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SABIO HONEY ADULTERATION AND FRAUD WORKSHOP



100 YEARS

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CONTENTS

41	Editorial - Honey Fraud
46	Chairperson's report SABIO AGM By: Adriaan du Toit
48	Minister's Speech
51	Global Honey Market and the Rise of Honey Fraud By: Norberto Garcia
55	Honey - A Summary of the South African Regulatory and Legislative Requirements By: Isabella Mazzone
58	Honey Fraud By: Neil Erasmus
60	Honey Authenticity By: Shannon Riva
64	A View from the Media By: Wendy Knowler
67	Honey Tasting By: Lynne Hepplestone
68	Fauna Habitat Melissopalynology By: Nikiwe Ndlovu, Michelle D. Henley, Robin M. Cook & Frank H. Neumann



SABIO is the official representative of the bee industry of South Africa. Its mission is to "represent and promote the interests of all persons involved in the beekeeping industry in South Africa in order to establish, support and develop an economically viable and sustainable apicultural sector and ensure the environmental security of the honey bee".

EDITORIAL

Honey fraud - a sticky illegal mess

The South African Bee Industry Organisation held their inaugural virtual Honey Fraud workshop on 20 May 2021. The timing of this event was very significant given that it coincided with World Bee Day.

The SABIO event focused on the health of the honey industry necessary to counter the threats posed by the COVID-19 pandemic to food security and agricultural livelihoods, by exploring ways to protect the authenticity of honey through global cooperation and solidarity. Both are objectives of World Bee Day. This message was emphasized during her opening address by the Honorable Minister of Agriculture, Land Reform and Rural Development, Ms. Angela Thoko Didiza.

The Minister highlighted the importance of developing emerging beekeepers in South Africa - not only as a counter measure for honey fraud but to promote economic development.

The Board of SABIO decided to host the workshop to highlight growing concerns related to the quality of honey sold in South Africa. Price wars are damaging the livelihoods of beekeepers, and consumers are sold products that are nothing more than honey flavoured sugar syrup. This matter needs to be highlighted in order to start the process of educating consumers and retailers alike to ensure that South Africans are not duped into buying bogus products.



President of the Apimondia Scientific Commission on Beekeeping Economy

Professor Norberto Garcia provided an overview of the increasing concerns about honey fraud globally. Honey is the third most adulterated food product. It was clear from his presentation that South African demand for honey far outstrips the local supply. South Africa is a net importer of honey with most honey imports coming from China. These products are priced significantly lower than imports from other countries. There is concern that honey imported into South Africa could be adulterated.

To stem the tide of honey fraud several international efforts have been launched, with the first formal position being the

2019 APIMONDIA Statement on Honey Fraud (available at www.apimondia.com).

In addition, the U S Pharmacopeia has created an International Expert Panel to rewrite a Honey Identity Standard for the USA and there is ongoing work to update the methods used for honey purity and authenticity testing in CODEX.

Professor Garcia reminded the audience that it was their duty as beekeepers to be the guardians of the purity and authenticity of bee products, not only for the benefit of our own industry but also to protect consumers, food security, and the biodiversity of the planet



President of the Oceania Commission of Apimondia

Jodie Goldsworthy, a fourth-generation beekeeper, and honey producer from Australia elaborated on the specific measures that have been taken within Apimondia to curb honey fraud. The updated Apimondia position statement includes more information on transparency and recommends a Food Fraud Mitigation

Plan (VACCP Tool) to prevent honey fraud. Given the complexity of identifying honey fraud, there is a recommendation for a multi test approach. In the commitment to educate and fight honey fraud, the Working Group was expanded to include all continents & a broader range of experts.



Food & Allergy Testing & Consulting Services- FACTS

It is clear that the process of adulterating honey is sophisticated and the process of testing for fraud is equally so. Shannon highlighted that there is no silver bullet for testing honey - you must know what you want to test and why. She stressed that

there are major apparent knowledge gaps with new types of honey in South Africa that are not addressed by the current legal framework. The current legislation should be reviewed to include the new testing methods that are available.

Honey adulteration in South Africa: Stable isotope analysis as a means of detection - Dr Grant Hall



UP Stable Isotope Laboratory, University of Pretoria

Dr Hall explained how the UP Stable Isotope Laboratory has begun applying isotope analyses to detect honey adulteration. Carbon isotope ratios are influenced by environmental conditions such as temperature or rainfall. To understand isotopic variation, seasonal data is required from across SA over several years, as well as pollen analyses and chemometric information. The effects of human manipulation, such as

artificial feeding or inclusion of additives must be understood. Substantial research and capacity building is required to ensure that SA honey products are accurately analysed. Collaboration, communication and knowledge exchange between specialists, producers and those responsible for quality control, to build capacity both in terms of people and equipment is essential.

Honey and the Law



Hahn & Hahn

One of the potential problems in dealing with honey fraud is our outdated legal framework. Janusz

Luterek from Hahn & Hahn outlined the current legal framework. Honey is regulated through

- R835 Regulations relating to the Grading, Packing and Marking of Honey and Mixtures of Bee Products intended for Sale in the Republic of South Africa (25 August 2000)
- R146 Regulations relating the Labelling and Advertising of Foodstuffs (1 March 2010)
- SANS 289
- Consumer Protection Act 68 of 2008

- CODEX Standard for Honey (CODEX STAN 12-1981)

Current concerns relate to labelling practices which may be false, misleading or deceptive. Luterek also stressed that single ingredient exemptions can only be used if the product is ONLY honey. He reminded the audience that the word honey may not appear on the label of any honey substitute other than in the ingredients listing.

There is some good news though

A panel discussion with Ms Salamina Maelane - Director: Food Import and Export Standards and Niel Erasmus - Chief Food Safety and Quality Assurance Officer, Directorate Food Safety and Quality Assurance, DALRRD highlighted the focus on developing beekeepers in South Africa and a pilot project in the Limpopo province that is showing positive results. The Department agrees that Regulation

R835 of the Agricultural Products Standards Act does need to be reviewed to bring this 20-year-old regulation in line with current testing methods. Ms. Matlou Setati, Executive FSI, Consumer Goods Council of South Africa stated that their members were committed to curbing food fraud of all types with the recent development of a Food fraud working group.



