bashford R (2001): The spread and impact of the introduced vespine wasps *Vespula germanica* (F.) and *Vespula vulgaris* (L.) (Hymenoptera: Vespidae: Vespinae) in Tasmania. *Australian Entomologist*. 28: 1–12.

15. Bashford R (2010): Development of an insecticide baiting system applicable for the control of exotic *Vespula* (Hymenoptera: Vespidae) wasp species in Tasmanian forestry operation sites. *Australian Entomologist*. 37: 163–169.

ABOUT THIS PROJECT

The Invasive Insects: Risks and Pathways Project is a partnership between Monash University and the Invasive Species Council. To find out more visit invasives.org.au/risks-and-pathways.