

## **Effect of APP applications to a commercial tomato crop during the 2024-25 season in Hastings, New Zealand.**

January 2025 S. Slack & R. Cox

### **Summary**

A field trial was established to assess the efficacy of foliar and soil applied phosphorus (in the form of ammonium polyphosphate, APP), as well as the effect of foliar applied products “Lono” and “Indra”. Results indicate that the application of APP did not significantly raise petiole phosphorus levels, and consequently did not have an effect on tomato yield.

### **Method**

#### **Experimental site and application details.**

An experimental area was established within a commercial potato planting of the cv “Orwell” in Tuakau, New Zealand. The commercial crop was planted on the 29 October 2024. The experimental design was a randomised complete block design (RCBD) with four treatment replicates. A total of six treatments were included in the experiment including an untreated control. Plots were one bed (1.62m) wide and 7m in length. APP applications were made in the form of “Nutri PZ” (product label in Appendix i) liquid fertiliser with two application methodologies utilised. Treatments 2, 3, and 4 were applied as foliar spray applications using a CO<sub>2</sub> powered plot sprayer using 11002 AITTJ60 teejet nozzles spaced at 30cm. The sprayer was calibrated to apply a water volume equivalent to 400L/Ha. Treatments 5 and 6 were a single application, as a banded, soil applied application to a depth of 20mm. Foliar applications began on December 5 with a total of 3 applications made at 7-10 day intervals.

17 days following the third foliar application, leaf samples were taken for petiole analysis. Ten petioles were taken from each replicate, with replicates then analysed as a bulk sample for each treatment. Analyses were conducted by Hill Labs and are reported in Appendix ii. Once the crop had reached full senescence 2m samples were harvested from each replicate, with potatoes graded based on tuber diameter. The size grades were; <30mm, 30-75mm, 75-100mm, and >100mm. Potatoes were counted and weighed from within each size grade, with final tuber counts and yields extrapolated from that.

#### **Statistical analysis**

Data were analysed using a 95% confidence interval. Analyses of variance (ANOVA) were computed using the statistical software ARM. Treatment means were separated using Duncans new multiple range test. As the LSD is computed using transformed data, comparisons of means should rely on the letters of separation, rather than the LSD value.

## Results

Results of petiole leaf analysis did not indicate an increase in petiole phosphorus levels. Yield analyses indicate that none of the treatments studied here showed any significant effect on tuber yield, number, or size distribution. It is hypothesised that in soils with excess soil available phosphorus, additional phosphorus applications have little effect on potato tuber number and yield. Additionally, it appears likely that the application methodology where phosphorus was applied in a narrow band has limited phosphorus uptake.

**Table 1:** APP treatment details

Trt	Product name	Product	Rate/ Ha	Application code
1	Untreated	-	-	-
2	Soil Applied	Nutri PZ	100L/ha	A
3	Soil Applied	Nutri PZ	200L/ha	A
4	Soil Applied	Nutri PZ + Lono	100L + 10L/ha	A
5	Soil Applied	Nutri PZ + Lono	200L + 10L/ha	A
6	Foliar	Albina + Indra	dfsgb	AB

**Table 2:** Application and assessment details

Date	Application	Growth Stage	Event
5/12/2024	A	Hook	First trial application
13/12/2024	B	Tuber initiation	Second trial application
9/01/2025	-	Tuber development	Petiole samples taken
12/03/2025	-	Crop maturity	Trial harvest

**Table 3:** Effect of APP treatments on potato tuber count and yield

Treatment	Greens (kg)	Breaks (kg)	Reds (kg)	Total Yield (kg)
1	10.45 -	5.78 -	14.175 -	30.738 ab
2	5.978 -	4.95 -	15.755 -	26.663 b
3	9.45 -	5.40 -	14.400 -	30.225 ab
4	10.38 -	5.08 -	14.975 -	31.375 a
5	10.90 -	6.83 -	13.325 -	33.538 a
6	8.90 -	7.03 -	15.575 -	31.163 a
LSD (p=0.05)	8.985	3.055	10.673	4.1199
S D	3.495	1.189	4.152	2.7336
CV	37.42	20.34	28.24	8.93
Replicate F	0.002	2.571	0.003	3.444
Replicate Prob(F)	0.9624	0.1698	0.9604	0.0439
Treatment F	0.533	1.119	0.099	2.699
Treatment Prob(F)	0.747	0.4525	0.9881	0.0622