Concluding the events, Professor Robin Crewe author of "The Dark Side of the Hive" highlighted the unfortunate practice of honey laundering. This means honey being imported from one of the countries that are major exporters of honey into a southern African country and then re-exported to South Africa as honey of African origin. This falsification of the true country of origin is fraudulent and devalues local high-quality products.

The formation of an Apimondia African Regional Committee to discuss regional standards is therefore vital to preserve and protect our honey market that has many unique kinds of honey.

SABIO would like to thank the sponsors Brand TV, Department of Agriculture, Land Reform and Rural Development and Food & Allergy Testing & Consulting Services - FACTS, who generously supported the event.

Chairperson's report

Why a symposium on honey fraud?

Honey fraud is a scourge of beekeeping and in terms of the Consumer Protection Act, Act 68 of 2008 this refers to misleading the consumer or misrepresenting a product. With honey this is mostly associated with mislabelling and adulteration. Mislabelling in general aims to achieve a superior market position, while adulteration is done for financial profit, known as economically motivated adulteration.

The SABIO Board has decided to embark on a consultative process whereby a broader stakeholder group will be engaged to determine the type and direction of change. This should include beekeepers (affiliated members and non-members), bottlers, traders and importers. Sub-committees will be established to discuss what changes are needed with sufficient motivation for such changes to be implemented.

The virtual Honey Fraud symposium hosted by SABIO on World Bee Day, 20 May 2021, drew much attention and publicity with more than 600 delegates registered. The industry was also grateful to the Honorable Minister of Agriculture, Land Reform and Rural Development, Ms. Angela Thoko Didiza, for opening the symposium and highlighting the plight of the beekeeping industry. The phenomenon of honey fraud, the testing methodologies, and the regulatory framework were well explained by various speakers during the symposium proceedings.

1. Honey Authenticity: Sub-committee convenors - Kai Hichert and Gabathata Matshediso. Honey Regulation R835; APS and Impumelelo's role as assignee; re-introduce grading of honey.
2. Honey labelling and Quality: Sub-committee convenors - Louis van Zyl and Roland Moore. Honey Regulations: R835 Honey Quality and labelling aspects; R146 Labelling and R858 Phytosanitary Regulations (irradiation).
3. HACCP: Sub-committee convenors - Tumi Mobu, Sisiphiwo Dingana. HACCP and LocalGAP auditing and approved packing facility R908; self-regulation including statutory levies and or import tariffs.

The meeting concluded that the underpinning standards are in place, but identified the need for these to be updated and aligned with norms set by Codex and other international honey standards. This refers in particular to new testing methods while it was clear that a database of the chemical and physical properties of South African honeys needs to be established. DALRRD appointed an assignee agent, Impumelelo Agribusiness Solutions, in terms of monitoring compliance and standards. Unfortunately, due to a lack of supporting funding, very few investigations of complaints could be conducted and carried through to establishing product compliance in the market place.

The aim of establishing the above Sub-committees is to create participation at industry level in advance of any engagement with regulatory authorities and agents. You are hereby invited to participate in the deliberations of the sub-committees in open, but respectful debate.

Adriaan du Toit

Chairperson of the SABIO Board of Directors



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Opening Statement by Minister Thoko Didiza

at the SABIO Honey Fraud Workshop

It is my singular honour and privilege that I participate in your workshop today. This workshop is taking place at the time when we are all anxious about the rising numbers of Covid-19 nationally. The Covid 19 pandemic has disrupted both our economic and social life. Given the current situation we will have to find ways in which we need to learn to live with this virus. In doing so we will have to continue using the non-pharmaceutical protocols as directed by our Ministry of Health. We also want to encourage those above 60yrs of age to register for vaccination.



It is important to appreciate what our government did in allowing that the Agricultural sector should continue to operate even during the intense lockdown level 5.

I still remember how we had to ensure that the regulations should allow the bee keepers and their workers to operate. This was critical given that Bee Keeping is part of the Agricultural sector. Secondly the demand for honey was on the increase.

This is good news for the industry, however it also spells trouble where scrupulous players commit various cases of fraud by introducing in the market products that do not meet the standards.

It is therefore important to have a workshop such as the one we are having to examine and reflect on what is happening in this industry.

Importantly this workshop is taking place during the World Bee Day.

Jose Graziano da Silva in highlighting the world bee day had this to say "World Bee Day presents an opportunity to recognize the role of beekeeping bees and other pollinators in increasing food security, improving nutrition and fighting hunger as well as in providing key ecosystem services for Agriculture".

Food and Agriculture Organisation highlight some facts and figures on the importance of this industry.

1. Three out of four crops across the globe producing fruits or seeds for human use as food depend, at least in part, on pollinators.
2. Improving pollinator's density and diversity boosts crop yields that affect 35 per cent of global Agricultural land supporting the production of 87 of leading food crops worldwide.
3. Pollinator dependent food products contribute to healthy diets and nutrition.
4. Safeguarding bees safeguards biodiversity: the vast majority of pollinators are wild including over 20 000 species of bees.

Chairperson, these facts about the role of pollination and pollinators are critical in understanding the role the beekeeping industry plays in the entire value chain.

It is also important that the importance of inaction also speaks to the importance of pollinators which are bees, birds, bats and many more. Ensuring that these pollinators continue to thrive requires a serious discussion about managing our biodiversity well.

Other issues we need to reflect on is climate change and its impact on pollinators such as bees. Can this call for conservation of these pollinators as

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PORT ELIZABETH / GOEBERHA



the debate is happening in other jurisdictions?

The changing nature of Agricultural practices might also pose a threat to our pollinators.

These are issues which I think as an industry we need to start to deliberate on.

