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FOR HONEY BEE PRODUCTS

Industry Quality Standard for Certified Western Australian Uni-Floral and Multi-Floral Honeys

29 June 2023

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Table of Contents

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Version 1.0

First published as BICWA Industry Quality Standard – Certified Western Australian Uni-Floral and Multi-Floral Honeys.

Written by Kenneth Dods, ChemCentre, under license from BICWA, ABN 68 609 634 059 as part of the project outcomes for the CRC Honey-Bee products.

The project manager Kenneth Dods wishes to acknowledge the assistance of the following.

Co-authors, Dr Tristan Campbell, Dr Lynne Milne, Dr Robert Manning, Dr David Chandler, Dr Chris May, Dr Kathryn Linge and their associated project teams to this report.

Dr Rob Manning, Field research coordinator
Rob Davis, Technical Officer, WA Herbarium, WA Department of Biodiversity Conservation and Attractions (DBCA)
Dr David Chandler –DNA and phylogenetic leader and his team from Australian Genomic Research Facility (AGRF)
Dr Lynne Milne,: Forensic Palynologist
Steven Davis (year 1), Colin Fleay, (years 2 and 3), Mat Welsh (Year 3), Dr Tristan Campbell (years 4 and 5 and onward). Role: BICWA and WA Farmers Federation (WAFF) WA Honey Research and Development Group (WAHRDG) Committee Chair. Michael Bellman (Treasurer), Kerry Fewster (Secretary), Kim Cheeseman, Ben Pan, Eduard Planken, Simon Green.

Final edit has been provided by Dr John Moursounidis.

1. Preface

This Industry Quality Standard (BICWA IQS) was prepared by the Bee Industry Council of Western Australia (BICWA), in collaboration with ChemCentre, the Cooperative Research Centre for Honey-Bee Products (CRC HBP) and bee industry stakeholders and has been designed to comply with the requirements of existing national and international standards for honey. Compliance with the provisions of this BICWA IQS does not preclude compliance with the provisions of the *Australia New Zealand Food Standards Code*, or with other applicable Commonwealth, State and Territory laws and regulations or laws concerning international trade.

Where appropriate, this BICWA IQS has incorporated new standards, materials and methods that reflect latest developments in technologies and industry practice around the world, with emphasis on protecting the quality, authenticity, and provenance of honey products and in particular uni-floral honeys.

This BICWA IQS recognizes that honey is a natural product and regularly presents variation in its chemical composition. The limits in this BICWA IQS have been established to accommodate the most common natural variations found in Western Australian uni-floral honeys such as Jarrah, Marri, and other single origin honeys and multi-floral honeys originating from complex foraging landscapes without reducing the accuracy and the ability to detect adulteration.

This BICWA IQS is a living document that reflect progress in science, technology, and systems. To maintain its currency, this BICWA IQS will be periodically reviewed, and new editions will be published. Between editions, amendments may be issued. Public comments and feedback to assist with this process will be requested and are welcomed by BICWA.

This hardcopy version of the BICWA IQS may also become redundant at any time due to normal amendment practice. It is important that readers assure themselves they are using a currently in-force BICWA IQS, which will include any amendments that may have been published since the BICWA IQS was first released. A link to the latest in-force version will be established on the BICWA website.

BICWA was established in December 2015 by existing WA bee organisations to represent the bee industry in Western Australia. BICWA is a not-for-profit industry association limited by guarantee.

BICWA wishes to acknowledge the participation of the expert individuals who contributed to the development of this BICWA IQS through their representation on the Technical Committee and through the public comment period.

2. Purpose of the document

The **purpose** of this Industry Quality Standard (BICWA IQS) is to provide those involved in production and supply chains for certified Western Australian uni-floral and multi-floral honeys, from beekeepers to consumers, with a modern reference document that establishes an objective basis for the definition these products.

Honeys certified under this BICWA IQS will be eligible to use the BICWA Honey Industry Quality Trademark (Trademark) which is registered in Australia and Internationally.

The product **scope** of this BICWA IQS is Western Australian uni-floral and multi-floral honeys that are produced in Western Australia and traded nationally and internationally as certified by BICWA.

The **objectives** of this BICWA IQS are to:

1. Define grades of uni-floral and multi-floral honeys.
2. Specify chemical composition and quality parameters for these grades.
3. Establish procedures for digital traceability of honeys to protect authenticity and provenance across supply chains.
4. Establish requirements for production, processing, packaging, and labelling.
5. Define approved methods of chemical analyses for certification.

3. Supporting documents and information

For the BICWA IQS to at minimum comply with relevant standards and guidelines for production of honey, the following external documents are referenced. The latest in-force version of these supporting documents as found on the relevant website shall always apply.

