



REPORT: MICROSOIL LIQUID FERTILIZERS

TITLE: PLANT HEALTH AND YIELD IN ZUCCHINIS

AUTHOR: PETER O'CONNELL & MELINDA EVERETT

CLIENT: MICROSOIL PTY LTD

CLIENT PROTOCOL ID: ZUCCHINI-2013

DATE: 6 SEPTEMBER 2013

REPORT STATUS: FINAL

VALENCIA PROJECT NO.: MSL2013-001

SUMMARY:

- Zucchini variety Regal Black was grown under typical commercial conditions at Farnsfield during the period April – June, 2013.
- MICROSOIL liquid fertilizer seemed to provide improved early plant vigour and maturity.
- The part standard grower plus MICROSOIL fertilizer programme provided the same number of fruit and the same fruit yield as the standard grower programme.
- The part standard grower plus MICROSOIL fertilizer programme appeared to provide an improvement in fruit quality with more premium fruit and less second grade and rubbish fruit than the standard treatment.
- The standard grower programme and the part standard grower plus MICROSOIL fertilizer programme produced the equivalent of 8.5t/ha over three picks.
- The part standard grower plus MICROSOIL fertilizer programme cost \$325/ha less than the standard grower programme as not all of the “standard grower” fertiliser was used in this treatment hence the cost saving/ha.

Key words: *zucchini, yield, quality, cost, MICROSOIL, fertiliser, pests, disease*

AIMS:

- 1) To determine the efficacy of MICROSOIL liquid fertilizers in zucchinis as compared to a standard fertilizer program of soluble fertilizers.
- 2) To evaluate pest and disease pressure in MICROSOIL treatments as compared to a standard fertilizer treatment.
- 3) Are MICROSOIL products able to be incorporated into the producer’s standard fertilizer program?
- 4) Do MICROSOIL products increase the yield and or quality in zucchini’s?

METHODS:

ASSESSMENT TYPE:

Crop Vigour: Crop vigour was to be assessed by rating plant size and biomass relative to the most vigorous plot. Vigour is expressed as percentage, where the most vigorous plot = 100%.

Crop Mortality: Seedling mortality or missing seedlings was counted within each plot. Each plot was planted with 60 seedlings and the percentage of dead or missing seedlings was calculated.

Plant Size: The number of small plants per plot was determined subjectively by visual assessment and the percentage of small plants calculated.

Growth Stage: The growth stage of zucchini was established for each plot, at each evaluation and recorded according to the BBCH growth scale using the 3-digit code. Note that for cucurbit crops the 300's and 400's are omitted on the growth scale.

Crop Monitoring for Pest and Disease: The treatments were monitored using 10 sites (plants) per treatment and 5 leaves per plant. Pest, eggs and larvae that are recorded as per plant are counted regardless of where they are found on the plant and the total number found is reported.

Pest, eggs, larvae and disease that are in the five leaf count are expressed as a percentage. Five leaves from different levels from different levels on the plant are selected. The underside and topside of the leaf is examined. If any pest eggs, larvae and disease are found on these leaves they are expressed as a percentage on the basis of presence or absence and the severity (number) is not necessarily recorded.

Plant Tissue Analysis: Plant samples were collected and samples were sent via courier to SESL for analysis. From each plot 5 leaves were taken including one lower leaf, two middle leaves and two youngest fully extended leaves.

Zucchini yield and quality: All plants per plot were used to measure crop yield. Fruit was collected on 3 occasions over an eight day period. Fruit of marketable size and maturity was picked and counted. Fruit was graded into premiums, seconds and rubbish and the number in each category counted. Marketable and unmarketable (rubbish) fruit were weighed separately. Cumulative fruit number and yield was calculated.

STATISTICAL ANALYSIS:

Analysis of variance (ANOVA) was used for comparing means of treatments. Following convention, means followed by same letter do not significantly differ ($P=0.05$, LSD). Where it seemed a treatment difference may exist, but this was not proven with $P=0.05$ LSD, then $P=0.1$ LSD was also tested. If there was still no significant difference between treatments results were presented at the $P=0.05$, LSD for the purpose of consistency of presentation. Where appropriate, data transformations have been applied to non-homogeneous data.

Client: MICROSOIL Client Protocol ID: Zucchini-2013 Project No. MSL2013-001 Date: 6 September 2013	Valencia Ecosystems Pty Ltd, P.O. Box 5098, South Turrumurra 2074. NSW, AUSTRALIA
---	--

PRODUCT DETAILS:

STANDARD FERTILIZERS

Product/Trade Name	Supplier	% (w/w)												
		N	P	K	Ca	Mg	S	B	Cu	Fe	Mn	Mo	Zn	
Calcium Nitrate	Grow Force	15.5			19									
Entec Nitrophoska Blue	Incitec Pivot	12	5.2	14.1	4.3	1.2	6	0.02						0.01
Flowfeed BM7	Grow Force	12.4	16.9	12.3			0.6	0.02	.007	0.1	0.05	.002		0.02
Magnesium Sulphate	Grow Force					9.6	12.4							
Micro Mix NS	Rutec	5					4.6	0.77	1	3	2	0.05		3
Potassium Nitrate	Haifa	13		46										
Super Growth	Katek	3.5	1.85	4	5.15	0.68	2.3							

