

SAMURAI® SYSTEMIC INSECTICIDE FOR CONTROL OF WOOLLY APPLE APHID IN APPLES: *Practical refinements to label*



This tech note discusses improvements* to the Samurai label, with specific reference to application via micro irrigation systems in high density plantings. In addition to the current recommendation for soil application to single trees, the improved label also:

- Makes a distinction between soil drenching of individual trees at low planting density, and soil application via micro irrigation systems in high density situations.
- Explains the relationship between the single tree rate at low densities and the per hectare rate in high density plantings.
- Gives detailed instructions for accurate calibration.
- Describes the steps or sequence of events for successful application via micro irrigation systems.

Samurai rate relationship between low and high density orchards

Trial results confirm that the rate of Samurai required to control Woolly Apple Aphid is related to tree canopy volume, which does not differ significantly between larger, single trees in a low density orchard and smaller, trellised trees in a high density orchard.

	Single trees / Low density planting			Trellised systems / High density planting
No. of trees / ha	600	800	1000	1000 to 3000
Product used at 2.5 g /tree	1.5 kg	2.0 kg	2.5 kg	2.0 kg
Product used at 5.0 g /tree	3.0 kg	4.0 kg	5.0 kg	4.0 kg

This relationship becomes clear from the table above, confirming that the original Samurai rate of 2.5 to 5 grams per tree – applicable to an average of 800 medium-sized single trees per hectare, corresponds to a rate of 2 to 4 kg / ha required for a larger number of smaller trees in trellised systems. In high density orchards the sheer number and close proximity of trees make application to every tree impractical, and a per hectare rate is more appropriate. Roots from adjacent trees overlap, and where they 'share' active ingredient, the full rate per tree as in single tree orchards is not required.

With regard to **application of Samurai via micro irrigation systems in high density orchards**, the following label changes have been submitted for registration:

Crop	Pest	Rate	Critical comments
Apples	Woolly apple aphid	For application through micro-irrigation in higher density orchards (1000 to 3000 trees / ha) 2 to 4 kg / ha	Apply between green tip and late petal fall. The higher rate should be used on heavier infestations in bigger trees and will give longer control. Determine the area in hectares of orchard to be treated. Multiply this by the kg rate of Samurai selected and add this amount of Samurai to the chemigation tank for injection into the irrigation system, e.g. 5 ha orchard block x 3 kg / ha = 15 kg to be added to injecting tank. Run the irrigation system for approximately 30 minutes and ensure the water has reached all parts of the block and wet the soil. Apply the required amount of Samurai through the irrigation system. Continue to run the irrigation system to ensure thorough wetting of the soil profile down to at least 10 cm depth. For mini-sprinklers with high application rates this may take 1 to 2 hours. For dripper systems this may take 4 to 8 hours. The soil in the irrigation zone should be free of weeds and heavy debris. Control may be achieved in the season of application. It is however recommended that trees with infestations in autumn are marked so that they can be treated at green tip the following season.

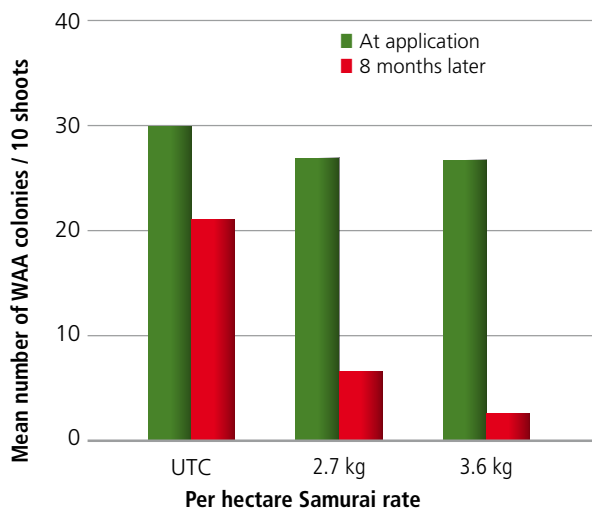
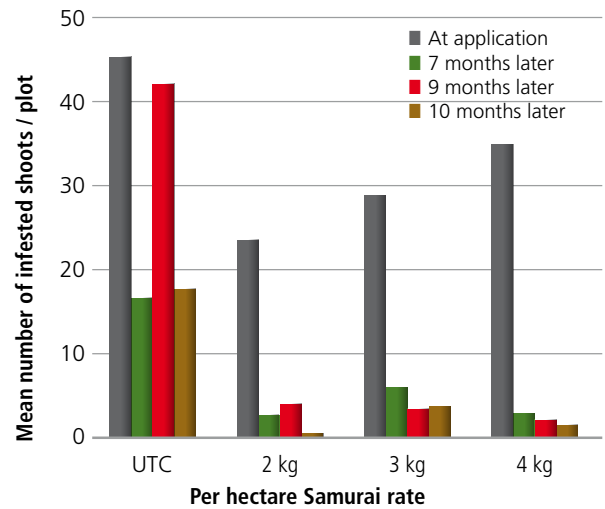
* Proposed changes currently under review by the APVMA.



