



LIVING NUTRIENTS :
How to make Green Manures
work for you

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N






How much N is in Green Manures?

- ❖ Depends on amount of dry material produced.
- ❖ Approximate values (healthy crop):

 Cowpeas:	 Sunn hemp:	 Velvet beans:
± 1-3 t DM/ha	± 5-9 t DM/ha	± 7-10 t DM/ha
@ 2.2 % N =	@ 2.5 % N =	@ 2.3 % N =
44 kg N/ha	175 kg N/ha	195 kg N/ha

Nutrient Availability:

Roughly 30-50% of the N in green manures becomes available to the plant crop; therefore

 Cowpeas:	 Sunn hemp:	 Velvet beans:
7-33 kg N	38-113 kg N	48-115 kg N
is available to the crop,		
Equivalent to roughly		
R143 - R674*	R776 - R2306*	R980 - R2347*
per hectare		

*Based on Urea: R9390/ton

Nutrient Availability: (contd)

It's apparent that the biomass produced affects the amount of N fixed:




Nutrient Availability: (contd)

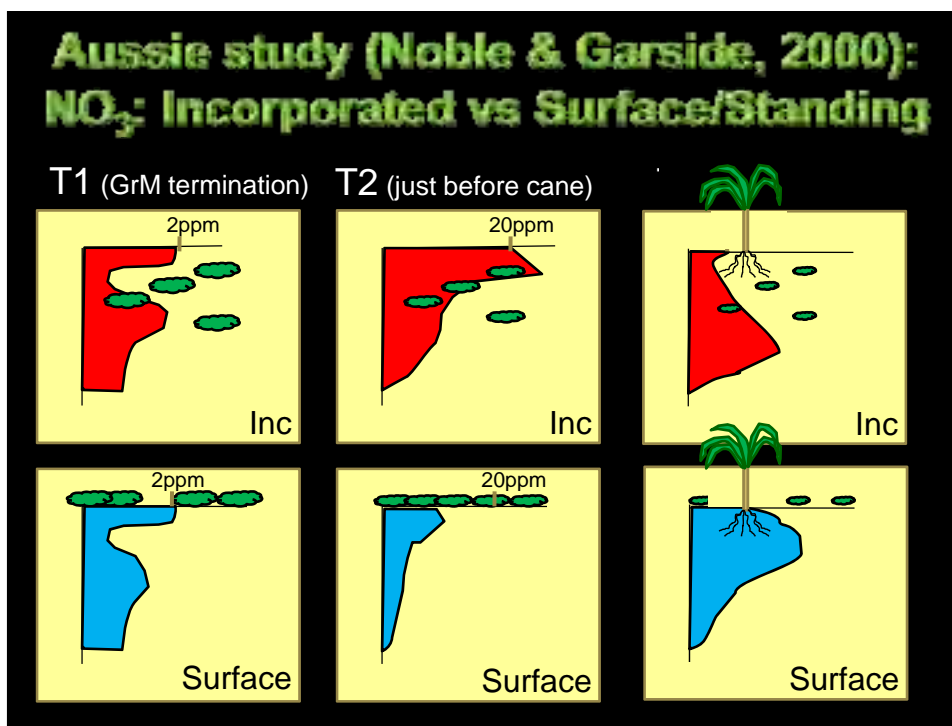
- ❖ Aus study suggests $\pm 50\%$ legume N fixed, 50 % scavenged from soil. (Varies)
- ❖ Release of N from green manure crop is not immediate
- ❖ Some inorganic N (~ 20 to 40 kg N/ha) should be applied soon after planting cane to ensure continuous N supply.
- ❖ Adequacy of N supply in cane crop should be monitored by early leaf sampling.





Incorporated	Surface Mulch / Standing
Rapid N mineralisation & movement down profile	Slow N mineralisation & movement down profile
Potential for N to move below cane root zone before cane can use it (leaching; acidity)	More time for cane to use legume N – most remains < 110 cm by 136 days after mulching
Cane yield tended to be slightly lower than in mulched / standing treatments (NS)	Cane yield not compromised by surface mulch or standing crop
Detrimental effects on soil macrofauna	Strategy of minimum tillage conserves soil biota





