TWINN CROP TRIAL

Irrigated Tomato: Bowen, QLD, Australia, Nov 2009

INTRODUCTION

The trial aimed to test the capacity for TwinN to enable a reduction in the amount of nitrogen (N) applied to an irrigated tomato crop in the three month period following planting. The trial was conducted by an independent trial company, Peracto Ltd, in Bowen, Australia, a significant horticultural district. The benefits of being able to reduce these nitrogen fertiliser applications are:

- Reduced fertiliser input costs.
- Avoidance of an undesirable high nitrate status during fruit maturation (with adverse effects on fruit quality and disease susceptibility).
- Reduced carbon footprint for produce.
- Improved soil health and long term fertility.

KEY RESULTS

The independent replicated trial in irrigated tomato showed:

- Two applications of TwinN with 50% of the standard N topdressings after the same standard 'at-plant' fertiliser application gave an equivalent fruit weight and fruit number per plant as the 100% standard fertiliser program.
- Decreased inputs of expensive calcium nitrate and potassium nitrate fertilisers made use of TwinN very cost effective.
- Application of TwinN to the crop by trickle tape irrigation was convenient and effective.
- The TwinN and N fertiliser response seen in the trial indicates that a reduction in post-plant N fertiliser to 65% of standard, plus TwinN applied twice to the crop, is likely to provide increases in yield with reduced input costs for producers.

TREATMENTS

Table 1: Summary of the treatments tested in the trial

Treatment No.	Treatment
1	Standard Practice (Base fertiliser + 100% nitrogen)
2	Base fertiliser + 50% nitrogen + 2 applications of TwinN
3	Base fertiliser + 25% nitrogen + 2 applications of TwinN

Details of fertiliser and TwinN applications are presented below.

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RESULTS

Fruit weight and number were recorded over five sequential harvests for the three treatments.

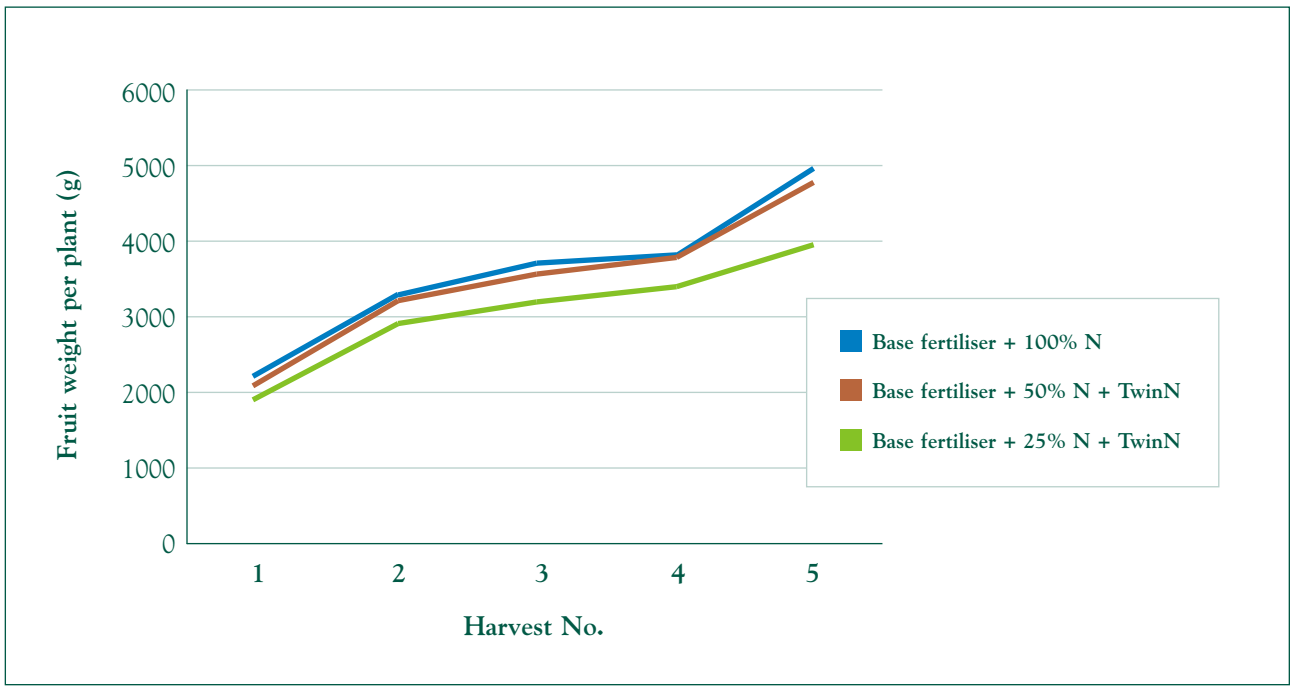

Figure 1: Cumulative fruit weight per plant over five sequential harvests from three treatments

