

THE FUTURE OF MUSHROOM PACKAGING

As consumers and regulators become increasingly concerned about sustainability, the Australian mushroom industry needs to explore alternative packaging solutions to meet the growing demand for environmentally friendly products. With fewer than 50 commercial growers, the mushroom industry has the opportunity to adopt sustainable packaging solutions across the board, positioning itself as a leader in Australian horticulture.

Mushrooms are well adapted to the cool, humid, still conditions inside growing rooms.

They are less well adapted to the harsh outside world, including the warm, dry conditions found in an average supermarket. Cut off from their parental mycelia and lacking even a proper skin, harvested mushrooms are vulnerable to physical damage, microbial contamination and moisture loss. Even the slightest bump, squish or misplaced fingernail leaves an ugly brown stain across their soft, white skin.

Packaging not only keeps mushrooms together, it helps to protect them from the environment. It also protects them from microbial and physical contamination - the potential result of grubby fingers riffling through a bulk box.

The current PET (polyethylene terephthalate) tray with a thin PVC (polyvinyl chloride) stretch wrap has many advantages. Crystal clear materials not only let customers see what they are purchasing but can improve the product appearance. The wrap has gas transmission properties that suit mushrooms, while anti-fog coating helps prevent condensation. It's been a great solution for many years, and has undoubtedly improved convenience and quality for consumers.

However, there is pressure to improve the sustainability of packaging, not just for mushrooms but all fresh produce. With increasing pushback from customers

Key points

- Social and regulatory pressure mean that the Australian mushroom industry will need to find sustainable packaging solutions.
- The industry is currently using a packaging solution comprising a PET punnet tray and a PVC stretch wrap seal.
- A R&D levy-funded project is examining various packaging formats based on commercial viability, operational feasibility, and sustainability.
- Global and domestic scans of packaging alternatives found 56 solutions potentially suitable to the Australian mushroom industry
- Two were selected to progress to a high-level cost-benefit analysis: recycled polyethylene terephthalate (rPET) and corrugated/fluted cardboard, both overwrapped with PVC.

on single use plastics, the mushroom industry needs to explore more sustainable solutions.

Developing more environmentally friendly packaging can also keep the industry ahead of potential regulatory pressure. New laws could well affect "Fast Moving Consumer Goods" (FMCG) such as mushrooms in the



An example of cardboard mushroom punnets used in Spain by Ayecue: The real green food company, has been exploring sustainable punnets for a number of years (FreshPlaza 2019)

near future. The 2025 National Packaging target, administered by the Australian Packaging Covenant Organisation (APCO)¹ and member organisations (including retailers) reflects a strong commitment to sustainable packaging targets.

Pre-packaged and value-added products³, such as sliced mushrooms, are the fastest growing segment in the domestic retail market. This sector is currently driving around 80% of current growth. If this is to continue, it is vital to keep up with consumer sustainability expectations.

A new, R&D levy-funded project has been examining various packaging formats available to the Australian mushroom industry. The aim is to evaluate their commercial viability, operational feasibility, and sustainability. The review will determine the readiness of sustainable packaging options for mushroom growers in Australia.

Global and local scans

To fully understand the state of play in sustainable packaging, the project team conducted a global and domestic scan of packaging alternatives.

The aim was to identify best practice as it relates to sustainable packaging in the fresh produce sector

and investigate sustainable packaging solutions from different countries, including those viewed as leading in environmental, social and corporate governance (ESG). Countries included in the scan were Australia, the United Kingdom, the United States, the European Union, and India.

Overall, 56 solutions were identified that had a near-term potential to meet the requirements of the Australian mushroom industry.

A Project Advisory Group (PAG) of industry representatives, packaging providers and retailers were engaged in a series of four workshops to ensure the validity, accuracy, and relevance of project findings. The group consisted of eight participants from the mushroom value chain including three grower representatives, three retailers, an expert from a packaging industry association, and one mushroom industry body representative. Industry consultations were also conducted throughout the project.

The desktop review indicated that alternatives to PVC wraps are not yet commercially viable for the mushroom industry.

Thereafter, the primary focus of analysis was on sustainable punnet tray alternatives.

The suitability of punnet tray alternatives was evaluated using a multi-criteria assessment. The criteria included five core components:

- 1. Cost** – packaging solutions needed to be commercially viable for the industry to ensure that it does not create additional cost burden to either the business or the consumer.
- 2. Sustainable** – the solution needed to align with the National Packaging Targets administered by the Australian Packaging Covenant Organisation (APCO) 2025.
- 3. Product quality and safety** – the solution needed to meet the physical and biochemical demands of mushrooms to maintain product quality and safety requirements for consumer purchase and consumption.
- 4. Supply chain suitability** – the solution meets logistics requirements including the necessary durability and robustness to withstand the entire mushroom supply chain.
- 5. Consumer acceptability** – the packaging solution does not hinder consumer acceptance or demand for the product.

From the evaluation, 12 solutions were identified as high scoring on a scale of 0-10 and were presented to the Project Advisory Group for feedback and evaluation. PAG votes and further industry consultations led to two solutions deemed worthy of a high-level cost-benefit analysis.

The top two solutions considered in the cost benefit analysis were:

1. Recycled polyethylene terephthalate (rPET) and,
2. Corrugated/Fluted cardboard.

High-level cost benefit analysis

The high-level cost benefit analysis compared the commercial viability of the two prioritised punnet tray solutions with an industry reference standard, a PET punnet tray.

The analysis identified the relevant costs, benefits, and considerations of adopting alternative packaging solutions in the mushroom industry, at a high level. Based on discussions with the PAG, the analysis used consistent size and closure method for the punnet tray across each option, with factors including size and grower output, to show potential impacts of these variables.

An additional supplementary analysis is now examining the cost of adopting wrap and seal alternatives to PVC cling film in greater detail. This will include consideration of the cost of transitioning to alternative materials, such as polylactic acid (PLA) cling film.

Once complete, the project team will present a series of recommendations and next steps for consideration.

There is no doubt that comprehensively addressing climate change is hard. However, eliminating single use plastics may be even harder. Achieving the right balance between environmental sustainability (by reducing plastic) and avoiding produce waste (by using plastic) is definitely not easy. However, by exploring the various solutions available to industry, this project will allow growers to choose the best possible option for their mushrooms.



References

- 1 Australia's 2025 national packaging targets - APCO. (2018). Retrieved February 6, 2023, from <https://apco.org.au/national-packaging-targets>
- 2 Hort Innovation Mushroom Fund. 2022. *Mushroom Strategic Investment Plan 2022-2026* [Brochure]. Author.
- 3 Norris, M. 2022. Hort Innovation and NielsenIQ. Retrieved March 22, 2023, from <https://www.harvesttohome.net.au/fruitmushroomnuts/case-studies/mushroom>



Around the world, many companies are already using cardboard punnets to package organic mushrooms.