



Horticultural EPR Scheme Feasibility Study

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Compiled for Tapex Group®

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EPR enviro

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Executive Summary

End-of-life plastic management in the Australian horticultural sector is poor, with the majority of plastics being landfilled, buried or illegally burnt. Only 8% of this plastic is currently recycled.

The Coffs Harbour pilot undertaken in 2021 indicates a strong desire from leading stakeholders in the Berry Sector, to create lasting sustainable solutions for end of life horticultural plastics. The technology exists to recover and recycle the majority of this plastic, with significant infrastructure investment underway in Australia, facilitating potential circular economy outcomes. However, the Coffs Harbour pilot revealed that most of these plastics will not be commercially viable to recover. The proper disposal and recycling would need to be subsidised by an Extender Producer Responsibility (EPR) scheme. Key reasons for the introduction of such an EPR scheme include:

- Strengthening Federal, State & Local Government action for plastics recycling to be addressed, through funding, banning and potential legislative compulsion.
- Consumers (& supply chain partners) exerting increasing pressure for responsible use and disposal of plastics within the food chain.
- Plastics are a finite resource, that can and should be reused in a circular economy.
- Improper disposal of plastics leads to littering and pollution, damaging the environment, the biota and horticulture sector's reputation.

The federally funded National Non-Packaging Agricultural Plastics Stewardship Scheme will submit a report and recommended scheme design in March 2023. Action by the horticulture sector will be expected. The opportunity presents for the leading horticulture stakeholders to guide the design of the EPR scheme this report will recommend, ensuring the needs of the sector are addressed.

Tapex Group®, with its extensive product stewardship experience, is uniquely positioned to provide an experienced, guiding voice in this process. It is proposed that Tapex engage with primary stakeholders prior to the tabling of the report and help create the structure for the sector to respond to the findings and ensure an EPR scheme is implemented to meet the needs of the sector.

Project Progression Recommendation



Stage 2 is now recommended. The work of Stage 3 is encapsulated in the National Agricultural Plastics Stewardship Scheme report, due in March 2023.

Introduction

This report has been commissioned as part of the Tapex Group® Horticycle program. Tapex have a long history of producer responsibility, having created the Plasback® Product Stewardship Scheme for their agricultural products in Australia and New Zealand www.plasback.co.nz. Tapex are a supplier to the horticulture sector through their Polygro¹ and Green Life Structures² businesses.

The aim of the Horticycle program is to advance the recycling of crop protection plastics for growers in Australia. Horticycle aims to facilitate solutions, but not to own the systems, material collected or infrastructure to bale, transport & process plastics. The intention is to assist the creation of a national Extended Producer Responsibility (EPR) Scheme for Horticultural plastics. By working with other suppliers, growers, industry groups and a network of national recyclers, Tapex will seek to add value by leveraging its experience in plastics, recycling & product development from recycled material.

Background

Australia consumes approximately 3.4 million tonnes of plastic annually (2018-19). This volume is projected to double by 2050³. Until 2018, of the plastics that were recycled, most were exported, resulting in an under resourced local recycling sector. The biggest export recipient was China, with over 1.25 tonnes of recyclable material (including paper & glass) sent in 2017. However, with the advent of the China Sword policy⁴ in January 2018, this export market ceased for most unprocessed plastics. The national recycling rate has now dropped to under 8%. The Federal government has progressively introduced legislation to increase domestic recycling capacity and encourage the business to adopt Extended Producer Responsibility (EPR) practices. The key developments from recent legislation effecting the horticultural sector are:

2018 National Waste Policy (NWP): Establishing the National Waste Plan which has set an 80% average recovery rate target from all waste streams by 2030; promoted the phase out of problematic and unnecessary plastics by 2025; will significantly increase the use of recycled content by governments and industry; and established the National Product Stewardship Investment Fund.

2020 Recycling and Waste Reduction Act: Banned the export of waste plastic, paper, glass and tyres⁵; promotes the establishment of voluntary Product Stewardship schemes and can compel the establishment of Co-regulatory or Mandatory Schemes for what are designated priority materials (those deemed to be *hazardous, resource waste or have environmental impact*)

¹ <https://polygro.com.au/>

² <https://greenlifestructures.com.au/>

³ Source: National Plastics Plan 2021, <https://www.dcceew.gov.au/environment/protection/waste/plastics-and-packaging/national-plastics-plan>

⁴ The China National Sword Policy was formulated in September 2017, and announced by the Chinese Government to the world in January 2018. Designed to improve its China's environmental performance, the policy banned 24 types of wastes and recyclables from entering the country. The decision has changed globally how countries manage and process their recyclables.

⁵ The export ban for waste plastics was introduced progressively – the export of mixed plastics was banned from July 2021, the exported of single source polymers from July 2022. Only processed, single source polymers can now be exported.

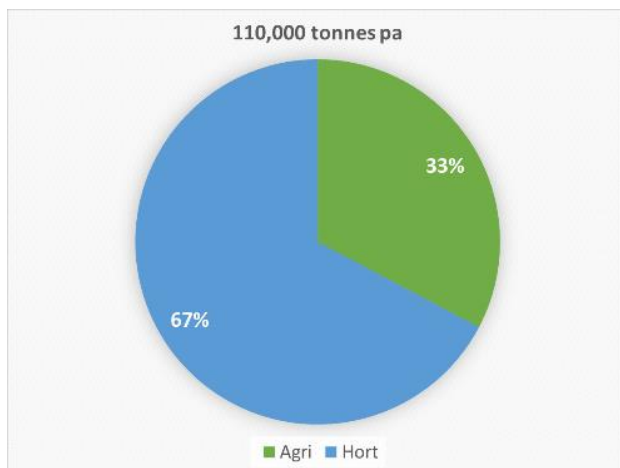
2021 National Plastic Plan⁶: Phasing out the most problematic plastics, legislating to ensure Australia takes responsibility for its plastic waste; co-funding investment to increase national recycling capacity; funding research to find new recycling technologies and alternatives to the plastics; supporting the community to help Australian’s recycling efforts.