Trial results

Effect of Samurai, applied at increasing rates through micro drippers, on Woolly apple aphid in apples

Location and variety	Gippsland, VIC; Cultivar Jazz, 5 years old; 3000 trees / ha
Soil type	Clay loam; Permanent mid row sward
Irrigation	Micro sprinklers; Wetting pattern 1 m x 1 m; Sprinkler output: 22 L / hr

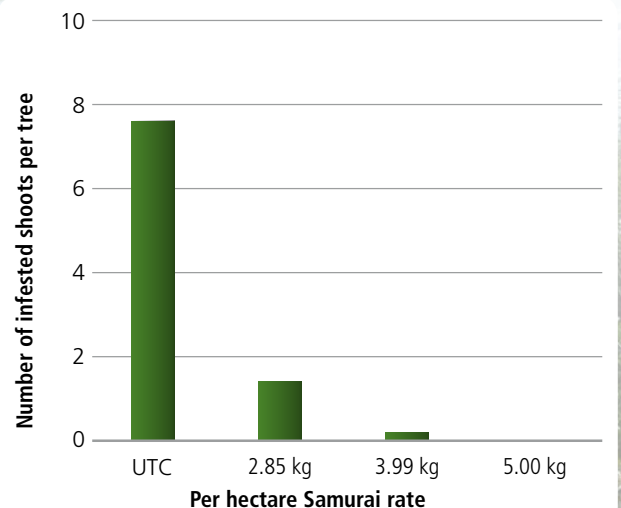


Effect of Samurai, applied at two rates through mini sprinklers, on Woolly apple aphid in apples

Location and variety	Lemnos, VIC; Cultivar Red Delicious, 2217 trees / ha
Irrigation	Mini sprinklers; Philmac XL-Jet on stands at 1.1 m intervals; Wetting pattern 1.5 m Ø; Sprinkler output 32 L / hr.

Effect of Samurai, applied at three rates through drip irrigation, on Woolly apple aphid in apples, 197 days after application

Location and variety	Lenswood, SA; Cultivar Fuji, 17 years old; 1140 trees / ha
Application timing	November 2011
Irrigation	Drippers on 13 mm Ø pipe, spaced at 62 cm intervals



Selecting a Samurai rate that is IPM compatible

Through trial and error growers may be able to select the rate of Samurai between 2 and 4 kg / ha that will give good, but not complete control of Woolly Apple Aphid. A preferred strategy may be to have a few surviving aphids to maintain the pest / predator relationship to ensure the survival of parasitic wasps, thereby prolonging the period of control from a single Samurai application.

How to get the best results from Samurai when applied through micro irrigation

- Make sure the zone to be irrigated is free of weeds and organic debris.
- Apply in spring between green tip and late petal fall.
- Apply after rain, or irrigate to field capacity **before** application.
- Calibrate & confirm the delivery rate of the irrigation system to ensure that the correct dosage is applied.
- After application, irrigate again to assist with getting Samurai into the soil profile. Continue irrigation until the top 10 cm of the soil profile is wet.
- Use the higher rate for bigger, older trees.
- The higher rate will also give control for up to two years.



Application to individual trees by soil drench

Of course, this application method is still registered and preferred for larger or individual trees in low density plantings.