B-QUAL

- Quality standard for the management of apiaries, production, and packaging of honey managed by the Australian Honey-Bee Industry Council (AHBIC).
- Includes guidelines for compliance with *Food Standards Australia New Zealand* (FSANZ) Food Standard Code, with Hazard Analysis and Critical Control Point (HACCP.)
- http://www.bqual.com.au/

Australian Honey-Bee Industry Biosecurity Code of Practice

- Best-practice biosecurity measures for beekeepers, including training and planning, preventing, and controlling pests and diseases, hive, and equipment maintenance.
- Managed by the Australian Honey-Bee Industry Council (AHBIC).
- https://beeaware.org.au/code-of-practice/

National Best Management Practice for Beekeeping in the Australian Environment

- Managed by the Australian Honey-Bee Industry Council (AHBIC)
- https://beeaware.org.au/industry/beekeeping-in-australia/

General Conditions for using Apiary Authorities on Crown land in Western Australia

- Conditions for use of apiary sites managed by Department of Biodiversity, Conservation and Attractions (DBCA) in WA
- https://www.dpaw.wa.gov.au/plants-and-animals/animals/beekeeping-on-crown-land-in-western-australia

Standard for Honey (CXS 12-1981)

- Accepted international definition of honey and key chemical attributes.
- Managed by the Food and Agriculture Organisation of the United Nations
- http://www.fao.org/fao-who-codexalimentarius/codex-texts/list-standards/en/

Food Standards Australia and New Zealand (FSANZ)

- Various standards, such as labelling, natural contaminants limits etc.
- https://www.foodstandards.gov.au

4. Definitions

For the purpose of this BICWA IQS, the following definitions apply:

Honey (abridged FAO CODEX definition)

Honey is the natural sweet substance produced by honeybees from the nectar of plants or from secretions of living parts of plants or excretions of plant sucking insects on the living parts of plants, which the bees collect, transform by combining with specific substances of their own, deposit, dehydrate, store, and leave in the honeycomb to ripen and mature.

a) *Blossom Honey or Nectar Honey is the honey which comes from nectars of plants.*

b) *Honeydew Honey is the honey which comes mainly from excretions of plant sucking insects (Hemiptera) on the living parts of plants or secretions of living parts of plants.*

Honey consists essentially of different sugars, predominantly fructose and glucose as well as other substances such as organic acids, enzymes and solids derived from nectar collection and the contributions of the bee.

The colour of honey varies from nearly colourless to dark brown. The consistency can be fluid, viscous or partly to entirely crystallised. The flavour and aroma can vary but are derived from the plant origin.

Uni-floral honey

Honey that is produced from apiary sites with a significant proportion of the vegetation comprising of the designated uni-floral species but still with other co-flowering species. To be classed as a uni-floral honey, the majority proportion of the designated uni-floral honey type must be present to the natural levels associated with that uni-floral honey type. It must also meet the normal chemical and other analytical requirements for certification as a uni-floral honey of that species as defined in this BICWA IQS.

5. Honey and plant reference collections

The definitions of Western Australian-specific honeys in this standard are derived from an extensive sampling program between 2016 to 2021. Over this period, samples of Jarrah, Marri and Powderbark honeys were collected and analysed for a range of chemical, microscopic and physical attributes to determine the overall natural range for these varieties, as well as intra-seasonal and geo-spatial variations.

The sampling included honey from early, mid, and late nectar flow times of each variety as well as ‘experimental’ and ‘beekeeper’ samples. Experimental samples were collected from fresh honeycomb frames inserted into commercial apiarist’s hives over the season, with beekeeper samples collected from existing honeycomb frames immediately adjacent to the experimental frames. This sampling approach allowed analysis of the ‘purest’ honey able to be collected from each apiary site, as well as the impact of industry standard apiary management practices on honey (compared with the ‘pure’ samples).

Each apiary site included in the program was botanically surveyed during the relevant flowering periods to verify the range and dominance of floral sources during the collection period.

As a result, the BICWA IQS is based on extensive analysis of over 750 honey samples collected over a wide range of geographic, botanical, and seasonal conditions.

6. Product certification overview

6.1. Quality Trademark

Certification is an essential requirement for assurance of provenance of, and marketing of, Western Australian uni-floral and multifloral honeys and is designated on pack using the BICWA IQS Trademark. (Section 9).

The Trademark is registered in Australia and internationally recognised in China, European Union, Philippines, United States of America, United Arab Emirates and Malaysia. Further extension to trademark registration in additional countries should be advanced through BICWA and will be considered on a case-by-case basis.

Western Australian uni-floral and multi-floral honeys will be tested and certified under this BICWA IQS.

Testing and certification to the levels listed in this BICWA IQS should occur prior to any use of the Trademark in any commercial transaction, transfer, or exchange of honey, and are the acceptance criteria for certified Trademark use.

