2012/13 Potted Plant Field Trial Programme

Covered plant results

21 December 2012

This report is an updated version of the previous one dated 12 December 2012

Background

In 2012/13, Zespri/KVH, are for the second consecutive season, conducting product testing trials at an orchard site in Te Puke using potted plants. Gold3 has not previously been tested in this way. An initial trial was undertaken to identify the concentration of Psa-V required to inoculate Gold3 plants in order to get a level of symptom expression sufficient to differentiate between treatments. The minimum period of leaf wetness needed for symptom expression was also investigated. Hayward plants were included in this trial to confirm the level of inoculum required to create symptom expression. Additionally, some inoculated plants were placed under rainproof covers to provide insight into the relationship between leaf wetness and infection. This report presents the results to date for the covered plants relative to the uncovered plants when inoculated with the same level of Psa-V.

Figure 1. Potted plants being misted in the trial described herein.

Methodology

On 31st October 2012, potted Gold3 plants on Bruno rootstocks, free of Psa-V, were inoculated with 10^5 cfu/mL[1]. Plants were then wetted for either 0, 12, 24, 36 or 48 hours using an overhead misting system[2] (Figure 1). Similarly, on 14 November 2012[3], potted Hayward plants on Bruno rootstocks were inoculated and wetted for different periods. At each time, a set of inoculated plants was not wetted. These plants were placed under temporary covers erected at the trial site immediately after inoculation. Each treatment comprises 10 replicate plants.

Psa-V symptoms are being monitored regularly. Individual leaves are assessed for leaf spotting and secondary symptoms are being recorded.

[1] i.e. 100,000 Psa-V bacteria per mL of solution.
[2] This equates to 0, 9, 17, 36 and 34mm of rainfall respectively.
[3] An initial trial on Hayward that commenced at the same time as the G3 trial had to be abandoned due to a technical problem.

Note – the covered plants were an ad hoc addition to the main trial described here. They were inoculated by moving the spray wand up and down each plant to represent a natural inoculation event. In the main trial, the uncovered plants were inoculated by targeting the under surface of individual leaves. When product testing, this method is required to maximise the probability of infection and the likelihood of obtaining meaningful results. It is possible that for the covered plants the under surface of the leaves, which is a key infection point, received significantly less inoculum than the under surface of the leaves on the uncovered plants. Future trials are planned to compare inoculation methods.

Results

G3

- The overall level of leaf spotting in the Gold3 after 43 days is less than 2% (Figure 2).
- There is a trend for the highest amount of leaf spotting to be present on plants wetted for the longest time (48 hours) following inoculation.
- There has been considerable variability in the level of leaf spotting between Gold3 plants.
- There is no clear trend between the length of wetting and the number of plants with secondary symptoms (Figure 6).

Hayward

- The overall level of leaf spotting in the Hayward after nearly a month is less than 2% (Figure 4).
- There is no clear trend between the length of wetting time and the level of leaf spotting in the Hayward. The reason for this is not known. Treatment differences may have been masked by rain which fell the night following inoculation and then again in the day following the wetting period (Figure 7).
- Only one of the Hayward plants has secondary symptoms.

Covered plants

Both the Gold3 and Hayward plants that were covered immediately following inoculation have a low level of leaf spotting (Figure 3 and Figure 5). This leaf spotting is continuing to increase. One of the covered G3 plants has shoot dieback.

Leaf spotting is lower on the covered plants. However they were inoculated differently and the effect of this is unknown.

Summary

The results presented here show that plants covered following inoculation have developed low levels of leaf spotting. These were inoculated by moving the spray wand up and down each plant to best represent a natural inoculation. Covering the plants has not completely prevented infection and leaf spotting is continuing to increase (albeit at low levels).

The uncovered plants at the trial site have higher levels of leaf spotting. These were inoculated differently. The undersides of individual leaves were targeted with the Psa-V (to maximise the likelihood of infection). Trials are planned to clarify whether differences in inoculation method affects infection and disease expression. Results are due in January/February 2013.

Trials are being conducted on orchards with covered structures to help understand the impact of covering plants on the incidence and severity of infection with Psa-V. The mature vines under these covers are frequently being visually assessed for Psa-V symptoms and results compared with vines from un-covered areas. Clean potted plants have also been planted out in one orchard, with some plants undercover and others planted outdoors, to assess whether infection can be prevented in an environment free of rainfall. Preliminary results from these trials are expected in January 2013.

For more information contact KVH or the Zespri Innovation team.