MICROSOIL FERTILIZERS

Fertilizer	N	P	K	Ca	Mg	S	Zn
Calcium and Zinc		0.2	0.1	0.5			0.3
Crop Starter	4.5	5.5	2.4			1.0	
N-Plus	12					4.5	
Protein Nitrogen	26						
Easy Cal	6			9			
Easy KS			12			15	

Client: MICROSOIL Client Protocol ID: Zucchini-2013 Project No. MSL2013-001 Date: 6 September 2013	Valencia Ecosystems Pty Ltd, P.O. Box 5098, South Turrumurra 2074. NSW, AUSTRALIA
---	--

TREATMENTS:

Trt No.	Treatment	Application Rate
1	Grower Standard Fertilizers	Grower rate
2	Part Grower Standard Fertilizers plus MICROSOIL Liquid Fertilizers	part rate T1 part rate T3
3	MICROSOIL Liquid Fertilizers	MICROSOIL rate

Fertilizer application dates and rates applied are provided in the appendices

SITE DETAILS:

Co-operator: Steve Hawkey
Field Site: McDonalds Rd,
City: Farnsfield
State: Queensland
Country: Australia

DESIGN:

Plot Width, Unit: 1.5 m **Experimental Unit:** 1 Plot
Plot Length, Unit: 30 m **Study Design:** Randomised Complete Block
Plot Area, Unit: 45 m² **Untreated** Single control randomised in each
Replications: 3 **Arrangement:** block
Treatments: 3

DESCRIPTION OF CROP & ENVIRONMENTAL CONDITIONS

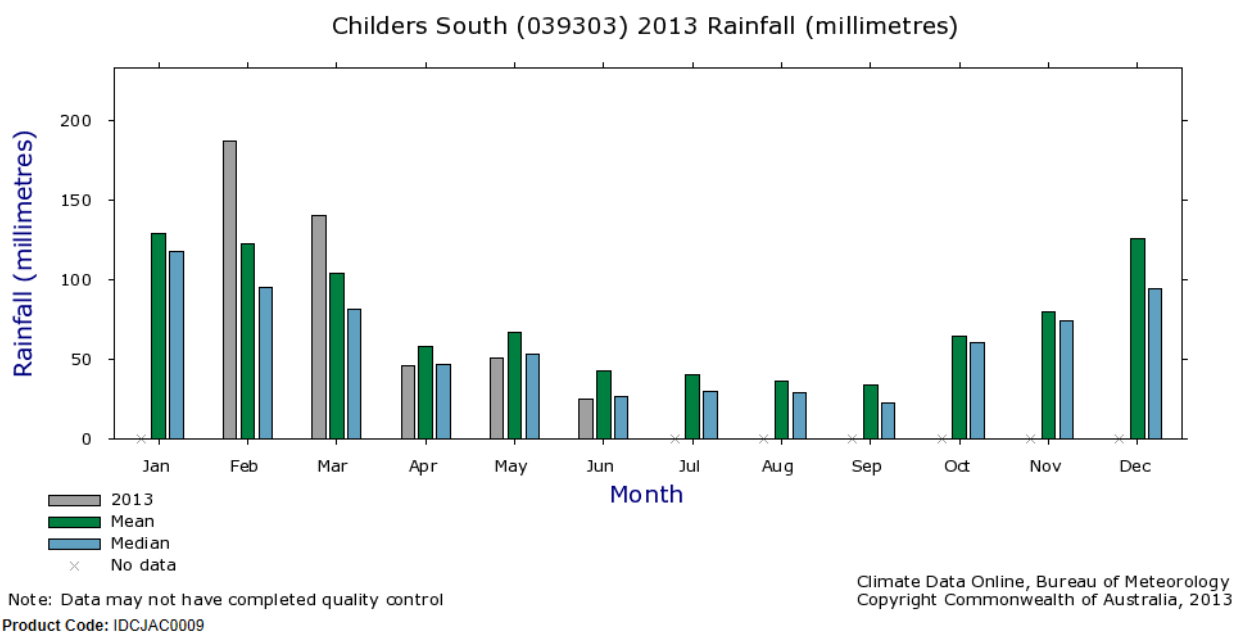
DESCRIPTION OF CROP AND PLANTING:

Crop zucchini
Variety Regal Black
Planting date, nursery 24-Apr-13
Transplanting date, field 6-May-13
Row spacing 1.5 m
Plant spacing within row: 50 cm
Plants per hectare 13,400

DESCRIPTION OF ENVIRONMENTAL CONDITIONS:

Rainfall was well above average for January to March. Rainfall for the period of the trial April to June was very close to the median and therefore could be considered to represent 'typical' conditions for the time of year.

FIGURE I: CHILDERS 2013 RAINFALL COMPARED TO LOCALITY MEAN AND MEDIAN RAINFALL



SOIL TYPE:

The soil was sand.

