Combined Proceedings IPPS 73: 146-152. 2023.

Plastic Propagation Additives and Recycling

Matthew Mills

MMGN Consulting Pty Ltd, Thomastown VIC 3074

mmgnconsulting@gmail.com

Keywords: environmental waste, containers, polystyrene, polypropylene

Summary

While plant propagation plastics are commonly used in Australia, there are initiatives in place to manage their disposal in an environmentally responsible way. These initiatives include the PP5 stewardship, a recycling program participated in by many nurseries and major horticultural suppliers. Unpacking plastic use as an input to propagation and its recycling for contained reuse in Australia, is a complex and engaging story of an industry's dedication to succeed.

INTRODUCTION

Plant propagation plastics are commonly used in Australia for the production of seedlings and cuttings in horticultural and agricultural industries. These plastics include various propagation trays, pots, and tubes, stakes and labels made of materials such as polystyrene (PS6) and polypropylene (PP5).

These plastics have proven effective for plant propagation and improved outcomes

however, they can contribute to environmental pollution if not disposed of properly. In Australia, the recycling of plant propagation plastics is a fast-developing area. There are initiatives in place to manage horticultural plastics away from disposal streams toward closed loop recycling in an environmentally responsible way. These initiatives have been driven by unity of desire between component manufacturers and green life propagators combined within the Horticulture sector Australia-wide and are unique to fit Australian conditions.

PLASTIC RECYCLING INITIATIVE

Through the challenges of the combination of material requirements, landmass, population and cost-efficient circularity, a leading initiative involving many nurseries and 3 major horticultural suppliers in Australia, has started to offer recycling programs for their plant propagation plastics. This program collects used plastic pots and trays from customers and recycles them through specialist recycling processes which have a guaranteed end customer.

The combination of complicated steps to work through, has been achieved through dedication from Horticulture Sector businesses right across the country co-operating together to achieve a meaningful outcome for consumption and our responsibility to manage landfill. **Figure 1** symbolically presents the initiatives and support base to manage the proper disposal of plant propagation plastics used commonly throughout Australia.

Figure 1. A symbolic presentation of the required initiatives to manage the proper disposal of plant propagation plastics used commonly throughout Australia. The commonly used plastics (hand symbol) require proper disposal methods (circle). PP5 initiative by three major horticultural suppliers has support from many leading nurseries and the community.

What is Polypropylene Plastic and why is it problematic?

Polypropylene plastic (PP5) is an endlessly recyclable plastic used prevalently across a wide range of industries, and the horticulture industry (Industry) is no different. PP5 reaches every garden centre, retail and commercial production nursery in Australia in the form of plant pots, punnets, trays, labels, and stakes. The Industry sells over 12 million kilograms of PP5 as finished goods per year. Currently only 10% of this PP5 is recycled — almost all by us!

The Industry has historically used PP5 recycled from other post industrial polypropylene and often colours its PP5 ‘carbon black’ to standardise the colour of the recycled material and enhance its UV sta-

bility for use in full sun. However, this colouring makes the PP5 unrecognisable on Materials Recovery Facility (MRF) sortation lines; thus, creating millions of kilograms of recyclable landfill even when it is placed in kerbside recycling systems.

Our Solution:

The PP5 Initiative (Initiative) is a joint venture between three major Australian businesses supplying horticulture: Norwood Industries, Garden City Plastics, and Polymer Processors. As a joint venture, our goal is to build an innovative infrastructure that allows our industry, and the communities that operate within, to sustainably consume and reuse our own PP5.

To that end we have developed a sustainable circular model (**Fig. 2**) whereby the PP5 sold by us is returned to us and converted into 'polymer granules' that are then remoulded into a form that can be resold. This video explains how we do it! We started from collecting 4,000 kilograms of PP5 in 2021 to collecting 100,000 kilograms per month in the second half of 2022! That is 10% of the PP5 the Industry sells!