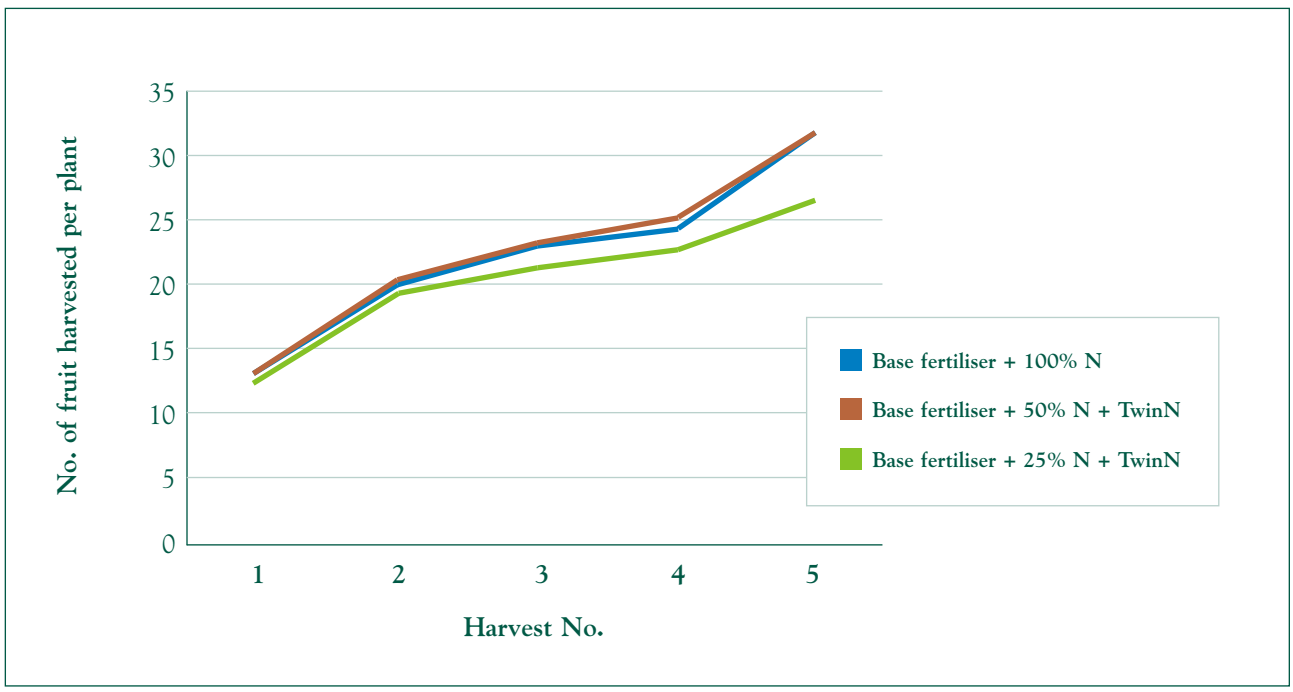

Figure 2: Cumulative fruit number per plant over five sequential harvests from three treatments

Treatment 2, TwinN and 50% post-plant N, gave statistically equivalent harvested fruit weights and fruit numbers per plant compared to Treatment 1, the 100% standard grower program, over the course of the five harvests during the season. Treatment 3, TwinN and 25% post-plant N, gave significant decreases in harvested fruit weight and number per plant compared to the grower

standard. This treatment showed the effect of too much reduction of N fertiliser on yield.

These results show that the TwinN applications were able to supply sufficient nitrogen and stimulation from Plant Growth Factors (PGFs) to the crop to enable a significant reduction in N fertiliser and decreased input costs. Growers have the option of using a smaller decrease in the post-plant N applications to around 65% of standard (rather than the 50% used in this trial) to target yield increases using TwinN technology.

Table 2: Cost of post-plant nitrogen fertilisers in different treatments

Fertiliser	Applied 100%: kg/ha	100% fertiliser: $/ha	Applied 50%: kg/ha	50% fertiliser: $/ha
Calcium nitrate	125	122.50	62.5	61.25
Potassium nitrate	187.5	345.00	93.75	172.50
Total		467.50		233.75

Based on current prices in Australia for calcium nitrate (A$1.00/kg) and potassium nitrate (A$1.85/kg).