Figure 2. Zespri/KVH potted plant trial results: average % leaf spotting on Gold3 leaves (mature and expanding) that were inoculated at 10^5 cfu/mL[4] followed by wetting for different periods of time (0, 12, 24, 36 or 48 hours). Each set of coloured bars represents a different number of days after inoculation at which time the plants were assessed. **Note – previously results for mature leaves only were reported.**

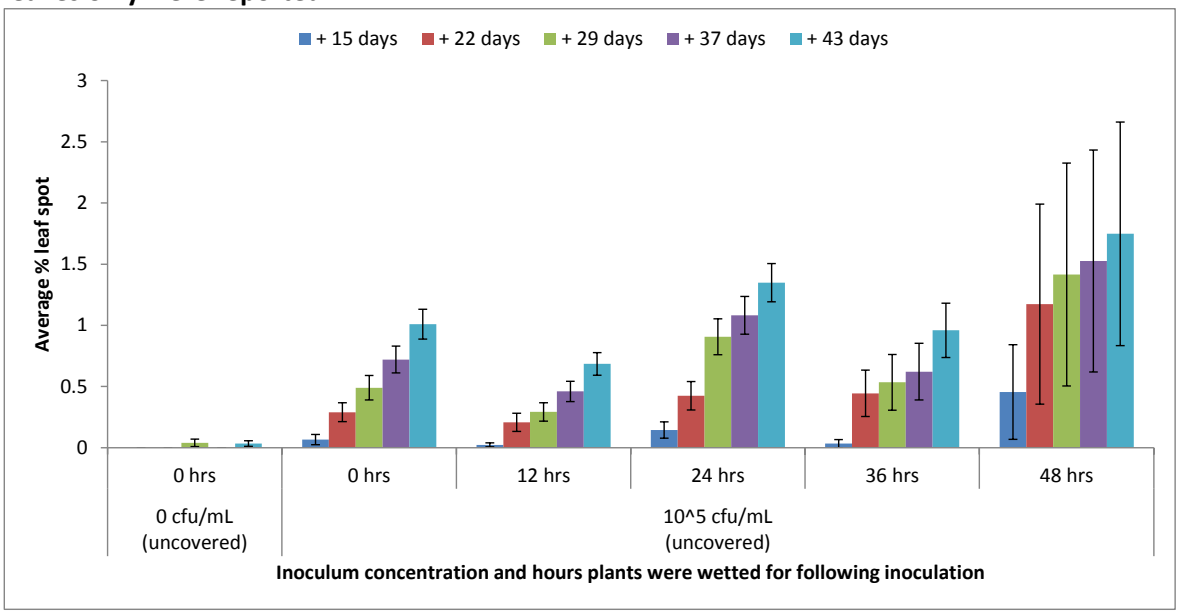
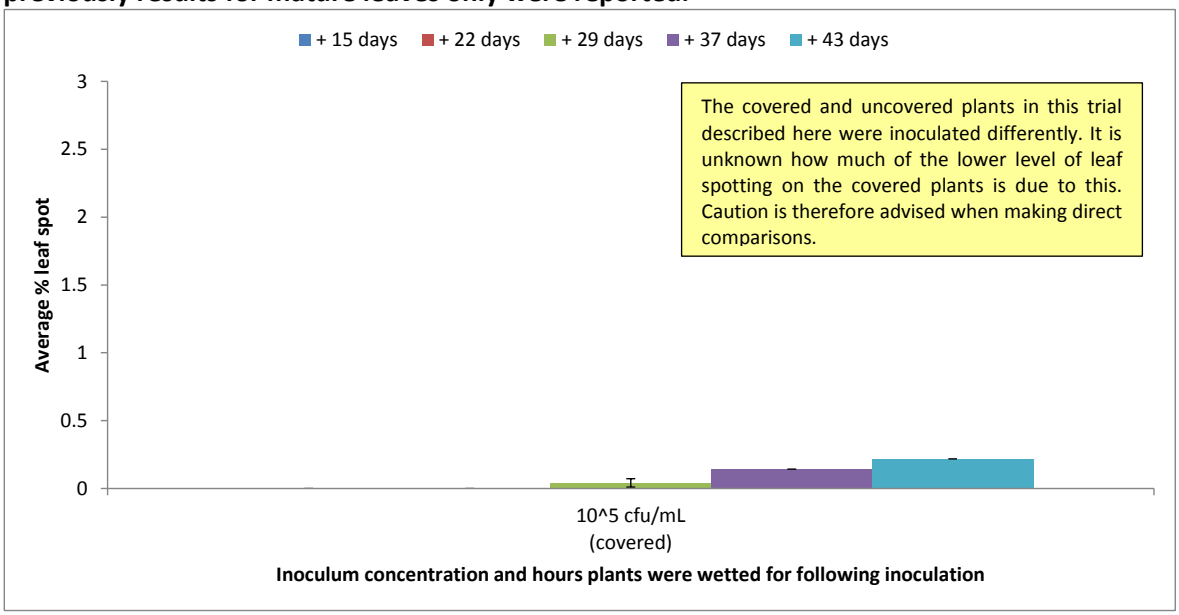


Figure 3. Zespri/KVH potted plant trial results: average % leaf spotting on Gold3 leaves that were inoculated at 10^5 cfu/mL and then covered i.e. not wetted. Each set of coloured bars represents a different number of days after inoculation at which time the plants were assessed. **Note – previously results for mature leaves only were reported.**



[4] Concentration of Psa-V used to inoculate the plants was measured by VLS on the day. Higher concentrations were targeted but there was some deterioration.