Honey and other by products of honey I have spoken a bit about our Pollinators. But the sweetest product they produce is equally important for human life. Yes they make life sweet. Honey is used in a number of food products, but it also contains many other useful and beneficial substances. Some of these have been used for time immemorial by our people.

In the modern days, honey is used as a sweetener and serves as an alternative to cane sugar. It is also used in a number of beverages and other food items.

So, we need to know what genuine honey is and what is not? This is important to address issues of

mislabeling and fraud. At a government level we have amended the Agriculture Products Standards Act in order to improve our regulatory framework. This will also enable us to examine claims that are at times made by producers or processors on what is actually used in the production process which makes people to make claims about their food stuff.

I do think that we will be able in this workshop to deliberate on measures that can be used to detect fraud and protect the industry.

I wish you all the success in this workshop and the celebration of "World Bee Day"

I thank you

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<https://www.gov.za/speeches/minister-thokodidiza-south-african-bee-industry-organisation-honey-fraud-workshop-20-may>



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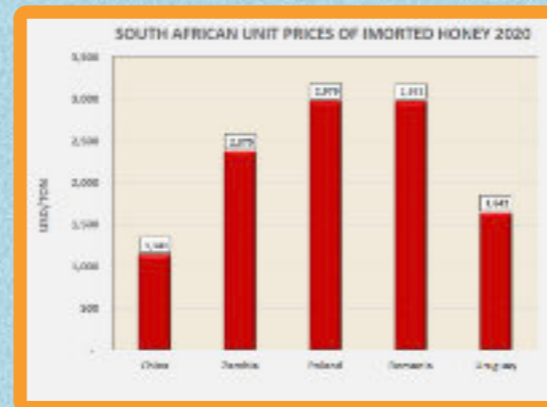
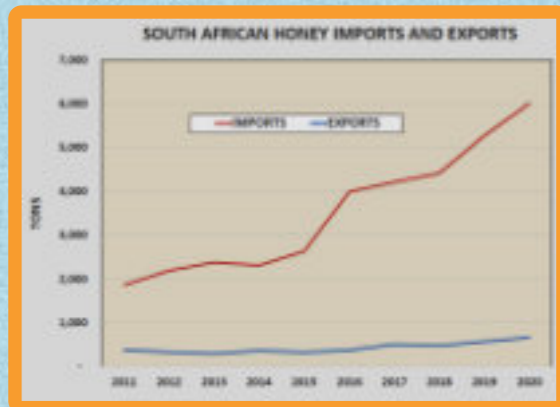
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The Global Honey Market and The Rise of Honey Fraud

- By: Prof Norberto Garcia
President of the Apimondia Scientific Commission on Beekeeping Economy

In his presentation to the workshop, Prof. Garcia started by analysing the state of the South African honey market. He showed that while exports had been relatively stable over the last decade, there had been a tripling in the level of imports. Two thirds of the imported honey originated in China.

The South African Honey Market



The price/ton of imported honey varied according to the country of origin, but that from China which supplies the bulk of the imports is also the cheapest by a significant margin.

The Definition of Honey and its Essential Composition

"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 bees collect, transform by combining **specific substances of their own**, deposit, dehydrate, **store and leave** in the honey comb **to ripen and mature.**"

Codex Alimentarius states that 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**.

No pollen or constituent particular to honey may be removed except where this is unavoidable in the removal of foreign inorganic or organic matter.

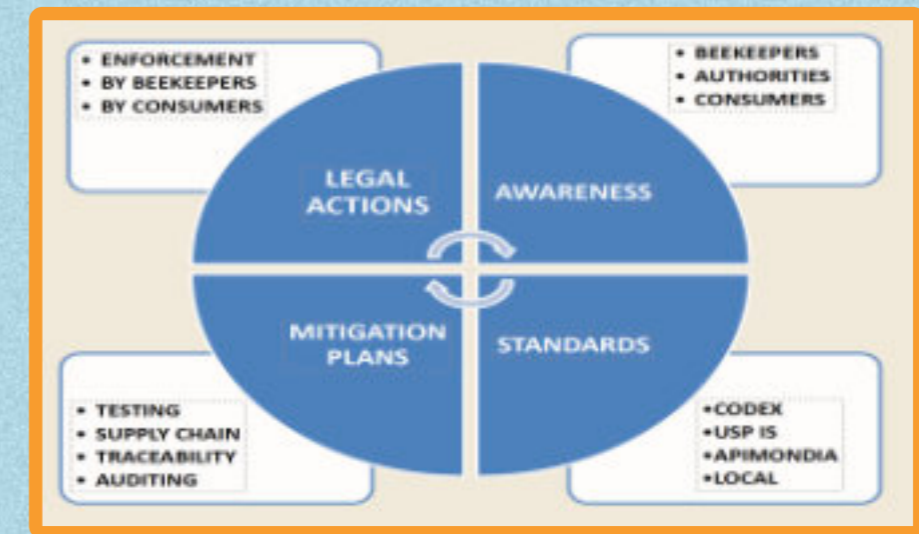
When this definition of honey is used, a number of types of honey fraud can be identified.

Types of honey fraud

1. Dilution with different artificially manufactured sugar syrups.
2. Harvesting of immature honey
3. Using ion-exchange resins to remove/ reduce residues ad/or lighten honey color
4. Masking and/or mislabelling the geographical and/or botanical origin of honey
5. Artificially feeding of bees during a nectar flow

Combating Honey Fraud

In order to effectively combat honey fraud, a number of stakeholders have to work together as indicated in the diagram below. The elements for success in combating fraud are an awareness of the problem, appropriate standards that can be used to differentiate between authentic honey and various fraudulent products, mitigation plans that carry the threat of exposure of the frauds, and taking of effective legal action against perpetrators.



Regulations

Official regulations of countries, blocs or regions are usually responsible for ensuring the quality and safety of both locally produced and imported products. Where there is a threat to a local industry, then the issue of food fraud becomes a priority.

Some current efforts to improve detection of fraud

In 2019, APIMONDIA released its statement on Honey Fraud (www.apimondia.com), and updated it in 2020.