To satisfy the criteria for certification honeys must:

1. Be produced and processed according to the requirements of the Industry Owned Quality Assurance System known as B-Qual or equivalent auditable quality assurance system.
2. Be produced from an apiary with beekeeper practice certification.
3. If sold as Organic, be produced, processed, and certified according to the requirements of the *National Standard for Organic and Bio-Dynamic Produce.*
4. Where applicable, meet the requirements of Australian and State regulations for honey-bee product production such as: Food facility licence, *Food Standards Australia New Zealand* (FSANZ), Therapeutic Goods Administration, Australian Competition and Consumer Commission, and/or the relevant standards of the end-market country as appropriate.
5. Meet distribution requirements described in this Standard.
6. Meet the compositional and quality factors described in this Standard.
7. Meet the hygiene, contaminants and additive requirements described in this Standard.
8. Meet the traceability, testing and quality management requirements described in this Standard.
9. Use legally defensible and certified NATA and ISO 17025 approved/recommended methods for analyses as specified by the honey specification and its intended use.

6.2. Production of honey

This BICWA IQS requires that uni-floral and multi-floral honeys are produced, processed, and certified prior to sale in Western Australia.

This includes for Apiary managers and beekeepers' maintenance and use of:

1 B-Qual Industry Owned Quality Assurance System (http://www.bqual.com.au/) or equivalent internationally auditable quality assurance system.

2 Retention of the production record suitable for audit for any apiary placement of bees including the transport record or record of stored boxes, frames, or honey after extraction. and boxes.

3 Transfer of a copy of the honey production record prior to sale, exchange or change of location or ownership.

4 A unique identification system on each form of stored honey (frames, boxes, International Bulk Container (IBC)) that enables a chain of custody for product to be maintained.

Certifications for honey attributes performed by the certifying laboratory are linked by the production record.

Beekeeper obligations for the production of certified honey include, but are not limited to:

1 Beehives shall be registered with the WA Department of Primary Industries and Regional Development (DPIRD) and all hives shall be marked clearly with the owner's registered stock brand as per DPIRD requirements.
- https://www.agric.wa.gov.au/livestock-biosecurity/registering-owner-stock-or-beekeeper

2 If not using private lands for apiary sites, apiary sites shall be approved by the WA Department of Biodiversity, Conservation and Attractions (DBCA) and managed in

compliance with DBCA's *"General Conditions for using Apiary Authorities on Crown Land in Western Australia".*

- https://www.dpaw.wa.gov.au/plants-and-animals/animals/beekeeping-on-crown-land-in-western-australia

3 Environmental best practice shall be undertaken in managing apiary sites as per the industry document *"National Best Practice for Beekeeping in the Australian Environment*".

- https://beeaware.org.au/industry/beekeeping-in-australia/

4 Beekeepers shall hold a Certificate 3 qualification in beekeeping or have at least four years demonstrated beekeeping experience.

5 The honey production record should meet the criteria outlined by B-Qual or an equivalent quality system and should be auditable to a relevant acceptable standard. For analysis, the analytical laboratory will require a chain of custody statement for the honey sample, preferably in electronic format. The statutory declaration by the beekeeper in the chain of custody record should contain:

- Hive and frame allocation to a site by the beekeeper including the site characteristics, colony queen identifier, bee health and veterinary interventions, water source, date of deployment, the predominant target species, and its stage of flowering at the site.
- Detail on the date and who collected the frames and boxes with capped honeycomb from the site, and their transport.
- The receival of the boxes and frames at the processing plant, the processing of the capped frames to release the honey and the conditions and equipment used in processing. This should include any key temperatures or separations that are implemented during processing as monitored critical control points in the processing system.
- How the honey is then stored after processing, the uniquely labelled bulk storage container of honey product from frame processing, and the time and temperature that the honey is stored.

6.3. Honey packing, labelling, and distribution

In accordance with BICWA IQS processors/packers shall be accredited to nationally or internationally recognised quality standards as appropriate and will be audited by independent third parties accordingly. Use of B-Qual or an equivalent quality system is one of the minimum standards for a honey packer to be eligible to advance honey product for analytical certification under this BICWA IQS Trademark.

An auditable record of production attributes including the beekeeping record and critical control point record for each packaging production batch is required by the certifying analytical laboratory before final packaged product analysis is begun.

All labelling requirements specified in relevant laws, regulations and standards shall be observed. These include the standards applying to food intended for direct sale to consumers in the *Australia New Zealand Food Standards Code* and any export country.

If a honey packer wishes to include certification or product claims on their packaged product that are not included in this BICWA IQS (such as organic certification) they must provide sufficient evidence of compliance with that certification or claim prior to the product being approved for use of the Trademark.

7. Product certification requirements

7.1. Product certification principles

The certification requirements for use of the Trademark have been designed to give all members of the supply chain from producers to consumers confidence in the process and quality of the end-product. The degree of certification is determined by the market positioning of the product, which ranges from bulk multi-floral honey to packaged uni-floral honey with therapeutic claims. Product certification requirements are graded accordingly to meet both market expectations and legal/regulatory requirements as appropriate with minimum reasonable testing and certification costs.

Where possible, international standards are used for the classifications, such as the range of chemical properties for a product to be defined as honey, and the recommendation of a combination of organoleptic, physico-chemical, and microscopic characteristics of honey to verify the main floral source (in the case of uni-floral certification).

