# Early sowing and irrigating of rape crops in cool temperate environments boosts forage yield potential

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## Introduction

Forage rape is commonly grown on Tasmanian dairy farms to provide feed during periods of low pasture growth and/or low nutritive value. In these regions, forage crops are generally sown between early spring and late autumn and are commonly rainfed, though farmers may apply a single irrigation at sowing. While the effect of water availability on forage yield has been well characterised for regions in north-western Tasmania (Neilsen 2005), there is a dearth of information for other regions in Tasmania. Hence, the objectives of this study were to identify optimal sowing times for, and determine the extent to which a single irrigation at sowing influences productivity of, rainfed brassica crops across the dairy regions of Tasmania.

## Methods

Annual forage yield potential was simulated using APSIM-Canola with historical climate data (1962-2007) and representative soil characteristics in four dairy regions (Table 1). Simulated sowing density was 75 plants/$m^2$ with nitrogen (N) fertiliser (50 kg N/ha) applied on the first day of the month between October and April. Grazing was implemented 112 days after sowing (typically the time at which dairy farmers initiate grazing in these regions). Crops were either fully irrigated or were rainfed and plant available water (PAW) at sowing was reset annually to 100%, 75%, 50% or 25% of PAW capacity (PAWC).

## Results and discussion

Forage yields were greatest at Edith Creek due to high PAWC and average annual rainfall, whereas yields were generally lowest at Scottsdale due to lower summer temperatures and PAWC. Irrigation raised forage yield of early sown crops at Bushy Park, Cressy and Scottsdale, with less influence of irrigation on forage yield at Edith Creek (Fig. 1). In all cases, irrigation reduced the variability of forage yield, indicating that watering of forage crops reduces the risk of low yield due to inadequate rainfall. Yields of irrigated crops sown in November were generally greatest. Yield benefits associated with irrigating after December were markedly reduced. Rainfed crop yields at Bushy Park and Scottsdale were similar for initial irrigation levels ranging from 100% to 50% PAWC, but were reduced when sowing PAWC was 25%. This suggests that for these locations there is minimal advantage of irrigating at sowing if PAW is 50% or above. In contrast, forage yield at sites with greater PAWC (Cressy and Edith Creek) was much more responsive to lower PAW at sowing, indicating that irrigating crops at sowing would be beneficial at these locations.

## Conclusions

This study revealed that simulated forage yield in Tasmanian dairy regions was greatest for crops sown in spring (October/November). Irrigation of early sown crops increased simulated mean forage yields and reduced yield variability. Sites with high PAWC (Cressy and Edith Creek) benefitted from any amount of irrigation at sowing; in contrast, irrigating rainfed crops at sowing at sites with lower PAWC (Bushy Park and Cressy) was not conducive to enhanced yield unless PAWC at sowing was less than 50%.

**Table 1. Soil characteristics (after Cotching *et al*. 2002 a,b,c) and annual rainfall of locations used in simulations.**

| Location | Lat (°S)/Lon (°E) | Soil type | PAWC (mm) | Mean annual rainfall |
|---|---|---|---|---|
| Bushy Park | 42.8/146.9 | Black vertosol | 136 | 574 |
| Cressy | 41.7/147.1 | Red tenosol | 167 | 629 |
| Edith Creek | 41.0/145.1 | Red ferrosol | 169 | 1106 |
| Scottsdale | 41.2/147.5 | Brown dermosol | 124 | 992 |

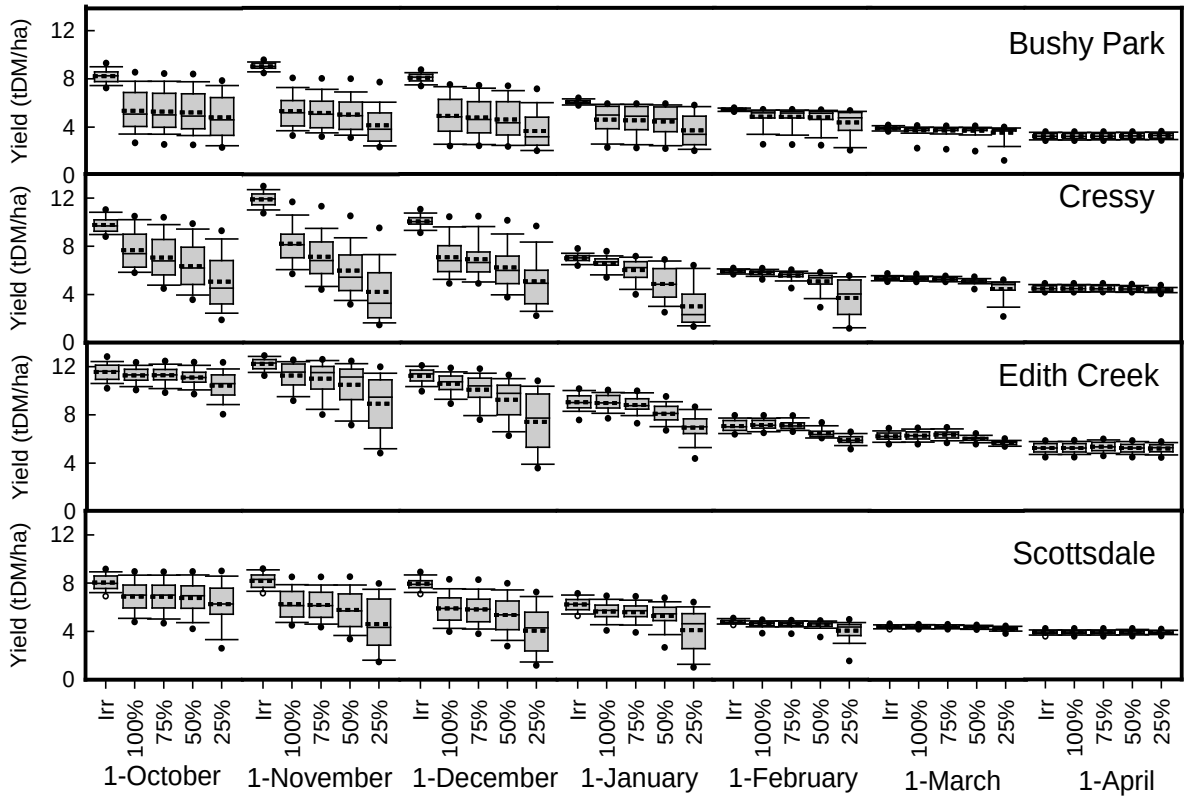


**Figure 1. Forage rape crop yields at four locations in Tasmania, Australia (solid lines represent medians, dotted lines represent means and dots (•) represent the 5th and 95th percentiles). Crops were sown on the first day of each month from October to April and were either irrigated (Irr) or rainfed; rainfed crops were irrigated to 100%, 75%, 50% or 25% of PAWC at sowing.**

## References

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