Clearly there is a strong push Federally, which has been replicated by supporting State legislation, for industry to address end of life plastic waste.

Horticultural Sector

Australian agriculture is estimated to use 110,000 tonnes of plastic per year on-farm in the production of food and fibre⁷. The main agricultural plastics are protective films (39%), hard plastics like storage, trays and labels (29%), and piping irrigation and drainage (26%). Polyethylene (including high, medium and low density) is the major polymer type accounting for 70% of all Australian agricultural plastics followed by polypropylene at 27%.

The horticulture industry accounts for 67% of all agricultural plastic. Broadacre cropping 14% and extensive livestock 10%.

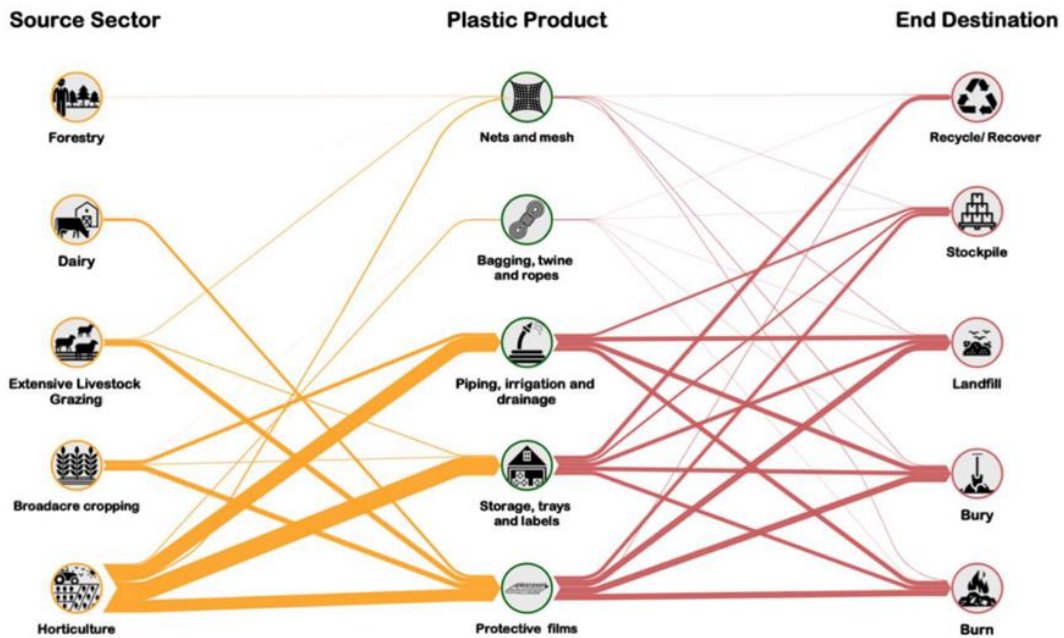


Horticultural plastics estimated at 74,000 tonnes annually

End-of-life plastic management in Australian agriculture is problematic due to the lack of recovery options available. Approximately 8% of this plastic is recycled annually. The chart below illustrates the disposal pathways currently used, with the majority of horticultural plastics being landfilled, buried or illegally burnt.

⁶ National Plastics Plan 2021, <https://www.dccew.gov.au/environment/protection/waste/plastics-and-packaging/national-plastics-plan>

⁷ RMCG National Non-Packaging Agricultural Plastics Stewardship Scheme – Update Jan 2022. This project is one of 20 funded under the National Product Stewardship Investment Fund and a key initiative of the National Waste Policy Action Plan. It is being implemented from January 2021 to March 2023. The project aims to develop an agricultural plastics stewardship scheme outline for non-packaging plastic waste and facilitate and incentivise a viable market to recycle agricultural plastics.

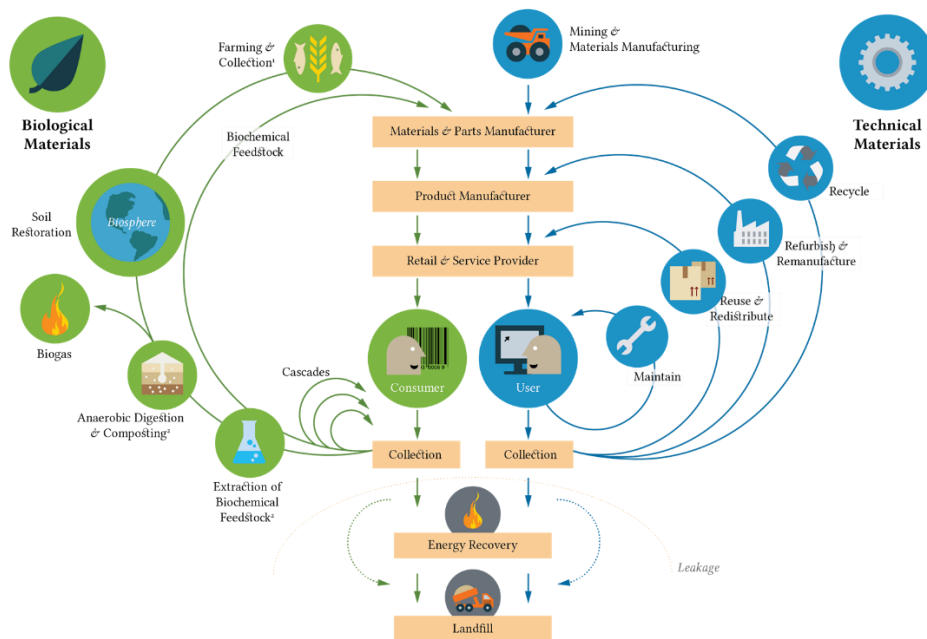


Source: RMCG, National Non-Packaging Agricultural Plastic Stewardship Scheme interim report 2022

