

# TWINN CROP TRIAL



Potato: Karnataka, India, April 2010

## INTRODUCTION

The trial was performed as an independent assessment of the capacity of TwinN to enable high yields in potato, in India, with reduced nitrogen fertiliser (N) application rates. One and two applications of TwinN were combined with 50%, 25% and 0% of the standard rate of nitrogen and compared with the standard 100% farmer fertiliser program.

## KEY RESULTS

- ♦ Two applications of TwinN combined with 50% of the standard nitrogen fertiliser application produced an 88% (+14.9 t/ha) increase in yield of marketable potatoes compared to the standard 100% fertiliser applications.
- ♦ A single application of TwinN and 50% nitrogen, or one or two applications of TwinN with 25% nitrogen, all yielded substantially higher than the standard 100% nitrogen fertiliser program.
- ♦ TwinN increased yields significantly in treatments that received only 25t/ha manure and no inorganic fertiliser.

## TREATMENTS

1. 100% N 125 kg/ha (Standard Program)	5. 25% N 31kg/ha + Two TwinN
2. 50% N 62.5 kg/ha + One TwinN	6. No nitrogen & no TwinN
3. 50% N 62.5 kg/ha + Two TwinN	7. No nitrogen + One TwinN
4. 25% N 31 kg/ha + One TwinN	8. No nitrogen + Two TwinN

All treatments received 25 t/ha Farm Yard Manure and standard rates of P and K.

## RESULTS

A reduction of N to 50% of the standard rate combined with a single application of TwinN resulted in an increase of 9.6 t/ha (+57%) in marketable tubers compared to the 100% N treatment. 50% N plus two applications of TwinN produced a significantly larger increase of 14.9 t/ha (+88%) compared to the 100%N treatment. Use of this treatment delivered savings in N fertiliser costs and a large increase in returns due to large increases in marketable tubers.

A further reduction to 25% of the standard rate of N combined with one or two applications of TwinN also delivered significantly higher total and marketable tuber yields compared to the standard 100% N program. Two applications of TwinN with no added inorganic N (0%N) gave the same yield as the standard 100% N treatment, but it should be noted that all treatments received 25 t/ha farmyard manure. The farmyard manure treatment is similar to an organic production system since the major supplies of N are from manure and TwinN.

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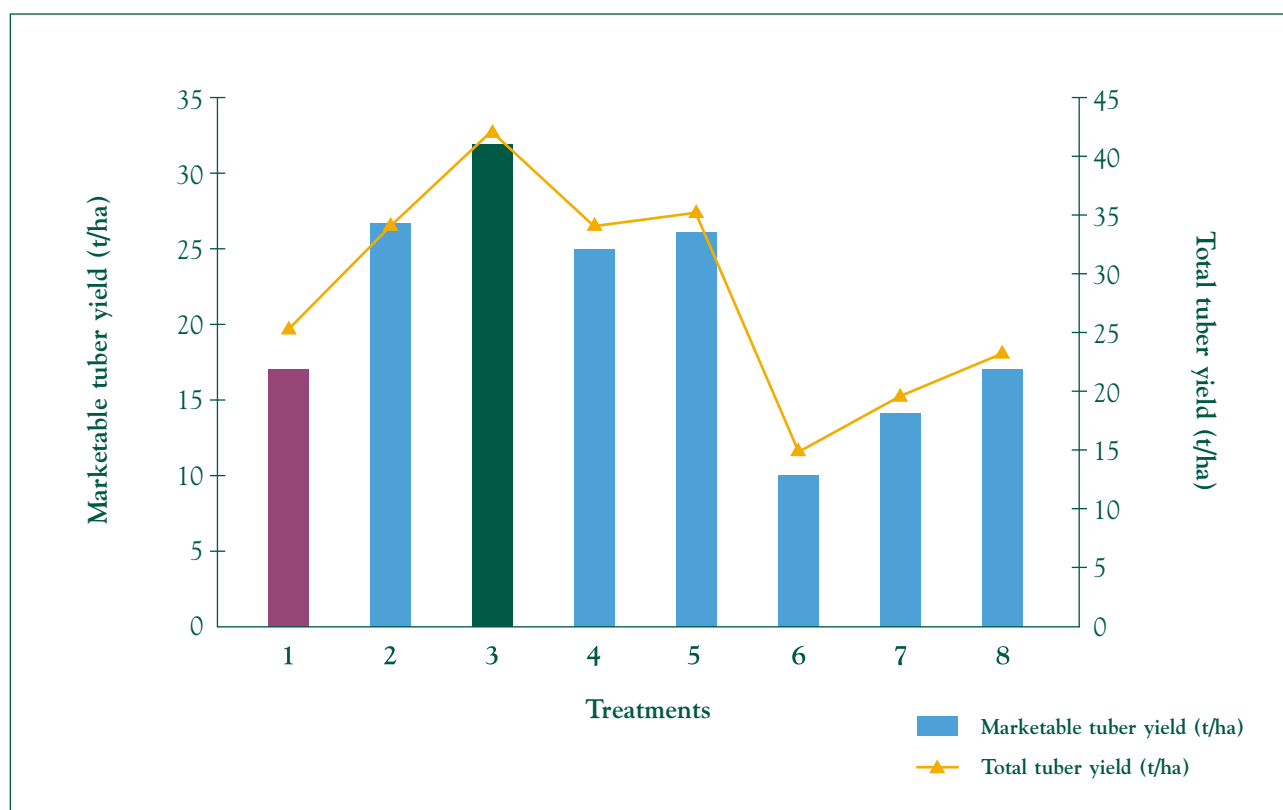
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**Table 1: Effect of TwinN on tuber yield of potato**

