Barley in pasture cropping system penalised by large 2011 summer pasture production

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Take home messages

- **sub-tropical perennial grasses have persisted and produced good quantities of biomass over several years in the Mallee**
- **due to low early winter rainfall and reliance on stored summer moisture, cropping into a summer-growing pasture base led to high yield penalties in 2011**
- **further research and development is needed to fine-tune management of the pasture cropping system before it can be deployed in the Mallee**

Background

Pasture cropping combines a summer-growing perennial with a winter-growing cereal, thus making use of the separate growth cycles of these two components (Harris et al., 2007). The potential benefits of pasture cropping include income diversification, green feed supply over summer and autumn, existence of a protective ground cover throughout the year, healthier and more stable soils and weed control. The most common pasture cropping types combine a winter cereal crop with either lucerne or native C4 grasses.

Evidence is being gathered that pasture cropping with sub-tropical perennial grasses holds significant promise in the marginal cropping environments of the northern wheat belt in Western Australia (Ferris et al., 2010, Nicholls, 2010). In the Mallee, field trials with sub-tropical grasses are still limited. As part of the Future Farm Industry CRC Evercrop project, pasture cropping with these grasses was tested for the first time in 2011 at Hopetoun and Karoonda.

Aim

To evaluate the potential of combining summer-growing perennial grasses with a cereal in a pasture cropping system in the Mallee.

Method

In November 2006, six summer-growing perennial grasses and one legume were established in a replicated trial at Hopetoun on a sandy loam soil with clay at depth and moderate subsoil constraints. Until the summer of 2010-11, assessments were limited to pasture biomass production over summer and grass persistence (Whitbread and Craig, 2010).

A barley crop was sown across the plots on 24 June 2011, after mowing and spraying the pasture with Roundup CT® and Triflur X®. The crop was sown at 65kg/ha with 50kg/ha of MAP fertiliser. As only the four Panicum cultivars *(Panicum maximum* cultivars Petrie and Gatton and *Panicum coloratum* cultivars Bambatsi and ATF-714) persisted until 2011, the pasture cropping trial now contains five treatments: four pasture cropping treatments with the different grasses (four replicates each), and one pure cropping treatment, operating as a control (12 replicates; four replicates for each of the three pasture treatments that did not persist).

Location:	Hopetoun
Replicates:	4

Sowing date:	24 June 2011
Seeding density:	65 kg/ha
Crop type/s:	Hindmarsh barley
Inputs/Fertiliser:	50kg MAP
Seeding equipment:	30cm

Results

The results from the pure pasture biomass production trial (2006-2011) indicated that summer-growing perennial grasses can persist over several years and produce biomass ranging from 1 to about 7-9t/ha in response to summer rainfall (Figure 1). This is a noteworthy outcome, pointing to the potential of using sub-tropical grasses to address summer-autumn feed gaps which are limiting stocking rates and compromising farm profitability in Mallee farming systems.