Solutions for End of Life Horticultural Plastics

The preferred solution for end-of-life horticultural plastics is that it does not become waste. The current process, where plastics, created from finite resources, are disposed of as waste at the end of their useful life – is a linear one. Manufactured, used and disposed of after use. The more sustainable solution is a circular one – where the waste is minimised or preferably eliminated altogether – where materials are continually circulated to their highest possible value.

These are the building blocks for creating a circular economy for resources, rather than the current linear economy.



Source: Ellen MacArthur Foundation

Hierarchy of preferred solutions

1. Maintenance

Correct cleaning and maintenance of some horticultural plastics – such as protective cropping structures – can extend the life of materials and save growers money. Simple maintenance routines, such as re-tensioning netting structures or washing down tunnels, significantly increases plastic performance. Better maintenance practices can be encouraged through education and maintenance contracts.

2. Repair & Reuse

Some materials can be repaired to extend their life; however, repaired materials must be compatible with later recycling paths – for example metal clips or nylon cable ties used for netting repair, contaminate the material for later possible mechanical recycling.

3. Mechanical Recycling

Mechanical recycling is the process of recovering plastic waste by mechanical processes such as sorting, washing, drying, grinding, re-granulating and compounding. Mechanical recycling does not change the chemical structure of the material and if processed correctly can allow polymers to be reused multiple times – although some thermal-mechanical degradation will occur. Mechanical recycling is usually a solution for single source polymers (hence the importance of sorting), resulting in a lower carbon footprint than other recycling techniques, as they are often replacing virgin polymer and usually command a higher plastic price. There are experienced mechanical recyclers in Australia, however the capacity of the sector is small currently due to years of underinvestment. This is being rectified, in particular with the injection of co-investment funds from government (ref National Plastics plan).

4. Advanced Recycling

Advanced recycling covers a number of technologies that break plastic waste down into its molecular chemical building blocks for conversion back into plastic, or other useful resources such as fuel. It is a solution for plastics which are problematic for mechanical recycling, such as mixed, multi-layer or contaminated polymers. Although some advanced recycling technologies are well established, such as pyrolysis, there has been limited investment in these technologies in Australia. Due to the cost of these processes, advanced recyclers are likely to charge a gate fee for plastics brought in for conversion. This is also being addressed, again with the injection of co-investment funds from government, with the prospect significant plant capacity coming on line from 2025. Qenos/Cleanaway⁸ and Brightmark⁹ are indicating significant investments.

5. Waste for Energy

Plastics that are too contaminated or complex for recycling options, still have high calorific value, so are valuable as a fuel source. ResourceCo¹⁰ have two facilities that convert combustible materials in Processed Engineered Fuels (PEF) that are burnt at high temperatures in kilns for sectors like the cement industry. Gate fees are charged for materials converted to PEF.

6. Landfill

The “least best” solution, but highly preferable to farm stockpiling, burying or burning. Where contamination is high or plastics are unsuitable/ cost prohibitive for recycling, landfill can be the only

⁸ <https://alkanew.com.au/advanced-recycling>

⁹ <https://www.brightmark.com/newsroom/brightmark-announces-australia>

¹⁰ <https://resourceco.com.au/what-we-do/energy/>

viable option. In most cases the plastics are inert when buried in landfill and are kept out of the waterways and environment.

Existing Agricultural Plastics Stewardship Schemes

At the time of this report, there are several product stewardship schemes operating in the agricultural space, each targeting specific plastics.

DrumMUSTER¹¹ is the most established, extensive and best funded scheme. This scheme was set up in 1998 by CropLife Australia¹², to create an end of life pathway for chemical drums and residue. The scheme is funded by a (per litre) levy on chemical sold by participating suppliers. Growers drop off drums for free at over 800 council sites nationally. The plastic material collected is sold by contract collectors to recyclers.

Big Bag Recovery¹³ is a for profit scheme, targeting plastic bags carrying over 15kg/l of contents (sacks and bulk bags). The program only includes recyclable bags that are woven polypropylene (wPP) and low density polyethylene (LDPE) from participating member companies, which pay a fee for the service. Growers drop off at designated sites for free. Material is sold to recyclers.

Recoil¹⁴ is operated by irrigation pipe supplier Netafim. Recoil will recycle old drip line replaced with a new Netafim product. On-farm collection is available for large quantities only. Recoiling of tube must be done with Netafim retrieval machines. Netafim subsidises hire and maintenance of the recoiling machines, freight and recycling, but there is a cost to growers. The material is reconstituted by recyclers into resin and remanufactured into new irrigation pipe by Netafim.

Garden City Plastics¹⁵, the leading supplier of pots and trays to the horticultural sector, provide a limited recycling service, with growers required to deliver pots (at no cost) to 30 designated drop sites. Pots are then transported to Melbourne, reconstituted by recyclers into resin and remanufactured into new pots.