**Table 4:** Effect of APP treatments on potato tuber size distribution

Treatment	<30mm	<30mm	30-75mm	30-75mm	75-100mm	75-100mm
	Tuber No.	Yield	Tuber No.	Yield	Tuber No.	Yield
1	0.047 -	0.1919 -	80.3 -	33.23 -	0.3 -	0.308 -
2	0.028 -	0.1159 -	74.8 -	30.350 -	0.0 -	0.000 -
3	0.036 -	0.1502 -	83.3 -	34.568 -	0.3 -	0.308 -
4	0.092 -	0.3774 -	82.0 -	32.563 -	0.3 -	0.205 -
5	0.066 -	0.2715 -	86.8 -	34.873 -	0.0 -	0.000 -
6	0.083 -	0.3409 -	79.0 -	34.258 -	1.3 -	1.543 -
LSD (p=0.05)	0.3592	1.4767	10.1141	10.0385	1.27	1.4767
S D	0.2383	0.9788	6.7107	6.6605	0.84	0.9798
CV	248.7	248.84	19.75	19.76	252.98	248.84
Replicate F	1.147	1.147	0.795	0.842	1.094	1.147
Replicate Prob(F)	0.3624	0.3624	0.5154	0.4921	0.3822	0.3624
Treatment F	1.398	1.400	0.360	0.348	1.219	1.400
Treatment Prob(F)	0.2805	0.2798	0.8681	0.8756	0.3479	0.2798

## Results

Crop Safety

Herbicide efficacy

**Future work**

## Appendix: Appendix i -Nutri PZ product label

Analysis:			
		Wt/Wt	Wt/Vol
Total Nitrogen	(N)	10.0%	136 gms/litre
Ammonia	(N)	10.0%	136 gms/litre
Phosphate	(P <sub>2</sub> O <sub>5</sub> )	34.0%	463 gms/litre
Zinc	(Zn)	0.2%	2.5 gms/litre
pH: (10% Solution)		6.0 -7.0	
Specific Gravity:		1.34 g/ml @ 18°C	

Dilution:	
Rates recommended are for standard spray volumes 500-1500 Litres/Ha	

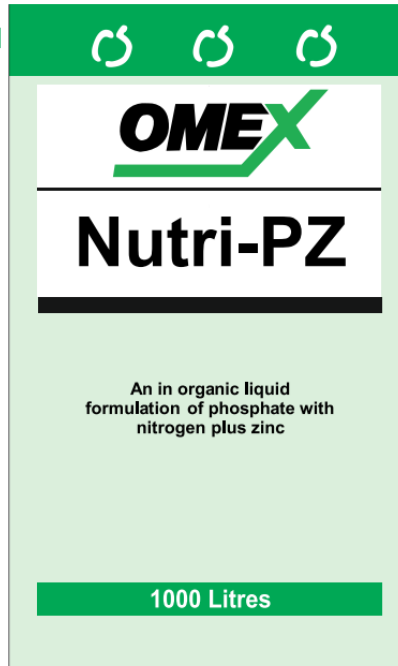
Handling Information & Storage:	
NUTRI-PZ should be stored in frost free conditions. Optimal storage temperatures range from 5-40 Degrees Centigrade. NUTRI-PZ is non-hazardous & non-flammable. Wear gloves & ace shield when handling the concentrate. NUTRI-PZ is low in toxicity but can cause eye and skin irritation in concentrate form.	
For further information please contact OMEX Agrifluids in Kings Lynn.	