Client: MICROSOIL Client Protocol ID: Zucchini-2013 Project No. MSL2013-001 Date: 6 September 2013	Valencia Ecosystems Pty Ltd, P.O. Box 5098, South Turrumurra 2074. NSW, AUSTRALIA
---	--

APPLICATION INFORMATION:

Application Timing:	Pre-plant		At transplanting	
Application Date:	29-April	1-May	6-May	6-May
Application Method:	broadcast not-incorporated	SDI	water wheel	SDI
Application Placement:	soil	soil	soil	soil
Applied By:	Everett M			

Application Timing:	After transplanting
Application Date:	8-May to 27-June
Application Method:	SDI
Application Placement:	soil
Applied By:	Everett M

IRRIGATION INFORMATION:

Type:	SDI (Subsurface Drip Irrigation)
Brand:	Netafim 22100FL
Operating pressure:	0.8-1.2 bar
S-SDI layout:	Single trickle line and zucchini transplanted to the side at 5-10cm
Emitter spacing:	0.3 m
Flow rate:	3.5 LPH/M (1.05 LPH/emitter)
Irrigation schedule:	Irrigation was applied as required

Client: MICROSOIL Client Protocol ID: Zucchini-2013 Project No. MSL2013-001 Date: 6 September 2013	Valencia Ecosystems Pty Ltd, P.O. Box 5098, South Turrumurra 2074. NSW, AUSTRALIA
---	--

CHRONOLOGY OF EVENTS:

Date of event	Days from transplanting	Activity	Details
		plant	Mon Repos nursery
29-Apr	-7	fertilize	Pre-plant, all treatments
1-May	-5	fertilize	Pre-plant MSL fertilizers through irrigation
6-May	0	transplant fertilize & irrigate	MSL fertilizers for week-1
8-May	2	fertilize & irrigate	week-1
10-May	4	assessment fertilize & irrigate	growth stage, mortality, vigour week-1
16-May	10	fertilize & irrigate	week-2
17-May	11	assessment fertilize & irrigate	growth stage, mortality, vigour week-2
23-May	17	fertilize & irrigate	week-3
24-May	18	assessment	growth stage, mortality, vigour
31-May	25	assessment fertilize & irrigate	growth stage, vigour week-4
4-Jun	29	fertilize & irrigate	week-5
6-Jun	31	assessment fertilize & irrigate	growth stage, plant size, vigour week-5
7-Jun	32	assessment	crop monitoring for pests and diseases
10-Jun	35	fertilize & irrigate	week-6
11-Jun	36	tissue test	sample for plant tissue analysis
13-Jun	38	assessment fertilize & irrigate	crop monitoring for pests and diseases growth stage, vigour week-6
17-Jun	42	fertilize & irrigate	week-7
20-Jun	45	assessment fertilize & irrigate	growth stage, vigour, yield week-7
24-Jun	49	assessment fertilize & irrigate	yield week-8
27-Jun	52	assessment fertilize & irrigate	vigour week-8
28-Jun	53	assessment	yield

Client: MICROSOIL Client Protocol ID: Zucchini-2013 Project No. MSL2013-001 Date: 6 September 2013	Valencia Ecosystems Pty Ltd, P.O. Box 5098, South Turrumurra 2074. NSW, AUSTRALIA
---	--

RESULTS:

CROP MORTALITY AND VIGOUR

There was no difference in seedling survival between the treatments. A few plants had been taken out by birds and these were replaced with seedlings from the original seedling trays. MICROSOIL liquid fertilizer seemed to provide improved early plant vigour and maturity.

TABLE 1: THE PERCENTAGE OF SEEDLING MORTALITY UP TO 18 DAYS AFTER TRANSPLANTING

Rating Date: Transplant-Evaluation Interval (days): Treatment	10-May	17-May	24-May
1 Standard	0 a	0 a	0 a
2 Part Standard plus MICROSOIL	0 a	2.2 a	2.2 a
3 MICROSOIL	0 a	0.6 a	1.7 a
LSD (P=.05)	0	2.95	3.67
Standard Deviation	0	1.3	1.62
CV	0	139.35	124.67

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

TABLE 2: ZUCCHINI PLANT VIGOUR AS A PERCENTAGE OF THE MOST VIGOROUS PLOT

Rating Date: Transplant-Evaluation Interval (days): Treatment	10-May	17-May	24-May	31-May	6-Jun	13-Jun	20-Jun	27-Jun
1 Standard	100 a	97 a	97 a	95 a	93 a	98 a	98 a	98 a
2 Part Standard plus MICROSOIL	100 a	98 a	97 a	97 a	97 a	98 a	98 a	98 a
3 MICROSOIL	100 a	100 a	100 a	100 a	100 a	100 a	95 a	93 a
LSD (P=.05)	0	4.6	7.6	7.6	9.3	6	6	6.5
Standard Deviation	0	2	3.3	3.3	4.1	2.6	2.6	2.9
CV	0	2.08	3.41	3.43	4.22	2.66	2.71	2.99

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

Client: MICROSOIL Client Protocol ID: Zucchini-2013 Project No. MSL2013-001 Date: 6 September 2013	Valencia Ecosystems Pty Ltd, P.O. Box 5098, South Turrumurra 2074. NSW, AUSTRALIA
---	--

SMALL ZUCCHINIS

MICROSOIL liquid fertiliser seemed to improve the size of zucchinis.

