

Introduction

- The nitrogen efficiency of nitrogenous fertiliser is very poor and the transfer to plants seldom exceeds 50% of added N¹.
- The low use efficiency of N is consequence of its losses by leaching, denitrification and volatilisation²
- This lost N represents both an economic inefficiency and an environmental burden³
- This study aims to increase N-use efficiency by blending brown coal with N fertilisers

Materials and Methods

Table 1: CN ratio, C and N contents of BCU blends used

Granules	C:N	C content (%)	N content (%)
Brown coal-urea 1 (BCU 1)	1.0	40	22
Brown coal-urea 2 (BCU 2)	1.5	46	17



Plate 1: Experimental set up in the glasshouse

Two soils with contrasting pH (Dermosol pH-5.4 and Tenosol pH-7.2) were tested in this study. Silverbeet was used as a test crop in this pot trial.

Table 2: Treatments applied in this pot trial study

Treatments	
T1	Control (Soil only)
T2	Brown coal
T3	Urea (N@100kg ha ⁻¹)
T4	Brown coal-urea 1 (BCU 1) (N @ 100 kg ha ⁻¹)
T5	Brown coal-urea 2 (BCU 2) (N @ 100 kg ha ⁻¹)
T6	Urea (N@50kg ha ⁻¹)
T7	Brown coal-urea 1 (BCU 1) (N @ 50 kg ha ⁻¹)
T8	Brown coal-urea 2 (BCU 2) (N @ 50 kg ha ⁻¹)

References

(1) Raun, W. R. et al. *Agron. J.* 2002, 94, 815-820. (2) Dong, L. et al. *Biol. Biochem.* 2009, 41, 612-621. (3) Wang, Q. et al. *Plant. Soil.* 2010, 337, 325-339.

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Results and Discussion

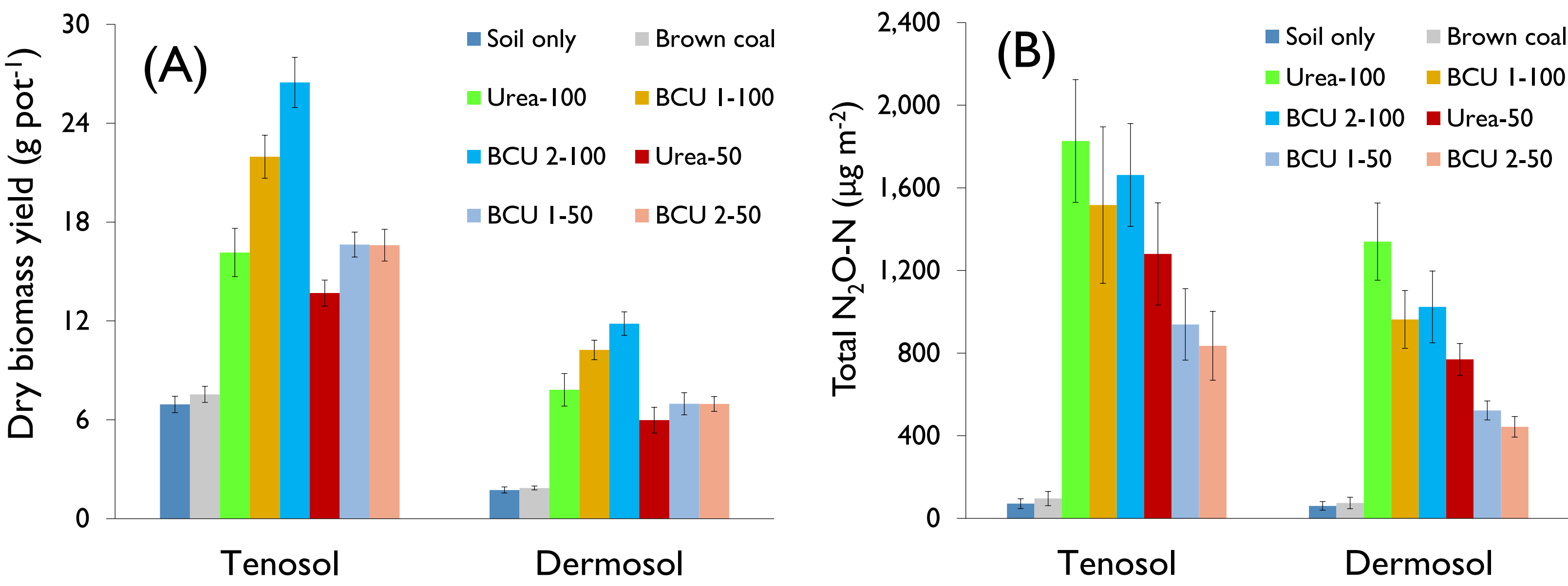


Figure 1: Biomass yield (A) of silverbeet and total N₂O-N emission (B) from soil (Bars indicate standard error, n=5).

