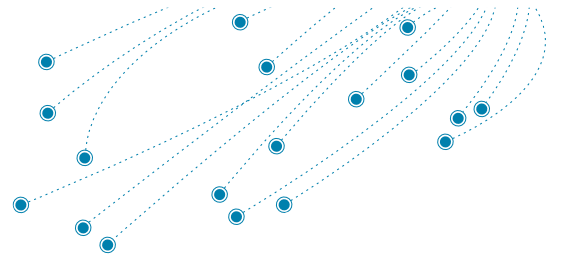


# HARLEQUIN LADYBIRD



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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

Harlequin ladybird / *Harmonia axyridis*. Also known as the multi-coloured Asian lady beetle.

## Main impacts

Displaces native ladybirds and other insects it preys on. Taints wine, congregates inside houses and causes allergic reactions.

## Native range

East Asia.<sup>1</sup>

## Invasive range

North America, South America, Europe, Middle East, a few parts of Africa, New Zealand.<sup>1,2</sup>

## Main pathways of global spread

- Unintentional introduction as a contaminant of nursery material, food and plants, with timber, and as a hitchhiker on ships and boats.
- Intentional introduction as a biological control agent.
- Natural dispersal across borders.<sup>3</sup>

## ENVIRONMENTAL IMPACTS OVERSEAS

The harlequin ladybird has been described by biologists as 'perhaps the most infamous of invasive insects in the twenty-first century'<sup>4</sup>. In many parts of North America and Western Europe it is now the most abundant ladybird<sup>4</sup>. The adults and larvae are voracious predators – typically eating 15 to 65 aphids a day – and they compete with and prey on other aphid predators ('intraguild predation'), especially native ladybirds<sup>1,5</sup>. The large larvae are particularly aggressive predators of the eggs and larvae of other aphid predators, and all life stages appear to have superior physical and chemical defences against counter-attacks by these predators<sup>6,7</sup>.



The harlequin ladybird. Photo: Gilles San Martin | Flickr | CC BY-SA 2.0

In Britain, seven native ladybird species (out of eight assessed) have declined since the arrival of harlequin ladybirds in 2003<sup>8</sup>. The formerly common two-spot ladybird (*Adalia bipunctata*) declined by 44% within five years<sup>8</sup> and ladybird communities on lime trees went from consisting of 99.8% native species to just 30.7% in 11 years<sup>9</sup>. In a central European study, harlequin ladybirds were found to be the dominant ladybirds on trees, the abundance of native ladybirds on all plants having declined by 50–70% since the 1980s<sup>10</sup>. Harlequins are only partly to blame for this, because the native ladybirds had been declining before they arrived.

Other prey species are scale insects, psyllids, mites, leaf beetles, weevils and butterflies, as well as other aphid predators, including lacewings, midges and hoverflies<sup>1</sup>. Impacts on other species are likely, but these have mostly not been studied. A risk assessment of predation

by harlequin ladybirds on the eggs and larvae of monarch butterflies (*Danaus plexippus*) predicted potentially serious declines<sup>11</sup>. The harlequins also eat nectar, pollen, fruit and young plant tissues, which has caused economic losses.

The harlequin ladybird can carry spores of a parasitic microsporidia benign to them but lethal to other ladybird species which, it has been proposed, 'may function like a biological weapon'<sup>12</sup>. Harlequin ladybirds have a high reproductive potential, producing (under laboratory conditions) up to 3800 eggs at a rate of 25 a day<sup>5</sup>.

## HUMAN AND ECONOMIC IMPACTS OVERSEAS

In the United States and Canada, harlequin ladybirds have caused millions of dollars of losses in the wine industry<sup>13</sup>. They feed on grapes at harvest time, and

## WHAT TO LOOK OUT FOR

The adult harlequin ladybird is one of the most variable-looking species in the world (hence the name 'harlequin'), making identification difficult. Some are red or orange with 0 to 21 black spots; others are all black or black with 2 or 4 orange or red spots. Most have white on the pronotum (the first segment behind the head) with black spots that usually form an 'M' or 'W' shape (the easiest way to identify them). The small head is mainly black and white. They range in size from 5.5 mm to 8.5 mm.

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even small numbers in the wine-making process can taint the wine, producing an aroma compared to burnt peanut butter<sup>14</sup>. They are considered a threat to the wine industry in New Zealand after being accidentally introduced there in 2016, the first record for Oceania<sup>15</sup>. The harlequin ladybird can also damage fruit crops, including grapes, stone fruit, apples, pumpkins and berries<sup>1</sup>.

Harlequin ladybirds are a nuisance to humans when they form large overwintering aggregations in buildings, staining carpets and furnishings if they are crushed<sup>1</sup>. A 2006 report from the Isle of Wight described 'clouds' of ladybirds 'smothering vegetation', 'covering outside walls and window frames' and 'clogging up footpaths'<sup>16</sup>. In houses they can trigger allergic reactions<sup>17</sup>.

## AUSTRALIAN CONCERNS

Given its very wide distribution (at least 59 countries)<sup>2</sup> and multiple pathways for spread, there is a high risk the harlequin ladybird will arrive in Australia. It has been intercepted at Australian ports<sup>18</sup>.

As indicated by its very broad invasive range, this ladybird is able to thrive in many habitats and climates<sup>1</sup>. Climate modelling indicates that most coastal and many inland areas of Australia are suitable<sup>20</sup> and host material is likely to be available all year round<sup>21</sup>.

Should the harlequin ladybird establish in Australia, we must be concerned about the fate of native ladybirds and other insects that prey on the aphids and scale insects eaten by the harlequin as well as other prey species. Australia has about 500 species of ladybird, mostly endemic, with about half yet to be described<sup>19</sup>.

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## 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](http://invasives.org.au/risks-and-pathways).