TABLE 3: THE PERCENTAGE OF SMALL ZUCCHINI PLANTS/PLOT

Rating Date: Transplant-Evaluation Interval (days): Treatment		6-Jun
1	Standard	26 a
2	Part Standard plus MICROSOIL	16 a
3	MICROSOIL	9 a
LSD (P=.05)		23.1
Standard Deviation		10.2
CV		60.85

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

TABLE 4: AVERAGE GROWTH STAGE OF ZUCCHINI (BBCH SCALE)

Rating Date: Transplant-Evaluation Interval (days): Treatment	10-May	17-May	24-May	31-May	6-Jun	13-Jun	20-Jun
1 Standard	102 a	104 a	501 a	535 ^o a	601 a	602 b	801 a
2 Part Standard plus MICROSOIL	102 a	104 a	369 ^o a	568 ^o a	602 a	602 b	801 a
3 MICROSOIL	102 a	104 a	501 a	601 a	603 a	701 a	801 a
LSD (P=.05)	0	0	299.2	129.9	1.5	0.8	0
Standard Deviation	0	0	132	57.3	0.7	0.3	0
CV	0	0	28.88	10.09	0.11	0.05	0

^oNot a growth stage *per se*, but a mean of the 3-digit code for 3 replicates

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

Description of growth scale used in Table 4

BBCH 3 digit code	Description of growth stage	
102	Leaf development	Two true leaves on main stem unfolded
104		Four true leaves on main stem unfolded
201	Formation of side shoots	First primary side shoot visible
<i>Note that 300's and 400's are excluded in the cucurbit growth scale</i>		
501	Inflorescence emergence	First flower with elongated ovary visible on main stem
601	Flowering	First flower open on main stem
602		Second flower open on main stem
603		Third flower open on main stem
701	Development of fruit	First fruit on main stem has reached typical size and shape
801	Ripening of fruit	10% of fruit show typical fully ripe colour

TABLE 5: PERCENTAGE INCIDENCE OF SILVERLEAF WHITEFLY ON 10 PLANTS/50 LEAVES

Rating Date: Transplant-Evaluation Interval (days): Pest Stage: Treatment	7-Jun		13-Jun	
	nymph	adult	nymph	adult
1 Standard	0	42	0	64
2 Part Standard plus MICROSOIL	2	36	0	26
3 MICROSOIL	2	28	2	72

TABLE 6: PERCENTAGE INCIDENCE DOWNY MILDEW ON 10 PLANTS/50 LEAVES AND HELIOTHIS EGGS ON 10 PLANTS

Pest: Rating Type: Rating Scale: Rating Date: Transplant-Evaluation Interval (days): Treatment	Downy mildew Incidence percentage		Heliothis egg Count number	
	7-Jun	13-Jun	7-Jun	13-Jun
1 Standard	1	4	0	1
2 Part Standard plus MICROSOIL	1	13	0	1
3 MICROSOIL	3	7	0	1

Client: MICROSOIL Client Protocol ID: Zucchini-2013 Project No. MSL2013-001 Date: 6 September 2013	Valencia Ecosystems Pty Ltd, P.O. Box 5098, South Turrumurra 2074. NSW, AUSTRALIA
---	--

TABLE 7: ZUCCHINI PLANTS WITH HARVESTABLE FRUIT PER/PLOT

Rating Date: Transplant-Evaluation Interval (days): Treatment	20-Jun	24-Jun	28-Jun	Average
45	45	49	53	45 to 53
1 Standard	26.7 a	53 a	51.3 a	43.7 a
2 Part Standard plus MICROSOIL	25.3 a	50.3 a	48.3 a	41.3 a
3 MICROSOIL	20.3 a	40.3 b	31 b	30.6 b
LSD (P=.05)	9.78	9	13.71	9.15
Standard Deviation	4.31	3.97	6.05	4.04
CV	17.89	8.29	13.89	11.93

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

TABLE 8: NUMBER OF ZUCCHINI FRUIT PER/PLOT

Rating Date: Transplant-Evaluation Interval (days): Treatment	20-Jun	24-Jun	28-Jun	Average
45	45	49 ^a	53	45 to 53
1 Standard	28 a	77.3 a	80.7 a	186 a
2 Part Standard plus MICROSOIL	28 a	84.7 a	73.7 a	186.3 a
3 MICROSOIL	20.3 a	40.3 b	37 b	115.3 b
LSD (P=.05)	13.14	32.35	13.71	2.15t
Standard Deviation	5.8	14.27	6.05	0.95t
CV	22.78	19.46	13.89	7.49

^a Failed Bartlett's test for homogeneity

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

t= Analysis performed on square root transformed data

FRUIT QUALITY

There was an improvement in fruit quality noted with the Standard plus MICROSOIL treatments.