These existing schemes account for most of the 8% of horticultural plastics are being recovered and recycled. The poor result is due to fragmented nature and limited scope of the existing schemes, a lack of a robust funding base and a broadly uncoordinated approach for the sector. The best resourced scheme – DrumMUSTER – is limited by its mandate from CropLife Australia to address chemical drums only (less than 3,000 tonnes pa of HDPE). This scheme will be expanded to include feed, seed & fertiliser bags (bagMUSTER¹⁶) – but will potentially undercut another existing scheme in this area – Big Bag Recovery. The other programs are specific to branded materials and privately run, not encouraging broader participation from other suppliers.

National Non-Packaging Agricultural Plastics Stewardship Scheme¹⁷, has been funded by the federal government to address this poor recovery rate. This scheme is one of 20 funded under the National Product Stewardship Investment Fund¹⁸ and a key initiative of the National Waste Policy Action Plan¹⁹. The project aims to develop an agricultural plastics stewardship scheme outline for non-packaging plastic waste, facilitating and incentivising a viable market to recycle agricultural plastics. It will not however establish a product stewardship scheme for the agricultural (& horticultural) sector. When the project concludes in March 2023, the authors – consultants RMCG²⁰ - will submit a set of recommendations to the Federal Government, with full system modelling and a proposed scheme design.

¹¹ <https://www.drummuster.org.au/>

¹² <https://www.croplife.org.au/> CropLife Australia represents the developers, registrants, manufacturers and formulators of plant science solutions for use in agriculture and the management of pests in other settings. Member companies produce the majority of crop protection and biotechnology products used by Australian primary producers to protect plants from pests and diseases, and help control weeds.

¹³ <https://www.bigbagrecovery.com.au/about-bbr/>

¹⁴ <https://www.netafim.com.au/irrigation-products/Recoil/Recycling/>

¹⁵ <https://www.gardencityplastics.com/sustainability>

¹⁶ <https://www.bagmuster.org.au/>

¹⁷ <https://www.dcceew.gov.au/sites/default/files/documents/recycling-non-packaging-agri-plastics.pdf>

¹⁸ <https://www.dcceew.gov.au/environment/protection/waste/product-stewardship/national-product-stewardship-investment-fund>

¹⁹ <https://www.dcceew.gov.au/environment/protection/waste/publications/national-waste-policy-action-plan>

²⁰ <https://www.rmcp.com.au/>

Potential Scheme Barriers & Opportunities

A summary of the barriers and opportunities for the establishment of a horticultural EPR scheme:

THEME	BARRIERS
Cost	<p>Initial set-up costs for collection infrastructure may be significant, especially if mobile baling capability is required for size reduction. Without guaranteed revenue streams ensuring a commercial pay-back, this infrastructure investment will be a barrier for contract collectors.</p> <p>The recovery of plastic product types that have no commercial value for mechanical recycling, would need to be subsidised.</p>
Infrastructure and logistics	<p>Size reduction equipment (shredding or baling) will be required for plastics aggregation to maximise freight efficiency. In locations where this infrastructure does not already exist, fixed or mobile infrastructure may need to be acquired.</p> <p>In more remote regions, large distances will separate aggregation points for pick-ups, increasing transport & labour costs.</p> <p>There are few processors/recyclers in regional/rural areas, making logistics more complex as material must be transported to Capital cities for sale (& processing)</p> <p>Most processors accept shipments in minimum volumes (20 tonnes per polymer type) that can create storage and shipment issues, as less frequently used plastics are stockpiled to create a commercial load.</p>
Contamination and standards	<p>Quality assurance (QA) standards of processors may lead to load rejection if contaminant level is deemed too high – so source segregation will be necessary, adding cost and rejection to landfill if necessary.</p>
Labour	<p>Collectors will be required to travel long distances in early scheme stages to collect economic volumes. Given the current labour market²¹, this may create a barrier to retaining skilled operators.</p>
Processing Capacity	<p>Mechanical recycling capacity in Australia is currently outstripped by demand. This is resulting in low prices and added volatility, due to processors being able to “cherry pick” cleaner material. Cleaner material is quicker to process, costing the recycler less. The small number of processors means scheme operators may have to chase markets, shipping material nationally rather than to their nearest processor, to get the best price. There is limited capacity at processors currently to sort unsegregated plastics.</p> <p>Advanced recycling, the most suitable solution for mixed polymers, is still in early developmental stage in Australia and will charge a gate fee for material. There is more capacity with Waste to Energy solutions, taking numerous feedstocks in addition to plastics²², to create PEF briquettes for fuel. All have negative gate fees.</p>
Market	<p>The shortfall in local recycling & remanufacturing capacity, could potentially leave an EPR scheme with an expensive collection system with no viable end</p>

²¹The rural labour market is experiencing shortages which are expected to continue in the medium term <https://www.agriculture.gov.au/abares/research-topics/labour/labour-force-survey#key-findings>

²² ResourceCo plants produce Processed Engineered Fuels (PEF) from select dry commercial, industrial, mixed construction and demolition materials – including plastics.