Due to the natural variations in honey, the certification requirements for each product grade comprise both primary certification (allowing use of the Trademark for that grade), along with more sensitive and detailed confirmation options should the results of the primary certification indicate that the product batch may be near or beyond the standard definitions for the proposed grade. These confirmation options may also be useful should the validity of the certification of a particular product batch be contested in any commercial or regulatory dispute.

7.2. General requirements

This BICWA IQS adheres to the *Codex Alimentarius Standard for Honey 12-1981* statement on essential composition and quality factors listed below and in Table *1*. Note that these criteria may be discretionally adjusted by BICWA with the agreement of its members, for specific honey varieties, should research clearly demonstrate natural variation of the honey variety outside of these criteria. If research is conflicting or not sufficiently demonstrative the existing criteria will remain in force until the conflicts are satisfactorily resolved.

Should change be necessary, the new criteria for the specific honey variety shall be provided in Section 8 (Varietal Definitions), with the supporting evidence cited.

1. Honey sold as such shall not have added to it any food ingredient, including food additives, nor shall any other additions be made other than honey.
2. Honey shall not have any objectionable matter, flavour, aroma, or taint absorbed from foreign matter during its processing and storage.
3. The honey shall not have begun to ferment or effervesce.
4. No pollen or constituent particular to honey may be added or removed except where this is unavoidable in the removal of foreign inorganic or organic matter.
5. Honey shall not be heated or processed to such an extent that its essential composition is changed and/or its quality is impaired.
6. Chemical or biochemical treatments shall not be used to influence honey crystallisation.

Table 1 Essential minimum chemical criteria to be classified as a honey (Codex).

Moisture	<20%
Sum of Fructose and Glucose	≥60%
Sucrose content	≤5%
Electrical Conductivity	≥0.8 mS/cm
Water insoluble solids	Pressed honey: <= 0.5% Other honey: <= 0.1%
Free acidity	< 50 Meq per 1000 grams
Diastase activity	≥ 8 Schade units
HMF	< 80 mg/kg

Honey sold in Australia must meet the requirements of the *FSANZ Food Standards Code*.

Honey exported internationally must meet international market entry requirements and be analytically certified to an ISO 17025 standard prior to leaving Australia if the honey product is to use the BICWA IQS Trademark.

Analytical certification is required for each batch or lot of packaged honey. A copy of the label showing the batch code for that production run must be submitted along with the B-Qual or equivalent record of beekeeper supply chain information and must be lodged with the certifying analytical laboratory prior to analysis.

The BICWA IQS Trademark may only be used on products that are packaged in Australia.

Exported bulk honey cannot use the BICWA IQS Trademark certification.

When an IBC or drum of bulk honey is certified to its relevant grade, the unique drum or IBC number along with the B-Qual or an equivalent record of beekeeper supply chain information, must be lodged with the certifying analytical laboratory prior to analysis.

If a certified IBC or drum is sold or transferred the seller must notify the analytical laboratory of the purchaser's details and arrange for the certification to be transferred to the new owner. This will include a statement that the honey has been stored appropriately at less than 25 °C for the duration of its storage and subsequent transfer.

If hydroxymethylfurfural (HMF) analysis is stipulated as an export requirement, then an updated HMF analysis will be required for each sale or transfer of honey product.

The certifying laboratory will reissue the BICWA IQS Trademark certification report with the new owner's details at the laboratory's discretion.

7.3. Grade 1: Multi-floral Western Australian Honey

Certification claim

1. Meets *FSANZ Food Standards Code and Codex* requirements for Honey.
2. If sold internationally, meets international market entry requirements and destination food standards requirements. Certified analysis of honey products for international destinations conforms to ISO 17025 or NATA requirements.
3. Made in Western Australia (100% Western Australian ingredients).

4. Additional regional or provenance claim (optional – such as Eucalyptus Forest, Coastal Heath, specific location, or region etc).
5. Uni-floral status unknown.

Primary certification conditions

1. Meets the general BICWA IQS Trademark requirements.
2. International market-entry requirements met (if applicable).
3. Source history documentation and traceability (B-Qual certified beekeeper/packer or equivalent with vendor declaration chain of custody lodged prior to analytical certification initiating).
4. Moisture and sugars as per Table 1 (NATA accredited).
5. HMF as per Table 1 (NATA accredited).
6. Heavy metals as per *FSANZ Food Standards Code* or international market entry as appropriate, compliance levels dependent on the destination regulatory requirements (NATA accredited).
7. Provenance determination using at least two from the list below.
   - Trace element profile (NATA accredited).
   - High-Performance Thin-Layer Chromatography (HPTLC).
   - DNA analysis (NATA accredited).

Confirmatory conditions (should primary certification prove inconclusive or be contested)

1. Amino acid profile (NATA accredited laboratory for this analysis).
2. Palynology (NATA accredited laboratory for this analysis).
3. Isotopic analysis (to a legally defensible standard).
4. NMR analysis (to a legally defensible standard).
5. Other NATA or ISO 17025 accredited compositional chemistry.

