

Ag Plastics - Case Study 1

The Queensland horticulture industry is a significant user of a variety of plastic products within its production systems, in particular single use irrigation drip tape and plastic mulch for weed management and product quality, which face ongoing disposal issues.

The Queensland pilot was established to address the issue of the plastic mulch and drip tape supply chain across Southern, Central and Northern Queensland. Specifically, the pilot sought to investigate and address the following problems:

- awareness and knowledge of agricultural plastic recovery and recycling options
- on-farm retrieval, source separation and contaminant minimisation of irrigation tape and plastic mulch in horticultural production systems

- strong support for local and regional recycling of agricultural plastics but limited processor capacity
- lack of coordination in collecting and recycling plastic mulch and drip tape across the supply chain

To assist the horticulture industry address a range of disposal issues, the Queensland pilot sought to engage growers to ensure a greater proportion of waste material could be recycled in the future.

Through delivery of the pilot process the project sought to gain an understanding of the types of on-farm retrieval methodologies and plastic quality specifications. On farm assessments enabled the pilot to review and document the cost and time implications of current compared to revised retrieval methods to stress test barriers to adoption of recovering plastic mulch and drip tape on-farm.

Case Study: 1.2ha block of Capsicum in Bundaberg during July 2022.

- The plastic mulch used on farm was 25um black/white (X-pect) and each 72 kg roll held 2300m x 1.2 m.
- Single laterals of Rivulus drip tape were used per bed and laid underneath the plastic mulch. - 22.2mm x 1700m roll (28kg/roll)

For the retrieval to commence the existing crop needs to have broken down (mulched off) sufficiently to reduce the amount of vegetation being collected. This can occur naturally or by applying a chemical spray (i.e. Paraquat in this instance) to reduce the biomass.

Retrieval of the plastic mulch and drip tape from the Capsicum beds was conducted using an unknown manufacturer branded hydraulic conical roller modified (fit for purpose) and fitted to a 95hp Kubota tractor.

The retrieval unit utilises rippers to loosen each side of the row to release the plastic mulch. The loosening also aids soil removal from the edges of the mulch plastic. The grower retrieves a combination of plastic mulch and drip tape onto a conical spool and retrieves two bed rows at 380m each to form a rolled bale.

Given the size and weight of the bale there are approximately 15 rolled bale per tonne. The grower currently spools plastic mulch and drip tape together as its not cost effective to separate.

To address some of the costs associated with separation there is the possibility of adding a separate roller to this to separate the drip tape. Some engineering would be needed to equip with the ratio of mulch exceeding the volumes retrieved in passes than the drip tape.

Generalised findings from on-farm evaluations of retrieval methodologies and adaptations

- Retrieval equipment used by growers on-farm varies due to:
 - Difficulty and cost in adapting some existing equipment
 - Engineering new single pass equipment would improve on-farm retrieval
- Challenges to retrieval separation include:
 - Limited change of practice would be supported by further awareness raising and training
 - Opportunity to improve acceptable levels of contamination
 - Collection point assessment of contamination (pre-processing, shredding to reduce contamination)
 - Transport mass reduction to improve cost efficiency (bailing, compacting, pre-processing)
- Outcomes / Opportunities for future irrigation tape and plastic mulch recycling:
 - Growers are currently ill-equipped to separate drip tape from plastic mulch
 - High volumes of organic material and soil contaminate the used plastic and reduce its potential to be recycled
 - Currently there is no collection points for recycling of plastic mulch, with all going to landfill
 - Current landfill costs are acceptable with growers willing and able to pay at \$250-300/tonne
 - Overall low volumes of retrieved plastic in Queensland are not attractive to recyclers.

ACTION	COST PER HA
Tractor p/hr cost + fuel	\$456
Labour cost p/hr x 2	\$990
Transport + Load incl. pa/ton	\$181
Landfill cost pa/ton	\$408
New plastic used (Ha)	0.420 (420Kg)
Retrieved difference (Ha)	1.180 (1180Kg)
Total	\$2035