Pilot Test: Effect of biofilm cleaning on drip irrigation flow rates

Date: 2/11 - 3/11/2018

Location: Advanced Nutrients, Brendale. QLD.

Aim

Biofilm (algal, bacterial) can build up in some conditions to block or reduce flow of emitters in drip irrigation systems.

Reduced, uneven or zero watering has a significantly negative effect on production and performance of horticulturalists. Current practice requires the handling of corrosive and harmful products to clear lines and/or maintain cleanliness. Many hazardous cleaning solutions have a further deleterious effect on soil biota and structure.

In this test, a novel Organocatalyst is used in replacement of chemicals to determine its cleaning effect by monitoring flow volume and rate through the emitters.

Process

Approx. 50m of used drip line was secured from grower. Rated at 2L/hr per emitter, the line had been replaced due to blocking and poor performance. This was cut into 2 x ~22m lines.

The line was prepared by connecting a pressure gauge to the end, with the other connected to a 53L tank connected to a 12v pump. Flow was regulated by two flow regulators one each on the infeed of the line and on a recirculating line back into the tank to maintain 20psi.

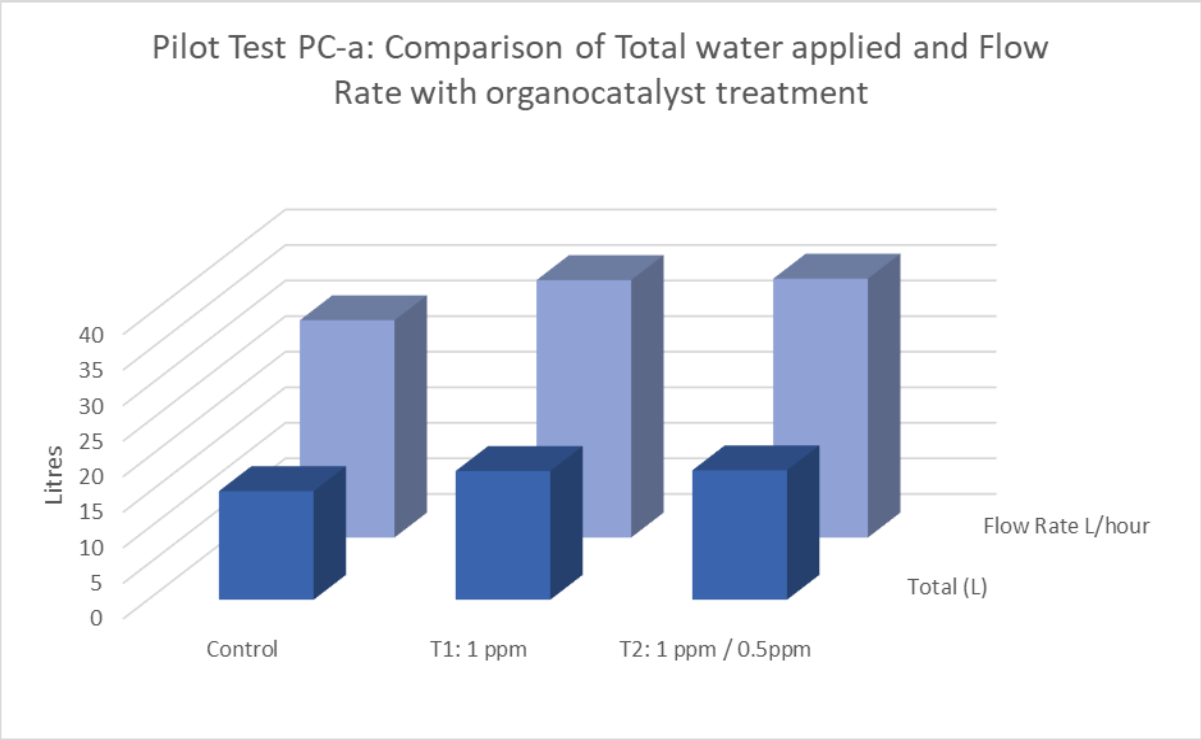
The first line (T1) was used twice, first a 30 min flush of untreated irrigation water (creek, Samford) at a constant pressure of 20psi (±10%). An aluminium tray was placed under each emitter (19) to catch flow. Total emitter volume over 30 mins was recorded. The tank was dosed and mixed with 1ppm (1mg/L) of the Organocatalyst, AquaMate™ LD, forthwith and a second flush for 30 mins @ 20psi, the flow captured and recorded as previous.

A second line (T2), was filled with irrigation water treated with 1ppm of AquaMate™ LD. The line was blocked off and left to "soak" overnight for 18 hours. The line was then flushed for 30 min with irrigation water treated with 0.5ppm of AquaMate™ LD, flow captured and recorded as previous.