7.4. Grade 2: Uni-floral Western Australian Honey

Certification claim

1. Meets *FSANZ Food Standards Code and Codex* requirements for Honey.
2. If sold internationally, meets international market entry requirements and destination food standards requirements. Certified analysis of honey products for international destinations conforms to ISO 17025 or NATA requirements.
3. Made in Western Australia (100% Western Australian ingredients).
4. Additional regional provenance claim (optional – such as Jarrah Forest, Coastal Heath, specific location, or region etc).
5. Uni-floral claim (predominantly from single floral source).

Primary certification conditions

1. Meets the general BICWA IQS Trademark requirements.
2. Source history documentation and traceability (B-Qual certified beekeeper/packer or equivalent with vendor declaration chain of custody lodged with the analytical laboratory prior to analytical certification initiating).

3. Market-entry requirements met (if applicable).
4. Meets moisture, sugars, and EC analysis outcome requirements as per Table 1 by a NATA accredited laboratory for this analysis.
5. Meets HMF analysis outcome requirements as per Table 1 with analysis performed by a NATA accredited laboratory for this analysis.
6. Meets heavy metals analysis outcome requirements as per *FSANZ Food Standards Code* or international market entry as appropriate, compliance levels dependent on the destination regulatory requirements by a NATA accredited laboratory for this analysis.
7. Meets palynology analysis outcome requirements to the uni-floral definitions for that source (percentage of predominant floral source requirements met, number of pollen present met). (Legal standard)
8. Trace element profile analysis outcome requirements are met for provenance claims and for uni-floral variety confirmation by a NATA accredited laboratory for this analysis.
9. Meets an attribute claim as required by a customer.

Antimicrobial capacity as determined by either

- Radial diffusion assay/Total Activity determined by a NATA accredited laboratory for this analysis.
- Broth dilution assay determined by a NATA accredited laboratory for this analysis.

Antioxidant capacity as determined by both

- Total Phenolic colorimetric assay determined by a NATA accredited laboratory for this analysis.
- Antioxidant assays such as Ferric Reducing Antioxidant Power (FRAP) assay determined by a NATA accredited laboratory for this analysis. Alternative antioxidant assays, Oxygen Radical Absorbance Capacity (ORAC) or the 2,2-diphenyl-1-picrylhydrazyl hydrate (DPPH) free radical method may be determined by a NATA accredited laboratory for this analysis if this is a specific antioxidant requirement from a customer.

Confirmatory conditions (should primary certification prove inconclusive or be contested)

1. Amino acid profile (NATA accredited laboratory for this analysis).
2. Palynology for co-occurring floral species from declared region (to a legal standard).
3. Phenolic profile using Liquid Chromatography Mass Spectrometry (NATA accredited laboratory for this analysis).
4. Oligosaccharide profile using Liquid Chromatography Mass Spectrometry (NATA accredited laboratory for this analysis).
5. Isotopic analysis (to a legally defensible standard).
6. NMR analysis (to a legally defensible standard).
7. Other NATA or ISO 17025 accredited compositional chemistry as required.

7.5. Grade 3: Uni-floral Western Australian Honey with therapeutic claim

Certification claim

1. Meets *FSANZ Food Standards Code and Codex* requirements for Honey.
2. If sold internationally, meets international market entry requirements and destination food standards requirements. Certified analysis of honey products for international destinations conforms to ISO 17025 or NATA requirements.
3. Made in Western Australia (100% Western Australian ingredients).
4. Additional regional provenance claim (optional – such as Jarrah Forest, Coastal Heath, specific location, or region etc).
5. Uni-floral claim (predominantly from single floral source).
6. Health claim to FSANZ health claim requirements (FSANZ health claim lodged, efficacy accepted by FSANZ, specific claim use on label). FSANZ label claim causal agent compound quantified; product attribute requirements analysed based on the claim made.
7. Health claim (Therapeutic Goods Administration (TGA) approved product). Critical product attributes analytically determined, specific causal agent or active pharmaceutical ingredient (API) identified, matrix confirmed, dose level confirmed. Product (TGA) packaged in a TGA approved manufacturing facility.

Primary certification conditions

1. Meets the general BICWA IQS Trademark requirements.
2. Source history documentation and traceability (B-Qual certified beekeeper/packer or equivalent with vendor declaration chain of custody lodged with the analytical laboratory prior to analytical certification initiating).
3. Market-entry requirements met (if applicable).
4. Meets moisture, sugars, and EC analysis requirements as per Table 1 by a NATA accredited laboratory for this analysis.
5. Meets HMF analysis requirements as per Table 1 with analysis performed by a NATA accredited laboratory for this analysis.
6. Meets heavy metals analysis requirements as per *FSANZ Food Standards Code* or international market entry as appropriate, compliance levels dependent on the destination regulatory requirements by a NATA accredited laboratory for this analysis.
7. Meets palynology analysis requirements to the uni-floral definitions for that source (percentage of predominant floral source requirements met, number of pollen present met).
8. Trace element profile analysis outcome requirements are met for provenance claims and for uni-floral variety confirmation by a NATA accredited laboratory for this analysis.
9. For a novel or specialist food, meets health claim to FSANZ health claim requirements.