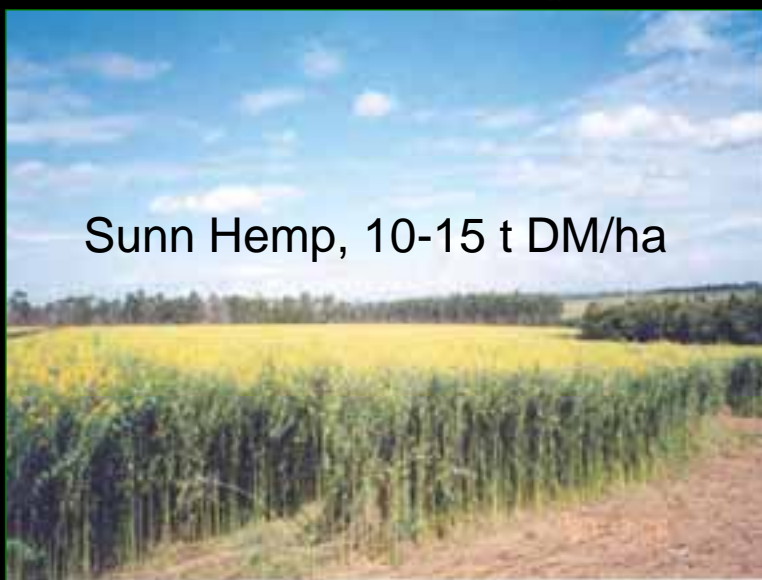
Incorporate vs Surface: Management

To maximise plant crop N utilisation:

- ❖ Establish cane crop soon after the cover crop
- ❖ Retain cover crop on surface to slow down mineralisation.
- ❖ Try to reduce tillage as much as possible.



Brazilian Example:



Sunn Hemp, 10-15 t DM/ha

Courtesy Chris Norris, Booker Tate Ltd



Courtesy Chris Norris, Booker Tate Ltd



Courtesy Chris Norris, Booker Tate Ltd



Courtesy Chris Norris, Booker Tate Ltd

Furrow & Fertilizer



Courtesy Chris Norris, Booker Tate Ltd

Planting

Planting: semi-mechanical
Covering: mechanical



Courtesy Chris Norris, Booker Tate Ltd

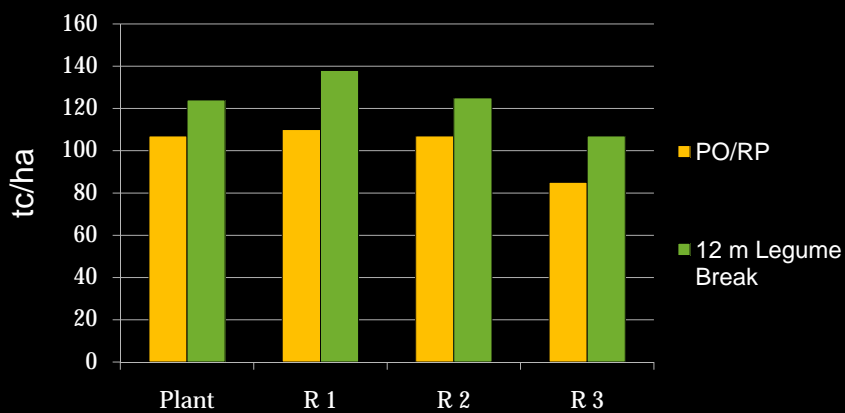
Aussie News 1: Fertilizer



- ❖ N rates after legumes:
 - Cut plant crop N by as much as 100 % after healthy legume
 - Starting to recommend cutting R1 N rates by half (early leaf sample)



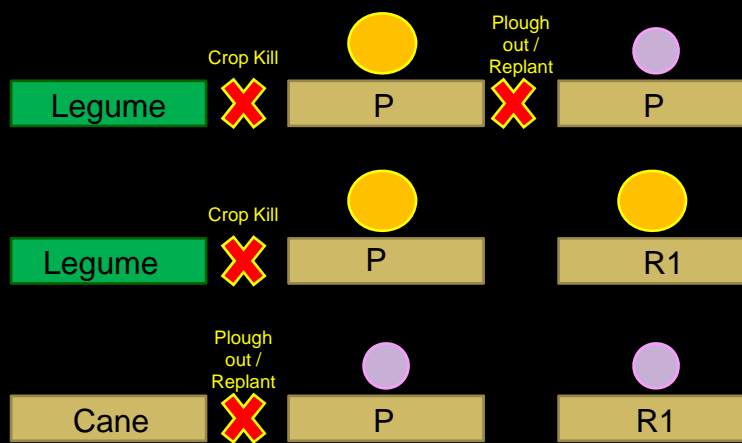
Aussie News 2: Extended GrM effect



E.g. Garside & Bell, 2007, Bundaberg
(3 other sites too). Why?



Aussie News 2: Extended GrM effect



Longevity of yield response into later ratoons = associated with the very positive effects of the break on the immediate plant crop.

Soybeans!

Crop Rotation or Green Manure?

- Excellent at fixing N (3-6 % N in stover; more in whole plant before harvest)
- 3 ton grain yield ~ 9 t stover (350 kg N/ha!)
- Gross profit margins : R2 000 - R8 000/ha

- Susceptible to nematodes, rust, stem rot & various insects
- Not as forgiving as commonly used green manure crops (soils, moisture)

- Soybeans can be grown as a green manure, but require more management input than 'traditional' GrM crops.
- Preferable to grow soybeans, with good management, as a cash crop, and stick to traditional choices for green manures.

Photo: Michiel Smit