Results

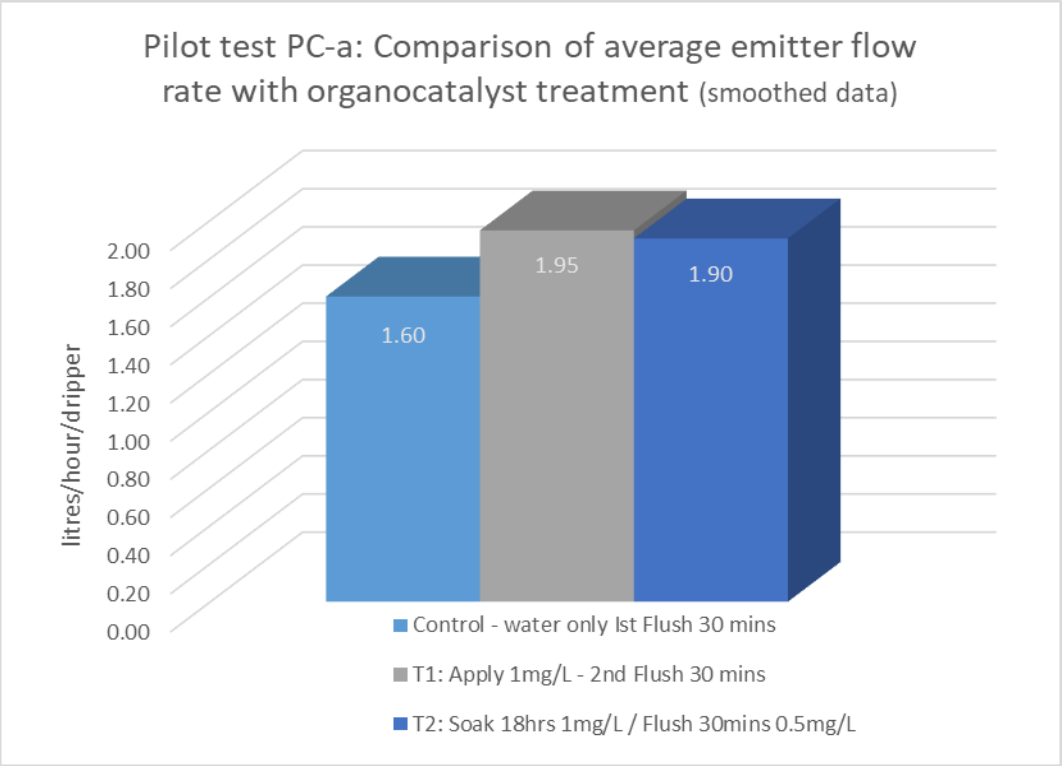
In the first test, the first flush with untreated water, a total of 15.3L water was delivered via 19 emitters over 30 mins (30.55L/hr). An average of 1.6L/hr/emitter.

By comparison, the second flush with treated water, delivered a Total of 18.1L water via 19 emitters over 30 mins (36.2L/hr). An average of 1.91L/hr/emitter. After smoothing, the adjusted Av. is 1.95L/hr/emitter.

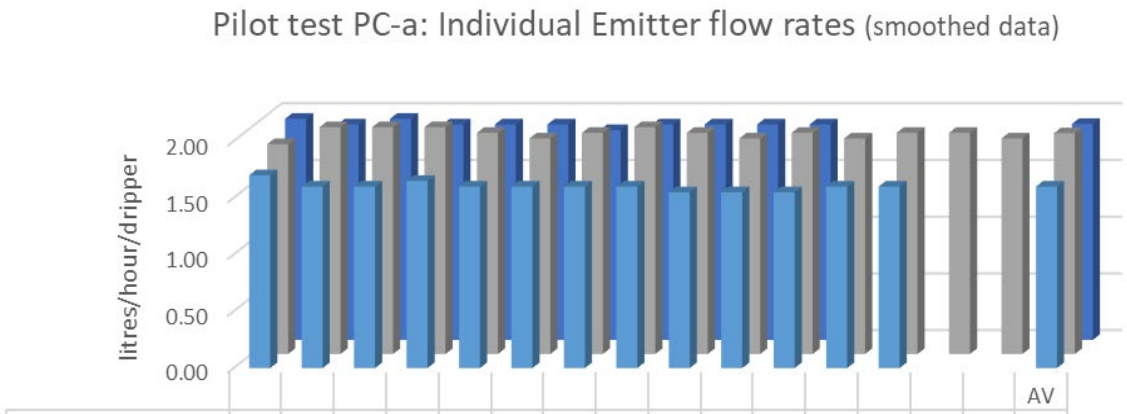


The second test of soaking overnight (18hrs) with treated (1ppm) water and then flush (30 min) with treated (0.5ppm) water gave virtually the same results as T1 (1pm) 30min second flush, 18.2L total water, av. 1.92L/hr/emitter. The only notable difference appeared in the Standard Deviation, in both the raw data and smoothed data, the SD in T1 was 30-50% higher than in T2 data sugesting the time extended method may produce a more uniform, not higher (L/s), result than flushing alone.

The T2 test may also corroborate that the results of both treated tests was the highest flow rate possible (given its used nature). Possibly why a soaking/flush had no greater effect than the flush alone.



Raw Data was analysed using Standard Deviation (P). Smoothing of data was carried out by removing data outside the S.D. of the raw data mean (removing outliers). This reduced the replications of Control, T1, and T2 to 13, 15 and 11 respectively. Standard Deviation and Variance in the smoothed data set were expectedly very small.



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Control	1.70	1.60	1.60	1.65	1.60	1.60	1.60	1.60	1.55	1.55	1.55	1.60	1.60			1.60
T1: 1 ppm	1.85	2.00	2.00	2.05	1.95	1.90	1.95	2.00	1.95	1.90	1.95	1.90	1.95	1.95	1.90	1.95
T2: 1 ppm / 0.5ppm	1.95	1.90	1.95	1.90	1.90	1.90	1.85	1.90	1.90	1.90	1.90					1.90

Conclusion

Whilst the pilot test was not conducted with strict scientific controls, the pilot test confirmed that the use of AquaMate to improve drip line performance is a successful strategy.