The type of analysis certification is based on specific product label claims. Laboratory analysis will require the identified active ingredient to be quantified and additional supportive secondary product attribute requirements analysed based on the type of claim made. The claim informs the analysis required as advised by FSANZ. Key criteria are;

- FSANZ health claim lodged and accepted, NATA certified analytical laboratory for this accreditation provided with evidence of this prior to initiating certified analysis.
- Specific claims on label as advised by FSANZ are met, and a copy of the label for the batch provided to the NATA certified analytical laboratory prior to initiating certified analysis.
- FSANZ label claim active ingredient is identified and quantified in the product to the efficacy level by a laboratory NATA certified for this analysis.

10. Health claim Therapeutic Goods Administration (TGA) approved product.

Products using this BICWA IQS that are making a TGA medicinal, or therapeutic health claim will need to comply with the following:

- The laboratory analysis can only be performed by a TGA approved laboratory to a NATA certified standard working to ISO 17025 Good Laboratory Practice (GLP) guidelines for the analysis requested.
- The requirements of analysis certification in this circumstance are based on TGA specific product registration requirements. Laboratory analysis is required of all ingredients in the product and on the final manufactured product that ensure TGA requirements for active compound inclusion, dose control and efficacy have been met.
- Any secondary product attributes or additional critical control TGA requirements will need to be met based on the TGA approved product specifications. The claim informs the analysis required as advised by TGA in their regulations, standards and guidelines and the product manufacturer.
- Manufacture of product must occur in a TGA certified Good Manufacturing Practice (GMP) manufacturing facility, the GMP facility works closely with the TGA approved laboratory to ensure product manufacture meets TGA requirements for compliance certification.
- Once a product is manufactured the market entry and specific medicinal and therapeutic conditions (including marketing authorisations and product registrations) of each country need to be met before the product leaves Australia.
- Analytically determined, active ingredient content, matrix confirmed, dose level confirmed. Product (TGA) packaged in a TGA approved facility.
- All documents assuring GMP production of TGA approved product are to be lodged with the certified TGA laboratory before analysis begins.

Confirmatory conditions (should primary certification prove inconclusive or be contested)

1. Amino acid profile (NATA accredited laboratory for this analysis).
2. Palynology for co-occurring floral species from declared region (to a legally defensible standard).
3. Phenolic profile using Liquid Chromatography Mass Spectrometry (NATA accredited laboratory for this analysis).
4. Oligosaccharide profile using Liquid Chromatography Mass Spectrometry (NATA accredited laboratory for this analysis).
5. Isotopic analysis (to a legally defensible standard).

6. NMR analysis (to a legally defensible standard).
7. Other NATA or ISO 17025 accredited compositional chemistry as required.

8. Varietal definitions

8.1. Uni-floral Jarrah Honey (Eucalyptus marginata, Myrtaceae)

Jarrah Honey (*Eucalyptus marginata*, Myrtaceae)

Summary

Jarrah (*Eucalyptus marginata*) honey is produced within the South-West Floristic Region of Western Australia (1). These trees occur naturally almost exclusively in the Jarrah, Warren and Swan Coastal Plain regions of the Interim Biogeographic Regions of Australia (IBRA) (2).

Jarrah trees are described by Florabase as:

"Tree, to 40 m high, bark rough fibrous. Fl. white-cream/pink, Jun to Dec or Jan. Grey sand, clay or sandy loam, laterite. Hills, rises."(3)

Honey production from Jarrah trees is typically from September to January but honey production is erratic (4)and apiary sites rarely produce Jarrah honey in consecutive years.

Jarrah honey is characterised by a golden brown colour, high viscosity and very slow crystallisation.

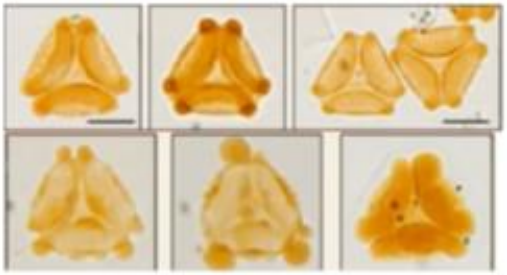

Figure 1 - Standard and unusual forms of Jarrah pollen

Jarrah pollen is moderately to well-represented in Jarrah honey. Blackbutt pollen (Eucalyptus patens) is commonly co-occurring.

The honey has a moderate to low Glucose content (<34%) and moderate to high F:G ratio (generally > 1.4). Ash, electrical conductivity are generally higher as well (greater than 0.4 g/100g, 100 mS/m and 4.0 respectively). Amino acid content variable but generally high (mean 3,118 mg/kg).

