The use of bio-degradable films for extending the sowing window

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Take home messages

- *There was no yield benefit using bio-degradable polymer film on late sown barley and field peas.*
- *Despite being sown in early July, Hindmarsh barley still yielded 1.5t/ha.*
- *For the films to be economically feasible, there has to be a 1t/ha yield increase to justify the $200/ha cost.*

Background

The current sowing window is 2 to 3 weeks earlier than what it was a decade ago. Heat stress at critical times such as September and October has driven the change to April – May sowing of all crops across the Wimmera Mallee. In the last decade heat events in spring have been more significant in causing a yield penalty than frost. Typically, late sown crops require extra fertiliser to promote growth during the winter months. Avoiding the drift of Roundup on to susceptible crops at sowing is another challenge associated with late sowing.

However there are still some reasons why late sowing (eg middle to late June) may have a place in our farming systems, hence the reason for the investigation of the use of bio-degradable films (polymers). Late sown crops have the advantage of spreading frost risk and allow for better control of weeds by delaying a knockdown application.

BCG is experimenting with the use of polymer films, in collaboration with Integrated Packaging, for extending the sowing window. Previous BCG trials have failed to show any economic benefit of using polymer films on wheat. However, the theory suggests this may not always be the case. The moist, humid environment created under the films theoretically should be ideal for plant growth and mineralisation of organic matter. Our current limitation when sowing later is crop growth and getting main stream varieties (eg Yitpi) to survive a dry spring. Shorter season crops such as Hindmarsh barley and Morgan field peas may show greater ability to produce in a shortened growing season.

Aim

To investigate whether polymer films can improve yields of short season crops when late sown.

Method

Two replicated field trials and 1 farmer strip demonstration were undertaken at *Sunnyside* (8km west of Birchip). Roundup CT, 1.2L/ha plus 1% (v/v) Hasten and Boxer Gold, 2.5L/ha were applied prior to sowing in separate applications. The trial was sown using a complete randomised block design with 3 replicates. The crop types included in the replicated field trials were Morgan peas and Hindmarsh barley (Table 1).

A demonstration strip of Yitpi wheat (plus and minus the film) was sown to get a large scale comparison. The strip was 800m long and was sown using the farmer's Flexi Coil seeder (12m wide). Treatments included each crop being grown with and without the presence of the polymer film. Films were overlaid immediately following sowing with a custom designed 3-point linkage layer, towed by a Case JX090 tractor.

Visual assessments and photos were taken during the growing season. The polymer films were removed from the barley and field peas on 10 September. For the demonstration strip, small incisions/slits were made to speed the breakdown of the films. The trial was harvested on 18 November. The yield in the farmer sown strip was determined by harvesting a random area using a Kingaroy trial plot harvester. The harvested area was then measured and the yield calculated.

A weather station was installed to measure daily temperatures, humidity, wind speed and soil temperature in the presence and absence of films.

Location:	Sunnyside (8km west of Birchip)
Replicates:	3
Sowing date:	7 July 2009
Crop type/s:	Morgan peas, Hindmarsh barley. Farmer demonstration: Yitpi wheat.
Seeding equipment:	Knife points, press wheels, 30cm row spacing
Fertiliser:	55kg/ha MAP (applied at sowing)

Table 1. Lists the treatments used in the experiment

Crop	Variety	Sowing rate (kg/ha)	Treatment
Field peas	Morgan	80	Nil
			Polymer
Barley	Hindmarsh	50	Nil
			Polymer
Wheat	Yitpi	80	Nil
			Polymer

Results

Crops under the polymers experienced severe heat stress in early September. The breakdown of the polymers was slow and therefore where the polymer had been applied there was substantial stress on the plants (visual observation).

Figure 1. Photo of the bio-degradable film on the field peas taken in September.

Rain in late September allowed the crops to recover, but significant yield potential had already been lost, especially under the films. Table 2, shows the yield data from harvest.

Table 2. Grain yield results (t/ha).

Crop	Variety	Treatment	Grain yield (t/ha)
Field peas	Morgan	Nil	0.45
		Polymer	0.41
		Sig. diff	**NS**
		CV%	**23.4**
Barley	Hindmarsh	Nil	1.53
		Polymer	1.46
		Sig. diff	**NS**
		CV%	**6.7**
Wheat	Yitpi	Nil	0.93
		Polymer	1.08
% increase from nil			**16**

There was no significant yield differences in either the barley or field peas. There was an increase of 16% in yield in the farmer sown wheat strips (single strips, not replicated). There were no differences in grain protein or quality between any of the crop types and treatment.

Interpretation

This trial found no benefit of using of bio-degradable polymer films. Despite finding a 16% difference in grain yield in wheat, it was only a demonstration and we cannot be confident that the result was not influenced by chance or soil variability. BCG will continue to investigate the use of the polymer films, especially into its use for late sowing.

For the films to be economically feasible in broadacre cropping, there has to be a 1t/ha yield increase to justify the $200/ha cost.

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