Working as a closed loop system within Horticulture, manufactured recycled, carbon black PP5 from Polymer Processors is passed onto Norwood Industries and GCP to produce plant pots, containers, and labels for production nurseries throughout Australia. Nurseries then collect and return end of use PP5 or on sell growing plants, passing the products to landscape projects or retailers for sale to home gardeners. Landscapers, retailers, and home gardeners are then all included in this recycling initiative by being either able to provide a PP5 collection point or return material to the nearest one.

Figure 2. Sustainable circular model of PP5 Initiative.

Since the Initiative's launch in 2020, we have collected over a million kilograms of PP5 to recycle that would have otherwise been sent to landfill. We have fostered a community of over 100 partners, not to mention the countless members of the public. Our partners have installed over 700 collection sites that deliver otherwise end-of-use PP5 to one of our shipping and processing facilities.

How did we get here?

First, we had to develop the infrastructure. We have seven major shipping and processing facilities all around Australia to convert end-of-use PP5 products to polymer granules; including a specialised facility in Queensland that sanitises collected PP5 of an invasive fire ant species (*Solenopsis invicta)* harmful to Queensland's ecosystem (WPSQ, 2022) before the PP5 is transported to other states. We then expanded our existing delivery and transportation network so that PP5 products can be collected and delivered to Melbourne for manufacturing without any cost to the community!

Next, we had to engage our industry community. To amplify the collective action, we ran education and awareness campaigns regarding how our community can collaborate with the Initiative. Underlying these campaigns is our collaboration with various organisations with the platforms to extend our reach such as 'Recycle Mate'; a partnership between the Australian Council of Recycling, the federal government and Greenlife Industry Australia (RM, 2023), Australia's national peak body for production and retail nursery businesses.

Finally, we needed commercial partners to host our collection sites. As our goals resonated with the values of our community, we had no shortage of interest from prospective partners. However, hosting collection sites incur some level of expense. These expenses made some prospective partners reluctant to sign onto our Initiative at first. But as we built the Initiative's brand and reputation, the more members of the public have come to expect our collection sites as their preferred retailers, the stronger the reputational benefits of hosting our collection sites have become.

Our commercial partners include Bunnings and Mitre 10 among some 100 others. The organic demand for more collection sites is now so overwhelming that we anticipate having over 1000 collection sites with over 200 collection partners by 2025! The key to our success has been developing an infrastructure that adds benefit to all contributing participants. Our Initiative not only supports, promotes, and strengthens sustainable green life production in our communities, it also makes the process as economically viable and convenient as possible. Our three pillars of success are presented in **Figure 3**.

We are more than economically viable. We have completely overcome our cost of transport. Once PP5 is returned to our collection sites, our three-step-process — identify, tap, and stack — efficiently transfers that PP5 to our shipping and processing facilities free from impurities, contaminants and wasted space on transports. This process is now so refined that it costs us the same to recycle used Industry PP5 as it does to purchase other recycled PP5 from outside industries or import PP5 into Australia. We anticipate that by 2025 it will cost us less to recycle our industry's own used PP5 than it would be to source elsewhere or import PP5 into Australia, savings which

we will pass onto growers via holding down prices on recycled PP5 products. Other economic benefits the growers enjoy include reduced landfill fees and fewer costs managing scrap plastics. We have created an engaging financial incentive to responsibly consume and reproduce our PP5!