Sensory description

Visual assessment	*Colour intensity*: Medium	
	Colour tone: Golden brown	
Olfactory assessment	*Intensity of odour*: Medium	
	Description:	
Tasting assessment	*Sweetness*: Medium-	*Acidity*: Medium
	Bitterness: Medium+	*Intensity of aroma*: Medium
	Description of aroma:	
	Persistence/aftertaste: Long	
	Other mouth perceptions: Tending towards a more savoury flavour profile, treacle, rich, viscous, sour plum, herbal nose, phenolic draw out finish, persistent.	
Physical characteristics	*Crystallisation rate*: very slow	
	Viscosity:	

Chemical description

Jarrah honey (*Eucalyptus marginata*)

Physicochemical parameters	Units	Mean	St. Dev.	95% confidence interval		Number of data
				5%	95%	
Specific pollen	%	79	12	55	94	182
Fructose *ORG155F*	g/100g	44.0	4.1	38.0	51.0	182
Glucose *ORG155F*	g/100g	27.5	3.2	23.6	34.4	182
Fructose/Glucose ratio *ORG155F*		1.6	0.2	1.2	2.0	182
Maltose *ORG155F*	g/100g	2.8	0.8	1.4	3.9	182
Sucrose *ORG155F*	g/100g	2.1	2.7	0.0	9.1	182
Total simple sugars *ORG155F*	g/100g	76.4	5.3	68.1	84.9	182
Moisture by refractometry *ORG401*	g/100g	17.7	1.3	16.0	20.2	182
Ash content *ORG402*	g/100g	0.54	0.13	0.33	0.74	182
Electrical conductivity *ORG404*	mS/m	124	23	78	169	182
pH *ORG403*		4.9	1.0	4.1	7.3	182
Free acid *ORG403*	meq/kg	23	12	4	46	182
Antioxidant activity (ORAC) *ORG425*	uM TE/g	4	2	0	7	182
Polyphenolics *ORG426*	mg/kg	480	178	252	813	182
Amino acid - Total measured	mg/kg	3122.7	1243.6	2984.1	6118.9	34
Amino acid - Alanine	mg/kg	124.2	57.4	76.1	282.3	34
Amino acid - Arginine	mg/kg	88.1	49.6	50.0	219.8	34

Amino acid - Aspartic Acid	mg/kg	434.4	260.7	106.8	986.3	34
Amino acid - Cysteine/Cystine	mg/kg	61.7	56.1	50.0	171.0	34
Amino acid - Glutamic acid	mg/kg	310.2	173.7	147.8	757.3	34
Amino acid - Glycine	mg/kg	107.2	79.6	56.5	281.0	34
Amino acid - Histidine	mg/kg	62.2	24.7	50.0	130.8	34
Amino acid - Hydroxyproline	mg/kg	80.8	68.0	50.0	216.0	34
Amino acid - Isoleucine	mg/kg	209.9	73.5	130.0	382.0	34
Amino acid - Leucine	mg/kg	50.0	0.0	50.0	50.0	34
Amino acid - Lysine	mg/kg	79.3	45.6	50.0	224.0	34
Amino acid - Methionine	mg/kg	50.1	0.5	50.0	50.8	34
Amino acid - Phenylalanine	mg/kg	130.9	62.6	50.1	262.3	34
Amino acid - Proline	mg/kg	727.1	374.5	264.0	1332.5	34
Amino acid - Serine	mg/kg	174.1	67.1	103.0	344.8	34
Amino acid - Threonine (Total)	mg/kg	185.4	79.7	89.4	378.0	34
Amino acid - Tryptophan	mg/kg	52.9	8.7	50.0	82.6	34
Amino acid - Tyrosine	mg/kg	56.7	23.3	50.0	107.5	34
Amino acid - Valine	mg/kg	137.5	65.0	74.4	289.0	34

8.2. Uni-floral Marri Honey (Corymbia calophylla, Myrtaceae)

Marri Honey (*Corymbia calophylla*, Myrtaceae)

Summary

Marri (*Corymbia calophylla*) honey is produced within the South-West Floristic Region of Western Australia (1). These trees occur naturally almost exclusively in the Jarrah, Warren and Swan Coastal Plain regions of the Interim Biogeographic Regions of Australia (IBRA) (2).

While also known as 'Red Gum' honey, this is produced from an entirely different species of tree than the Red Gum from south-east Australia (*Eucalyptus camaldulensis*)

Marri trees are described by Florabase as:

"Tree or (mallee, rarely), to 40(-60) m high, bark rough, tessellated. Fl. white/pink, Dec or Jan to May. Red-brown clay loam, orange-brown sandy clay, gravel, grey sand over limestone, granite, laterite. Flats, hills, slopes, breakaways, wetlands, fringing salt marches, beside drainage lines."(3)

Honey production from Marri trees is typically from late February to March, with honey production often earlier to the south of the species' extent and later to the north (4).

Marri honey is characterised by medium colour, long aftertaste and coarse crystal size when crystallised.