Figure 4. Zespri/KVH potted plant trial results: average % leaf spotting on Hayward leaves that were inoculated at 10^5 cfu/mL followed by wetting for different periods of time (0, 16, 24, 40 or 48 hours). Each set of coloured bars represents a different number of days after inoculation at which time the plants were assessed.

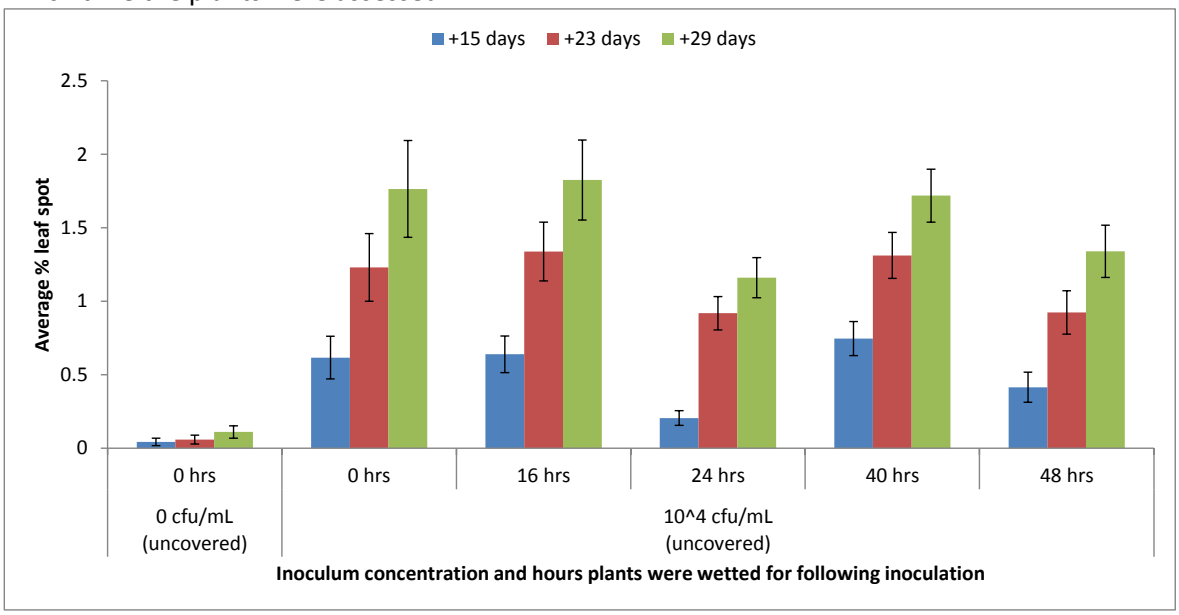


Figure 5. Zespri/KVH potted plant trial results: average % leaf spotting on Hayward leaves that were inoculated at 10^5 cfu/mL then covered i.e. not wetted. Each set of coloured bars represents a different number of days after inoculation at which time the plants were assessed.