<b>MANUFACTURED BY:</b> Omex Agrifluids Ltd, Saddlebow Road, Kings Lynn, Norfolk, PE24 3JA England Tel: (44) 1553-817500 Fax: (44) 1553-817501 www.omex.co.uk	<b>DISTRIBUTED BY:</b> Inta-Ag Limited 45 Kitchener Road Pukekohe Tel: 0800 100 747 www.inta-ag.co.nz 
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<b>BATCH NO:</b> P34719
<b>MANUFACTURED DATE:</b> JUN 2019 <b>EXPIRY DATE:</b> JUN 2022
PR407



Recommendations for use:			
CROP	RATE L/ha	RATE MW1000	APPLICATION DETAILS
Coffee	1.0-1.5	200	Apply after conversion. Repeat application according to pesticide programme.
Cereals	1.0-1.5	500	Apply at any stage to phosphorus deficient crops
Potatoes	20		Apply 7-10 days after tuber initiation
	2-3Ltr/Ha in 500Ltr of water		Maintenance
Strawberries	1.5-3.0	300	Single application 3 weeks after planting
Tomatoes/Peppers	1.5-3.0	250	1 <sup>st</sup> application 3 weeks after transplanting. Follow by 2 <sup>nd</sup>
Vegetables	1.5-3.0	500	1 to 2 applications early on in growth period of crop
Other crops	1.0-2.0	300-600	For crops with phosphorus deficiencies, repeat at 10-14 day intervals as required

**Mixing & Spraying:**  
Always add NUTRI-PZ to spray tank first after initial pre-mixing with water while agitating. When applying NUTRI-PZ alone, an anionic wetting agent should be added to achieve maximum crop cover.

**Tank mixing compatibility:**  
OMEX NUTRI-PZ is compatible with most, but not all pesticides, both as regards physical mixing in the tank & as regards the biological effect on the crop. However OMEX cannot accept any liability for any loss or damage as not all pesticides have been tested & because the efficacy of any mix depend on, among other factors, the pesticide concerned, crop conditions, growth stage, weather & volumes of water used.

## Appendix ii- Pre-planting soil test information

## Appendix iii- Plant petiole analysis results

<b>Phone:</b> 09 237 1153	<b>Order No:</b>	<b>Client Reference:</b>
	<b>Submitted By:</b> Steve Slack	

Plant Analysis Results						
Sample Name:	Ngatarawa Rd 1	Ngatarawa Rd 2	Ngatarawa Rd 3	Ngatarawa Rd 4	Ngatarawa Rd 5	Ngatarawa Rd 6
<b>Lab Number:</b>	3780746.7	3780746.8	3780746.9	3780746.10	3780746.11	3780746.12
<b>Sample Type:</b>	LEAF Tomato, Outdoor	LEAF Tomato, Outdoor	LEAF Tomato, Outdoor	LEAF Tomato, Outdoor	LEAF Tomato, Outdoor	LEAF Tomato, Outdoor
<b>Sample Type Code:</b>	P67	P67	P67	P67	P67	P67
Nitrogen	% 6.1	% 5.9	% 5.6	% 5.8	% 6.1	% 5.9
Phosphorus	% 0.50	% 0.57	% 0.54	% 0.52	% 0.58	% 0.49
Potassium	% 4.2	% 4.2	% 3.9	% 3.8	% 3.8	% 3.9
Sulphur	% 1.61	% 1.42	% 1.58	% 1.83	% 1.59	% 1.74
Calcium	% 2.55	% 2.31	% 2.49	% 2.54	% 2.64	% 2.79
Magnesium	% 0.49	% 0.47	% 0.47	% 0.49	% 0.49	% 0.50
Sodium	% 0.092	% 0.071	% 0.085	% 0.064	% 0.070	% 0.070
Iron	mg/kg 111	mg/kg 109	mg/kg 115	mg/kg 117	mg/kg 115	mg/kg 118
Manganese	mg/kg 230	mg/kg 220	mg/kg 240	mg/kg 320	mg/kg 250	mg/kg 250
Zinc	mg/kg 59	mg/kg 58	mg/kg 59	mg/kg 67	mg/kg 60	mg/kg 59
Copper	mg/kg 790	mg/kg 770	mg/kg 720	mg/kg 1,060	mg/kg 810	mg/kg 760
Boron	mg/kg 63	mg/kg 55	mg/kg 67	mg/kg 81	mg/kg 75	mg/kg 79
Titanium*	mg/kg < 11	mg/kg < 10	mg/kg < 10	mg/kg < 11	mg/kg < 10	mg/kg < 10