

# Queensland technical methods - Horticulture (bananas)

## Australian Biomass for Bioenergy Assessment

May 2018

This document is part of a series describing the technical methods used to publish the Queensland based data for the Australian Biomass for Bioenergy Assessment (ABBA) <[arena.gov.au/projects/the-australian-biomass-for-bioenergy-assessment-project](http://arena.gov.au/projects/the-australian-biomass-for-bioenergy-assessment-project)>. All documents in the series are available to view and download at <[publications.qld.gov.au](http://publications.qld.gov.au)>.

### What is the Australian Biomass for Bioenergy Assessment?

ABBA provides detailed information about biomass resources across Australia. This information will assist project developers make decisions for new bioenergy projects, and provide linkages between potential biomass feedstocks—through the supply chain—to end users. To achieve this, ABBA collects datasets, on a state- by-state basis, about the location, volumes and availability of biomass, and publishes them on the Australian Renewable Energy Mapping Infrastructure (AREMI) platform <[nationalmap.gov.au/renewables](http://nationalmap.gov.au/renewables)>. ABBA is managed by AgriFutures Australia with funding support from the Australian Renewable Energy Agency (ARENA).

### Why banana industries?

Bananas are by far the most popular fruit consumed in Australia – each person consumes a banana on average every 5 days (Australian Banana Growers Council 2018). All bananas consumed in Australia are produced in Australia with more than 90% of bananas consumed grown in an area within approximately 50 km of Tully in north Queensland (DAF 2013). The processes of growing and marketing bananas generates large amounts of biomass residues (Guerrero et al 2016). In other parts of the world the potential for banana residues as a resource for secondary processing such as bioenergy production has attracted considerable interest (Padam et al 2014). In Australia exploitation of banana residues has been investigated and bioenergy production trialled at a small-scale (Clarke et al 2008) however the majority of residues are still disposed as waste.

Bananas are a perennial herbaceous plant with above-ground parts comprising one (or a number) of false stem(s) ('pseudostem') from which fruit (and leaves) are produced and an underground true stem ('corm') from which above-ground parts emerge as suckers (Australian Government 2008). In commercial banana plantations new plants are established by burying sections of corm from which a number of suckers emerge each year, one of which is selected to grow on and bear fruit and the rest are removed early in the season to avoid competition with the selected sucker (DPI 2004). The above-ground parts of banana plants live for about one year, bearing fruit only once (Guerrero et al 2016). The fruiting sucker is removed at harvest (around a year after emergence) after which a new sucker is selected to bear the following years fruit. Paddocks produce a plant crop and 3-5 ratoon crops before the operation costs are considered to be too high and then the crop is destroyed. Thus a paddock would be typically be in production for 5+ years before replanting.

A large number of different varieties of banana are cultivated throughout the world and these vary greatly in the size and shape of plants and in cultivation requirements. In Australia however, the overwhelming majority (more than 95%) of bananas grown are of the 'Cavendish' variety (Australian Government 2008) so the size and shape and management of plants are relatively consistent.

### What data about banana industries is published by ABBA?

The banana industry produces two different types of biomass residues:

- Lignocellulosic prunings of above ground plant parts that are generated episodically largely during or soon after harvest and are distributed throughout the plantation generally where they fall;
- Starchy waste fruit that is concentrated at the packing shed and generated throughout the year but in quantities that vary depending on the condition of fruit and the market.

ABBA publishes a dataset for the processing residues (or waste fruit) that are produced at the packing shed only.

## Methods

### Mapping planted area

The area planted to bananas is identified from the most recent land-use mapping for Queensland and New South Wales, which has identified by commodity type in each state using the Australia-wide land use mapping standard criteria (ABARES 2011). In Queensland mapping of banana plantation areas was updated in 2015 as part of a major bio-security response (Lawrence et. al. in press). In New South Wales, mapping of banana plantation areas was updated in 1999/2000. The land-use mapping was intersected with the latest local government boundary mapping to determine the area of bananas planted in each local government area (LGA).

Access to land use mapping is available through the following links:

- Queensland <[qld.gov.au/environment/land/vegetation/mapping/qlump](http://qld.gov.au/environment/land/vegetation/mapping/qlump)>
- New South Wales <[data.nsw.gov.au/](http://data.nsw.gov.au/)>

### Estimating residues

#### Estimating starchy (processing) residues

The Australian Banana Growers Council Inc. (ABGC) reported that in 2016/17 the yield of marketable fruit produced in Queensland and NSW was on average 35 t/ha and 11 t/ha (fresh weight (FW)) respectively (Australian Banana Growers Council 2018) whilst the moisture content for fresh banana fruit in North Queensland has been measured as between 81-82% (Armour and Daniells unpublished). It has been variously suggested (Anon 2017, Guerrero et al 2016) that between 10% and 30% of banana fruit harvested is rejected at the processing shed as being unsuitable for the fresh market.

Assuming an average rejection rate of 20% (and a minimum and maximum of 10% and 30% respectively), between 3.9 and 15 t/ha in Queensland and between 1.2 and 4.7 t/ha in New South Wales (FW) of fruit is wasted each year which equates in dry matter (DM) terms to between 0.7 and 2.7 t/ha in Queensland and between 0.2 and 0.9 t/ha in New South Wales.

To estimate the amount of residues from banana processing in each LGA in each year, the area of banana plantation mapped in each LGA was multiplied by the appropriate factor (DM) as calculated above. Estimates were calculated for the high, low and mid-range values.

The final data is rounded to the nearest 10 by the following rules:

- Data at the midpoint is rounded up (e.g. 35 has been rounded to 40)
- Data less than five is given a value of zero
- Data five or larger (but less than 10) is given a value of 10.

### Outputs

- A table of estimated average annual production of starchy processing waste from banana production in Queensland and New South Wales by LGA.

### Assumptions

The assumptions made when calculating residues for banana production include:

- Average yield of fruit reported by ABGC in 2016-17 is not considered a long term average.
- Area planted as mapped by QLUMP and New South Wales land-use mapping is relatively stable in the medium term.

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