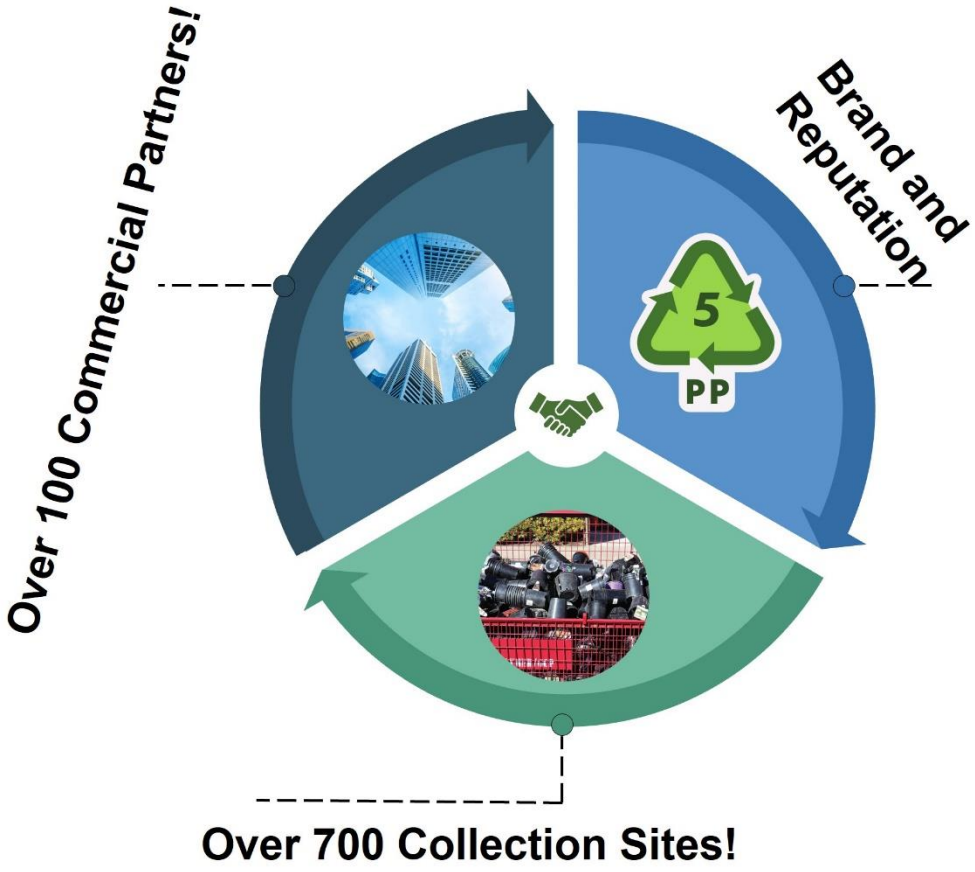

Figure 3. Three pillars of success of horticultural plastic recycling in Australia: increasing number of commercial partners and their collection sites with the development of an incredible reputation of our brand.

To amplify the collective action, we run education and awareness campaigns regarding how our community can collaborate with the Initiative. Our community of sustainably-minded members of the public are core to our Initiative. We market ourselves online through several channels (**Fig. 4**):

- The PP5.com.au website (PP5, 2023)
- PP5 Recycling For Schools App (PP5, 2023)
- Through social media on Instagram and Facebook.

We also engage our community directly via:

- Various commercial industry events
- Conferences with industry peak bodies and the public
- Talkback radio interviews
- Displays at the Melbourne International Flower and Garden Show
- Horticultural Society events
- Delegations to State Parliaments

