

# TWINN CROP TRIAL



Dryland Potato, South Africa, Oct 2008 - May 2009

## KEY RESULTS

An independent replicated trial in potato showed:

- ♦ Use of 2 applications of TwinN combined with 50% synthetic N fertiliser gave an 4% (0.9 t/ha) increase in yield and a 9% (A\$605/ha) increase in profitability compared to the conventional 100% N fertiliser program.
- ♦ Use of TwinN enabled accumulation of high yields using 25% or 50% of the normal rates of N fertiliser.
- ♦ TwinN treatments gave significantly larger tuber size compared to the 100% N fertiliser program.

## TREATMENTS

Treatment	Preplant (kg/ha)	1 <sup>st</sup> TwinN Week 3	Topdress 1 Week 4	2 <sup>nd</sup> TwinN Week 5	Total chemical N/ha
1. Full chemical fertiliser program	300 MAP 200 KCl	0	320 kg/ha LAN 50 kg/ha KCl	0	123 kg
2. 25% chemical N	300 MAP 200 KCl	0	50 kg/ha KCl	0	33 kg
3. 50% chemical N	300 MAP 200 KCl	0	96 kg/ha LAN 50 kg/ha KCl	0	60 kg
4. 25% chemical N + 2 TwinN (1 soil, 1 foliar)	300 MAP 200 KCl	Soil applied	50 kg/ha KCl	Foliar applied	33 kg
5. 50% chemical N + 2 TwinN (1 soil, 1 foliar)	300 MAP 200 KCl	Soil applied	96 kg/ha LAN 50 kg/ha KCl	Foliar applied	60 kg
6. 25% chemical N + 2 TwinN (both foliar)	300 MAP 200 KCl	Foliar applied	50 kg/ha KCl	Foliar applied	33 kg
7. 50% chemical N + 2 TwinN (both foliar)	300 MAP 200 KCl	Foliar applied	96 kg/ha LAN 50 kg/ha KCl	Foliar applied	60 kg
8. As per Treatment 7 + organic N <sup>a</sup>	300 MAP 200 KCl Organic N	Foliar applied	96 kg/ha LAN 50 kg/ha KCl	Foliar applied	60 kg

a: 15 T/ha Gromor compost; LAN is limestone ammonium nitrate; MAP is mono ammonium phosphate.

## TRIAL SUMMARY

**Trial Performed & Analysed By:** Neu-agri Consulting, Republic of South Africa, as an independent trial

**Trial Design:** Randomised block design with eight treatments and four replicates of each treatment.

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## TRIAL RESULTS: Yield and Profit Increase Comparisons

Treatment	Yield (T/ha)	% Yield Increase <sup>y</sup>	% Large Tubers <sup>t</sup>	Fertiliser Costs (\$AU/ha)	Profit <sup>p</sup> \$AU/ha	Change in Profit <sup>i</sup> (%)
1. Full chemical fertiliser program	23.7 b	29	41 a	1722	6858	0
2. 25% chemical N	18.4 a	0	46 a	1328	5316	-22
3. 50% chemical N	22.2 b	21	47 a	1446	6577	-4
4. 25% chemical N + 2 TwinN (1 soil, 1 foliar)	22.7 b	23	47 a	1328	6859	0
5. 50% chemical N + 2 TwinN (1 soil, 1 foliar)	24.1 b	31	51 b	1446	7260	6
6. 25% chemical N + 2 TwinN (both foliar)	23.2 b	26	50 b	1328	7049	3
7. 50% chemical N + 2 TwinN (both foliar)	24.6 b	34	54 b	1446	7463	9
8. As per Treatment 7 + organic N <sup>a</sup>	23.6 b	29	51 b	3108	5433	-21

LSD (p= 0.05) for yield = 3.07 T/ha and yields with the same letter (a, b) beside them are not statistically different. For example, T1 is different from T2 because they don't share an a or b.

**y:** % increase in yield is compared to T2.

**t:** % of tubers larger than 60 mm diameter.

**p:** Profit per ha is calculated by multiplication of the yield by the potato price and subtraction of all fertiliser and TwinN prices that were current in RSA at the time of the trial. Currency conversions are 1AU\$ = R6.5, US\$0.77, EUR 0.56. Profit calculation does not include premium for % larger tubers.

