



Abstract from Evaluation of

AquaGro Gold in Apples

Shepparton, Victoria, 2006/07.

Trial conducted by David Bell & Associates

Background

Water allocation to Goulburn Valley farmers for the 2006/07 season, was only 30%. Orchardist's had to either purchase additional water at high prices and or stretch their irrigation cycles, often creating a water deficit situation in the orchard.

Continued use of knockdown or residual herbicides will often result in a tree line that is left totally bare. Soils often lack organic matter and the surface crusts making water penetration difficult. Irrigation water will often shed to the middle of the tree rows.

Application

A replicated trial was conducted in a Shepparton block of Pink Lady apples. The soil type was a Goulburn valley clay loam. The trial was conducted as replicated trial using a randomised complete block design. The trial was replicated six times. Plot size was 10.5 metres in length by 2 metres in width. Each plot contained 6 pink lady apple trees.

AquaGro Gold, soil surfactant was applied at the initial rates of 5 and 10 lts/ha on the 1st of November 2006. Applications there after were applied at half these rates being 2.5 and 5 lts/ha respectively at monthly intervals; being the 4th of December, 2nd January, 6th February with the final application being made on the 2nd of March. Application occurred down the tree line and across the entire width of the orchard tree line (2m). Irrigation followed within 1 to 3 days following application to incorporate the AquaGro Gold in to the soil.

The orchard block was irrigated by mini sprinklers. All plots received the same irrigation schedule and the same amount of water.

Very little rain fell in the Goulburn Valley over the 2006/07 fruit season. The summer temperatures were above average. The summer was best described as hot and dry.

The orchard block where the trial was conducted ran at a level of approximately 80% water deficit over the summer months.

Soil moisture infiltration response

The soil moisture in the apple root zone was greater and the water had penetrated to a significantly greater depth following the application of AquaGro Gold at 5/2.5 and 10/5 lts/ha when compared to the untreated control. At 5/2.5 and 10/5 l/ha the water had penetrated to a depth of 15.3 and 24.3 cm respectively compared to the untreated control at 6.8 cm. The apple root zone was moist in the AquaGro Gold treated plots when compared the untreated control, where the soil was dry.

The soil moisture probe was much easier to push down to both 5 and 10 cms in the AquaGro Gold treated plots when compared to the untreated control.

On January 2nd the water penetration depth was measured in the centre of each plot. A shovel cut was taken across the tree line until dry soil was reached. The depth of soil moisture was recorded. The mean water penetration depth is presented in table 2.

Table 1. Mean Water penetration depth – cm.

Description				Soil Moisture Depth
Rating Date				2/01/2007
Rating Data Type				Moisture depth
Rating Unit				cm
Days After First/Last Applic.				29
Trt No.	Treatment Name	Form Type	Rate Rate Unit	
1	Untreated Check			6.8 c
2	AquaGro Gold	EC	5 l/ha	15.3 b
	AquaGro	EC	2.5 l/ha	
3	AquaGro	EC	10 l/ha	24.3 a
	AquaGro	EC	5 l/ha	
LSD (P=.05)				1.77
Standard Deviation				1.38
CV				8.92

Means followed by same letter do not significantly differ (P=.05, LSD)



Untreated – moist to 7.5 cm



AquaGro Gold – moist to 30 cm.

Soil moisture content results

The soil moisture in the apple root zone was greater and the water had penetrated to a significantly greater depth following the application of AquaGro Gold at 5/2.5 and 10/5 lts/ha when compared to the untreated control. At 5/2.5 and 10/5 lts/ha the water had penetrated to a depth of 15.3 and 24.3 cm respectively compared to the untreated control at 6.8 cm. The apple root zone was moist in the AquaGro Gold treated plots when compared the untreated control, where the soil was dry.

In April a Delta-T Services Ltd moisture meter type HH2 was used to measure the soil moisture content at 10 and 20 cms. On April 20th the untreated control and AquaGro Gold applied at 5/2.5 lts/ha had equivalent soil moisture contents at 10 cm's. AquaGro Gold at 10/5 lts/ha had significantly higher levels of soil moisture than the untreated control and AquaGro Gold at the lower rate of 5/2.5 lts/ha.

The AquaGro Gold treated plots at both the high and low rates had significantly higher soil moisture contents at 20 cm's than the untreated control.