	<p>market for the plastics. Robust processing infrastructure and end markets should be established, otherwise suppliers will see this as a major barrier to scheme establishment.</p> <p>Processors will pay varying prices for polymer types and grades depending on market demand – creating uncertainty for budgeting scheme costs. Collectors could potentially have to stockpile some polymer types if demand is low, incurring holding costs.</p> <p>Mechanically recycled mixed plastics have a limited market, confined for use in the manufacture of downcycled materials such as plastic lumber, furniture etc, which incorporate composite materials. The size of this market is still small (<15,000 tonnes pa) in Australia, with ample existing feedstocks. So a small or negative price could be expected.</p> <p>Advanced Recycling or Waste to Energy solutions are the likely options for mixed plastics, and these will incur significant gate fees per tonne.</p>
Circular Economy	<p>Most plastic products used in the horticultural sector are imported and made from virgin polymer. There are some domestic manufacturers incorporating a proportion of recycled content into their products, as long as technical performance is not compromised eg Netafim, Garden City Plastics. But this local manufacturing sector would need to expand to create a local circular economy for the recycled polymer. The other option is to export recycled polymer feedstock under the new export legislation to participating overseas manufacturers.²³</p>
EPR Scheme	<p>The introduction of a levy to fund an EPR (Extended Producer Responsibility) scheme may be viewed as a potential anti-competitive cost barrier, exposing participating suppliers to greater price competition from direct imports and free riders.</p>

THEME	OPPORTUNITY
Participation	<p>There is a general interest in the horticultural sector for growers to adopt more sustainable practices – but no system in place. A scheme backed with an education and awareness communications plan of the environmental impact of poor management practices among growers, will encourage uptake.</p> <p>Sustainable practice regarding waste disposal & plastics recycling could be incorporated into existing certification processes such as Fresh Care²⁴ or supermarket specific such as WSE²⁵. This would drive participation.</p>
Producer Responsibility	<p>Requirements by government and growers for producers/suppliers to accept responsibility for end-of-life plastics will ensure stewardship schemes have more stable, long-term funding (e.g. levy based). For collection contractors and recyclers, this will mean assured funding for their operations and capital investment.</p>

²³ From **1 July 2022**, export waste plastics must be: sorted into single resin or polymer type and further processed, for example flaked or pelletised, or. processed with other materials into processed engineered fuel. <https://www.environment.gov.au/protection/waste/exports/plastic>

²⁴ <https://www.freshcare.com.au/>

²⁵ <https://www.qmsaudits.com.au/woolworths-certification/#:~:text=Direct%20fruit%20and%20vegetable%20suppliers%20are%20also%20required,prior%20performance%2C%20the%20Woolworths%2FWSE%20audits%20are%206%20monthly.>

THEME	OPPORTUNITY
Regulation	<p>Increased State & Federal funding for product stewardship²⁶, targeted at collection infrastructure and processing capacity, presents opportunities for funding scheme infrastructure and recycling capacity. Coordinated approaches by government for plastics product stewardship, associated collection infrastructure and processing capacity through the National Plastics Plan 2021²⁷, creates funding opportunities. This funding (through State & Federal grants) is being committed through vehicles such as the Recycling Modernisation Fund²⁸, enabling recyclers and waste operators to recoup up to 50% of capital investment on new plant & infrastructure to increase capacity.</p> <p>The ban on export of non-processed, segregated plastic introduced on July 2022²⁹, is providing further incentive for government & industry to invest in circular economic solutions.</p> <p>The Australian Packaging Covenant has set aggressive targets for recycled content in packaging, including 50% recycled content in packaging by 2025.³⁰ This is incentivising supply chain partners to set similar targets (eg Woolworths 360³¹) and to encourage more sustainable practices by growers.</p>
Research & Development	<p>Resources are being committed to create new product streams and circular solutions for recycled plastics e.g. CSIRO³². The requirement for recycled content in products will create stable markets longer term, and incentivise capacity investment.</p>
Market	<p>Horticulture has commercial quantities of a variety of polymer types (estimated 74,000 tonnes pa). This is increasing as trends towards protected cropping and soilless growing are resulting in a greater use of plastics. Horticultural plastics present a large potential raw material source for downstream processing by Australian based manufacturers back into finished product. This could present a cost advantage over imported polymer, which is subject to high shipping costs and variable polymer prices.</p> <p>Horticultural growers tend to congregate in “regions” – for example irrigated areas (e.g. Mildura) or favourable climates (e.g. Coffs Harbour), leading to local economies of scale for plastics collection and processing.</p> <p>Although there is a broad range of polymer types and usages across all farming sectors, there is an opportunity for schemes to pool resources for collection & processing economies of scale, while deploying the same infrastructure across different growing seasons and regions.</p>

²⁶ <https://business.gov.au/grants-and-programs/national-product-stewardship-investment-fund>

²⁷ <https://www.environment.gov.au/system/files/resources/a327406c-79f5-47f1-b71b-7388407c35a0/files/national-plastics-plan-2021.pdf>

²⁸ <https://www.environment.gov.au/protection/waste/how-we-manage-waste/recycling-modernisation-fund>

²⁹ From **1 July 2022**, export waste plastics must be: sorted into single resin or polymer type and further processed, for example flaked or pelletised, or. processed with other materials into processed engineered fuel. <https://www.environment.gov.au/protection/waste/exports/plastic>

³⁰ <https://apco.org.au/national-packaging-targets>

³¹ <https://www.woolworthsgroup.com.au/page/community-and-responsibility/group-responsibility/responsible-sourcing/moving-to-a-circular-economy>

³² Ending plastic waste is one of CSIRO 12 core research goals. <https://www.csiro.au/en/research/environmental-impacts/recycling/plastics>

Coffs Harbour Pilot

The Coffs Harbour LGA was chosen as the site to conduct a pilot trial to test the feasibility of the collection of horticultural plastics from the berry sector. The pilot methodology was to engage with Berry Industry stakeholders, growers, government and waste contractors, to ascertain:

1. The willingness of growers and other stakeholders to participate in a recycling program
2. The size of the plastics issue - what the materials are, the quantities and which plastic products can currently be recycled
3. What infrastructure is required for recovery/ recycling and at what cost
4. What potential circular outcomes can be identified to use recycled plastics back onto farms.

