

Biodegradable mulch film trials

MT09068 Comparison of biodegradable mulch products to polyethylene in irrigated vegetable, tomato and melon crops
Project Update May 2010

Project objectives

In the dry tropics of Queensland, field production of tomato, capsicum, cucurbits and eggplant is almost exclusively based on trickle irrigation and polyethylene mulch systems. While the mulch provides benefits for weed control, water savings, crop yield and product quality, removal and disposal of polyethylene remains an intractable environmental problem for the industry.

The aim of the project is to accelerate the development of practical solutions to the plastic waste problem by evaluating alternative mulch films against the standard. A series of research station and on farm trials are in progress to:

- Screen potential replacement mulch products
- Conduct in-depth trials to answer specific research questions arising from earlier screening work
- Evaluate promising replacement products under commercial conditions on local farms

The focus is Mater-Bi, a biodegradable polyester/corn starch product from Novamont (Italy) which looked promising in earlier trials. Other products are included in trials as they become available.

Desirable characteristics

- Adequate bed coverage throughout the life of the crop including a period of at least four weeks exposure to photo-degradation prior to the crop being planted.
- Weed suppression, water retention, crop quality and yields comparative to those currently provided by standard polyethylene mulch films
- No disposal issues and accredited as compostable and biodegradable (EN13432, AS 4726-2006) to ensure mulch can be incorporated into soil after harvest leaving no toxic residues or build up of toxins or plastics
- Economic viability



Results for 2009

The trials confirmed earlier the 2007 and 2008 results obtained with Mater-Bi when 25, 20, 15 and 12 micron thickness products were tested in screening trials at the Bowen Research Station and local farms.

Replicated research station trial

Two grades of product were trialled against the standard 25 micron polyethylene:

- Mater-Bi NF803 manufactured in Australia from imported resin (12 and 15 micron)
- A new generation Mater-Bi product imported directly from Novamont (15 micron)

Mulch was laid on 4 June and planted with double rows of capsicum seedlings six weeks later on 16 July. A section of the trial was left uncropped to observe mulch performance without crop shading. The trial was harvested from early to mid October.

We found no significant yield differences between the three Mater-Bi treatments and polyethylene. Mater-Bi provided adequate bedcover and weed suppression throughout the life of the crop. As expected, buried edges of Mater-Bi started to biodegrade well before crop harvest. After slashing harvested crop, trickle tape was lifted up through the mulch without problems and disced into the soil with ease.

Research station screening trial

Ecocrop, a paper product from Ecocover (New Zealand) was the only product available for screening in 2009. We were unable to lay the product with existing machinery so reverted to hand laying. The trial was successfully planted with commercial equipment, provided adequate bed cover and weed suppression until crop end and biodegraded under the soil.

On farm trial results

We tested 12 and 15 micron Australian manufactured black Mater-Bi NF 803 across a range of vegetable crops, soil types and farming systems in the Bowen and Gumlu districts. A small trial was also established at Gatton and we inspected its performance on farm in Bundaberg.

The product performed well in most situations with the 12 micron product particularly well suited to vine crops such as melons and cucumber. Some problems were encountered with more difficult soil types and older laying and planting equipment.

Further information

A detailed progress report and farm walk leaflet are available from Sue Heisswolf at Bowen Research Station on 07 4761 4000.

Current situation

At this stage the good results obtained with the black 12 micron and 15 micron Mater-Bi product marketed by Australian Bio-Plastics warrant more extensive trialling under commercial conditions for specific crops. These are melons, possibly zucchini, cucumber and capsicum for 12 micron Mater-Bi and tomato, small cucurbits and capsicum for 15 micron Mater-Bi.

We suggest that interested growers trial Mater-Bi on a limited scale on their properties to assess performance and commercial viability within their farming system.

Technical considerations

- Mater-Bi mulch film seems capable of being laid and planted with most commercial equipment. Some minor adjustments may be needed to the tension applied to the mulch as it is being laid.

- The product may not be suitable for all laying and planting equipment. Some may need modifications particularly where rollers press on mulch and soil as it is being laid.
- Keep an eye on the laying and planting operations as Mater-Bi is more susceptible to tearing and damage as it is much thinner than the standard polyethylene mulch.
- Water up before planting into hard ground to avoid plant wheel damage. Wipe down rollers when starting a new roll of mulch.
- Avoid laying out mulch more than 4 weeks prior to planting crop. This gives enough time to germinate and kill weed seeds while minimising exposure of mulch to photo-degradation. Crops which quickly shade mulch will help protect Mater-Bi from photo-degradation, for example melons, cucumber and tomato.
- Date of manufacture is important. Check with the supplier on age of product. It should be less than six months old. Store in a cool location out of the weather.
- The product may not perform on all soil types for example, sharp quartz soils, heavy clays, stony soils.
- There are advantages to using Mater-Bi in alluvial soils with high nutgrass infestation as the product does not need lifting but can be chopped directly into the ground.

Australian Bio-Plastics contacts

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Plans for 2010

The aim is to trial Mater-Bi under early to mid season conditions on local farms, screen an alternative biopolymer product BioPak and continue assessing new generation Mater-Bi.

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