

# Transformation opportunities of industry waste and potential routes to market: a snapshot



Kieran C. Hirlam<sup>1</sup>, Josh L. Hixson<sup>1</sup>, Tadro Abbott<sup>1,2</sup>, Steve Lapidge<sup>3</sup>

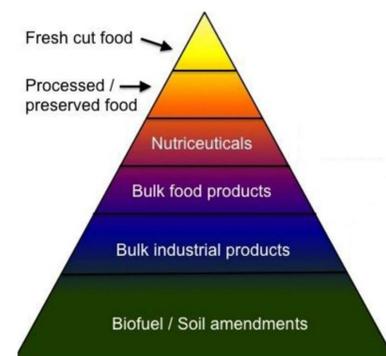
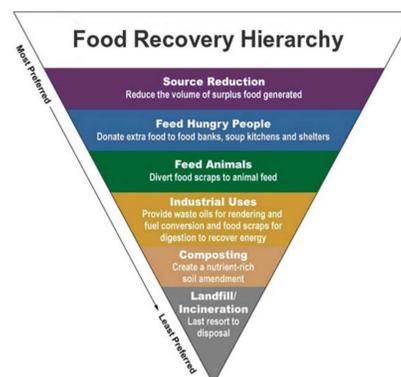
<sup>1</sup> The Australian Wine Research Institute, PO Box 197, Glen Osmond (Adelaide) SA 5064, Australia

<sup>2</sup> Current address: CSIRO, Waite Campus, Urrbrae SA 5064 Australia

<sup>3</sup> Fight Food Waste Cooperative Research Centre, PIRSA, L1 Wine Innovation Central, Urrbrae SA 5064, Australia  
Corresponding author's email: kieran.hirlam@awri.com.au

## Introduction

- The Riverland and Murraylands contribute almost \$2.2 billion to South Australia's food and wine industries.
- This project mapped and determined the most profitable value-add options for lost or under-valued food and industry waste (e.g. grape marc, waste water, vineyard posts) in line with the principles of the waste hierarchy of alternative uses for the region.
- Project phases included identifying volumes and seasonality of waste, bioprospecting of waste streams and investigations into marketable avenues.



The principles behind waste hierarchy were introduced into European policy in the 1970s, with the term 'waste hierarchy' clearly defined in European legislation in the late 1980s. Since then, waste hierarchy has been adopted worldwide as the principal management framework for waste products, including food.

## Overall key findings

- Rejected potatoes (due to cosmetic standards), almond husks/shells and unsaleable citrus were the three largest horticulture waste streams from the study region.
- Significant wine industry waste streams were vine prunings and grape marc, with the latter already well used and aggregated, and the former typically non-valued as an under-vine mulch.
- Cross-industry aggregation hubs would further capabilities in the waste valorisation industry to better take advantage of seasonality of produce.

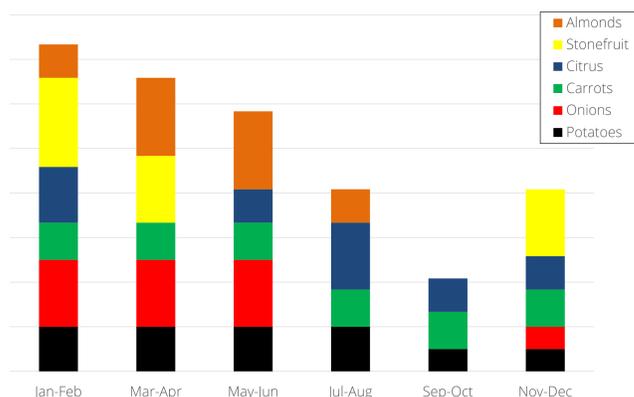
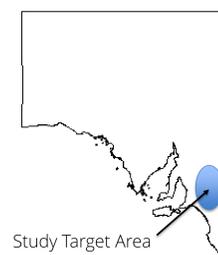


Figure 1. Seasonality of horticultural products as a percentage of the total waste from the industry

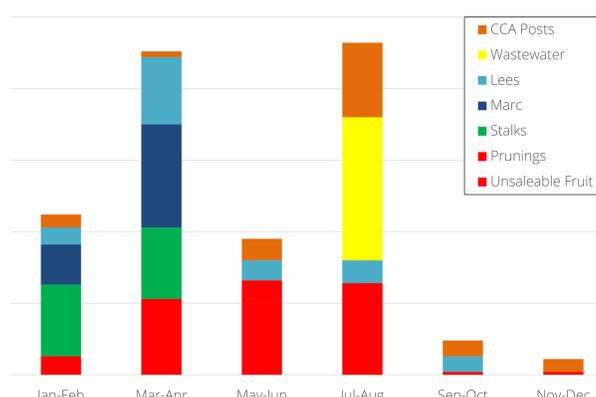


Figure 2. Seasonality of wine industry products as a percentage of the total waste from the industry

## Seasonality of waste streams

- From a horticultural aspect, waste generated from potatoes and carrots is typically available year-round (Figure 1).
- For the wine industry, peak waste generation times are during harvest/crush and following fermentation (Figure 2).
- Seasonality of selected waste streams can significantly affect the potential marketable value attained through processing.

## Potential wine industry waste transformation opportunities

### Bioenergy

Aggregation opportunities:

#### 1. Anaerobic Digestion

Recommendations:

- Grape marc and potato waste aggregation for anaerobic digestion.

Considerations:

- Moderate-to high moisture content of grape marc (40 – 60% DM) and potato waste (10–20% DM).
- Not co-located.

Further:

- Need to determine heat/steam generation requirements.

#### 2. Gasification

Recommendations:

- Combined gasification of almond waste and steam distilled grape marc for steam and electricity production.

Considerations:

- Locate at almond processing facility and supplement with freighted excess steam distilled grape marc (post-ethanol and tartaric acid removal.)
- Gas and electricity offsets for almond processor and revenue payback for grape waste facilities.

Further:

Sensitivity analysis dependent on value potential of using almond waste as a livestock feed or supplement.

### Nutraceuticals

Grape seed extract:

High quantities of polyphenolics and tannins

Requires significant purification to meet requirements for inclusion into nutraceutical applications

More knowledge required around the marketable nature of the product

### Bulk food products:

Grape seed oil:

Good source of polyunsaturated fatty acids

Limited degradation and accessible from processed and pre-extracted grape marc/seeds

Processing infrastructure and grape seed isolation from grape marc key functional requirements to improving product availability

### Animal Feed Products

Grape waste:

Current prospect: high mass – low value

Future prospect: boundary between high mass – high value with some components as low mass – high value after fractionation, including lees and tannin-based components.



The AWRI is a member of the Wine Innovation Cluster.