The U.S Pharmacopeia has created an International Expert Panel to write new Honey Identity Standards for the U.S.

There is an ongoing work to update the methods used to determine honey purity and authenticity testing in CODEX

The APIMONDIA statement on Honey Fraud is the official position of APIMONDIA regarding honey purity, authenticity, and the fair methods of production, also referring to the best available methods to detect and prevent fraud.

How public standards help combat food fraud Introducing the FOOD CHEMICAL CODEX (FCC)

The FCC was created by the US-FDA and the US National Institute of Medicine in 1966 and is currently published by the United States Pharmacopeia (USP), a non-profit organization. It includes >1250 standards for additives, ingredients, and other food chemicals. These standards are developed by expert volunteers. It is the only fully independent source of food ingredient standards.

Proposal for Honey

A new FCC Standard was proposed in the June 2020 FCC Forum. This was done because of the increasing frequency of reports of adulterated honey. The Standard was developed at the request of the US Honey Industry and the Honey Integrity Task Force.

The standard was developed by an Expert Panel of international specialists from Argentina, Canada, China, Germany and the United States.

What tests to use?

The complex composition of honey and the increasingly sophisticated methods used to produce fraudulent honey, means that no single test can detect all types of fraud.

Currently a combination of three tests is recommended, these are liquid chromatography combined with isotope ratio mass spectrometry (LC-IRMS), nuclear magnetic resonance (NMR) analysis, and liquid chromatography combined with high resolution mass spectrometry (LC-HRMS). This is considered to be the best available combination. If non-conformances appear, other targeted tests may be necessary to confirm the fraudulent nature of the sample.

A Final Message

It is our duty as beekeepers to be the guardians of the purity and authenticity of bee products, not only for the benefit of our own industry but also to protect consumers, food security and the biodiversity of the planet.

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HONEY – A SUMMARY OF THE SOUTH AFRICAN REGULATORY AND LEGISLATIVE REQUIREMENTS

– **Isabella Mazzone LLB**
Hahn & Hahn Attorneys

When it comes to the regulation of Honey in South Africa, there are multiple sources of law that are used for various aspects of honey including the R835 Regulations relating to the Grading, Packing and Marking of Honey and Mixtures of Bee Products, the R146 Regulations relating the Labelling and Advertising of Foodstuffs, SANS 289, the Consumer Protection Act as well as the CODEX STAN 12 1981 Standard for Honey (used to review South African legislation and used when our law is silent on certain aspects).

The R835 Honey Regulations contain the more specific requirements for honey as well as the applicable definitions to be used including chunk honey, comb honey, creamed honey, bee products...etc. The R146 Labelling Regulations apply to all foodstuffs in South Africa and regulate the mandatory requirements on a label as well as the various claims that may and may not be placed on a label. The various claims under R146 include comparative claims, negative claims and nutritional content claims. These types of claims are regulated due to the fact that they can mislead the consumer with regard to the characteristics of the product.

Regulation 9 of R835 prohibits "wording, illustration or other means of expression which constitutes a misrepresentation or which, directly or by implication, may create a misleading impression of the contents" which appears on the container of honey and bee products. This includes the fact that the word "honey" or any representation thereof may not appear anywhere on

the label of a honey substitute and should a honey substitute contain any honey, then the word "honey" shall only appear within the list of ingredients of such honey substitute. This regulation stipulates that "except for honey and mixtures of bee products, no other product may have its label, packaging, trade name, trade mark or pictorial illustrations, so designed as to imply that honey is a main ingredient". This is important when it comes to the protection of the integrity of honey.

R146 also contains general prohibitions and restrictions with respect to pictorial representation in terms of Regulation 34 and misleading descriptions in terms of Regulation 47. The Consumer Protection Act, which regulates all aspects when it comes to the protection of the consumer, also regulates these labelling aspects in section 24 (product labelling), section 29 (general standards for the marketing of goods and services) as well as section 41 (false, misleading or deceptive representations). Accordingly, there is a triple barrier of legal protection when it comes to the claims that are permissible on the label of honey and bee products. It must also be noted that honey and bee products are considered as agricultural products and therefore fall under the Agricultural Products Standards Act (APS Act).

R146 defines honey as a single ingredient agricultural commodity which means that certain regulations have specific application such as regulation 49(4) with respect to irradiation statements and the regulation 54(2)(b) exemption from the requirement of an ingredient list (if the product is in fact honey and not a honey substitute).

Geographic origin

A geographical indication identifies agricultural products as originating from South Africa or another country where the quality, reputation and other characteristics of the product are attributable to such country and is an important aspect when it comes to honey and bee products. It is regulated by the R447 Regulations relating to the Protection of Geographical Indications used on Agricultural Products which protects registered geographical indications from being used on

similar products not covered by the registration and dissimilar products trying to exploit the reputation of the GI. It also specifically prohibits "any false or misleading indication or depiction as to the agricultural product's true origin, provenance, manufacturing process, nature or essential characteristics on a container, an outer container, a notice board and/or in an advertisement thereof".

Other origins

Other particulars/origins can be used to describe the type of a honey or bee product such as floral, honeydew, irradiated, radurised... etc in terms of R835. However,

the product must comply with the definition in R835 in order to place this particular on the label of the product.

The addition of sugar

When it comes to the addition of sugar in a honey product, this may be done but would then qualify the honey as a honey substitute in terms of the definitions of R835. This means the product must be named as a

honey substitute and honey, if actually contained in the product, may only be present in the ingredient list of the product.

Grading of honey

Regulation 5 and Part II of R835 deals with the grades of honey in South Africa. There are two grades for liquid honey, creamed honey and comb honey (choice grade and industrial grade) and one grade for chunk honey

and mixtures of bee products (choice grade). Raw honey is not graded in South Africa and crystallisation does not result in down-grading. The table set out in Part II of R835 lists the standards for each grade.

