ARC
Training Centre for
Innovative Horticultural Products

Industry Report: The use of PLA for food packaging in Australia

PLA Highlights

Poly(lactic acid) (PLA) is a bio-based* polymer, produced from a variety of plant based materials. Its ability to be produced relatively cheaply from readily available starch-producing grains has led to its position as one of the most widely used bioplastics worldwide. PLA has long been used for biomedical applications and 3D printing, and increasingly is being used for food packaging as well.

The key selling feature of PLA is its biodegradability under industrial composting conditions (Mistriotis *et al.* 2016). However its true biodegradability when used in commercial applications is disputed (Rudeekit *et al.* 2008; Robertson 2012), and life cycle assessments have shown the overall sustainability benefits of PLA compared with conventional plastics are uncertain (Hottle *et al.* 2013).

Advantages:

- Bio-based polymer (commonly derived from corn, sugar cane or other plant residues)
- Biodegradable when composted industrially (with high temperatures and digesting bacteria)

Disadvantages:

- Can be brittle unless blended with other cheaper and less environmentally friendly polymers (Robertson 2012)
- PLA is commonly derived from GMO plant matter (however the heat involved in processing removes genetic material)
- In Australia, PLA is unlikely to be adequately composted, as it would need to be correctly sorted with green waste and then shipped to a correctly managed composting facility

Recommendations:

- The use of PLA in combination with currently widely recycled polymers (such as PET) may conflict with existing recycling programmes, causing counterproductive sustainability effects
- The use of PLA to replace other plastics, however, to then be placed in targeted recycling or degradation programmes, could prove much more environmentally beneficial

References

Hottle, TA, Bilec, MM, Landis, AE (2013) Sustainability assessments of bio-based polymers. *Polymer Degradation and Stability* **98**, 1898-1907.

Mistriotis, A, Briassoulis, D, Giannoulis, A, D'Aquino, S (2016) Design of biodegradable bio-based equilibrium modified atmosphere packaging (EMAP) for fresh fruits and vegetables by using micro-perforated poly-lactic acid (PLA) films. *Postharvest Biology and Technology* **111**, 380-389.

Robertson, GL (2012) 'Food packaging: Principles and practices.' (CRC Press: Boca Raton, USA)

Rudeekit, Y, Numnoi, J, Tajan, M, Chaiwutthinan, P, Leejarkpai, T (2008) Determining biodegradability of polylactic acid under different environments. *Journal of Metals, Materials and Minerals* **18**, 83-87.

* derived primarily from annually renewable sources