Exotic plant pests and diseases to keep an eye out this season

Dr Zac Hemmings, Regional Plant Biosecurity Officer,
NSW Department of Primary Industries and Regional Development

Growers are accustomed to dealing with a wide range of pests, from fruit flies to rusts. Wouldn't it be nice if we could stop them becoming a problem in the first place? Luckily for us, some of the world's worst plant pests are yet to reach our shores! Here's a quick peak at four of the biggest exotic threats to the berry industry, what they look like, what their impacts are, and things you can do to keep the list of pests you have to worry about shorter.

Xylella fastidiosa

Xylella fastidiosa, or simply *Xylella* as it is known, is a bacterial pathogen capable of infecting more than 450 species of plant, including blueberries and Rubus. The bacterium inhabits the xylem of its host, the part of the plants vascular system responsible for transporting water and nutrients from the roots to the stems and leaves.

> Xylella is an extremely destructive plant pathogen, there is no treatment and infected plants will eventually die.

Build-up of bacteria within the xylem inhibits movement of water causing a progression of symptoms. Initially, leaf edges become scorched, giving the disease its name "bacterial leaf scorch".

This scorching progresses towards the middle of the leaf, with infected leaves being dropped by the plant and eventually the stems turning yellow (Figure 1), and finally the plant dies. Symptoms typically develop within the first year of infection and generally continue through a second season. These symptoms are shared with other diseases, nutrient deficiencies, and abiotic stressors. The yellowing of stems combined with loss of all leaves is one of the best indicators that a berry plant is infected with *Xylella*.

Xylella can only be spread between host plants through grafting of infected plant material or by xylem feeding insects, most notably the exotic glassy-winged sharpshooter and meadow spittlebug (Figure 2).

Japanese beetle (*Popillia japonica*)

Japanese beetle is a small, brightly coloured, scarab beetle. Adults are 8 – 11 mm long with a metallic green head and coppery bronze wings (Figure 3). There are similar looking beetles in Australia (e.g. the dung beetle *Onitis alexis*), however, a key feature of this pest are the six tufts of white hair running down each side. While these tufts are not unique to Japanese beetle, other species that share this feature are also exotic. Despite its rather pretty appearance it is a voracious pest, feeding on over 400 species of plant including blueberry, Rubus, and strawberry.

Adults feed on the leaves, flowers, and fruit of their hosts and are capable of skeletonising leaves. They congregate in large groups to feed, typically starting at the top of the host and moving downwards. These aggregations can completely strip a plant of its leaves and will often feed on fruit, rendering it unsuitable for market (Figure 3). Large infestations can result in crop losses of > 60%, or even 100% as while not all fruit is damaged picking the crop uneconomical.

Figure 1. Blueberry plants showing symptoms of *Xylella* infection; leaf scorch (A, B), dropping of leaves and yellowing of stems (C). Photos credit: Phillip M. Brannen

