

# Product testing report

7 November 2011

Liquicop		
Supplying company:	Hortigro	
Active ingredient:	Copper ammonium acetate	
Mode of action:	Protectant <input checked="" type="checkbox"/>	Biological <input type="checkbox"/> Elicitor <input type="checkbox"/>
Application rate (per 100L):	Multiple	
Recommended rate in kiwifruit (per 100L):	500ml during dormancy 200 to 250ml post-green tip	

## Test results

Test	Greenhouse seedling tests
Method description	<b>Experiment 1: Protectant (1 June 2011 – 23 June 2011)</b> Bruno seedlings were treated once with Liquicop at 6.25ml L <sup>-1</sup> , allowed to dry and then inoculated with Psa-V (at 10 <sup>8</sup> cfu ml <sup>-1</sup> concentration). Assessments were made at weekly intervals after inoculation. The degree of leaf spotting was determined visually using a 0 – 5 scale and is plotted as an 'Infection Score'.
	<b>Experiment 2: Protectant (9 June 2011 – 4 July 2011)</b> Bruno seedlings were treated once with Liquicop at 4.1ml L <sup>-1</sup> one day prior to inoculation with Psa-V (at 10 <sup>9</sup> cfu ml <sup>-1</sup> concentration). Assessments were made at weekly intervals after inoculation. The degree of leaf spotting was determined visually using a 0 – 5 scale and is plotted as an 'Infection Score'.
	<b>Experiment 3: Protectant (24 August 2011 – 14 September 2011)</b> Bruno seedlings were treated once with Liquicop at 5ml or 10ml L <sup>-1</sup> , partnered with Latron at 2ml L <sup>-1</sup> . Seedlings were allowed to dry and then inoculated with Psa-V (at 10 <sup>9</sup> cfu ml <sup>-1</sup> concentration). Assessments were made at weekly intervals after inoculation. The degree of leaf spotting was determined visually using a 0 – 5 scale and is plotted as an 'Infection Score'.
	<b>Experiment 4: Protectant (20 September 2011 – 6 October 2011)</b> Hort16A seedlings were treated once with Liquicop at 2.5 ml or 5ml L <sup>-1</sup> , with or without the addition of Duwett. Duwett was added at either 0.33ml or 0.66ml L <sup>-1</sup> . Two days after treatment plants were inoculated with Psa-V (at 10 <sup>9</sup> cfu ml <sup>-1</sup> concentration). Assessments were made at weekly intervals after inoculation. The degree of leaf spotting was determined visually using a 0 – 5 scale and is plotted as an 'Infection Score'.

## Results

Key:

0 = no leaf spotting

1 = up to 10%

2 = up to 25%

3 = up to 50%

4 = up to 75%

5 = 100%

(of leaf area)

### Experiment 1:

In Bruno seedlings, Liquicop did not significantly affect the degree of leaf spotting at one, two or three weeks after inoculation with Psa-V.

### Experiment 2:

In Bruno seedlings, Liquicop did not significantly affect the degree of leaf spotting at one, two or three weeks after inoculation with Psa-V.

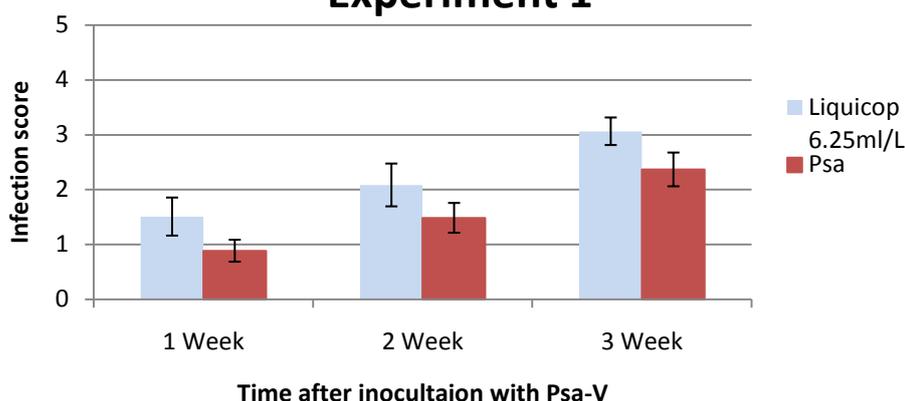
### Experiment 3:

In Bruno seedlings, Liquicop applied at either 5ml L<sup>-1</sup> or 10ml L<sup>-1</sup> with addition of Latron, did not significantly affect the degree of leaf spotting at one, two or three weeks after inoculation with Psa-V.

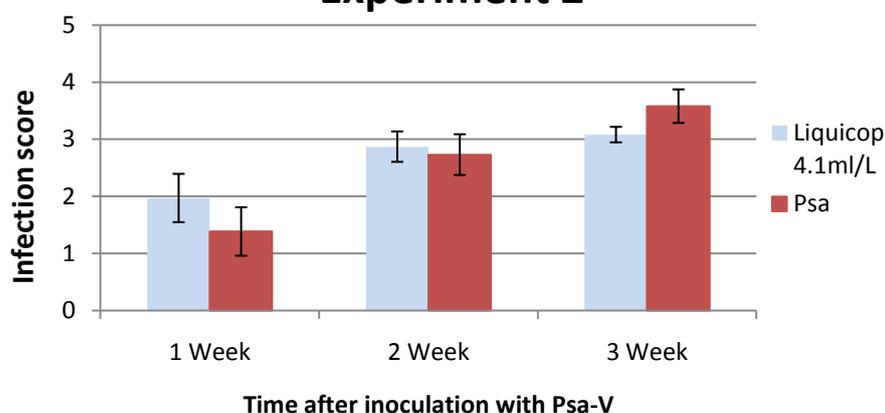
### Experiment 4:

In Hort16A seedlings, Liquicop applied alone at 2.5 ml L<sup>-1</sup> or 5ml L<sup>-1</sup> significantly increased leaf spotting one and two weeks after inoculation. Liquicop partnered with Duwett increased leaf spotting in Hort16A seedlings. Significant increases in leaf spotting were observed in seedlings treated with Liquicop at 2.5ml L<sup>-1</sup> partnered with Duwett at 0.66ml L<sup>-1</sup> one week after inoculation, Liquicop at 2.5ml L<sup>-1</sup> partnered with Duwett at 0.33ml L<sup>-1</sup> and 0.66ml L<sup>-1</sup> two weeks after inoculation, and Liquicop at 5ml L<sup>-1</sup> partnered with Duwett at 0.66ml L<sup>-1</sup> two weeks after inoculation.

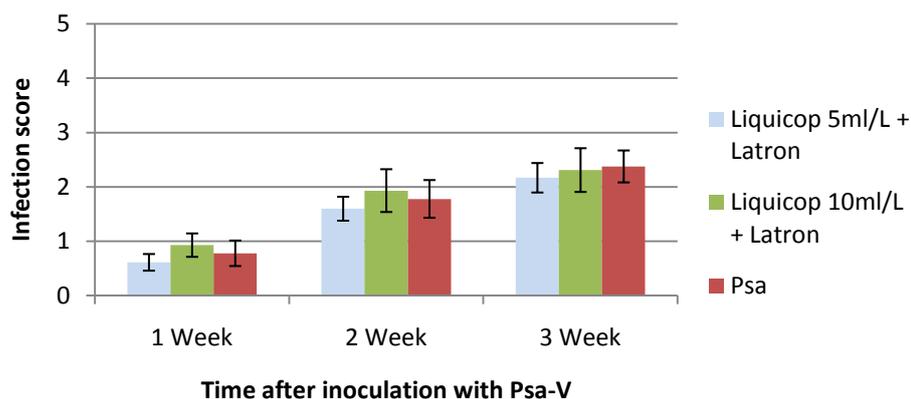
### Bruno Experiment 1



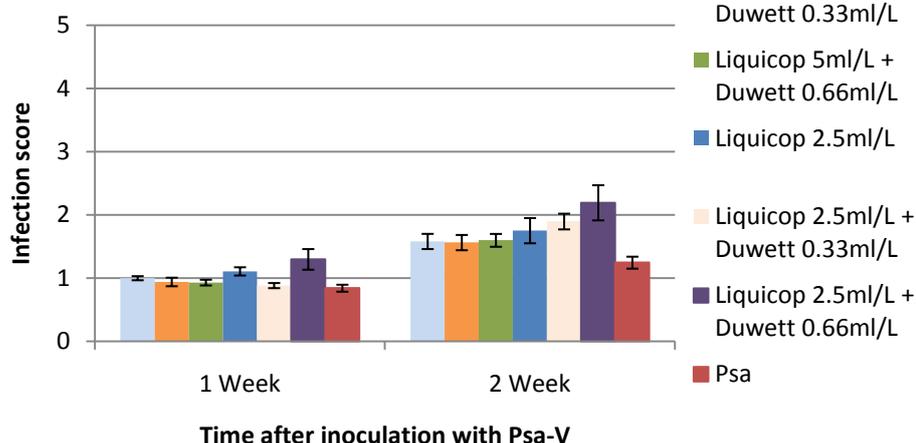
### Bruno Experiment 2



## Bruno Experiment 3



## Hort16A Experiment 4



\* Psa inoculated control and the treatment are statistically significantly different at the 5% level

## Summary

In general, single applications of Liquicop with or without an adjuvant either had no effect or significantly increased leaf spotting, in comparison with the Psa inoculated controls. Increased leaf spotting in seedlings treated with Liquicop partnered with Duwett may be caused by Duwett increasing run-off, resulting in insufficient active ingredient being deposited on the leaves. Liquicop did not demonstrate any positive results in reducing leaf spotting following inoculation with Psa-V, therefore no further greenhouse trials are planned with this product. Liquicop has been prioritised for testing during the in-pot field trials due to its current use in the industry.

## Comments

A standardised screening protocol has been used to test products for efficacy against Psa-V to enable a high throughput of products. Protectant, biological or elicitation tests may be performed, depending on the mode of action of the product. Protectant tests involve the product being applied to the plant with inoculation following on the same day, once the product has dried. Biological tests involve the product being applied two to three days prior to inoculation with Psa-V. Elicitation tests involve the product being applied to the plants seven to ten days prior to inoculation with Psa-V. Assessments of leaf spotting are performed at weekly intervals after inoculation. This method has

largely involved testing products using information provided on the product's label. In the future, products may be retested using protocols provided by supplying companies. Products which have previously shown some level of efficacy will be given priority for re-testing.

Data are presented for all assessment timings; however, evaluation of results is largely focussed on the final 'three week' assessment data. Disease symptoms will be better developed by this time and earlier assessments are considered to be less reliable. However, in the case of some elicitors, it is possible that the elicitation effect has been expended and that poor results at the 'three week' assessment time indicate reduced efficacy as a result of insufficient frequency of application.

Results from greenhouse trials primarily serve as a screening tool to determine products that will progress to field trials. Care should be taken when extrapolating results to field conditions. Results in the field may differ due to different environmental conditions and differences in plant material.

**Note – leaf spotting may not necessarily mean the plant is infected. It simply indicates that the plant has been challenged by Psa.**

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