TABLE 9: NUMBER OF ZUCCHINI FRUIT PER/PLOT

Treatment	Premium	Grade-2	Rubbish
1 Standard	129.3 a	45 a	11.7 a
2 Part Standard plus MICROSOIL	143 a	33.7 b	9.7 a
3 MICROSOIL	78.7 b	28.3 b	8.3 a
LSD (P=.05)	47.42	6.67	12.33
Standard Deviation	20.92	2.94	5.44
CV	17.88	8.25	55.03

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

Client: MICROSOIL Client Protocol ID: Zucchini-2013 Project No. MSL2013-001 Date: 6 September 2013	Valencia Ecosystems Pty Ltd, P.O. Box 5098, South Turrumurra 2074. NSW, AUSTRALIA
---	--

TABLE 10: WEIGHT (KG/PLOT) OF MARKETABLE & UNMARKETABLE ZUCCHINI FRUIT

Rating Date: Transplant-Evaluation Interval (days): Treatment	Marketable				Unmarketable			
	20-Jun	24-Jun	28-Jun	Total	20-Jun	24-Jun	28-Jun	Total
	45	49	53	45 to 53	45	49	53	45 to 53
1 Standard	3.2 a	7.1 a	9 a	19.3 a	0.2 a	0.6 a	0.6 a	1.4 a
2 Part Standard plus MICROSOIL	2.9 a	8.4 a	7.5 a	18.8 a	0.1 a	0.5 a	0.3 a	0.9 a
3 MICROSOIL	2.4 a	5.4 a	3.8 b	11.5 b	0.1 a	0.5 a	0.2 a	0.7 a
LSD (P=.05)	1.57	3.04	3.16	5.29	0.36	0.6	0.63	1.46
Standard Deviation	0.69	1.34	1.39	2.33	0.16	0.26	0.28	0.64
CV	24.4	19.3	20.63	14.1	129.71	52.48	71.58	63.2

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

TABLE 11: COST OF FERTILIZER PROGRAMMES

Treatment	Cost	
	\$/ha	% of the standard programme
1 Standard	\$2,271.42	100.00%
2 Part Standard plus MICROSOIL	\$1,946.70	85.70%
3 MICROSOIL	\$2,180.80	96.01%

DISCUSSION:

GENERAL:

A very wet summer preceded the planting of the trial. Rainfall conditions returned to normal for the period April through to June. Zucchini variety Regal Black from Seminis® was planted as this is the variety grown on this farm commercially.

ZUCCHINI GROWTH AND VIGOUR:

A few plants were taken by birds shortly after transplanting and these were replaced. There was no treatment effect on seedling survival or mortality.

For the period from transplanting (6-May) until flowering (13-Jun) the MICROSOIL Liquid fertilizer treatment (T3) appeared to result in superior plant vigour and plant development (Table 2 & Table 4). The number of small plants were assessed on 6-Jun (31 days after transplanting) and there was a lesser number of small plants in the MICROSOIL only fertilizer treatment (Table 3). Differences were generally not statistically different at $p=0.05$ LSD, with the exception of plant growth stage on 13-June (Table 4). Melinda reported more flowers within T3 on 12-June, 37 days after transplanting.

PEST MONITORING:

Pests were checked on 10 plants per treatment, across the three replicates. The main pests identified were Silverleaf whitefly (SLW), Heliothis and Downy mildew (Tables 5 & 6). The early assessment for SLW suggested lower incidence of SLW adults with the MICROSOIL fertilizer treatments (T2 and T3) compared to the standard treatments, T1 (Table 5).

ZUCCHINI YIELD AND QUALITY:

The standard grower fertilizer treatment (T1) and the mixture of standard plus MICROSOIL fertilizer treatment (T2) produced 186 fruit per plot and this was significantly ($p=0.05$, LSD) more than the MICROSOIL alone treatment, T3 (Table 8). T2 had a higher number of premium fruit (not statistically significant) and a significantly lesser number of Grade-2 fruit ($p=0.05$, LSD) compared to T1. T2 also seemed to have less rubbish fruit than T1 (Table 9).

The yield of marketable fruit from T1 and T2 was almost identical, approximately 19 kg/plot (8.5 t/ha). The yield from the MICROSOIL fertilizer (T3) was significantly less than T1 and T2.

ZUCCHINI FERTILIZER PROGRAMME COST:

The part standard plus MICROSOIL fertilizer treatment -T2 cost 14% less than the standard grower fertilizer treatment -T1 (Table 11), based on prices supplied by a fertiliser supplier and MICROSOIL. The MICROSOIL fertilizer -T3 cost 4% less than the standard fertilizer treatment (T1). Details of treatment costs are supplied in the Appendices, Table 13.

CONCLUSION:

Zucchini variety Regal Black was grown under typical commercial conditions at Farnsfield (near Bundaberg) in the period April – June, 2013. Rainfall was close to median and irrigation was applied as needed. Except for the pre-plant fertilizers, the treatments were placed through the sub-surface trickle irrigation. A standard grower fertilizer regime (T1) was compared to MICROSOIL only fertilizer (T3) and a mixture of part standard fertilizer plus MICROSOIL fertilizer (T2).

The MICROSOIL only fertilizer seemed to provide improved early plant vigour and maturity. However the total rate of fertilizer applied was most likely insufficient and this treatment failed to fill much of the fruit that had initiated.

The part standard + MICROSOIL fertilizer programme provided the same number of fruit and the same fruit yield as the standard grower programme. There was an improvement in fruit quality with the part standard + MICROSOIL fertilizer programme, with more premium fruit and less second grade and rubbish fruit than the standard treatment. Both treatments yielded close to 8.5t/ha over three picks.