Crop	Pest	Rate	Critical comments
Apples	Woolly apple aphid	<p>For application to individual trees by soil drench on low density orchards (666 to 1000 trees / ha)</p> <p>2.5 to 5 g per tree applied in 1 L of water to the soil around the base of the tree. (Applying 2.5 to 5 g / tree at a density of 800 trees / ha will be equivalent to 2 to 4 kg per ha of orchard)</p>	<p>Apply between green tip and late petal fall. The higher rate should be used on heavier infestations in bigger trees and will give longer control.</p> <p>The speed of control from this application depends on how fast the product enters the root zone and is taken up by the tree actively growing. The diluted product needs to be applied to give thorough coverage around the trunk to a distance of 15 cm from the trunk. Ensure that mixture penetrates the soil around the trunk base and does not run off. If in doubt about penetration, irrigation or rain is required after application to take the chemical into the root zone. Remove trash and weeds from application zone before application.</p>

Apply to the soil, around the trunk out to a distance of 15 cm from the base of the trunk. The chosen dose of Samurai is applied in 1 Litre of water per tree. A single spurt to one side of the trunk is not sufficient; attempt to apply Samurai **around** the tree.

Good soaking rain or irrigation after application will enhance uptake and give quicker and better results. Trickle irrigation is generally not adequate for wetting.



Application guidelines for bigger and older trees

FIGURE 1: Spatial distribution of the roots of a mature apple tree (topical view)

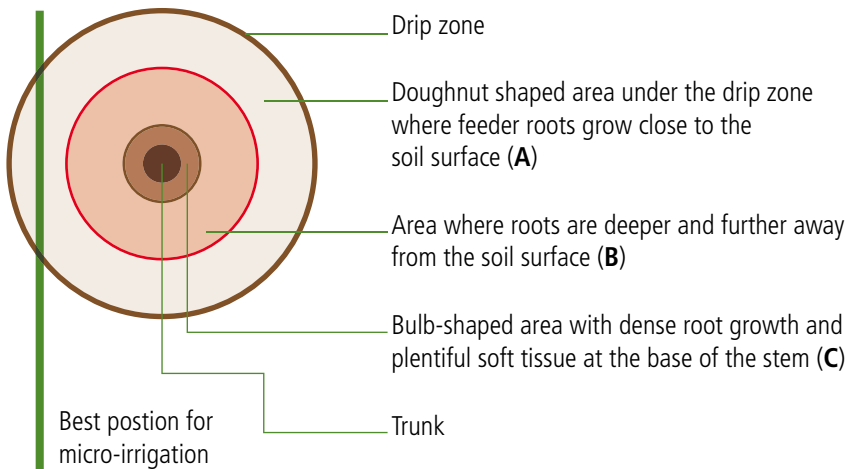
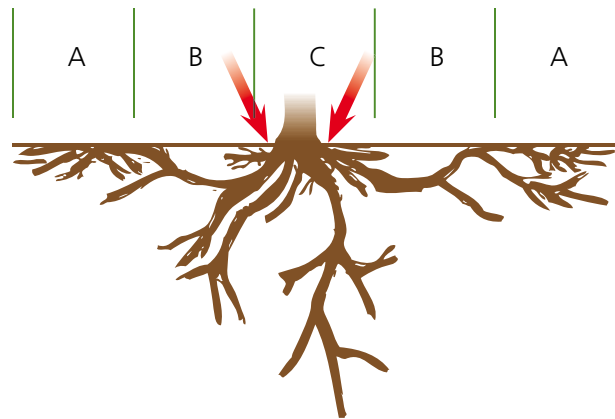


FIGURE 2: Spatial distribution of the roots of a mature apple tree (lateral view)



The spatial distribution of roots in older, bigger apple trees is different to young trees. In young trees, the majority of roots grow relatively close to the soil surface. As the tree grows, a dense mass of roots containing a high proportion of soft meristematic tissue develops at the base of the trunk; marked as C in Figures 1 and 2. **This is the area where Samurai should be applied around the base of the trunk.**

Outwards from this point, the roots tend to grow deeper with few feeder roots close to the soil surface (area marked as B). This area is **not ideal** for Samurai application. However, feeder roots are also found close to the surface in a doughnut-shaped area which corresponds roughly with the drip line (A). This is the best position for irrigation systems to be installed. In addition, research has shown the development of dense feeder root mass around drippers and micro irrigation points.

Thus for mature trees, Samurai should either be applied around the base of the trunk, or through a irrigation system provided it is positioned correctly relative to the zones where feeder roots occur close to the soil surface.



SUMITOMO CHEMICAL AUSTRALIA PTY LTD
 ABN 21 081 096 255 www.sumitomo-chem.com.au
 Level 5, 51 Rawson Street, EPPING NSW 2121
 TEL: (02) 8752 9000 FAX: (02) 8752 9099

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