

# Opportunistic summer cropping for increased water use under wheat-based dryland winter cropping systems

## WRITTEN BY

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**Location:** Pine Lodge South, east of Shepparton, Victoria

**Growing season rainfall 2009-2010:**  
326mm September 2009 to April 2010

### Soil:

**Type:** Sandy clay loam

**pH (H<sub>2</sub>O):** 4.9–6.8 (0–20cm)

### Paddock history:

**2008** — wheat

**2007** — canola

**2006** — wheat

**Plot size:** 1.2ha

**Replicates:** 3

## KEY POINT

- Opportunistic summer cropping can make use of summer rainfall that may otherwise be lost to evaporation.

## Aim

The aim of this trial is to investigate how different summer crops influence soil moisture throughout their growing seasons and in the subsequent wheat crop.

## Method

A replicated experiment was established to investigate the effect of various summer crops on soil moisture and subsequent wheat crop yields in comparison to a chemical summer fallow (see Table 1).

Permanent soil moisture probes were located in two of the three replicates of each treatment (a total of 12 probes) to measure moisture, temperature and electrical conductivity (EC).

At installation of the probes, soil was sampled every 20 centimetres for moisture content, pH and EC.

A total of 42 neutron probe access tubes were installed and readings continue to be taken about every two weeks.

Crop growth stages were monitored weekly.

Measurements were being taken of crop emergence (plants per square metre) dry matter (DM) and grain yield.

A soil survey was carried out and soil bulk density has been measured.

## Results (to date)

See Tables 2 and 3 for crop development, dry matter and grain yield results to date.

See Figure 1 for soil moisture results.

**TABLE 1 Summer cropping trial species sowing and crop emergence information**

Crop (variety)	Sowing date	Sowing rate (kg/ha)	Row spacing (cm)	Fertiliser (kg MAP/ha)	Emergence (plants/m <sup>2</sup> )
Safflower (Sironaria)	4 September 2009	9, 12.5 & 16	62	50	16.2
Sunflower (Aussie gold 62)	20 October 2009	2.4	124	30	3.1
Millet (French white)	1 December 2009	9	31	75	8.8
Lablab (Rongai)	1 December 2009	28.5	62	75	20.2
Mung beans (Emerald)	4 December 2009	16	62	60	5.0



FIGURE 1 Average soil moisture for all probes against rainfall

### Observations and comments

**Water use (early observations need to be confirmed with soil bulk densities):**

- Most crops are drawing moisture to 80cm (millet drawing deeper at 100cm).
- Soil moisture in paddock seems to depend more on soil type rather than crop present with average soil moistures varying with location not crop type. Differences between replicates are apparent.
- Crop soil moisture usage decreases dramatically with the end of vegetative production and the start of flowering.
- Rain during November 2009 and the New Year was quickly lost from all blocks.
- Rain during February 2010 filtered to between 30 and 80cm with most being lost. Slight improvement in soil moisture in fallow and safflower blocks.
- Rain during March 2010 has moved deeper into the soil profile with the exception of millet, where it appears rapid plant uptake hindered infiltration.

### Cropping:

- Establishment was patchy in the sunflower blocks.
- Millet was showing symptoms of drought stress from the middle of January 2010 until February rain. Just before the rain the crop looked like it was going to fail. This was especially true in Replicate 3, which falls into an old creek bed.
- There is variation in the crop performance across the replicates. This could be due to the varying soil across the paddock. There has also been a different level of weed establishment between the replicates.

TABLE 2 Dry matter results for forage crops

Cut – 8 March 2010	Millet (t/ha)	Lablab (t/ha)
Replicate 1	8.50	3.32
Replicate 2	5.03	2.68
Replicate 3	4.96	2.29
Average yield	6.16	2.76

TABLE 3 Grain yield

	Safflower (kg/ha)	Mung Beans (kg/ha)	Millet (t/ha)
Replicate 1	358	546	2.85
Replicate 2	766	574	2.68
Replicate 3	398	399	1.53
Average yield	507	506	2.35

### Sponsors

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