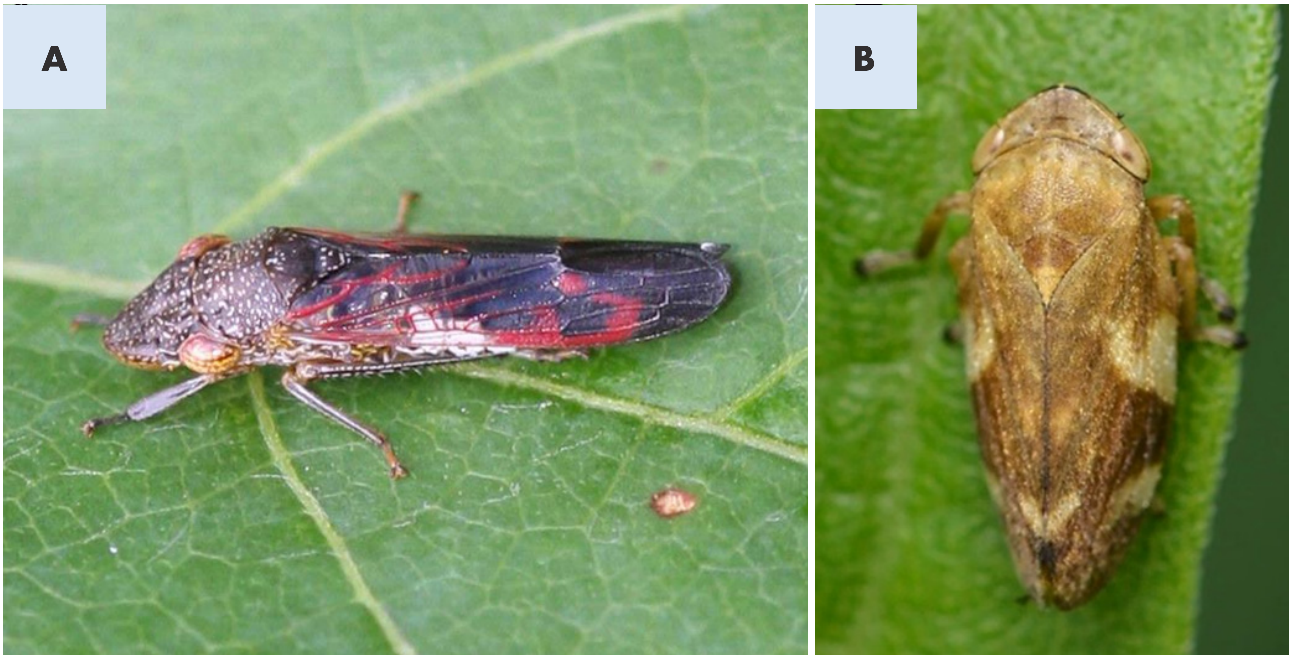

Figure 2. A) Glassy winged sharpshooter. Photo credit: Johnny N. Dell, Auburn University, Bugwood.org used licensed under a Creative Common Attribution-Noncommercial 3.0 License. **B) Meadow spittlebug.** Photo credit: Ryan Hodnett, licensed under a Creative Commons Attribution-Share Alike 4.0 International License.

Female beetles lay their eggs in moist soil, and prefer irrigated environments, such as golf courses and turf farms. Larvae inhabit the soil where they are a major pest of grasses. They will spend the summer and autumn months consuming grass roots before overwintering in the deeper soil layers. In early spring they move back to the surface, with adult beetle typically emerging in late spring to early summer.

Figure 3. A) Adult Japanese beetle. Photo credit: Susan Ellis, Bugwood.org, **B) Japanese beetle on raspberry.** Photo credit: European and Mediterranean Plant Protection Organisation, Bugwood.org, **C) light Japanese beetle damage to raspberry leaves.** Photo credit: Whitney Cranshaw Colorado State University, Bugwood.org. Images licensed under a Creative Commons Attribution 3.0 License.

Spotted wing drosophila (*Drosophila suzukii*)

Spotted wing drosophila (SWD) is a pest of soft skinned fruit, including blueberries, Rubus, and strawberries. While it's often called a fruit fly it's a bit different to other fruit flies you may be familiar with, such as Queensland fruit fly. It is actually a member of the genus *Drosophila*, the same group as the vinegar flies you see buzzing around your kitchen. Where your typical vinegar fly reproduces using fermenting and rotting fruit, SWD prefer to lay their eggs inside undamaged and slightly under ripe fruit. Once the eggs hatch, larvae consume the flesh of the fruit leaving it unsuitable for all markets. Once fruit has been infested there are no viable options for control or redirection to other markets. Yield losses of up to 80% have been reported, but losses of 30-40% are more common.

Adults are 2-3 mm long, with red eyes, and yellow-brown bodies (Figure 4). Male flies have a dark spot on the end of their wings but are otherwise similar in appearance to other species of *Drosophila*. Flies emerge in spring, and are typically active from October – May, although if it is warm enough in the winter then some adults will be active. Development from egg to adult can take as little as nine days, with up to 15 generations per year depending on conditions. Often the first sign of a SWD infestation is the presence of scars and maggots on otherwise healthy fruit (Figure 4 B).