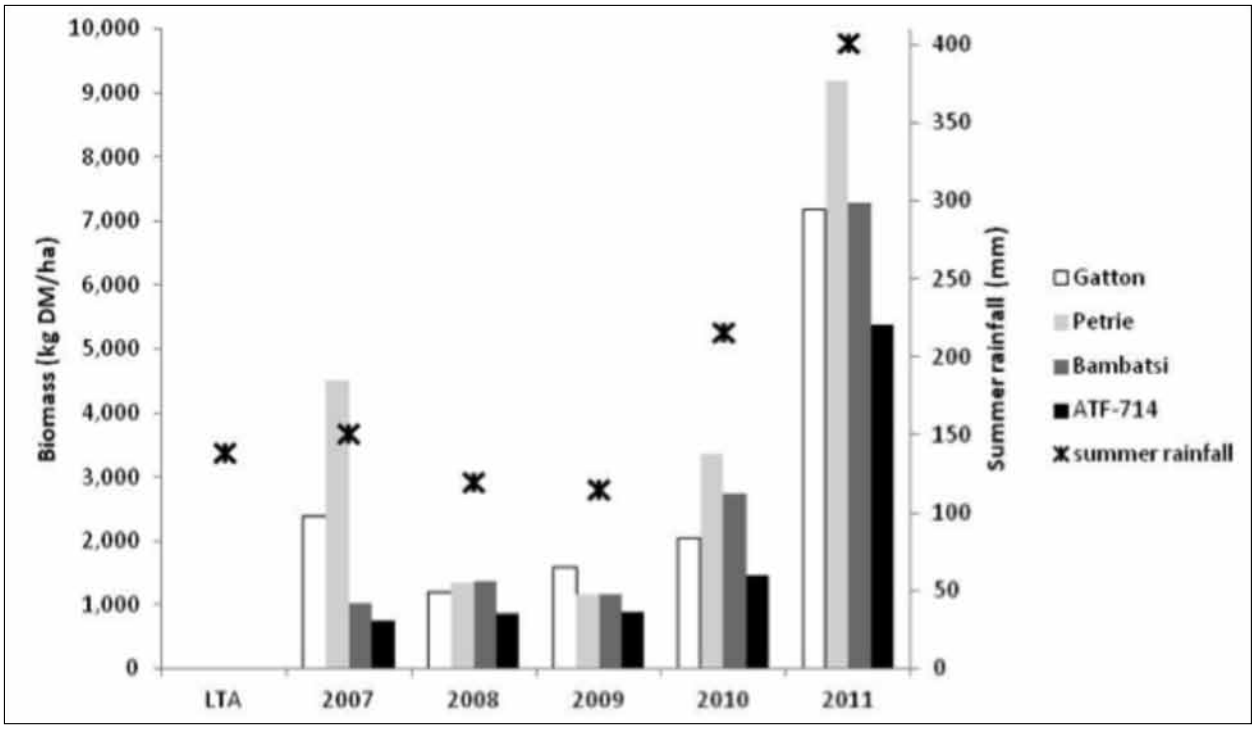

Figure 1: Dry matter production from subtropical perennial grasses and summer rainfall (LTA: long term average) at the Hopetoun trial site

This year's first attempt at using the grasses in a pasture cropping system resulted in low barley grain yields across all treatments. No significant differences were found between the four pasture cropping treatments and average yields ranged from 63 to 119kg/ha. Grain yield was significantly higher in the pure crop plots, but still extremely low at 236kg/ha.

With low early winter rainfall in 2011, crop production strongly depended on stored summer rainfall, which had been abundant. However, cropping into a summer-growing pasture turned out to be not a viable option under these conditions, because the pasture had dried up the soil profile. Together with failed weed control, this led to extremely poor barley yields across all treatments. Specific pasture cropping management issues included poor crop establishment due to more difficult sowing conditions and the overlapping growth of the cereal and the grass in October, resulting in competition for resources.

Interpretation

Summer growing perennial grasses are promising options for filling the summer-autumn feed gap in the Mallee region. A pasture cropping system combining these grasses with cereals was tested in the Mallee for the first time this year.

The high summer rainfall of 2010/2011 created high levels of pasture growth, which consequently used up a lot of soil moisture. With low early winter rainfall, 2011 turned out to be a poor season for cropping into the summer-growing pasture base. From this it can be concluded that in areas with strong reliance on storing summer rainfall, sowing a crop over a summer pasture should only be considered if good rainfall is received in mid-late autumn and is too risky otherwise.

Failed weed control in 2011 was due to a reluctance to use in-crop selective herbicides for fear of damage to the perennial pasture base. However, recent research on herbicide tolerance (Ryder, 2010) has shown that herbicide options exist and should be considered in the next years of the trial.

The disappointing yields from the 2011 season should not immediately lead to discarding this new cropping system, but point in the direction of future research and management questions that need an answer.

Commercial Practice: what this means for the farmer

Before recommendations on the use of pasture cropping systems with subtropical grasses can be made, future research needs to be done to find answers as to how to reduce the impact on cereal cropping through appropriate sowing time and techniques, adapted cereal cultivars, timing of summer pasture grazing to allow for a minimum of soil profile wetting, and how to effectively contain weed pressure.

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