Importantly while providing similar yield and improved quality to the standard fertilizer programme, the part standard plus MICROSOIL fertilizer treatment (T2) cost 14% less (\$325/ha) than the standard grower fertilizer treatment (T1).

The MICROSOIL fertiliser treatments provided benefits, but further application rate optimisation may see greater benefits achieved.

APPENDICES:

TABLE 12: SITE FERTILIZER RECORDS, RATE/HA

Timing	Date	Day	Treatment # Treatment description Product	1 Standard	2 Standard + MICROSOIL	3 MICROSOIL
Pre-plant	29-Apr	-7	Nitrophoska Blue	450	450	300
			Super Growth	250	250	150
	01-May	-5	Protein Nitrogen		20	40
			Crop Starter		20	40
At transplant (water wheel)	06-May	0	BM7	5 g/m		
			Crop Starter		10	10
At transplant (SDI)	06-May	0	Crop Starter		10	10
			Calcium + Zinc		20	20
Week 1	08-May or 10-May	2 or 4	Calcium nitrate	12.5		
			Magnesium sulphate	12.5		
			Potassium nitrate	12.5		
			Micro mix	10		
Week 2	16-May or 17-May	10 or 11	Calcium nitrate	12.5		
			Magnesium sulphate	12.5	25	25
			Potassium nitrate	12.5	25	
			Micro mix	10		
			Crop Starter		10	5
Calcium + Zinc		20	20			
Week 3	23-May- 13	17	Calcium nitrate	12.5		
			Magnesium sulphate	12.5	25	
			Potassium nitrate	12.5	25	
			Micro mix	10		
			Crop Starter		10	
			Calcium + Zinc		20	20
N-Plus		10	20			
Week 4	31-May- 13	25	Calcium nitrate	25	25	
			Magnesium sulphate	25	25	25
			Potassium nitrate	25	25	
			Micro mix	10		
			Crop Starter		10	5
			Easy Cal			30
			Easy KS			30

Timing	Date	Day	Treatment # Treatment description Product	1 Standard	2 Standard + MICROSOIL	3 MICROSOIL
			N-Plus		10	20
Week 5	04-Jun-13 or 06-Jun-13	29 or 31	Calcium nitrate	25	25	
			Magnesium sulphate	25	25	
			Potassium nitrate	25	25	
			Micro mix	10		
			Crop Starter		5	5
			Calcium + Zinc			10
			Easy Cal			30
			Easy KS			30
			N-Plus		10	20
Week 6	10-Jun-13 or 13-Jun-13	35 or 38	Calcium nitrate	25		
			Magnesium sulphate	25		
			Potassium nitrate	25		
			Micro mix	10		
			Crop Starter		5	5
			Calcium + Zinc			10
			Easy Cal			60
			Easy KS			80
			N-Plus		10	40
Week 7	17-Jun-13 or 20-Jun-13	42 or 45	Calcium nitrate	25	25	
			Magnesium sulphate	25	25	
			Potassium nitrate	25	25	
			Micro mix	10		
			Crop Starter		5	5
			Calcium + Zinc			10
			Easy Cal			60
			Easy KS			60
			N-Plus			40
Week 8	24-Jun-13 or 27-Jun-13	49 or 52	Calcium nitrate	25		
			Magnesium sulphate	25		50
			Potassium nitrate	25		
			Micro mix	10		
			Crop Starter		5	5
			Calcium + Zinc		10	10
			Easy KS			100
			N-Plus			100

Client: MICROSOIL Client Protocol ID: Zucchini-2013 Project No. MSL2013-001 Date: 6 September 2013	Valencia Ecosystems Pty Ltd, P.O. Box 5098, South Turrumurra 2074. NSW, AUSTRALIA
---	--

TABLE 13: COST OF FERTILIZER PROGRAMMES, \$/HA

Timing	Treatment 1: Standard programme				Treatment 2: Standard plus Microsoil programme				Treatment 3: Microsoil programme			
	Fertilizer	Rate/ha (L-Kg)	\$/ha	Sum \$/ha	Fertilizer	Rate/ha (L-Kg)	\$/ha	Sum \$/ha	Fertilizer	Rate/ha (L-Kg)	\$/ha	Sum \$/ha
Preplant	Nitrophoska Blue	450	\$540.00	\$967.50	Nitrophoska Blue	450	\$540.00	\$1,047.50	Nitrophoska Blue	300	\$360.00	\$662.50
	Super Growth	250	\$427.50		Super Growth	250	\$427.50		Super Growth	150	\$142.50	
					Protein Nitrogen	20	\$23.00		Protein Nitrogen	40	\$46.00	
					Crop Starter	20	\$57.00		Crop Starter	40	\$114.00	
At Trans-planting & Week 1	BM7	33.3	\$92.67	\$208.92	Crop Starter	30	\$83.50	\$126.50	Crop Starter	20	\$57.00	\$100.00
	Potassium nitrate	12.5	\$18.75		Calcium + Zinc	20	\$43.00		Calcium + Zinc	20	\$43.00	
	Magnesium sulphate	12.5	\$20.00									
	Calcium nitrate	12.5	\$17.50									
	Micro mix	10	\$60.00									
Week 2	Potassium nitrate	12.5	\$18.75	\$116.25	Calcium + Zinc	20	\$21.50	\$127.50	Crop Starter	5	\$14.25	\$97.25
	Magnesium sulphate	12.5	\$20.00		Potassium nitrate	25	\$37.50		Calcium + Zinc	20	\$43.00	
	Calcium nitrate	12.5	\$17.50		Magnesium sulphate	25	\$40.00		Magnesium sulphate	25	\$40.00	
	Micro mix	10	\$60.00		Crop Starter	10	\$28.50					
Week 3	Potassium nitrate	12.5	\$18.75	\$116.25	Potassium nitrate	25	\$37.50	\$161.20	Calcium + Zinc	20	\$43.00	\$67.40
	Magnesium sulphate	12.5	\$20.00		Magnesium sulphate	25	\$40.00		N-Plus	20	\$24.40	
	Calcium nitrate	12.5	\$17.50		Calcium + Zinc	20	\$43.00					
	Micro mix	10	\$60.00		N-Plus	10	\$12.20					
					Crop Starter	10	\$28.50					
Week 4	Potassium nitrate	25	\$37.50	\$172.50	Calcium nitrate	25	\$35.00	\$153.20	Crop Starter	5	\$14.25	\$168.65
	Magnesium sulphate	25	\$40.00		Potassium nitrate	25	\$37.50		Easy Cal	30	\$48.00	
	Calcium nitrate	25	\$35.00		Magnesium sulphate	25	\$40.00		Easy KS	30	\$42.00	