Product seizure

When honey products are non-compliant under the APS Act, one of three things can occur: a directive to comply can be sent with a deadline for resolving the issue with either a dispensation or a change of label; a seizure notice (which is far more severe) can be sent out in which case no dispensation is possible and sales must be stopped immediately until the issue on the label is resolved; or the product is discarded or the manufacturer of the product can be prosecuted with a fine or imprisonment depending on the severity of the non-compliance. When it comes to a dispensation with the Department of Agriculture (DALRRD), it is a formal procedure where a specific dispensation form must be completed along with a letter to the competent division explaining the circumstances. It must however be noted that a dispensation is an admission of guilt with respect

to non-compliance with the Act and Regulations and cannot be undone. When products are seized, this can be done whereby all products, materials, substances, books and documents which may afford evidence of the commission or suspected commission of any offence or is intended to be used in the commission of any such offence are seized. The items may be returned if no prosecution is ordered or if the cause of the complaint is removed. There is also an appeal process whereby an appeal may be lodged with the assignee within 10 days of receiving the notice and the prescribed appeal fee must be paid within those 10 days. A decision shall be made by the appeal board and shall be given to the appellant in writing with reasons. This ruling may either confirm a directive/seizure or make another ruling.

Conclusion

The regulation of honey in South Africa is supported by multiple legislative sources under the various different Acts as well as the relevant assignee under DALRRD. Labelling aspects must be assessed through the lens of all of the various sources in order for the products to be compliant and permissible in South Africa.

For further questions with respect to the regulatory aspects of honey in South Africa, please contact Janusz F. Luterek, Pr.Eng, Attorney, Patent Attorney and Partner at Hahn & Hahn Attorneys at janusz@hahnlaw.co.za or www.hahnlaw.co.za.

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Honey Fraud

Discussion of the Issues related to regulation.

– Niel Erasmus -DALRRD, Directorate Food Safety and Quality Assurance, Division Animal and Processed Products Directorate

We have heard today that the honey grading regulations were published in 2000, as R835 Regulations relating to the Grading, Packing and Marking of Honey and Mixtures of Bee Products. There are several concerns about this regulation such as the limited number of grades for human consumption and the labelling requirements. Would it not be prudent to consider updating this regulation to bring it in line with Codex and new testing methodologies?

Honey is a biological product and the composition can vary due to various factors, such as climate, type of crop, etc.

The latest Codex standard, that was updated in 2019, still covers the same compositional requirements and testing methods as in the previous Codex standard, as well as those in the SA regulations.

One difference is that the Codex standard makes provision for various exceptions where honey from certain plants and climates differs from the standard composition, while the SA regulations are rigid and do not allow for any exceptions.

The Codex standard does not have grades as in the SA regulations, but does have for example labelling according to the extraction methods.

It was agreed that the SA regulations can be updated to reflect these changes.

What is the legal interpretation of a blend of honeys – where the packed honey is sourced from several countries? The law states that country of origin must be specified? I understand that a concession was granted for an ambiguous listing of country of origin?

Local honeys from different sources are often blended to obtain a certain taste/colour profile, and the same applies to imported honey.

Permission was granted for the indication of the country of origin to read the same as that in Department of Health's (DoH) labelling regulations. DoH labelling regulations allow the indication of a number of the countries of origin separated by and/or in the case of a single ingredient agricultural product in the case of unavailability due to climatic, seasonal or other contingencies.

The poultry industry recently indicated that this requirement is being abused in their industry since the products presented for sale do not comply with the requirements for unavailability due to climatic, seasonal or other contingencies, and thus requested that poultry meat be excluded from this permission. The honey industry may thus also request that this

permission be withdrawn for their industry with proper motivation.

Just note that honey is different from poultry in that imported honey must be irradiated and indicated as such on the label, and SA is a net importer of honey.

Is it possible that honey could be diluted with other syrups and still comply with this legislation? Has the department ever had complaints of this nature? There have been issues reported in the media.

There have been such cases in the past, so it is possible.

But this can be detected by enforcement and analysis.

Note that for adulteration, other detection methods than those stipulated in the regulations may be used, provided that they are based on sound science, are reliable and reflect SA honey.

Traceability of honey is prescribed in the regulations and can also be used as a method to prevent adulterated honey from being sold since adulterated honey will not be fully traceable to the premises where the product was produced/packed.

Can you sell a mixture of honey and syrup? Is it allowed to sell a product such as "Honey Flavoured Syrup"?

Various innovations are being experimented with such as fruit flavoured honey in straws, flavour infused honey, honey with herbs and/or spices, etc.

The principle is that the seller must clearly label the product in order for the consumer to understand the composition and what he/she is buying, for example if syrup is added to honey (< 50% syrup) it must be labelled as for example "Honey with syrup" in letters of the same size and type.

The regulations stipulate that a honey substitute may not indicate the word "honey" on the label, except in the case of the ingredients list when honey is a component of the substitute. A honey substitute is regarded as a product that resembles honey but contains less than 50% honey. "Honey Flavoured Syrup" is thus regarded as being a honey substitute since the honey content is less than 50% (i.e. it is not "Honey with..." as explained above). The word "Honey" may thus not be used on a product such as "Honey Flavoured Syrup". This also applies to words that by implication resemble "honey", for example "Honee".

CONTACT DETAILS

NATIONAL ASSOCIATION

SABIO: South African Bee Industry Organisation

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REGIONAL / LOCAL ASSOCIATIONS & INTEREST GROUPS

Eastern Highveld Beekeepers' Association

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Eastern Cape Development Beekeepers

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Knysna Beekeepers' Association

Co-ordinator: Owen Williams * Knysna, Garden Route
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KwaZulu-Natal Bee Farmers' Association

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Mpumalanga Beekeeping Interest Group

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Northern Cape Bee Interest Group

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Northern Beekeepers' Association

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Southern Beekeeping Association

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Western Cape Bee Industry Association

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INTERNET FORUMS

BeesSA Email Discussion Group

Moderator: Robert Post * Joostenbergvlakte, Boland, Western Cape
Tel: 021 971 1022 * Email: crpost@telkomsa.net

Apiculture SA Email Discussion Group

Moderator: Dean Lennox * Cape Town, Western Cape
Email: deanlennox@gmail.com
Web Address: <http://groups.google.com.co.za/group/apiculture-sa>



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Honey Authenticity:

types of fraud, and how to test for them

Shannon Riva

Food & Allergy Consulting and Testing Services (FACTS)
Stellenbosch

Honey is the third-most-faked food in the world, behind milk and olive oil. The extent of fraudulent honey available for sale in South Africa is unclear; however, there is an obvious supply-demand imbalance. Local producers are only able to meet half of the country's demand for honey. This shortage, in addition to the high economic value of honey, creates major opportunities for honey fraud.