TREATMENT	Marketable tubers /plant		Total tubers /plant		Marketable tubers t/ha	Total tubers t/ha
	Number	Weight g	Number	Weight g		
1. 100% N 125 kg/ha (Standard Program)	1.53	107.00	4.07	162.13	16.84	25.49
2. 50% N 62.5 kg/ha + 1 TwinN	2.07	170.93	5.00	220.60	26.43	34.09
3. 50% N 62.5 kg/ha + 2 TwinN	2.40	187.07	5.20	245.07	31.74	41.60
4. 25% N 31 kg/ha + 1 TwinN	1.87	149.80	4.47	202.73	24.99	33.85
5. 25% N 31 kg/ha + 2 TwinN	1.87	155.47	4.13	211.42	25.99	35.36
6. 0% N & no TwinN	1.20	60.60	3.40	91.33	9.96	15.01
7. 0% N + 1 TwinN	1.47	83.93	3.13	116.79	14.11	19.63
8. 0% N + 2 TwinN	1.67	107.87	3.80	147.87	16.87	23.07
CD (p=0.05)*	0.37	15.53	0.44	15.52	3.40	4.07

\*CD (p=0.05) Treatment means that differ by more than this value are statistically different.



Tables 2 and 3 (following page) show that the TwinN plus 50% N and the standard 100% N treatments produced taller, larger plants than the treatments receiving less N fertiliser. It is of interest to note that, despite producing less vegetative matter than the 100% N treatment, the TwinN plus 25% N treated plants produced higher tuber yields. Similarly, the TwinN plus 50% N treatments had approximately equal haulm heights and weights as the 100% N treatment but produced much higher tuber yields. In this trial TwinN had a stronger effect on tuber yield than vegetative growth.

**Table 2: Effect of TwinN on growth parameters of potato**

TREATMENT	Plant emergence (%)	Plant ht (cm)	No. stems/plant	No. leaves/plant
1. 100% N 125 kg/ha (Standard)	83.95	48.93	59.06	1.50
2. 50% N 62.5 kg/ha + 1 TwinN	82.22	48.40	57.72	1.43
3. 50% N 62.5 kg/ha + 2 TwinN	90.87	47.40	58.58	1.57
4. 25% N 31 kg/ha + 1 TwinN	89.13	44.07	55.06	1.40
5. 25% N 31 kg/ha + 2 TwinN	89.38	41.60	57.58	1.67
6. No nitrogen & no TwinN	87.63	31.10	34.01	1.40
7. No nitrogen + 1 TwinN	89.63	32.60	35.13	1.37
8. No nitrogen + 2 TwinN	83.23	36.47	42.79	1.40
CD (p=0.05)	NS	7.68	4.96	0.20

**Table 3: Effect of TwinN on haulm and root weights of potato**

TREATMENT	Fresh haulm wgt (g/plant)	Dry wgt of haulm (g/plant)	Root fresh wgt (g/plant)	Root dry wgt (g/plant)	Tuber dry matter (%)
1. 100% N 125 kg/ha (Standard)	77.93	41.78	6.79	4.07	17.30
2. 50% N 62.5 kg/ha + 1 TwinN	72.26	39.37	6.04	3.97	17.25
3. 50% N 62.5 kg/ha + 2 TwinN	73.63	41.41	6.87	4.09	17.35
4. 25% N 31 kg/ha + 1 TwinN	69.08	34.44	6.12	3.70	17.07
5. 25% N 31 kg/ha + 2 TwinN	71.87	37.44	6.66	4.02	17.17
6. No nitrogen & no TwinN	42.49	19.00	4.26	2.83	14.10
7. No nitrogen + 1 TwinN	48.33	22.42	4.60	3.24	16.50
8. No nitrogen + 2 TwinN	52.75	28.99	5.86	3.48	17.02
CD (p=0.05)	6.27	3.22	1.01	0.40	1.13

## TRIAL SUMMARY

**Trial Performed & Analysed By:** Agricultural Research Station, University of Agricultural Science (B), Madenur Post, Hassan - 573 220, Karnataka, India.

**Trial Design:** Randomised Complete Block Design, 8 treatments, 3 replicates. Plots were 5.4 m x 3 m with 4.2 m x 2.8 m harvested. Plant spacing was 60 cm x 20 cm.

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## TRIAL DETAILS

**Crop:** Potato  
**Planting date:** 15/1/2010  
**TwinN application dates:** 17/2/2010 and 5/3/2010 (for treatments receiving two applications)  
**Harvest date:** 15/4/2010  
**Irrigated:** Yes

**Fertiliser data:** Standard fertiliser program (T1) is N 125 kg/ha, P 100 kg/ha, K 125 kg/ha plus 25 t/ha farm yard manure. P, K and farm yard manure rates were maintained constant across all treatments, with N varied according to each treatment. N was applied in two splits, the first at planting and the second at earthing up stage.

### Soil data: Initial soil fertility status of experimental plot

pH	EC (ds/m)	OC (%)	N <sub>2</sub> O (kg/ha)	P <sub>2</sub> O <sub>5</sub> (kg/ha)	K <sub>2</sub> O (kg/ha)
6.74	0.16	0.37	270 (low)	297.77	365.30

**TwinN applications:** TwinN was mixed and applied according to the standard instructions. A backpack was used to apply the tank mix to the plots.

## CONCLUSIONS

- ◆ Use of two applications of TwinN enabled reductions to 50% of normal nitrogen fertiliser and produced large increases in yields of marketable tubers (+14.9 t/ha, +88%). This result would provide a great improvement in profits to farmers.
- ◆ Two applications of TwinN gave a significantly better result than one application at 50% N.
- ◆ TwinN gave a significant increase in yield of marketable tubers in the absence of inorganic N fertiliser and the presence of 25 t/ha farm yard manure.