**i:** Change in profit is compared to 100% chemical fertiliser treatment.

## SUMMARY OF RESULTS

- ◆ Two TwinN applications plus 50% chemical N fertiliser gave the highest **yield** in the trial with a 34% (6.3 t/ha) yield increase over the 25% N/ zero TwinN control and a 4% (0.9 t/ha) increase over the 100% N treatment.
- ◆ Two TwinN applications plus 50% N gave a 9% (A\$605/ha) increase in **profitability** compared to the 100% N. This was due to a combination of a 4% (0.9 t/ha) yield increase and an 16% (A\$276) decrease in total fertiliser costs.
- ◆ Two TwinN applications plus 50% N gave a 13% increase in the proportion of large prime grade tubers, compared to the 100% N.
- ◆ Yield was strongly affected by N application rate, with the 25% N yielding 29% less than the 100% N treatment.
- ◆ The 25% N plus 2 TwinN application treatments and the 50% N plus 2 TwinN treatments were all statistically equal with the 100% chemical N treatment yields, demonstrating that it is possible to achieve normal high yields with greatly reduced rates of N fertiliser application using TwinN.
- ◆ The substitution of the first foliar application of TwinN with a soil drench application in combination with 25 or 50% N did not statistically alter yields, although the yields were consistently slightly lower than those from two foliar applications.
- ◆ Addition of organic fertiliser in T8 reduced yields and profitability. This is thought to be due to use of non-composted organic material and is strongly at odds with other trials of TwinN combined with organic fertilisers.

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## TRIAL DETAILS

### Crop Data

Crop: Potato Variety: Mondial Row width: 90cm  
Plot size: 4 rows by 4m, middle 2 harvested.  
Sowing date: 3/11/2008  
TwinN application dates: 26/11/2008, 10/12/2008  
Harvest date: 16/2/09

Tubers were graded into small (<60mm) and large (>60mm).

### Soil Data

Soils were red in colour with approximately 52% clay and 3.0% organic carbon content. Soils were free draining with very little moisture retention in the top 50mm. NH<sub>4</sub>N levels in soil were approximately 3.5ppm and NO<sub>3</sub>N levels 15.4ppm. 500 kg/ha dolomitic lime was applied prior to discing of the land.

### TwinN Applications

The first foliar application was at 8am at 23 days post-planting when the plants were at the 4-5 leaf stage. Weather conditions were 15°C, misty with overcast conditions for the remainder of the day. The second application was made at tuber initiation under similar conditions, but the foliar moisture dried off after 1.5 hours and the daily temperature rose to 29°C followed by 15mm rain late in the day. Foliar applications were made using a backpack at 400L/ha using a coarse nozzle setting and banding over the top of the crop. Soil applications were made at a rate of 1000L/ha onto moist soil and banded onto the base of plants.

### Crop Protection Treatments

Karate (Cyhalothrin) applied at planting for cutworm. Greencure (natural pyrethrum) at 22/12/08 for beetles.

## CONCLUSIONS

- ♦ Use of 2 TwinN applications combined with 50% chemical N gave the highest yields in the trial and the highest profitability (increase of 9%) compared to the standard 100% N treatment. This is the recommended program for most producers as it maximises both profit and yield per unit of land, while improving environmental outcomes by reducing use of nitrogen fertilisers.
- ♦ Use of 2 foliar applications of TwinN combined with 25% chemical N gave similar yield and slightly increased profitability compared to 100% chemical N. This program may be suitable for producers who need to farm with lower fertiliser inputs.



Fig. 1: Trial site at first TwinN application stage.

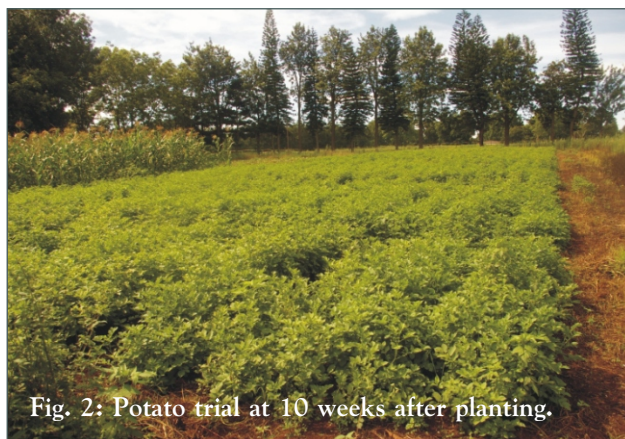


Fig. 2: Potato trial at 10 weeks after planting.