Client: MICROSOIL
 Client Protocol ID: Zucchini-2013
 Project No. MSL2013-001
 Date: 6 September 2013

Valencia Ecosystems Pty Ltd,
 P.O. Box 5098,
 South Turrumurra 2074.
 NSW, AUSTRALIA

Timing	Treatment 1: Standard programme				Treatment 2: Standard plus Microsoil programme				Treatment 3: Microsoil programme			
	Fertilizer	Rate/ha (L-Kg)	\$/ha	Sum \$/ha	Fertilizer	Rate/ha (L-Kg)	\$/ha	Sum \$/ha	Fertilizer	Rate/ha (L-Kg)	\$/ha	Sum \$/ha
	Micro mix	10	\$60.00		N-Plus	10	\$12.20		Magnesium sulfate	25	\$40.00	
					Crop Starter	5	\$14.25		N-Plus	20	\$24.40	
Week 5	Potassium nitrate	25	\$37.50	\$172.50	Calcium nitrate	25	\$35.00	\$138.95	Crop Starter	5	\$14.25	\$150.15
	Magnesium sulphate	25	\$40.00		Potassium sulphate	25	\$37.50		Easy Cal	30	\$48.00	
	Calcium nitrate	25	\$35.00		Magnesium sulphate	25	\$40.00		Easy KS	30	\$42.00	
	Micro mix	10	\$60.00		N-Plus	10	\$12.20		Calcium + Zinc	10	\$21.50	
					Crop Starter	5	\$14.25		N-Plus	20	\$24.40	
Week 6	Potassium sulphate	25	\$37.50	\$172.50	N-Plus	10	\$12.20	\$26.45	Crop Starter	5	\$14.25	\$292.55
	Magnesium sulphate	25	\$40.00		Crop Starter	5	\$14.25		Easy Cal	60	\$96.00	
	Calcium nitrate	25	\$35.00						Easy KS	80	\$112.00	
	Micro mix	10	\$60.00						Calcium + Zinc	10	\$21.50	
									N-Plus	40	\$48.80	
Week 7	Potassium nitrate	25	\$37.50	\$172.50	Calcium nitrate	25	\$35.00	\$138.95	Crop Starter	5	\$14.25	\$264.55
	Magnesium sulphate	25	\$40.00		Potassium sulphate	25	\$37.50		Easy Cal	60	\$96.00	
	Calcium nitrate	25	\$35.00		Magnesium sulphate	25	\$40.00		Easy KS	60	\$84.00	
	Micro mix	10	\$60.00		N-Plus	10	\$12.20		Calcium + Zinc	10	\$21.50	
									N-Plus	40	\$48.80	
Week 8	Potassium sulphate	25	\$37.50	\$172.50	Crop Starter	5	\$14.25	\$26.45	Crop Starter	5	\$14.25	\$377.75
	Magnesium sulphate	25	\$40.00		N-Plus	10	\$12.20		Magnesium sulfate	50	\$80.00	
	Calcium nitrate	25	\$35.00						Easy KS	100	\$140.00	
	Micro mix	10	\$60.00						Calcium + Zinc	10	\$21.50	
									N-Plus	100	\$122.00	

Client: MICROSOIL Client Protocol ID: Zucchini-2013 Project No. MSL2013-001 Date: 6 September 2013	Valencia Ecosystems Pty Ltd, P.O. Box 5098, South Turrumurra 2074. NSW, AUSTRALIA
---	--

	Treatment 1: Standard programme				Treatment 2: Standard plus Microsoil programme				Treatment 3: Microsoil programme			
Timing	Fertilizer	Rate/ha (L-Kg)	\$/ha	Sum \$/ha	Fertilizer	Rate/ha (L-Kg)	\$/ha	Sum \$/ha	Fertilizer	Rate/ha (L-Kg)	\$/ha	Sum \$/ha
Overall	Standard programme			\$2,271.42	Standard plus Microsoil programme			\$1,946.70	Microsoil programme			\$2,180.80

