X tend trial - CRC Polymers

Aim

To determine if cereal wheat yields can be increased using X-tend® (polyolefin films) that have been developed for use in agriculture.

Summary

Agricultural crop film may be the future of agriculture. This project aims to understand the degradation process of polyethylene, as well as understand the effects on crops when covered with polyethylene.

At this stage of the project, results from demonstrations suggest that there may be a slight increase in yield for those treatments with plastic compared to the control (no plastic).

This project will continue in 2006. Other possibilities which will be investigated through this project include the potential of adding herbicides to the film, as well as installation methods to lay the film.

Background

X-tend® is Integrated Packaging's patented method for growing maize, corn, vegetables and other crops through polyethelene films laid on the ground after sowing. Trial work conducted by Integrated Packaging using X-tend® comparing corn, maize, potatoes and other crops has shown increased yields ranging from 30% to 100%. BCG is working with the CRC for Polymers and Integrated Packaging to see if growing wheat under X-tend improves crop production and yield.

The concept is that such polyethelene films can be laid over certain crops during and after sowing as a way of retaining moisture and acting as a form of a 'mini greenhouse' to improve plant growth. This technology is also said to maximise photosynthesis in the critical period of early plant growth, raise and maintain soil temperature.

The key benefits of this technology particularly to farmers in low rainfall environments is that the films allows farmers to plant crops earlier and extend the growing season, and reduce herbicide use and water consumption.

Current agricultural films either do not break down or, if they do degrade, they are either made from polymers that are too expensive or do not degrade satisfactorily for widespread usage in large scale crop production. X-tend® polyolefin films are designed to break down naturally in sunlight and could transform the way we currently produce broadacre crops.

However, this technology needs to be developed further to control and adjust the rate of degradation of the film so this can be tailored for specific crops and regional differences in climatic conditions. BCG is working to tailor this product to winter cereal and pulse crops grown in the Wimmera and Mallee.

Methods and Results

Replicates: Demonstration

Plot Size: 12m x 1m

Variety: Yitpi

Sowing Date: 4/7/2005

Seeding Density: 170plant/m^2 and 90 plants/m^2 (as per treatments)

Treatments: Sowing rates and Timing of plastic coming off

Fertiliser: 50kg/ha MAP

Table 1: Sowing rate, timings for polymer removal and yield for 2005 harvest

Sowing rate Plants/m2	**Date plastic removed (no of days covered)**	**Yield t/ha**	**Sowing rate Plants/m2**	**Date plastic removed (no of days covered)**	**Yield t/ha**
90	No plastic	2.8	170	No plastic	2.8
90	3rd Aug (30 days)	2.7	170	3rd Aug (30 days)	2.5
90	17th August (47 days)	2.7	170	17th August (47 days)	2.9
90	29th August (59 days)	3.9	170	29th August (59 days)	2.7
90	15th September (76 days)	3.1	170	15th September (76 days)	3.1

The temperatures recorded under the plastic were much warmer than the outside temperatures (Table 2), this clearly demonstrates that the plastic acts like a greenhouse.

Table 2: Temperature records

Date	Time	Temp under plastic	Outside temperature
6/7	3pm	17°C	12°C
12/7	11am	10°C	7°C
19/7	10.30am	11°C	7°C
25/7	1pm	16°C	13°C
3/8	11.30am	17°C	13°C
17/8	10.15am	17°C	8°C
26/8	10am	20°C	16°C
29/8	2.40pm	26°C	20°C
31/8	10.30am	19°C	16°C

Results

Average Control 2.6t/ha

Average 3.1t/ha (90plants/m2)

Average 2.9t/ha (170plants/m2)

No difference in yield between the sowing rates or in yield between the timing of plastic coming off – however there may have been a slight increase in yield for those treatments with plastic compared to the control (no plastic).

There were no differences in screenings and protein, and all treatments would have made the H2 bin at the silos (which attracts a premium over APW or ASW).

In future, a true replicated trial design will be employed so the data can be statistically analysed as there is evidence (good visuals during the year as well as yield results) that suggests that the plastic may have had some benefit.

Commercial Practice

A significant deficiency with degradation systems that are initiated by light is that the edges of the film, covered by soil during the film laying process, remain at the end of the growing season. There are currently no commercial available degradation systems for polyolefins that provide the necessary control for degradable polyolefin films in the production of a wide variety of crops. These films will require different degradation times, and will be subject to different agricultural practices depending on the choice of variety.