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Potential yield of cocksfoot (*Dactylis glomerata*) monocultures in response to irrigation and nitrogen

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**Cocksfoot pasture produced >22.5 t DM/ha/yr in Canterbury, New Zealand.
Without irrigation or N, yield was 7.5 t DM/ha/yr.**

1 Introduction

In temperate dryland environments cocksfoot productivity is severely restricted by water and nitrogen availability.

This research quantified the response of pure cocksfoot pasture to irrigation and nitrogen.

2 Methods

- A split plot experiment was imposed on a 9 year old 'Grasslands Wana' cocksfoot pasture.
- Mainplots were Dryland (D) or Fully Irrigated (I) with the deficit maintained at less than 50 mm in the top 0.5 m of soil.
- Subplots were 0 (-N) or 800 kg N/ha/yr (+N) applied in eight split applications of 100 kg N/ha/yr.

3 Results

Potential yield for this environment exceeded 22.5 t DM/ha/yr (I+N) (Figure 2a).

Yield was 10.5, 15.1 and 7.5 t DM/ha/yr for I-N, D+N and D-N treatments, respectively.

Yield increased by 6.5 kg DM/°Cd (I+N), 2.9 kg DM/°Cd (I-N) and 1.8 kg DM/°Cd (D-N), using a base temperature of 2.5°C (Figure 2b).

During periods of water stress the D+N yield increased at a similar rate to D-N pastures (1.5 kg DM/°Cd). After rainfall, the rate of D+N DM production was similar (7.1 kg DM/°Cd) to the I+N treatment.



Figure 1. Treatments (left to right at bottom of photo) are : I+N, I-N, D+N and D-N respectively. (Photo taken 15 Jan 2004).

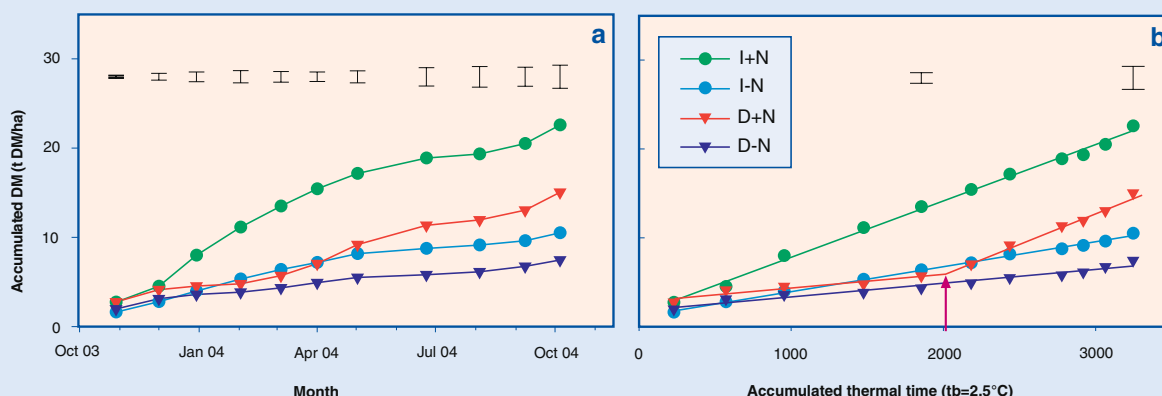


Figure 2. Accumulated DM production of 'Grasslands Wana' cocksfoot, at Lincoln University, Canterbury, New Zealand against time (a) and thermal time (b). Base temperature (tb) for thermal time calculations was 2.5°C. The arrow indicates the point of inflexion for the broken stick model (b). Error bars are LSD ($p \leq 0.05$) for the I+N interactions.

4 Conclusions

- DM yield under non limiting water and nitrogen conditions exceeded 22.5 t DM/ha/yr.
- Addition of N doubled current average dryland DM yield.
- The linear relationship between DM production and thermal time for each treatment allows comparison of growth in other environments and seasons.

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