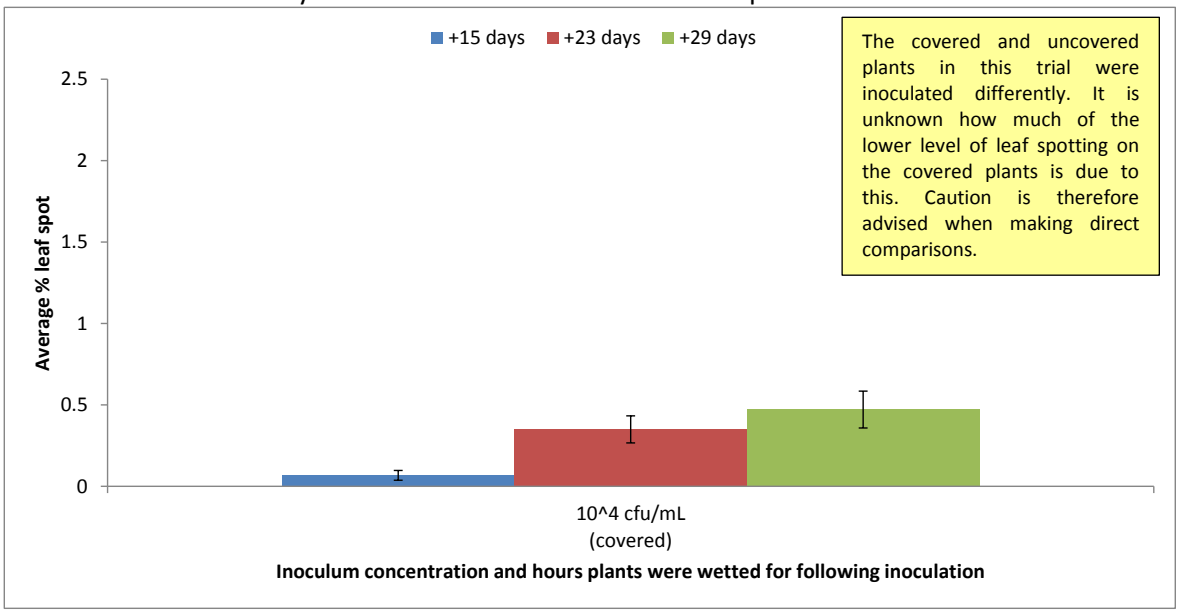
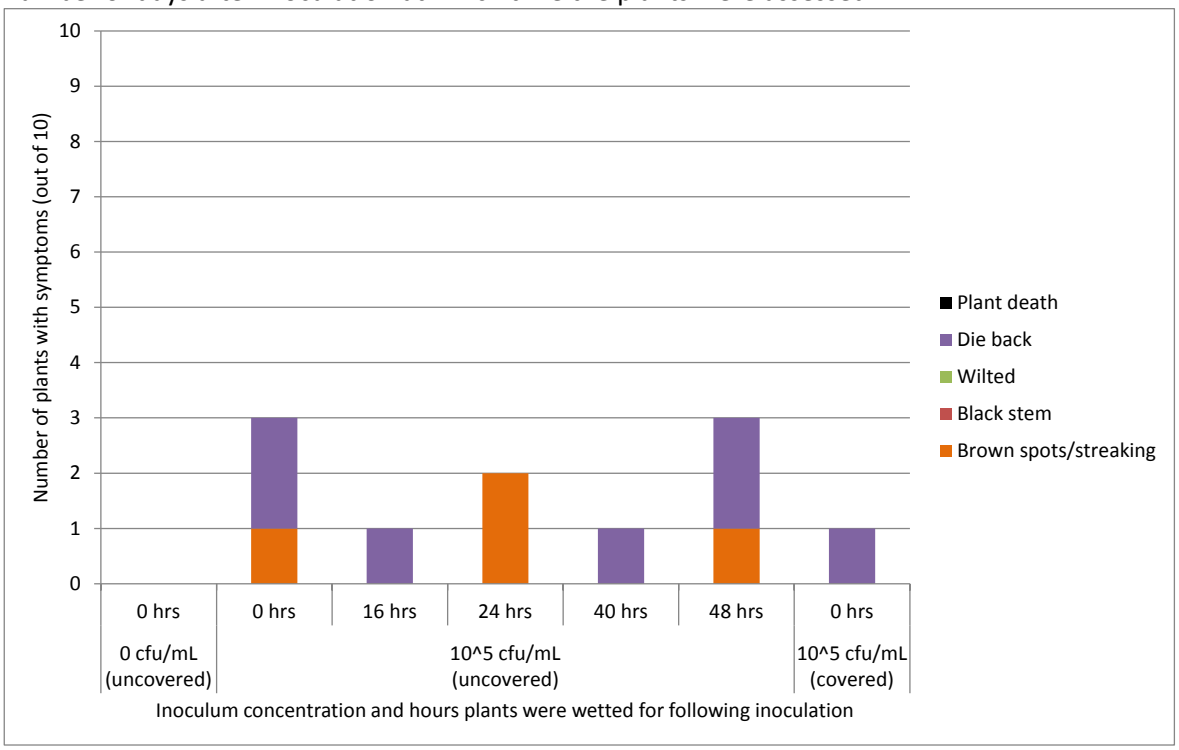


Figure 6. Zespri/KVH potted plant trial results: number of Gold3 plants which have developed secondary symptoms (out of 10 per treatment) 43 days after inoculation. Plants were inoculated at 10^5 cfu/mL[5] followed by wetting for different periods of time (0, 16, 24, 40 or 48 hours). Covered plants were inoculated but not wetted. Each set of coloured bars represents a different number of days after inoculation at which time the plants were assessed.



[5] Concentration of Psa-V used to inoculate the plants was measured by VLS on the day.

Figure 7. Zespri/KVH potted plant trial results – weather during the trial described in this report.