

TWINN CROP TRIAL



*Tobacco: Kandiya Research Station, Malawi, 2007-08
and 2008-09*

INTRODUCTION

The trial was conducted by the Agricultural Research and Extension Trust (ARET) to assess the capacity of TwinN to replace part of the standard inorganic nitrogen (N) fertiliser applications used to produce burley tobacco in Malawi over two consecutive years.

KEY RESULTS

An independent trial in tobacco over two years showed showed:

- ♦ Use of an application of TwinN to seedlings plus an application at six leaf stage enabled a 35% reduction in inorganic N with either no decline in yield (2007/08) or a 21% yield increase (2008/09) compared to the standard practice (100%N).
- ♦ A single application of TwinN applied in addition to the standard practice (100%N) gave an additional 7% yield (2007/08) and 18% yield (2008/09).

TREATMENTS

NURSERY TREATMENT	FIELD TREATMENT
Standard	Super D + CAN + CAN
Standard	Super D + CAN + TwinN
Standard	Super D + TwinN + TwinN
Standard + TwinN	Super D + CAN + CAN
Standard + TwinN	Super D + CAN + TwinN
Standard + TwinN	Super D + TwinN + TwinN

Standard = 'S' Mixture (6% N, 18% P₂O₅ and 6% K₂O) + Nitrate of Soda (16%N). CAN = calcium ammonium nitrate.

The recommended field application of Super D (10.5% N, 24% P₂O₅ and 20% K₂O) + CAN (28% N) + CAN supplied 160 kgN, 108 kg K₂O and 90 kg P₂O/ha.

Substituting the second top dressing CAN with TwinN reduced the total inorganic nitrogen fertiliser by 35% and replacing all top dressing CAN by TwinN reduced the total inorganic nitrogen fertiliser by 70%.

RESULTS

Table 1: Effect of TwinN on yield and gross returns of burley tobacco in 2007/08 & 2008/09

TREATMENT	Yield (kg/ha)	
	(% increase over T1)	[Increase in gross returns* over T1]
	2007/08	2008/09
T1: Standard x Super D + CAN + CAN	2121 (0%)	1550 (0%)
T2: Standard x Super D + CAN + TwinN	1961 (-7%)	1679 (8.3%)
T3: Standard x Super D + TwinN + TwinN	1825 (-14%)	853 (-45%)
T4: Standard + TwinN x Super D + CAN + CAN	2275 (7%) [\$462]	1832 (18%) [\$846]
T5: Standard + TwinN x Super D + CAN + TwinN	2130 (0%) [\$27]	1879 (21%) [\$987]
T6: Standard + TwinN x Super D + TwinN + TwinN	1906 (-10%)	1028 (-34%)
SE ± for Yield	169	342

*Based on a current price of US\$3/kg.

Yields differed significantly between 2007/08 and 2008/09 due to rainfall variation, but the interactions between effects of TwinN and N fertiliser applications followed a consistent pattern.

Replacement of both CAN top dressings (a 70% reduction in N fertiliser, T6) resulted in a significant yield decline in both seasons. Replacement of the second CAN top dressing (a 35% reduction in N fertiliser) with a single application of TwinN (T2) resulted in a 7% yield decrease in 2007/08 and an 8% yield increase in 2008/09.

When TwinN was applied at seedling stage and at 6 leaf stage combined with removal of the second CAN application (T5), this resulted in equal yields to the full N application (T1) in 2007/08 or a 21% yield increase in 2008/09. When TwinN was added to the full standard fertiliser program, significant yield increases (7 and 18%) were observed in both seasons (T4) and these produced significant increases in gross returns.

Recommendations

- ♦ T5 (Standard + TwinN seedling application at 4- 5 days pre-transplant x Super D + CAN +TwinN at 6 leaf stage) is the recommended treatment for producers who aim to **maintain yield but reduce N fertiliser costs**. This provides a 35% decrease in total inorganic N application.
- ♦ For producers who aim to **maximise yields** when tobacco returns are high a variation of T4 is recommended (Standard + TwinN seedling application x Super D + CAN +CAN + TwinN at 6 leaf stage).

Colour Distribution

There was a general trend of an increase in the proportion of red coloured leaf with the partial substitution of CAN (Table 2), while total substitution of CAN resulted in the lowest proportion of red leaf.

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Table 2: Influence of TwinN on colour distribution of burley tobacco, 2007/08 and 2008/09

TREATMENT	Distribution (%) 2007-08			Distribution (%) 2008-09		
	Buff	Tan	Red	Buff	Tan	Red
T1: Standard x Super D + CAN + CAN	38	49	13	60	24	11
T2: Standard x Super D + CAN + TwinN	28	63	9	65	13	20
T3: Standard x Super D + TwinN + TwinN	32	51	17	78	15	2
T4: Standard + TwinN x Super D + CAN + CAN	42	44	15	58	30	6
T5: Standard + TwinN x Super D + CAN + TwinN	29	49	23	52	20	18
T6: Standard + TwinN x Super D + TwinN + TwinN	35	47	18	56	35	3
SE ± for colour distribution	6.29	8.7	4.98	7.9	7.8	5.8

TRIAL SUMMARY

Performed and analysed by: Agricultural Research and Extension Trust (ARET), Kandiya Research Station, Lilongwe, Malawi

Trial design: Two nursery treatments and three field treatments were tested to give six treatments. The trial design was a randomised complete block design with four replicates per treatment.

Crop: Burley tobacco

Replicate plot size: Six ridges spaced at 1.2m and 7.2m in length. Each row had twelve plants spaced at 0.6m apart. The net plot consisted the two middle rows with the two end plants discarded.

TwinN applications: Seedling applications were made to seedlings 48 hours prior to transplant. Field applications were made at the six and ten leaf stages. All applications were made in 200 l/ha as foliar applications by knapsack under conditions recommended by the supplier.

Crop treatments: Topping was at the extended bud stage and Tabamex Plus was applied immediately thereafter to control suckers. Escape and new suckers were removed by hand as soon as they could be picked by the fingers. All other cultural practices were implemented as currently recommended for burley tobacco production in Malawi.

CONCLUSIONS

- ♦ Use of a seedling and field application of TwinN enabled a reduction of 35% of inorganic N production with either the same or increased yield.
- ♦ Use of a single application of TwinN combined with the standard fertiliser program increased yields and gross returns substantially.