Table 2. Soil Moisture Reading 20th April 2007

Description					Soil Moisture Content			
					20/04/2007		20/04/2007	
Rating Date					%Soil Moisture		%Soil Moisture	
Rating Data Type					10 cm		20 cm	
Rating Unit								
Trt	Treatment	Form	Rate	Unit				
No.	Name	Type	Rate	Unit				
1	Untreated Check				17.4	b	17.3	b
2	AquaGro	EC	5 l/ha		18.9	b	21.8	a
	AquaGro	EC	2.5 l/ha					
3	AquaGro	EC	10 l/ha		22.2	a	21.3	a
	AquaGro	EC	5 l/ha					
LSD (P=.05)					1.64		2.15	
Standard Deviation					1.28		1.67	
CV					6.56		8.3	

Means followed by same letter do not significantly differ (P=.05, LSD)

Crop Yield Outcome

Following the hand thinning by the grower in November apple numbers were counted and all trees were hand thinned to have 250 apples per tree. Throughout the growing season apples were lost from the trees and close to harvest when apples that were sizing were pushed from the trees.

At harvest all of the apples from the two centre trees were harvested and fruit numbers and weight were recorded.

There were no significant differences in apple numbers per tree and hence it can be concluded that it is the application of AquaGro Gold that has affected apple fruit weights and apple yields.

The application of AquaGro Gold at an initial rate of 5 and 10 lts/ha with subsequent applications at 2.5 and 5 lts/ha have significantly increased the apple fruit weight and the apple yield per tree when compared to the untreated control.

Table 3. Treatment effect on apple numbers and apple weights.

Rating Date				30/07/2007	30/07/2007	30/07/2007
Rating Data Type				Apples/tree	Apples (kgs/tree)	Av Apple wt (g)
Trt No.	Treatment Name	Form Type	Rate Unit			
1	Untreated Check			203.7 a	25.4 b	0.125 b
2	AquaGro	EC	5 l/ha	214.8 a	30.5 a	0.142 a
	AquaGro	EC	2.5 l/ha			
3	AquaGro	EC	10 l/ha	208.7 a	30.9 a	0.149 a
	AquaGro	EC	5 l/ha			
LSD (P=.05)				11.78	1.93	0.0093
Standard Deviation				9.16	1.5	0.0072
CV				4.38	5.18	5.19

Means followed by same letter do not significantly differ (P=.05, LSD)

Visual observations whilst harvesting the trial clearly showed that the apples from the AquaGro Gold treated trees were clearly larger. This is clearly reflected in the apple weights.

By taking the yield data and using the number of trees per hectare (1190), total yield per hectare can be calculated (Table 4). Table 4 shows a yield increase of 6,069 to 6,545 kgs per hectare from the use of AquaGro Gold.

Economic Analysis - ROI

An analysis of the economics of applying AquaGro Gold was undertaken. This economic analysis is based on a number of assumptions:

- Apples are packed in a 12 kg carton.
- AquaGro Gold retails for \$15.00 per Litre

Table 4 Economic Analysis.

AquaGro Gold Calculation Chart	Analysis	
	AquaGro Gold 10/5 l/ha	AquaGro Gold 5/2.5 l/ha
Cost of AquaGro Gold (6 applications)	\$219	\$109
AquaGro Gold Yield (kgs/ha)	36771	36295
Untreated Control Yield (kgs/ha)	30226	30226
Additional Yield with AquaGro Gold	6545	6069
Extra cartons/ha @ 12 kg per carton (80% packout)	436	405
Expected price per carton	\$16.00	\$16.00
Gross extra income per ha	\$6,981	\$6,474
Less the cost of AquaGro Gold	\$218.75	\$109.40
Payback per hectare	\$6,763	\$6,364

The economic analysis clearly shows that in this case the grower stood to make an excellent return on his investment, in that spending \$109 to \$219/ha he would make \$6,364 to \$6,763/ha. A return of \$60 to \$30 for every dollar spent.

Conclusions:

The application of AquaGro Gold along the orchard tree line at 10/5 and 5/2.5 lts/ha at monthly intervals over the summer months has resulted in significant increases in water penetration to depth in to the soil; significant increases in soil moisture content at 10 and 20 cm's, significant increases in fruit weight and fruit yields.

This has resulted in a significant increase in the gross margin return to the grower of over \$6,000 per hectare.

Full Evaluation

For the complete evaluation contact David Bell – david.j.bell@telstra.com