TABLE 14: DAILY RAINFALL 2013, CHILDERS SOUTH

	Jan	Feb	Mar	Apr	May	Jun
1st	0	0	0	18.8	0	0.4
2nd	0	0	36.8	0	0	0.8
3rd	0	0	60.6	0	1.6	0.6
4th	0	0	8.6	0.6	0	0
5th	0	0	0.4	6.6	0	0
6th	0.2	0	0	0.6	0.2	0.6
7th	0	0	0.6	1.6	1.6	0
8th	0	0	4.8	1.4	1.4	0
9th	0	0	3.6	2	0.6	1.6
10th	0	4.6	0.4	0.4	1.6	2
11th	0.2	0	0	7.2	0	0.2
12th	0	0	1	0.8	1.4	0
13th	0	0	0.4	2.8	0	13.6
14th	0	0	0	1.2	12.8	0.4
15th	1.6	0	0	0	1.2	0
16th	0	13.6	0	0	0.6	0
17th	0	0.8	0	0	14.6	0
18th	0	4.6	2	1.6	0	0
19th	0	10.4	0	0.4	0	0
20th	0.6	11.6	1.8	0	0	0
21st	0	1.6	10.4	0	0	2
22nd	0	2.4	2.2	0	0	2.6
23rd	0	0	0.6	0	7.6	0
24th	4.2	4	0	0	0.4	0
25th	100.8	7.8	0	0.2	0	0
26th	101.4	71.2	0	0	0	0
27th		53.6	0	0	0	0
28th	2.2	0.8	1	0	0	0
29th	0.4		0	0	4.2	0
30th	0		0	0	0.4	0
31st	0		5.2		0.6	
Highest Daily	<i>101.4</i>	<i>71.2</i>	<i>60.6</i>	<i>18.8</i>	<i>14.6</i>	<i>13.6</i>
Monthly Total	--	<i>187.0</i>	<i>140.4</i>	<i>46.2</i>	<i>50.8</i>	<i>24.8</i>

TABLE 15: DAILY MAXIMUM & MINIMUM TEMPERATURE, 2013, BUNDABERG AIRPORT

	Apr		May		Jun	
	Min °C	Max °C	Min °C	Max °C	Min °C	Max °C
1st	20.2	28.3	17.5	27	14.2	23.2
2nd	18.6	28.9	14	28.3	12.9	25
3rd	18.6	28.5	18	25.9	13	23.1
4th	18	27.6	12.2	27.5	8.7	23.2
5th	17.5	26.8	11.4	27	13.2	24.1
6th	16.7	26.9	17.1	25	14.2	24.6
7th	18.4	22.6	16.2	25.9	14.6	24.3
8th	17.3	27.1	15.7	23.4	14.5	23.9
9th	17	27.7	14.3	24.8	16.2	25.2
10th	17.9	21.8	15.5	25.9	15.8	24.7
11th	17.4	25.5	14.6	26.1	16	25
12th	19	24.7	15.8	25.9	15.6	23.8
13th	19.2	26.2	14.9	25.8	18.5	26.1
14th	17.6	27.9	18.1	24.4	15.5	23.5
15th	18	27.7	14.9	23.9	9.3	20.5
16th	18.2	28.9	15.5	17.7	7.1	19.4
17th	18.1	29.4	11.8	22.9	10.6	21.8
18th	17.6	29.4	9.5	23.5	9.1	20.6
19th	17.5	30.1	9.7	22.3	6.1	19.1
20th	15.6	28	5.8	21.8	6.5	20.2
21st	10	26.5	8.8	21.2	13.4	15
22nd	12.2	27.2	12.1	20.2	8.4	20.3
23rd	17.8	28.6	13.3	22.6	10.5	20.1
24th	17.1	28.8	11.1	20.7	10.8	22.1
25th	17.9	29	11.7	23.7	8.4	20.4
26th	17.4	27.4	12.3	24.6	6.2	18.3
27th	16.1	27.1	14	24.7	6.2	20.7
28th	16.8	27.9	14.2	22.6	11	23.1
29th	17.2	27.9	16.1	24.4	12.5	23.5
30th	17	27.6	15	24.7	13.8	23.5
31st			14.6	24.9		

TABLE 16: PLANT TISSUE TEST RESULTS FOR MAJOR NUTRIENTS (PERCENTAGE)

Nutrient	Treatment		
	1	2	3
N	7.06	5.62	4.9
P	0.69	0.43	0.52
K	5.2	4.2	4.1
Ca	1.75	3.14	2.86
Mg	0.64	0.69	0.55
S	0.41	0.34	0.46

TABLE 17: PLANT TISSUE TEST RESULTS FOR MICRO NUTRIENTS (PPM OR MG/KG)

Nutrient	Treatment		
	1	2	3
NO3	20034	21842	2190
Fe	111	85	111
Mn	62	81	58
Zn	90	65	82
Cu	17	19	56
B	25.1	23.2	32.1
Mo			
Cl	0.78	0.61	1.28
Na	0.01	0.01	0.02