

South African Sugar industry  
Agronomist's Association

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Project no: 5111  
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**Title:** Response of sugarcane to various green manure crop combinations in the Umhlali area (Maric Farm).

**1. Particulars of the project:**

This crop : Plant cane	Soil Analysis: 18/05/2001					
Site : Maric Farm	pH	OM%	Clay%	Sand%	N cat	
Region : Umhlali, KwaZulu-Natal	4.8	0.8	7	88	1	
Soil system : Vryheid Sediments	Ppm					
Soil form : Glenrosa	P	K	Ca	Mg	Zn	Al
Design : Randomised blocks	15	42	89	22	0.8	24
Variety : N27						
Fertilizer : N P K	Age: (17/10/01 –7/8/02) 11.7 months					
(kg/ha) 76 33 90						
Split into 2 applications	Irrigation: Nil					

**2. Objective:**

2.1 To establish the yield response of sugarcane to various green manure crops and green manure crop combinations.

**3. Treatments:**

**Sugarcane following:**

- T0 Bare fallow control
- T1 Lupins
- T2 Oats
- T3 Lupins + Oats
- T4 Rape + Oats
- T5 Sweet Vetch + Oats
- T6 Sweet vetch
- T7 Lupin to seed

**Notes on treatments:**

- Phase 1: The cover crops were grown for a period of 90 days starting on the 30 May 2001, then mown and incorporated into the soil with light discing.
- Phase 2: Sugarcane (N27) was planted in the trial plots 47 days after incorporating the green manure crop (15 Oct 2001).

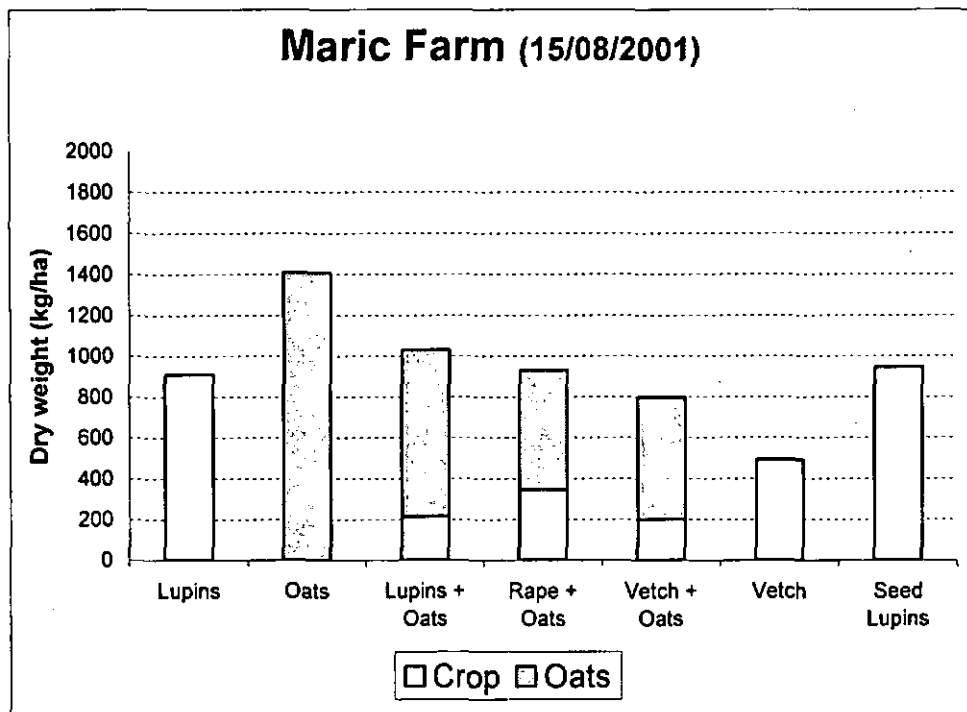
**4. Results and discussion:**

The cover crop species evaluated in the trial were grown over winter when cane land often lies fallow until spring planting. Nutrient loading rates of the cover crops are given in Table 1.

**Table 1: Cover crop nutrient content at 78 days after planting.**

Cover crop	Nitrogen (kg/ha)	Phosphorus (kg/ha)	Potassium (kg/ha)
T1 Lupins	25.1	2.3	22.3
T2 Oats	35.4	3.2	53.7
T3 Lupins + Oats	25.2	2.5	28.5
T4 Rape + Oats	24.2	3.0	32.2
T5 Vetch + Oats	26.0	2.8	37.6
T6 Vetch	12.3	1.4	17.9

The overall dry matter production of each treatment is summarised in Figure 1.



**Figure 1: Dry matter production of green manure crop combinations on Maric Farm**

Oats yielded significantly higher biomass in the short growing period than the other treatments. All crops appear well suited to growing in the area at this time of year, and can be considered as potential green manure crops. All of cover crops 'caught' and returned nutrients to the soil, which were available for the subsequent cane crop. The oats treatment in particular returned over 35kg of N per hectare. Although not all of this N would be in an available form, one could consider reducing N applications in the subsequent plant cane crop so that N is not over applied.

After the green manure crops were disced into the soil and N27 was planted into the trial plots.

**Table 2: Average of cane properties and yields at harvest.**

Crop	Treatment: Cane after	Cane yield t/ha	ERC t/ha	Sucrose t/ha
Plant crop	Control (bare fallow)	86.9	12.1	13.1
	Lupin	84	11.0	12.1
	Lupin to seed	98.3	13.2	14.5
	Sweet vetch	85.0	11.2	12.4
	Oats	94.6	11.9	13.3
	Oats + Lupin	89.9	10.9	12.3
	Oats + Rape	84.7	10.1	11.3
	Oats + S Vetch	87.7	11.2	12.4
	SED	10.6	1.4	1.6
	LSD05	21.8	3.0	3.2

Note: \* = Significantly different from the control plots ( $P < 0.05$ )

As evidenced in Table 2, none of the cover crops caused significantly higher cane yields, ERC or sucrose per hectare than the bare fallow control. The trial was therefore terminated after the plant crop. The lupin to seed treatment, although not significant, nonetheless promoted higher cane yield, ERC and sucrose per hectare. This was similar to the Rosemead trial.

## 5. Conclusions

Oats grow well over the winter period in the Umhlali region, even on very sandy soils, and, coupled with observations on the potential of oats to control *Digitaria abyssinica* (which has been observed in the region), make this a good potential green manure crop. Although there were no significant improvements in cane yield, ERC or sucrose per hectare after the green manure crops as compared to the control, the lupin to seed treatment showed promise, increasing these values to an extent. Future trials should include a cane-on-cane control to provide a more realistic picture of the effects of green manures.