Adulteration

Adulteration, such as substitution or dilution, includes the act of adding undeclared and inferior substances to food, often for financial profit. This is known as economically motivated adulteration (EMA).

Probably the most well-known form of honey adulteration is the addition of sugar syrups to honey to increase production volumes. This is a major challenge for the honey industry, as adulterated honey may look and taste just like authentic honey. Adulterated honey may even test as compliant to criteria set out by local authorities. This highlights the importance of reviewing standards and regulations on a regular basis to update these documents with the most recent scientific findings and include indicators that detect new fraudulent practices.

The Codex Standard for honey (CX5 12-1981) defines honey as "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". Local and international standards and regulations do not permit any other ingredients to be added to honey. Therefore, if a product is referred to as 'honey', it should be free from impurities, additives, added foodstuffs and other adulterants.

Stable carbon isotope ratio analysis is usually the 'go-to' method to detect honey adulteration. This method is based on the principle that honey is generally made from the nectar of dicotyledonous (C3) plants, while most sugar syrups are made from monocotyledonous (C4) plants such as corn and cane. However, adulteration with sugar syrups from C3 plants such as rice and beet cannot be detected with this test, as these syrups have a similar isotope fingerprint to honey. Fraudsters know this; therefore, there is a major risk that they will capitalise on this shortcoming.

Recent studies have highlighted the potential of using oligosaccharides (large sugar molecules) with a high degree of polymerisation as markers of adulteration. Syrups of both C3 and C4 origin generally contain detectable levels of these oligosaccharides, while authentic honey does not. However, some syrups may be hydrolysed to such an extent that no oligosaccharides remain. This is often true for rice syrups.

To overcome this hurdle, researchers have identified glucosyl isomaltol as a marker for rice syrup adulteration in honey. Testing for this marker, in addition to testing for oligosaccharides with a high degree of polymerisation and the more conventional sugar-ratio analysis, constitutes a strong basis for detecting honey adulteration.

Honey Mislabelling

Because South Africa can only produce around 50% of the local market demand for honey, honey must be imported from various countries including China, Zambia and Romania to compensate for this shortage. Cheap (and potentially fake) imported honey may be blended with locally produced honey

and labelled as authentic South African honey. This threatens the livelihoods of local beekeepers and may put pressure on them to undercharge, overprocess, and cut corners in their honey production to compete and stay afloat.

Mislabelled honey is not permitted by the Consumer Protection Act (68 of 2008), which prohibits the direct or indirect marketing of goods implying a false, misleading or deceptive misrepresentation to the consumer. In essence, if a consumer purchases locally produced honey, they have the right to be sold honey that is 100% South African.

Even when the label of a blended honey declares the countries of origin, the accuracy of the source of origin claim may still be incorrect. The global honey supply chain has been shown to be incredibly complex, so there is a risk that imported honey may not actually be from the country that is labelled as the country of origin. Furthermore, there is a lack of internationally harmonized regulations and controls for honey, resulting in different quality levels and different legal opinions regarding the marketability of honey.

Incorrect labelling regarding botanical source is another area of concern. Honey produced from a single botanical origin generally fetches a higher price on account of it having a distinct sensory profile. Fraudsters may label a honey as monofloral, when in fact it is not.

Several test methods have been explored to determine the botanical and geographical origin of honey. Melissopalynology, or the study of pollen in honey, has been the traditional testing approach. However, there are various drawbacks to this method, including low sample throughput, the requirement for experienced personnel and a comprehensive collection of pollen, seasonal pollen variation, and the risk of certain pollens being under-represented due to low pollen counts in flora.

Modern testing approaches for determining the botanical origin of a honey sample include DNA-based methods, chromatographic methods and spectroscopic methods. These methods are largely based on the use of discriminative markers such as phenolic compounds, volatile organic compounds and minerals and trace elements. Chemometrics is required to process the large datasets resulting from these techniques. Models are often generated to interpret the findings more accurately.

Due to the complexities of origin testing, there is currently no standardised and/or regulated test available that can confirm the botanical source and geographical origin of honey.

should prohibit such lack of clarity, as this is incredibly confusing for the consumer.

The demand for honey appears to be ever-increasing; therefore, the risk of honey fraud is also on the rise. Combatting honey fraud is no small task, but authenticity testing is a key part of the solution. Because there is no single test method that can prove honey is absolutely authentic, testing should involve several complementary methods to provide a comprehensive and reliable assessment. Honey authenticity testing is like a puzzle: the more pieces you can collect, the more information you can reveal about a sample. Local honey regulations also play an integral part in combatting honey fraud. These regulations should be clear and relevant and should be updated as new scientific advances are made. It is necessary for all role players along the honey supply chain to take action against honey fraud, to ensure that only authentic honey is present on South African shelves.

Other Forms of Honey Fraud

Beyond adulteration and mislabelling, other forms of honey fraud include harvesting of immature honey, using ion-exchange resins to remove residues and lighten honey colour, and artificial feeding of bees during a nectar flow.

Honey quality is a grey area when considering honey fraud. Processing factors such as temperature, method of honey extraction, degree of filtration and storage time before sale can have a major impact on honey quality. Although poor quality honey is theoretically still honey, it may not deliver the same perceived health benefits for which a consumer may be purchasing it.

