

Irrigation Management in Substrate Grown Blueberries

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Background

BerryCo licenses growers, including Miro LP, to grow blueberries of the elite 'Mountain Blue' genetics. Mountain Blue Orchards (MBO) in Australia have granted BerryCo the exclusive license to grow these berries in New Zealand. As well as the premium genetics BerryCo is promoting the latest worldwide trend of growing under tunnels and in substrate. This improves both quality and yield delivering a superior eating experience to the consumer along with higher yields and pack outs for the grower.

These crops are grown under plastic, so all irrigation and nutrients are supplied via drippers directly into the pots. The management of this becomes a precision process and one that is closely monitored daily and is highly efficient.

BerryCo currently has 20 growers licensed from the far North to Motueka. A significant number of these are in the Waikato, Eastern Bay of Plenty and Western Bay of Plenty.



Set up

While in some cases growers do plant in the soil, most plant in 30L round or square pots. The growing media is a Bark/Pumice/Coir/Peat potting mix. Nutrient is supplied by a precision fertigation system that supplies all the elements required for growth 'little and often' with each irrigation. This is delivered to the pots that contain 2-4 drippers depending on the set up. Each dripper delivers between 1.2 -2.2L/hr depending on the set up. These normally run in several short cycles (3-6minutes) several times a day -perhaps 2 or 3 irrigations per day in the winter and as high as 8-10 times in the height of the summer.

This whole process is driven by a fertigation controller. Irrigation is generally controlled by solar integration. That is an irrigation is triggered once a set number of solar units have accumulated. By this method more irrigations are triggered on a hot sunny day than a cool cloudy day, reflecting the needs of the plant.

Most of BerryCo's growers use an Autogrow 'Multigrow' controller that also has detailed data logging and analytics via its 'Insights' cloud-based application. Some screen shots are included below.

A part of this set up is utilising rootzone monitors that measure the volume EC and pH of the drain water coming out the bottom of the pot.





Water usage

For initial planning for our original growers we had to rely on daily uptake figures for Blueberries from Published data. This was mainly Australian and given their hot dry climate was not applicable. We are now into our 3rd year of growing with this methodology and have been able to asses actual usage in New Zealand conditions for this growing methodology.

From the most advance planting, almost at full growth measured through the hottest months of summer had the following results

Grower Cotterell	Plants in 3 rd year, Katikati. 2108 - 2019		
Date	Litres/plant per day	M3 per Ha per day	Comment
November	3.48	13.93	Full foliage, peak of fruit harvest
December	4.02	16.0	Hottest temps
January	4.05	16.2	
February	3.64	14.54	
March	3.12	12.5	Full foliage from summer growth

The smaller plants at Miro, Fort Block Te Teko used 1.84L per plant per day in January 2019. With Double bunked planting this equated to 16.51m3 per Hectare per day

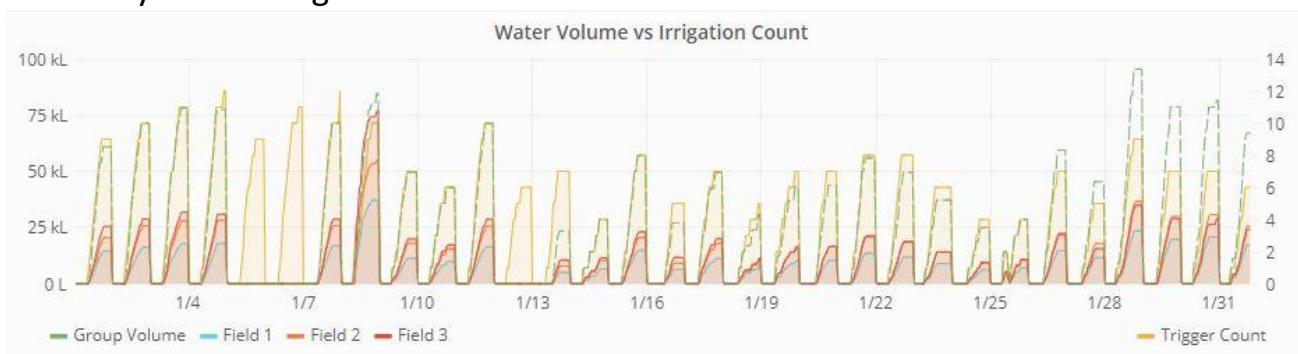


Cotterell plants November 2018

BerryCo's planning is now based on providing 20m³ per day per Ha for maximum summer usage and/or 4.5L per plant per day in summer and 2.5L/plant per day in winter.