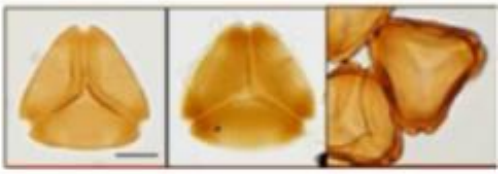

Figure 2 - Marri pollen and example hybrid species pollen

Marri pollen is very well-represented in Marri honey. The honey has consistently low F:G ratio (<1.5), Sucrose and ash content (<0.09 and <0.5 g/100g), low EC (<130 mS/m) and pH (<4.4). Amino acid content generally low (mean 1,716 mg/kg)

Sensory description

Visual assessment	*Colour intensity*: Medium+	
	Colour tone: Dark amber	
Olfactory assessment	*Intensity of odour*: medium	
	Description:	
Tasting assessment	*Sweetness*: Medium	*Medium+*
	Bitterness: Medium	*Intensity of aroma*:
	Description of aroma:	
	Persistence/aftertaste: Long	
	Other mouth perceptions: Medium bodied, dried peach, redcurrant, fine acidity. Long persistent flavour, savoury tones, evenly weighed across palate	
Physical characteristics	*Crystallisation rate*: Moderate	
	Viscosity:	

Chemical description

Marri honey (*Corymbia calophylla*)

Physicochemical parameters	Units	Mean	St. Dev.	95% confidence interval		Number of data
				5%	95%	
Specific pollen	%	83	12	58	98	248
Fructose *ORG155F*	g/100g	43.1	4.1	36.3	50.0	248
Glucose *ORG155F*	g/100g	30.9	2.9	25.8	35.5	248
Fructose/Glucose ratio *ORG155F*		1.4	0.1	1.3	1.5	248
Maltose *ORG155F*	g/100g	1.9	0.8	0.5	3.2	248
Sucrose *ORG155F*	g/100g	0.3	0.3	0.0	0.9	248
Total simple sugars *ORG155F*	g/100g	76.2	7.4	63.4	87.8	248
Moisture by refractometry *ORG401*	g/100g	17.7	1.6	15.8	21.0	248
Ash content *ORG402*	g/100g	0.30	0.12	0.16	0.53	248
Electrical conductivity *ORG404*	mS/m	83	21	59	130	248
pH *ORG403*		4.0	0.2	3.8	4.4	248
Free acid *ORG403*	meq/kg	29	7	19	41	248
Antioxidant activity (ORAC) *ORG425*	uM TE/g GAE	3	2	0	7	248
Polyphenolics *ORG426*	mg/kg	355	120	189	589	248
Amino acid - Total measured	mg/kg	1716.7	315.689577	1403.4	2502.84	45
Amino acid - Alanine	mg/kg	75.1	17.4	56.8	105.4	45
Amino acid - Arginine	mg/kg	63.7	14.1	50.0	86.6	45

Amino acid - Aspartic Acid	mg/kg	109.3	65.8	64.6	231.9	45
Amino acid - Cysteine/Cystine	mg/kg	50.0	0.0	50.0	50.0	45
Amino acid - Glutamic acid	mg/kg	182.8	57.2	130.2	354.6	45
Amino acid - Glycine	mg/kg	78.4	14.7	59.8	106.7	45
Amino acid - Histidine	mg/kg	51.4	5.8	50.0	61.6	45
Amino acid - Hydroxyproline	mg/kg	54.7	9.9	50.0	84.3	45
Amino acid - Isoleucine	mg/kg	133.8	24.2	103.1	184.3	45
Amino acid - Leucine	mg/kg	50.0	0.0	50.0	50.0	45
Amino acid - Lysine	mg/kg	60.6	11.7	50.0	86.0	45
Amino acid - Methionine	mg/kg	50.0	0.0	50.0	50.0	45
Amino acid - Phenylalanine	mg/kg	52.9	12.9	50.0	81.0	45
Amino acid - Proline	mg/kg	249.1	48.1	206.3	365.7	45
Amino acid - Serine	mg/kg	108.0	23.9	81.0	167.8	45
Amino acid - Threonine (Total)	mg/kg	125.0	35.3	87.8	180.3	45
Amino acid - Tryptophan	mg/kg	50.0	0.0	50.0	50.0	45
Amino acid - Tyrosine	mg/kg	51.9	5.9	50.0	62.8	45
Amino acid - Valine	mg/kg	120.1	28.3	90.7	179.5	45

Note – 50.0 mg/kg is Limit of Detection and may be considered as Not-detected.

9. BIQWA IQS Trademark

Grading colourations

Grade 1 – Black is replaced with silver

Grade 2 – Black is replaced with gold

Grade 3 – Black is replaced with dark blue

10. References

1. Hopper S, Gioia P. The Southwest Australian Floristic Region: Evolution and Conservation of a Global Hot Spot of Biodiversity. *Annu Rev Ecol Evol Syst*. 2004;**35**:623–49.

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3. Herbarium WA. Florabase - the Western Australian Flora [Internet]. DBCA. 1998. Available from: https://florabase.dpaw.wa.gov.au/

4. Smith FG. Honey plants in Western Australia. *Dep Agric West Aust Bull.* 1969;**3618**:1–78.