Costa Group had already set up a recycling system for their tunnel film from the Corindi farms with local waste contractor Coffs Harbour Paper & Oil (CHP&O). Horticycle worked with CHP&O, helping improve their infrastructure and understanding their costs to provide an expanded service to Costa and smaller growers such as Oz Group members.

Stakeholder engagement

Key Growers/Merchants

Costa Group

Costa Group are one of Australia's largest wholesale distributors and exporters of fresh fruit and vegetables. Costa has strong sustainability policies within the business and take active measures to ensure sustainable outcomes on their farms. Mathew Holmes was the primary contact. The Corindi farms are 30 years old and the hub of the Costa berry business. A significant portion of crops are now grown hydroponically. 300 hectares of cropping, 140 hectares under tunnels, bird net used at the tunnel ends. Costa had already actively sought recycling solutions for their plastics through their Farm Maintenance & Workshop Manager, Russell Jefferies. Russell worked with local waste contractor, Coffs Harbour Paper & Oil to set up recycling of their tunnel film only.

During several months of engagement with Costa, we investigated alternate recycling pathways for other plastics, assisted Coffs Harbour Paper & Oil with expanding their logistics capacity, scoped potential uses on farm for recycled plastic products and engaged with the national team.

Oz Group

Oz Group has 150 members growing predominantly blueberries, as well as raspberries and blackberries on the NSW Coffs Coast. Oz Group has centralised packing and marketing facilities and charges growers a set amount per kilogram for the facilities, with profits going back to members via a rebate. Meetings with Satpal Singh (Chairman) & Adam Bianchi (CEO) indicated strong interest in helping members to more sustainable outcomes for plastic waste. Five leading Oz Group growers were engaged to join Costa in collections of tunnel film only. This was initially been done as drop-off only to check contamination guidelines are being followed. Then on farm skips could be provided.

Bennings Bros

Largest independent grower in the region, having operated for over 20 years. Bob Benning primary contact. 160 hectares blueberries under crop protection netting, 4 hectares tunnels, rubus varieties grown hydroponically. As a large grower, Bennings landfills approx. 15 tonnes plastic annually. Would prefer to recycle if there was an option

Mountain Blue – (Tabulem)

Large independent grower and nursery operator for the broader sector. Contacts with Andrew Bell, MD and Kamaldeep Singh-Clair, COO. The main Tabulam farm has 115 hectares planted, with further plantings at Lindendale (Nursery), Lismore, Casino and the Atherton Tablelands. Over 70 hectares is protected cropping (nets & tunnels). A high profile industry leader with a commitment to sustainability.

Government

Coffs Harbour City Council

The main contact Elana Balderstone, Waste Strategic Projects Officer, indicated council are eager to work with the sector to reduce the plastic waste issue from horticulture. Horticultural plastics, classified as mixed waste, cost \$306 a tonne to dispose of at the LGA landfill, which is on outskirts of Coffs township and approaching capacity. With no plans to open a new landfill (lack of suitable land), and a likely increase in the state landfill levy, landfill costs will increase. Some plastics, netting in particular, create issues as they cannot be compacted, getting caught in machinery.

The relationship between the berry sector and council has been strained at times, in part due to the waste generated by intensive horticulture.

State Govt (NSW)

Federal and state governments are encouraging investment in waste reduction and recycling, with a particular focus on reducing waste to landfill. The Recycling Modernisation Fund³³, set up under the previous federal government, combining with ongoing state government funding, totals more \$800 million of funds available for primarily new recycling infrastructure investment. Initial investigations with regional waste groups (eg. Mid Waste³⁴), DPI (NSW) & EPA (NSW) revealed a number of grant opportunities to potentially help with the infrastructure investment required for product stewardship scheme establishment. During the course of the project, the author assisted Coffs Harbour Paper & Oil successfully apply for one of these grants to upgrade their baling facilities³⁵.

Industry Association

Berries Australia is a joint venture between Australian Blueberry Growers' Association (ABGA), Strawberries Australia Inc (SAI) and Raspberries and Blackberries Australia Incorporated (RABA). Berries Australia now represents the single biggest fresh produce line in our supermarkets and our combined value is more than \$1 billion.

Berries Australia were engaged early in the pilot, main contact Rachel MacKenzie, CEO. In parallel to this research, they were also running a research project on quantifying plastic used in the strawberry sector in Morton Bay, QLD - the biggest issue being mulch film, but also tunnel film, t tape, grow bags etc. Berries Australia were helpful and will be a crucial stakeholder in any broader scheme development.

³³ <https://www.dcceew.gov.au/environment/protection/waste/how-we-manage-waste/recycling-modernisation-fund>

³⁴ <https://www.midwaste.org.au/>

³⁵ <https://www.newsofthearea.com.au/groundbreaking-recycling-project-for-coffs-harbour-business-76881>

Materials Identified in Coffs Harbour Trial

The below summary includes polymer types & estimated plastic waste volumes in region per annum.