The Codex Standard for honey (CX5 12-1981) states that "honey shall not be heated or processed to such an extent that its essential composition is changed and/or its quality is impaired". Quality parameters are typically regulated to protect both the consumer and the market. There are various tests available to evaluate honey quality, with each test providing a piece of information about the honey. For example, diastase activity and 5-hydroxymethylfurfural (HMF) content are indicators of overheating. Honey is often heated to make it easier to process, but overheated honey has reduced enzymatic activity and polyphenol content – factors that are considered to give honey its antimicrobial and antioxidant properties. Therefore, HMF and diastase activity are regulated to control the risk of overheating and prevent the sale of poor quality honey.

The sale of honey in South Africa is regulated by the Department of Agriculture, Land Reform and Rural Development (DALRRD) through the Agricultural Product Standards Act 119 of 1990 Regulations Relating to the Grading, Packing and Marking of Honey and Mixtures of Bee Products intended for sale in the Republic of South Africa (R. 835/2000). This regulation identifies 17 tests to determine the authenticity, composition, quality and ripeness of honey, and states that any of the relevant tests may be selected and "if the honey does not comply with any one of these selected tests, then it shall be deemed as not complying with the standards for grades of honey". The ambiguity of this statement, in combination with the fact that this regulation was published over 20 years ago, highlights the need for the regulation to be reviewed and updated.

The regulation should provide definitive testing requirements, encompass recent scientific findings when setting these requirements and should take into consideration the current and relevant concerns of the bee industry regarding origin.

If it is not feasible to standardise a test for the botanical and geographical origin of honey, then stricter requirements should be implemented regarding labelled origin claims and the documentation that is required to substantiate these claims. Labels for blended honey can be particularly cryptic, for example, indicating "South Africa and/or Argentina/China/Uruguay/Zambia/Poland" as the country of origin. Regulations



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CONTACTS FOR BEEKEEPING

Mr Riaan van Zyl and Mr Kobus Kemp are the persons who beekeepers should contact if they have any suspicion about bee diseases or the presence thereof such as AFB and the Capensis clones.

They can also be contacted regarding legislation concerning honey labelling and the standards of import requirements of honey.

They do not provide advice on beekeeping practises, but will if possible direct persons with enquiries to the correct or experienced sources.

PLEASE CONTACT THEM:
Riaan van Zyl: (Capensis)
Tel: 021 809 1702
Cell: 083 414 2494
Email: riaanz@dalrrd.gov.za

Kobus Kemp: (Scutellata)
Tel: 012 309 8762
Cell: 082 873 1678
Email: kobusk@dalrrd.gov.za



BEECON EVENTS 2021

SABIO & SAMAC POLLINATION PARTNERSHIP



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f SABIO - South Africa Bee Industry Organisation

A VIEW FROM THE MEDIA

**Falsely labelled, mixed with syrup or 'laundered': Honey fraud is rife in SA
Honey is the third most adulterated food in the world after milk and olive oil**

- Wendy Knowler (Consumer Journalist)



consider the price, Garcia said. Chinese honey is by far the cheapest, at around \$1,141 (about R15,900) a ton, versus double that for Zambian honey (\$2,375, or about R33,100) and close to \$3,000 (about R41,800) per ton for Polish and Romanian honey.

Here's the thing. "There are not enough bee colonies in China to explain the huge amount of honey they are currently exporting," Garcia said. "Honey is a product of the interaction between the plant and the animal kingdom. No additions can be made at all. If you blend pure honey with fake honey, it is not honey."

Where does the honey in the squeeze bottle you buy from your local supermarket come from, and what has it been blended with, is it honey at all?

There's a very good chance that what is in the bottle is not 100% honey: not the liquid gold containing pollen with the health benefits.

That is what emerged during a virtual workshop on honey fraud hosted by the SA Bee Industry Organisation (SABIO) on Thursday and attended by beekeepers, retailers and regulators.

Local beekeepers are only able to meet half the demand for honey in this country and the rest is imported, mainly from China.

Prof Norberto Garcia from Argentina, president of the Apimondia Scientific Commission of Beekeeping Economy, revealed that SA's honey imports trebled from around 2,000 tonnes in 2011 to 6,000 tonnes in 2020, 60% of which (4,700 tonnes) came from China.

The rest came from Zambia (706 tonnes), Poland (305) and Romania (257).

The reason for that becomes clear when you

"Local beekeepers can't compete with the price of Chinese honey," Garcia said. "Your [SA's] situation is particularly worrying."

Other forms of honey fraud include:

- labelling honey as coming from a particular floral source, for example orange blossom, aloe or litchi, when it has been blended with other honey or doesn't come from that source at all;
- adulterating it with fructose, rice or beet syrup; and
- "honey laundering", or importing cheap Chinese honey in bulk and passing it off as high quality local honey.

Honey is the third most adulterated food in the world after milk and olive oil, said Shannon Riva of the Stellenbosch-based Food and Allergy Consulting and Testing Services (Facts).

Shannon Riva of Food and Allergy Consulting and Testing Services

There is no one test which can reveal all about a honey sample in terms of adulteration.

"Honey is such an easy target for adulteration," Riva said. "Most adulterated honey tastes compliant. You have to test."

Garcia said with honey adulterators constantly coming up with new methods, it boils down to "a competition between the development of new tests and the development of new syrups". "Old testing methods will not detect the latest adulteration methods," he said. "Testing is complex and expensive, with the main labs in Europe, particularly Germany. They have the most advanced testing methods for honey adulteration."

Consumers, regulators urged to help combat honey fraud

With SA's 20-year-old honey legislation and standards in urgent need of updating, adulterated honey could falsely be considered compliant, it emerged at the workshop.

Niel Erasmus of the Food Safety and Quality Assurance animal and processed products directorate was non-committal when questioned about the updating of the legislation, but did say it was possible that producers may be prohibited from not disclosing the country of origin.

It is not uncommon to see honey bottles with "Product of SA and/or China/Zambia/Poland", meaning the consumer cannot make an informed choice.