Miro Fort Block graph of daily irrigation volume via drippers

Daily monitoring of run off.

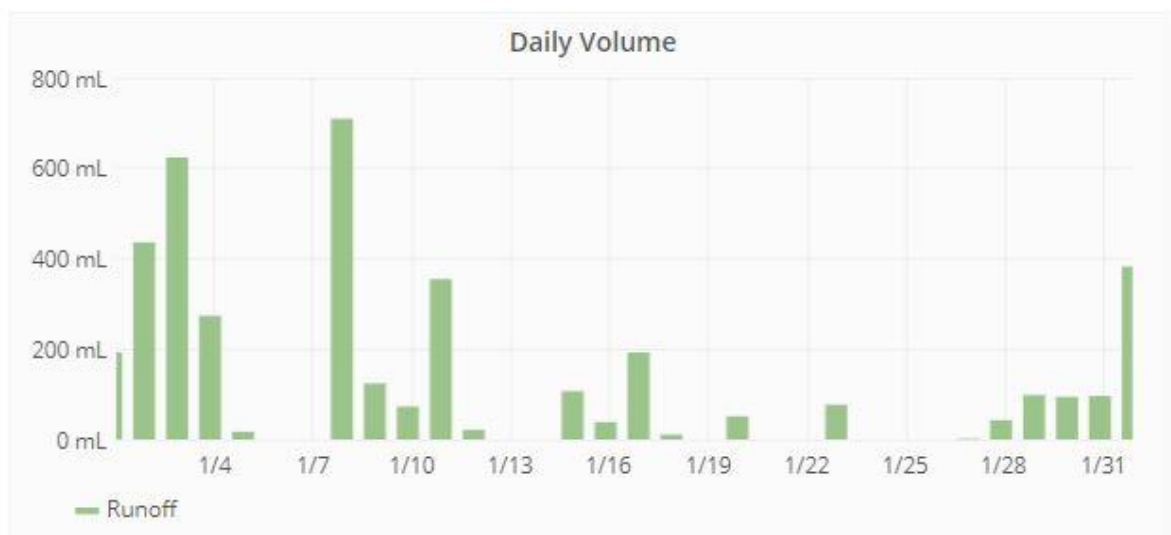


Precision accuracy in irrigation volumes and nutrient levels become the key priority for Blueberry substrate pot growers. Utilising the data logging metrics backed up with manual testing from different locations around the tunnels the growers will 'live and breathe'

what's happening with the drain solution from the bottom of the pots. So constantly monitoring pH and nutrient levels as expressed by EC relative to the levels going in. Monitoring this information gives real time indications to what is happening in the rootzone. Probes within the pot is also measuring moisture percentage and sometimes EC levels. As the delivery is by drippers all the nutrient goes into the rootzone. There is virtually no evaporation and no wastage in the walkways or between plants as would happen with overhead sprinklers.

The key calculation used is 'run off %'. This is run off volume relative to volume in. so if 1L goes into the pot and 100mls comes out (over time) then the run off % is 10%. Target run off percentage varies as to the circumstances, stage of growth, time of year etc. Mostly it is in the region of 10-15%.

A higher run of % means water and nutrient is being needlessly wasted. Too little or zero run off risks a salt build-up of elemental salts within the pot which can in turn cause root damage and ill thrift to the plant.



Run off volume daily graph Miro Fort Block, January 2019

Main System Readings

	Air Temp	RH	Solar RAD	Solar PAR	VPD	Dew Point	Accum. PAR	Accum. RAD
tunnels	24.1°C	49%	654W/m ²	1101µmol/m ² /s	1.524kPa	12.7°C	9.5mol/m ²	546.2J/cm ²
	Nutrient	pH	Actual Flow	Grp1 Last Irrig.	Water Source Level	Grp1 Act. Count		
Blueberry l...	1.06mS/cm ²	5.38pH	0.00L/min	10:12:04 Tue 16 Apr	86%	3		
	Runoff EC	Runoff pH	Runoff Moisture	Runoff Ratio Today	Volume Today per Plant			
field	0.61mS/cm ²	3.69pH	58.18%	7.91%	285.4mL			
Outputs								

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Screenshot of dashboard showing real time run off %