Tunnel film LDPE approx. 50 tonnes life 4-6 years



Bennings Bros, Raspberries

Costa, Raspberries

Netting HDPE 30 tonnes life 5-7 years main contaminant – nylon cable ties



Bennings Bros, Black & White netting over blueberries. White nets better temp and birds see it



Costa, Netting over tunnel ends and sides.

Weed Mat PP 120 tonnes life 15 years



Costa, Weed matting as grass suppressant

Pots PP Multi use, but must be washed between plantings

Pots used for hydroponics, and can be reused but grow bags are easier and widely used. Garden City Plastics have their own EPR program in place



Pots, Bennings Bros

Grow Bags LDPE single use, the growing medium has some value as mulch

Cucumber industry - 100% hydroponic and all grown in grows bags, under tunnels. These bags are changed 1-2 times per year as there is a 8-12 week growing cycle.



Raspberries, Bennings Bros

Bennings cut the plastic off and reuse coconut fibre as mulch – very laborious. Grow bag plastic is landfilled

Rope PP used to secure netting over tunnel ends. Relatively clean of contaminants



Costa, 6mm rope in situ and rolled for disposal

Twine PP Organic plant matter a significant contaminant for recycling. Biodegradable?



Twine usage, Bennings & Costa

Twine is used extensively to support plants, and is very labour intensive to install so all growers are looking for an alternative that is easier to put up. High levels of organic plant contaminant

Lateral Irrigation Pipe MDPE

Recyclers will reject the material if silicon is used to ensure secure joining for drippers. Netafim have their own EPR program for large users, material collected recycled into new irrigation pipe.



White Irrigation Pipe, Costa (can't use black because of heat generation).

Collection & Recycling Infrastructure

Coffs Harbour Paper & Oil – 24 Hulberts Rd, Toormina

The key element to keeping logistics cost low in any collection and recycling system, is to use local contractors with existing infrastructure. Fortunately local business, Coffs Harbour Paper & Oil (CHPO) already had baling, yard and collection facilities in close proximity to the growing area. Sam Fifita, manager, was the primary contact. CHPO had already initiated some on farm plastic collection with Costa Group, so we analysed this system and the feasibility of expanding it.

The CHPO collection method was effective and the cost for growers lower than the landfill cost.

1. Farm Gate pick up. A large cage bin is used (2 tonne approx. volume). Price to growers \$200 per bin pick up (2 weeks on site). A hook bin(5-6 tonne capacity) price can be provided for larger farms.
2. Initial collection was tunnel plastic only. Plastic must be neatly folded and free of cable ties & metal rings.
3. Upon receipt at the CHPO depot, plastics are baled (an old cardboard baler onsite was used), bales stockpiled until a full B Double load was aggregated then shipped to Melbourne plastics recycler Polymer Processors. There the clear tunnel film was processed through a wash-plant and Erema extruder, re-compounded and sold on as a raw material for manufacturing back into blown film.

Coffs Harbour Paper & Oil's role was to collect the plastic from farm, bale it and transport it to recycling processors. All billing of growers was direct by CHPO. Baling and transport costs were met by CHPO. Invoicing of recycling processors for plastic sold was direct from CHPO.

Clear LDPE films, such as tunnel film, have value and recyclers will pay for this type of material. CHPO are undertaking this process as a commercial venture. Revenue from on-farm collection and sale of the material, covered the costs of collection, baling, handling, storage and freight – resulting in a small profit for the contractor. This collection system can be used for the other plastic types identified in the pilot, however the value of those materials is not sufficient to make them commercially viable for a waste contractor like CHPO to collect.

With improvements in processing infrastructure and closer recyclers, logistics costs would be lowered, making other plastic streams also potentially viable to collect³⁶.

Mechanical & Advanced Recyclers

Several mechanical recyclers and one advanced recycler were interviewed and sent samples for assessment and pricing. A full list of current recyclers approached is provided in the table below. The majority of higher capability recyclers for post farm gate plastics are located in Victoria and southern NSW, so freight is a significant cost component.

A 20 tonne tunnel film trial was run with a new Sydney recycler Plasmar, with a view to the material being incorporated in their composite fence post products and sold back to growers. Composite posts or lumber can contain a mix of polymers, as materials such as wood flour to promote rigidity. Plasmar produce strainer and fence posts, which could potentially be used in trellis structures. Sampling was provided to a leading grower but at the time of writing this circular economy solution had not progressed. Recycled plastic stake samples were also provided from Plastic Forests. Trials with new Brisbane mechanical recycler Sunlight Group are currently ongoing.



Plasmar composite posts (vineyard application) Plastic Forests recycled plastic stakes

Advanced Recycler, IQ Renew were sent bird netting samples for appraisal, with an initial estimate of a \$200 per tonne gate fee to be charged. No sample processing was undertaken. Material samples

³⁶ This is why CHPO were assisted in their successful Remanufacture NSW Grant application, to install a new high capacity plastics baler to reducing baling time and increase bale weight. These improvements will provide CHPO with the infrastructure to run a full horticultural plastics recycling program in the region collecting 300+ tonnes of material pa and lowering processing costs.

were also sent to CSIRO, providing horticultural plastic feedstock for their Advanced Recycling research program. The program aim is to provide clarity on what plastic feedstocks can be processed with ‘simple’ pyrolysis, and at what level of contamination other Advanced Recycling processes would be needed. This contributes to the wider discussion over coming months/years between feedstock suppliers, process operators and customers for the commercial viability of oils produced by pyrolysis or other Advanced Recycling processes.

