

GLASSY-WINGED SHARPSHOOTER

Homalodisca vitripennis



Glassy-winged sharpshooter (GWSS) - a serious threat to New Zealand

The insect called 'glassy-winged sharpshooter' (GWSS) is not yet found in New Zealand. It is a leafhopper of the family Cicadellidae and is related to – but much larger than – the common apple and bramble leafhoppers. 'Sharpshooters' are species placed in the sub-family Cicadellinae, and are usually xylem feeders. GWSS is known to transmit the bacterium *Xylella fastidiosa*, the causal agent of Pierce's Disease of grapevines.

A few other insects in New Zealand such as spittlebugs (Cercopidae) can also transmit *X. fastidiosa* but GWSS poses a particular threat because it can spread the bacterium in grapevines. This disease is fatal with no cure and would pose a significant threat to New Zealand's wine industry. The insect is also a serious pest of citrus trees, and the bacteria may also cause distinctive diseases in a diverse range of fruit crops, arable crops and ornamental trees and shrubs. Recent observations in California have shown that the bacteria can also infect some New Zealand native shrubs and trees including pohutukawa.

GWSS inhabit forest edges in their native environments, and it is very likely that they will colonise at least the edges of patches of bush in New Zealand, where, for example, brambles are known hosts for both GWSS and *X. fastidiosa*.

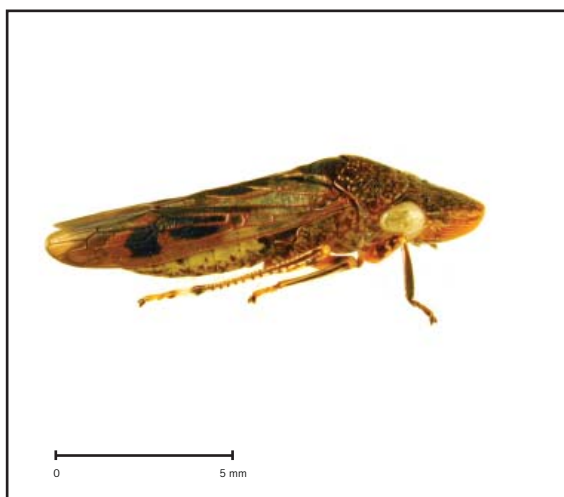
GWSS and the bacteria it transmits should be of concern to horticulturalists, gardeners and environmentalists throughout New Zealand.

Where does it come from?

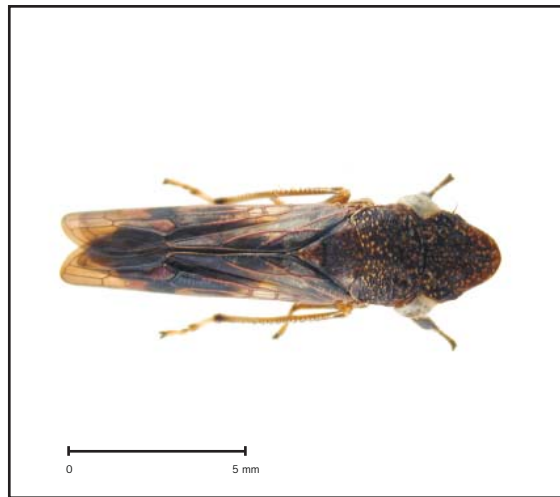
GWSS is native to the southeast USA and Central America. It spread to California in the late 1980s and from there to French Polynesia (where it was first seen in Tahiti in 1999), Hawaii in 2004 and the Cook Islands (Rarotonga) in March 2007. This gradual spread across the Pacific was almost certainly facilitated by air transport, which shows that both the GWSS insect and egg masses can survive after travelling for long distances. If GWSS establishes in Rarotonga, there is a high risk that it will spread across Polynesia and may arrive in New Zealand.

What does it look like and what are the lifestages?

Adult GWSS are quite large insects – about 12mm long. They are 3-4 times the size of apple and bramble leafhoppers, and the green or yellow leafhoppers commonly found in grass, weeds or other plants around horticultural crops. Their shape is quite distinctive and is unlike any other leafhopper in New Zealand. They are a dark brown to black colour with a lighter underside. The upper parts of the head and back are sometimes stippled with ivory or yellowish spots, and they have a rather bullet-shaped head. The adults can fly well, but their wings (which are partly transparent with reddish veins) are held closely to their body giving the whole insect a streamlined, projectile-like appearance.



Adult Glassy-winged Sharpshooter



Adult Glassy-winged Sharpshooter

Females usually lay eggs under the epidermis of leaves. The eggs are quite elongated and are laid side by side in small, green, slightly curved, 'blister-like' rafts. When first laid the eggs are rather inconspicuous, but the rafts darken to a pale brown when the eggs have hatched. In California, 10 to 12 eggs are usually laid together, but this number may increase to 20 to 30 on occasions elsewhere.

Eggs hatch into young nymphs which are wingless and slate-coloured with patches of rusty red on the abdomen. They have distinctive bright red eyes. As the young nymphs grow and moult, they develop wing-buds from the thorax and eventually moult to adults. All stages feed on the stems rather than the leaves of their host plants.

There are two generations of GWSS a year in California. Females overwinter as adults and begin to lay eggs in late-winter or early spring. The emerging nymphs then grow and mature in late spring through summer, and lay more eggs. This second generation begins to mature in summer, and provides the overwintering adults for the following year.

