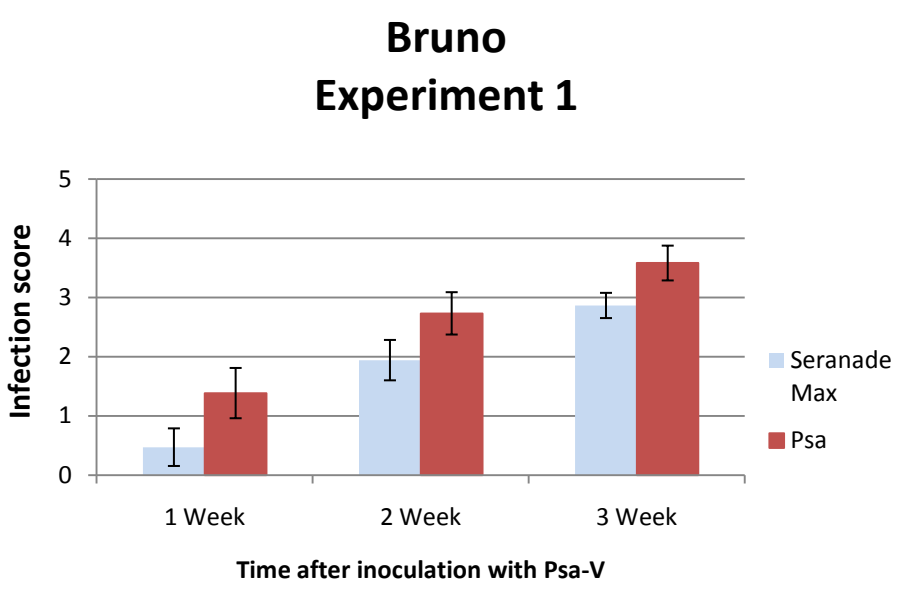
Product testing report

7 November 2011

Serenade MAX			
Supplying company:	BASF New Zealand Limited		
Active ingredient:	*Bacillus subtilis* QST 713		
Mode of action:	Protectant ☐	Biological ☒	Elicitor ☐
Application rate (per 100L):	200g (2.2×10^5 cfu ml^{-1})		
Recommended rate in kiwifruit (per 100L):	250 to 400g		

Test results	
Test	**Greenhouse seedling tests**
Method description	**Experiment 1: Biological (9 June 2011 – 4 July 2011)** Bruno seedlings were treated once with Serenade Max and inoculated one day later with Psa-V (at 10^9 cfu ml^{-1} 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, Serenade Max reduced leaf spotting at one, two and three weeks after inoculation, however, differences were not significant.  *** Psa inoculated control and the treatment are statistically significantly different at the 5% level**

Summary

At the final assessment, three weeks after inoculation with Psa-V, a single application of Serenade Max reduced leaf spotting in Bruno seedlings; however, reductions were not significant. These results are based on a ratio of biological control agent (BCA) to Psa-V of less than 1. Ideally the ratio should be 1 or greater. The high Psa-V concentration used of 10^9 cfu ml^{-1} has been necessary to force consistent leaf spotting. Unfortunately this means that it is often not practical to apply BCAs at a concentration that would provide a ratio of 1 or greater as they become paste-like in consistency. Further testing of some BCAs is planned using a lower concentration of Psa-V (e.g. 10^8 cfu ml^{-1}). Results for Serenade Max were inconclusive, therefore further tests are planned to clarify efficacy. Serenade Max 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.