Recyclers Interviewed

Processor name	Address	Polymer types processed	Product	Annual vol processed (t)	Other comments
MECHANICAL RECYCLERS					
Astron Sustainability	Ingleburn, NSW	HDPE,PP,LDPE,LLDPE	processed pellet	30,000	wash plants & extruders at each site, mainly post-ind.
GT Recycling	Geelong, VIC	HDPE,PP,LDPE,LLDPE	processed pellet	9,000	agri pipe & baling twine, washplant with one extruder
Integrated Recycling	Reservoir, VIC	HDPE, PP, LDPE, LLDPE, PS	recycled products	1,000	granulators, extruders, taking post agri, post indust, post consumer
Olympic Polymers	Moorabbin VIC	HDPE,PP,LDPE,LLDPE	processed pellet	16,000	wash plant, grape cover, t tape, film recycler of post indust film
Plasmar	Minto, NSW	HDPE,LDPE,LLDPE	recycled products	6,000	granulators, extruders, manufacturing posts & dunnage
PlasticForests	Albury, NSW	HDPE,PP,LDPE,LLDPE	recycled products	8,000	dry cleaning, shredders, granulators, extruders, sheet extrusion line
Polymer Processors	Braeside VIC	HDPE,PP,LDPE,LLDPE, ABS	processed pellet	25,000	2 x wash plants & extruders, post-ind & post consumer. Putting in new line
Recycling Plastics Australia	Kilburn, SA	PP, HDPE	processed pellet	40,000	post-consumer hard plastics, with being processing PET within 12 months
Resitech Group	Wacol QLD	HDPE,PP,LDPE,LLDPE	recycled products	12,000	wash plant & extruders, agri & post industrial.
Sunlight Group	Carole Park, QLD	HDPE,LDPE,LLDPE	processed pellet	4,000	wash plant & extruder, agri & post industrial. Truck mounted mobile baler
ADVANCED RECYCLERS					
iQ Renew	Central Coast, NSW	All	waste to fuel	6000	advanced recycling, polymer to fuel technology

Pilot Conclusions

A general willingness was exhibited by leading growers in the berry sector to participate in a product stewardship scheme for horticultural plastics. They recognised this is an imperative for their industry, while acknowledging the practices of some growers (improper disposal) impact the whole sector. Coffs Harbour Council are pressing for a solution: from the waste perspective due to a rapidly filling landfill and from a community perspective due to the polluting aspect of improper disposal. This uneasy relationship between council and the horticultural sector is mirrored in other regions.

The aim of the pilot was to test uptake if collections costs for growers were below landfill cost, test the most viable collection system and ascertain if it could be expanded. Investigations to date have revealed a commercial market for some of the plastics, but not all. The clear LDPE tunnel film collected in the trial has a ready market. Other products, such as grow bags and PP ropes, could also have value to recyclers. The other plastics that could be recycled, would be at a negative cost. There may be scope for replacement with materials better suited for end of life conversion – such as the use of compostable twines where organic contamination is too high. There is no market or capability to recycle HDPE net currently – however there are potential solutions being trialled. All plastics need to be baled & transported to major centres for reprocessing, so logistics costs are critical. There are opportunities for circular economy outcomes with growers, through developing recycled plastics products for use back in the sector.

Recommendations

Plastics are an essential component of Australia's efficient horticultural production systems. Reduced water availability, increasing weather instability, high labour costs and consumer demand for quality produce are going to continue driving the increasing use of plastics in horticulture. However, the low residual value of the majority of these plastics at end of life, means commercial solutions for their recovery at scale are not viable. If all these plastics are to be recovered, recycled and reused, the cost of recovery will need to be incorporated in the price of the products.

Several factors make the introduction of an Extended Producer Responsibility scheme for horticultural plastics inevitable. Decisive government action in the last four years around waste and the recycling of plastics in particular, will compel the sector to act. Both internationally and domestically consumers (& consequently supply chain partners) are exerting pressure for responsible use and disposal of plastics within their food chain. Plastics are a finite resource, that can and should be reused in a circular economy. Improper disposal of horticultural plastics leads to littering and pollution, damaging the environment, the biota and sector's reputation.

The opportunity presents itself for the horticultural sector to lead the design of their own EPR scheme. The research & development work being undertaken by RMCG for the federally funded National Non-Packaging Agricultural Plastics Stewardship Scheme, will provide a template for the whole agricultural sector to address the issue of plastic waste. Government will expect action by the sector once this report and the recommended scheme design is tabled in March 2023.

The proposal is to engage with primary stakeholders - leading suppliers, growers, industry groups, supply partners and government – prior to the tabling of this report. The horticultural sector can then respond to the findings in a coordinated manner, to facilitate implementation of the recommendations with the appropriate tailoring to meet the needs of the sector. Tapex Group®, with its extensive product stewardship experience, is uniquely positioned to provide an experienced, guiding voice in this process, to ensure the sector creates a sustainable platform for the continuation and growth in the use of this invaluable material.

Project Progression Recommendation



This recommended progression is highlighted in the above graphic, with the work of stage 1 now complete with the submission of this report. The commencement of Stage 2 is now recommended – starting with the circulation of these findings and the engagement with key stakeholders in the sector. The work of Stage 3 will be largely encapsulated in the National Non-Packaging Agricultural Plastics Stewardship Scheme report. If the recommended (Stage 2) actions have been undertaken, the sector will then have the structure in place to critically analyse this report and have an active role in its implementation in the Stage 4 phase.

NOTE: The Author of this report is currently engaged by RMCG as a plastics & product stewardship expert in the development of the National Non-Packaging Agricultural Plastics Stewardship Scheme research project.

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