We would expect this general life-cycle activity to occur New Zealand as well, although the exact timing of events (especially egg laying) will depend on temperature and other environmental conditions, the effect of which can't be accurately determined before they arrive here.

Why is glassy-winged sharpshooter a problem?

GWSS is a problem on two accounts. The first is its feeding strategy, and the second is its ability to transmit plant diseases.

The feeding problem

GWSS feeds on xylem sap. This is the sap that transports water to the plant from its roots. It contains very little in the way of food, unlike the phloem sap that is full of sugars that are used by mealybugs and most other 'sap-sucking' insects. So, in order to obtain sufficient food GWSS has to feed virtually all the time, sucking up huge quantities of sap, most of which passes through the gut and is excreted. As a result, GWSS produces a more or less continuous stream of small watery droplets. When large numbers of insects live in a tree, these droplets are called 'leafhopper rain' which is a very messy nuisance. In addition, the excrement dries like a white-wash which can discolour fruit and may require post harvest washing to remove. The large size of GWSS also enables it to feed on woody parts of the vine (e.g. at the base of the trunk) and on dormant vines.

The pathogen transmission problem

The really big problem with GWSS is that it transmits a bacterium called *Xylella fastidiosa*. This species is also native to the Americas, and there are almost 150 known strains. These bacteria live in the xylem sap of many different plants (c.200 known host species) where they may be entirely benign or cause mild to severe disease symptoms. *X. fastidiosa* causes fruit crop and ornamentals diseases such as citrus variegated chlorosis, phony peach disease and oleander leaf scorch.


In grapes, one of these strains of bacteria causes a lethal disease, first described by Pierce in 1892. Pierce's Disease is also transmissible by grafting. It has been present in Californian vineyards for many years, but was quite easily managed because the native sharpshooters were poor vectors, and were not so active on grapes as GWSS. The arrival of GWSS in California changed that completely, with many hundreds of hectares of vines damaged since its arrival. An epidemic in the Temecula region in the south of the State threatens the survival of the local viticultural industry.



Egg mass of the Glassy-Winged Sharpshooter



Nymph of the Glassy-Winged Sharpshooter



In the USA, Pierce's Disease is limited to areas with mild winters, and is only severe where the average minimum January temperature (equivalent to July in New Zealand) is higher than 4.5°C. Applying these temperature criteria to New Zealand would mean that the areas at highest risk from the disease are Northland, Auckland, Gisborne, Hawke's Bay, Taranaki and Wellington. However, the different survival parameters for GWSS and *X. fastidiosa* indicate that GWSS will be able to survive in some regions of New Zealand where *X. fastidiosa* cannot.

What are the symptoms of Pierce's Disease?

Grapevine leaves develop marginal leaf yellowing and die-back on white cultivars and marginal leaf reddening and die-back on red cultivars. Diseased leaves fall from the vine leaving their petiole attached to the cane. Fruit are also affected. Berries shrivel and also drop from the inflorescence leaving a bare central axis; and the diseased cane shows uneven bark maturity.

How can GWSS be detected?

GWSS are usually found on the stems of their hosts rather than on the leaves. They are quite sensitive to movement and are likely to retreat to the back of the stem as you move closer to examine them. They spread throughout the canopy of their hosts. Because of their very wide host range, they might be expected to be found almost anywhere when they arrive in New Zealand. However, they are very fond of citrus, and their presence in citrus trees in the 'urban forest' of back yards may prove to be very useful indicators of their presence elsewhere, especially in the North Island.

GWSS can be found by eye – simply searching for the insects or egg masses on trees or by sweep netting. Often the first sign of their presence – especially in large trees - is the fact that it appears to be raining, but only under the tree!

However these active techniques are most useful when GWSS are known to be present in a district. Surveillance techniques to establish when they arrive in New Zealand will most likely to centre around the deployment of yellow sticky traps, and regular examination of these for the presence of the adult insects. Pheromone trapping is not an option for GWSS.

How do they spread?

Active stages of the insect must feed constantly to avoid starving to death as adults cannot survive for more than about 4h without food, making New Zealand's distance from other countries an advantage. Eggs can survive for much longer, and movement of plant material with eggs is an important pathway for GWSS spread over long distances between countries or regions. However the adults are active fliers and, once established, may spread rapidly over several kilometres every year.

How can they be controlled?

Chemical control: Insecticides effective against leafhoppers (Cicadellidae) in general are likely to be effective against GWSS, but their potential use in New Zealand would be determined by registration and industry integrated pest management programmes. Systemic insecticides appear to offer the best opportunities against these sap feeding insects, but new classes of 'anti-feeding' chemicals may also be worth investigation. It is worth remembering, however, that the pest status of GWSS in grapes is because the insect transmits *X. fastidiosa*. The effectiveness of an insecticide must be measured by its ability to prevent the disease from spreading - blanket applications of insecticide in California have failed to prevent the spread of Pierce's Disease.

Biological control: As a result of extensive research by Californian entomologists, a biological control programme against GWSS using several species of tiny parasitic wasps has been developed. These parasitoids attack the eggs and have successfully reduced the originally very large populations of GWSS in Tahiti. Because biological control is compatible with all industry integrated pest management and sustainability programmes in New Zealand, these natural enemies should be considered for importation to New Zealand if GWSS became established.

What should you do if you think you have found one?

If you see any insect that looks like the GWSS images in this brochure, you should attempt to catch it, place it alive in a tube or plastic bag and contact MAFBNZ at 0800 80 99 66. You should contact this number even if you cannot catch the insect. Most importantly – do not post live insects.