Use of TwinN enabled large reductions in the amount of calcium nitrate and potassium nitrate as the fruit matured and ripened. This is beneficial for growers who are concerned with the effects of excess nitrates on fruit quality. TwinN microbes supply N in ammonium form. Several quality parameters were measured in this trial, including shelf life and firmness, and no differences were found between treatments.

The reductions in nitrogen fertiliser applications available from use of TwinN in horticultural crops such as tomato also provide reduced carbon footprint for produce (see Carbon Footprint at www.mabiotec.com) and reduced leaching of nitrates into aquifers and waterways.

TRIAL SUMMARY

Trial Details

Location Peracto North Qld Research Farm, Bowen QLD 4805
Soil type Sandy clay loam
Crop Tomato
Variety Pinnacle
Trial design Randomised complete block
Replications 4
Plot size 1 row x 15 m
Plant spacing 40 cm
Row spacing 1.5 m
Plant density 16,668 plants/ha
Planting date 14/08/09
Harvest dates 29/10/09, 4/11/09, 9/11/09, 13/11/09, 17/11/09
Irrigation type Subsurface trickle irrigation under plastic mulch

TwinN Applications

Date & Application	Days after planting	Times of day	Temperature (°C)	Crop stage	Soil moisture
First Application: 14.8.09	At transplant	8.30am - 9.10am	21.0	Seedling at transplant	Moist
Second Application: 31.8.09	17	8.30am - 9.10am	23.7	Initial flowering	Moist

Equipment

Dosatron proportional liquid dispenser connected to trickle tape laid at a depth of approximately 7.5 cm below the soil surface.

Application Volume

2 L of TwinN treatment solution.

Method

Twin N treatments were prepared as per manufacturer's instructions and mixed with 2 L of water. The irrigation ran for one hour prior to the injection of the treatments. The treatment preparation was applied during the next hour period and then the irrigation continued for another six hours after the treatment preparation had all been applied, giving a total of eight hours of irrigation.

Table 3: Nutrient treatments in 50% N treatment plus TwinN

				Fert. Analysis (%)					Applied Nutrient (kg/ha)					Cumulative Total (kg/ha)				
Week	Application	Product	Rate (kg/ha)	N	P	K	S	Ca	N	P	K	S	Ca	N	P	K	S	Ca
Planting	Base	CK88	600	15.4	3.0	11.0	15.4	0.0	92.4	18.0	66.0	92.4	0.0	92.4	18.0	66.0	92.4	0.0
2	Trickle	Calcium nitrate	31.25	15.5	0.0	0.0	0.0	18.8	4.84	0.0	0.0	0.0	5.88	97.2	18.0	66.0	92.4	5.88
2	Trickle	Gypsum	15	0.0	0.0	0.0	19.0	42.0	0.0	0.0	0.0	2.85	6.3	97.2	18.0	66.0	95.3	12.2
4	Trickle	Calcium nitrate	31.25	15.5	0.0	0.0	0.0	18.8	4.84	0.0	0.0	0.0	5.88	102	18.0	66.0	95.3	18.1
4	Trickle	Gypsum	15	0.0	0.0	0.0	19.0	42.0	0.0	0.0	0.0	2.85	6.3	102	18.0	66.0	98.1	24.4
6	Trickle	Potassium nitrate	31.25	13.0	0.0	38.3	0.0	0.0	4.06	0.0	12.0	0.0	0.0	106	18.0	78.0	98.1	24.4
6	Trickle	Potassium sulphate	50	0.0	0.0	42.0	17.9	0.0	0.0	0.0	21.0	8.95	0.0	106	18.0	99.0	107	24.4
8	Trickle	Potassium nitrate	31.25	13.0	0.0	38.3	0.0	0.0	4.06	0.0	12.0	0.0	0.0	110	18.0	111	107	24.4
8	Trickle	Potassium sulphate	50	0.0	0.0	42.0	17.9	0.0	0.0	0.0	21.0	8.95	0.0	110	18.0	132	116	24.4
10	Trickle	Potassium sulphate	62.5	0.0	0.0	42.0	17.9	0.0	0.0	0.0	26.3	11.2	0.0	110	18.0	158	127	24.4
12	Trickle	Potassium nitrate	31.25	13.0	0.0	38.3	0.0	0.0	4.06	0.0	12.0	0.0	0.0	114	18.0	170	127	24.4
14	Trickle	Potassium sulphate	62.5	0.0	0.0	42.0	17.9	0.0	0.0	0.0	26.3	11.2	0.0	114	18.0	196	138	24.4