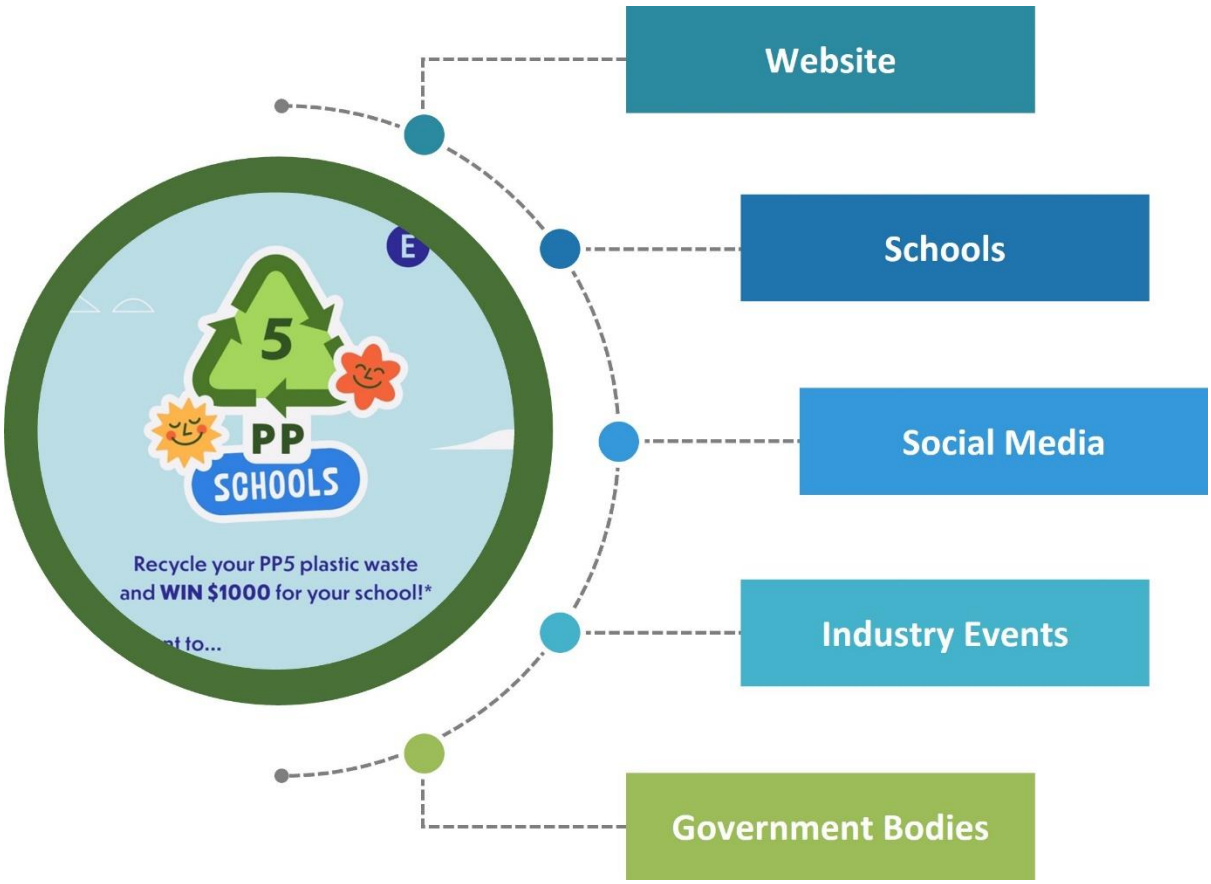

Figure 4. Members of the public are core to recycling effort. PP5 Initiative has a multifaceted approach to educate and collaborate with the members of the public.

Future Perspectives

Given Australia's increasing focus on ethical and sustainable use of plastics, our list of prospective partners is limitless. Our focus for 2023 is three-fold:

- Continue expanding our lists of commercial partners to install even more strategically located collection sites
- Collaborating with local councils to require transfer stations that can serve as both centralised collection sites, and a governmental platform to promote the Initiative
- Collaborating with the Nursery & Gardening Industry Victoria (NGIV) to run several programs in schools across Victoria to educate the leaders of tomorrow, as well as engaging NGIV's interstate counterparts to expand our school programs across Australia!

The versatility of our process extends beyond horticultural PP5 products. We are expanding the capacity of our collection sites to pick up PP5 products outside of the Industry. Our partnership with Hexa-Cover® enables their floating cover system for controlling and deterrent of unwanted waterfowls to be a part of our sustainable circular model. Our goal is to eventually be a one stop shop for all 'carbon black' PP5 recycling!

Last, but not least, is the scope for our community to be used as a platform to promote other sustainability efforts! This is why we hope to partner with the Banksia Foundation (BF, 2021). This foundation has the cross-sector reach that we need to leverage our growing community of like-minded individuals and organisations to promote other sustainability initiatives.

LITERATUE CITED

BF (2021) Banksia Foundation. https://banksiafdn.com/ downloaded on 18 August 2023

PP5 (2023) Polypropylene # 5 recycling in Australia. https://www.pp5.com.au/ downloaded 18 August 2023

RM (2023) Recycle Mate. https://recyclemate.com.au/ downloaded 18 August 2023

WPSQ (2022) Wildlife Preservation Society of Queensland. https://wildlife.org.au/fire-ants-threaten-wildlife-and-ecosystems-in-australia/ downloaded 18 August 2023.