Brown Marmorated stink bug

Brown marmorated stink bug (BMSB) is a highly invasive species. It is extremely polyphagous with over 300 known hosts, attacking most species of commercially grown fruit and vegetable. It is frequently intercepted at the border in shipping containers and vehicles from late spring to late autumn. There's even been reports of them in people's luggage! These interceptions are the result of the overwintering behaviour of BMSB, where large groups seek shelter to hibernate during the colder months in the northern hemisphere.

Adult BMSB are 12 – 17 mm long and are generally a mottled brown colour. The key features that differentiate BMSB from similar species of stink bugs are white bands on the antennae, alternating black and white stripes along the sides of the body, a rounded (not pointy!) head and shoulders (Figure 5).

BMSB feed by piercing the plant with specialised mouthparts, injecting saliva and removing fluids. This can result in sunken areas on the fruit surface, deformed fruit and shrivelled seed pods, pale spongey areas on the surface of fruit, internal tissue damage, and rotting or corking flesh. This also creates an opportunity for secondary infection by bacteria and fungi.

Not only is it a plant pest but its overwintering behaviour makes it a serious social pest as well. In countries where the pest is established groups of thousands of BMSB will often seek shelter inside houses and under eaves where their excrement can cause damage to the building. When they're disturbed they release a foul-smelling odour.

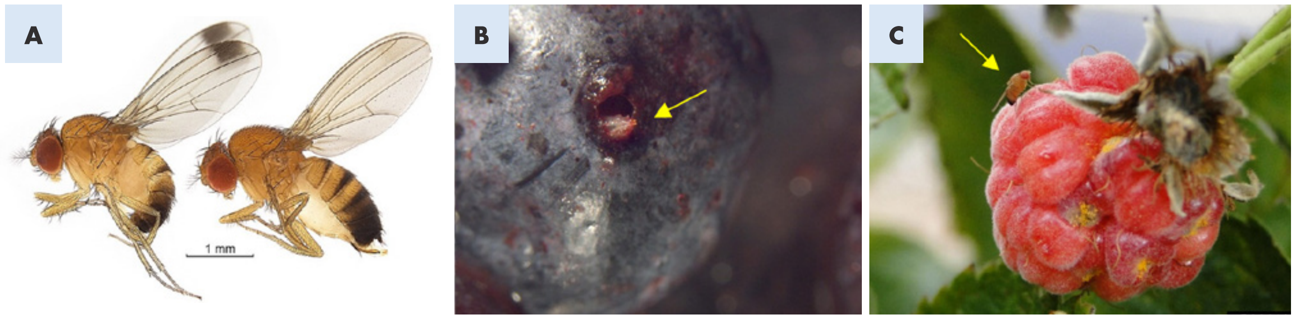

Figure 4. A) Male and female spotted wing drosophila. Photo credit: Shane F. McEvey, Australian Museum, **B) Oviposition hole and larvae in a blueberry.** Photo credit: Frank A. Hale, Bugwood.org, **C) Spotted wing drosophila on Rubus berry** Photo credit: Hanna Burack, Bugwood.org. Images licensed under a Creative Commons Attribution 3.0 License.

Figure 5. Size of a brown marmorated stink bug adult (middle), and nymph (right) relative to a $1 coin Adapted from photos by Susan Ellis, Bugwood.org licensed under a Creative Commons Attribution 3.0 License.

What you can do

This is far from a comprehensive list of exotic pests of the berry sector. The Berry Industry Biosecurity Plan 2020 assessed over exotic 200 pests, and while many of these present a negligible or very-low risk it always pays to be vigilant. New pests could arrive at any time, or species that were thought to have only have a minor impact may turn out to be a more significant threat once they enter a new environment. This is not to say that you should panic whenever you see a strange new insect, rather the message is to be alert, not alarmed.

Growers are a vital component of Australia's biosecurity system; you can mitigate the risks and help protect your industry and community by:

- Maintain good biosecurity practices
- Having a biosecurity management plan for your property can help you assess and mitigate biosecurity risks
- Be vigilant
- If you see something unusual, such as pest you haven't seen before, unusual symptoms, or an old pest on a new crop report it
- You can use the exotic plant pest hotline—1800 084 881—to report it from anywhere in Australia
- Alternatively, you can contact your state's biosecurity organisation directly

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