- Biomass yield and N uptake by silverbeet were significantly higher with the addition of BCU blends in both soils compared to urea alone.
- Statistically identical biomass yields were obtained from the soils amended with 50 kg N ha⁻¹ from BCU and 100 kg N ha⁻¹ from urea.

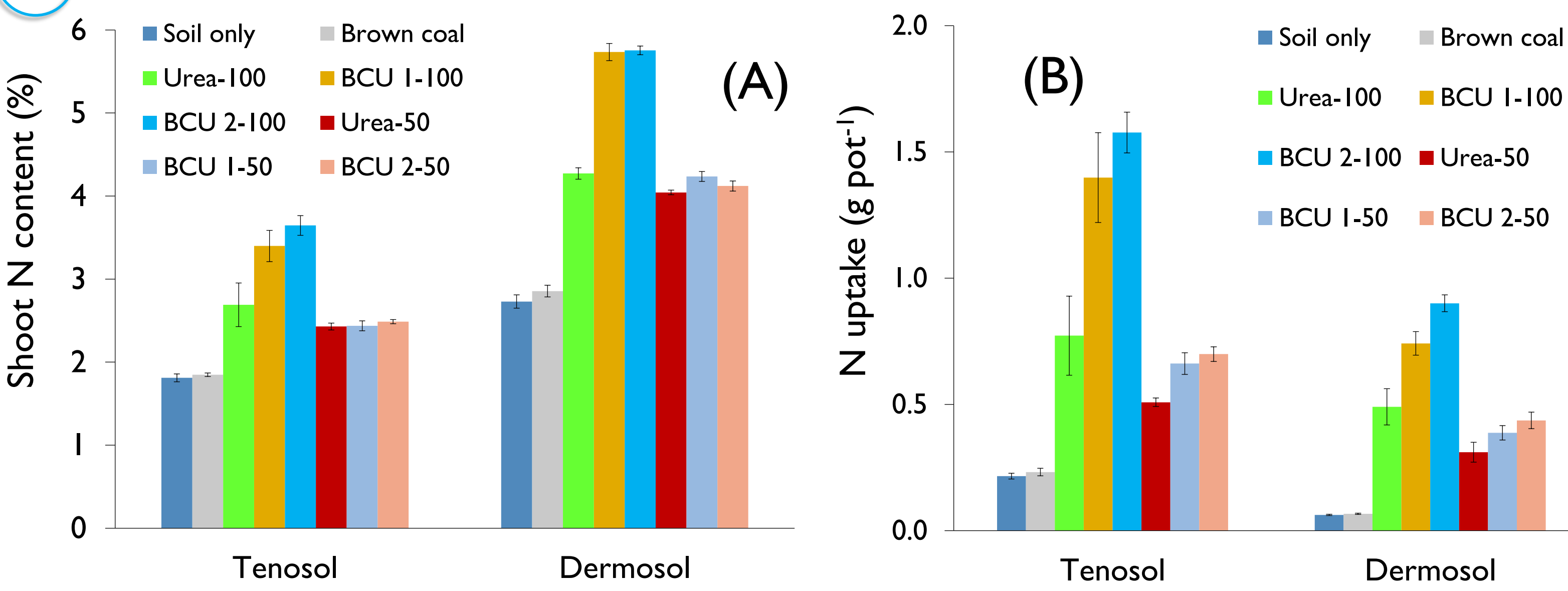


Figure 2: Shoot N content (A) and uptake (B) by silverbeet

Conclusions

- The BCU blends suppressed the total N₂O emissions by 29% and 13% from the Tenosol and Dermosol, respectively.
- Maintained higher available N in soil which facilitated more N uptake by plant.
- The increased N uptake resulted in 27% (Tenosol) and 23% (Dermosol) more biomass yield from BCU blends compared to urea alone.