"Industry can approach us to remove that allowance," he said.

Matlou Setati of the Consumer Goods Council of SA said it was "saddening" that honey fraud was happening.

"We will look at this and recommend to the

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Source: <https://www.timeslive.co.za/news/consumer-live/2021-05-21-falsely-labelled-mixed-with-syrup-or-laundered-honey-fraud-is-rife-in-sa/>

regulators and the legislators that we crack down on the fraud," she said. "Laboratories are very expensive to set up, but we could accredit private labs and work together to help each other."

Attorney Janusz Luterek said many retailers were selling products that looked like honey, but in fact were either only part-honey or not honey at all.

"The next time you ask for honey at a coffee shop, look very carefully at the label. Legally, no words or illustration may create a misleading impression of the contents," he said.

"If it's not 100% honey, it can't be described as honey."

Attorney Janusz Luterek

Fourth-generation New Zealand beekeeper and Apimondia regional president for the Oceania region, Jody Goldsworthy, said beekeepers around the world were having their prices undercut by the suppliers of adulterated honey.

"With a fraudulent product, supply is unlimited," she said. "They create a false market floor which the supermarket groups use to bring other suppliers down to."

Ultimately consumers are key to stemming honey fraud, she said. "Many regulators will be the last to act, but consumers vote with their feet. They abandon brands which are implicated in adulteration."

But that can only be proved by means of very expensive testing.

Honey bees don't just produce honey, they pollinate crops, and their loss is a threat to agriculture and food security, says renowned bee researcher Prof Robin Crewe.

"So protecting them is absolutely vital."



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Honey tasting Event: who can detect fraudulent honey?

Lynne Hepplestone
Blue Hills Veterinary Hospital
Midrand

In line and along with the successful SABIO Workshop on Honey Fraud was the planned Honey Tasting event, (the intention of which was to present honeys for tasting, some of which would intentionally be adulterated).

And so an enthusiastic trio of SABIO Board members, Kai Hichert, Louis Coetzee, and Tumi Mobu, mixed and matched honeys, making up an adulterated Macadamia honey (75% Puratex and 25% Macadamia), an almost non-honey (95% sugar syrup, dash of lemon juice to prevent granulation / crystallization, and adding 5% Citrus honey for colour!) and then also including a pure Sunflower honey, with a pure Litchi honey from the Lowveld, to complete the samples.



The 4x honey samples were delivered to Linda, Adele, and Tammy, from Food Focus, who beautifully packaged and presented the Gift Packs (see above) to a select panel of 25 VIPs, including gov officials and higher level corporate buyers. No bottle was labeled, and all the honeys appeared to look very similar, being classified on HJG criteria as Liquid Honey Light exhibits. These lovely gift packs included tasting spoons, bee-themed serviettes, the honey-tasting palate cleansers of a bottle of sparkling water with a little bread, and information sheets including a honey-judging score card (see below), and helpful details about SABIO.

As we were still subject to COVID restrictions, this tasting event was facilitated online. The HJG Judges and Stewards were down in PMB for the KZNBFA (KwaZulu Natal Bee Farmers Association) Honey Show, along with the SABIO Board, making an online event easy regardless of location.

It turned into so much Fun, with enthusiastic and interactive participants giving their strong opinions on the different tastes and aromas, with a little suspicion aroused around the adulterated samples. Assessing and discussing Aroma, Viscosity, Flavour, Colour, Presentation and Appearance, on a specific points system (as we would judge honey in a competition), the general consensus was that these honeys were acceptably delicious and palatable! A few guessed which the adulterated samples were, and most were surprised at how easy it is to slip adulterated honeys into the market. Point made. Most fun for me was the opportunity to educate people about Honey, and share the knowledge that's being learned through the HJG training. Wonderful attention to detail was shown throughout this event, and I would like to thank and congratulate SABIO and Food Focus for a successful Honey Tasting, and Workshop.

Melissopalynology uncovering pollen diversity within Lowveld honey.

By: Nikiwe Ndlovu¹, Michelle D. Henley^{2,3}, Robin M. Cook^{3,4}, Frank H. Neumann¹

- 1 Evolutionary Studies Institute, University of the Witwatersrand, Johannesburg
- 2 Applied Behavioural Ecology and Ecosystem Research Unit, School of Environmental Sciences, University of South Africa
- 3 Elephants Alive, Hoedspruit
- 4 School of Animal, Plant and Environmental Sciences, University of the Witwatersrand, Johannesburg

Honey background

Elephants Alive is a South African Not for Profit Company (NPC) and our collaborator in this project where we analyse pollen in honey to determine its botanical and geographical origin (melissopalynology). Elephants Alive's mission is to ensure the survival of elephants and their habitats and to promote harmonious co-existence between elephants and people (<http://elephantsalive.org/>). In keeping with their mission, Elephants Alive has successfully used African honey bees to protect iconic marula trees (*Sclerocarya birrea*) from elephant impact (Cook et al. 2018). Elephants are highly sensitive to the stings of African honey bee (*Apis mellifera scutellata*) colonies (hereafter referred to as bees), and so they avoid trees with beehives at the experimental site in Jejane Private Nature Reserve (Cook et al. 2018). In the rest of Africa, this avoidance behaviour by elephants has successfully been used to protect crops from elephants by placing beehive fences around crop fields (King et

al. 2017). In the process of using bees to protect marula trees in South Africa, the bees function as important pollinators to this protected and culturally important trees species. The honey and honey-related products (lip balm, honey-infused soaps and food wax wraps) are being sold to help finance the tree-protection project. More recently, the all-female Black Mamba Anti-Poaching Unit (<https://www.blackmambas.org/>) has been trained in beekeeping to upskill them, diversify their patrolling routine, and supplement their income, while developing entrepreneurial skills around the sale of honey and honey related products at a time when food scarcity is becoming a conservation concern due to the impact of COVID-19. In addition, the medicinal value of the honey that is being produced is demonstrated through the treatment of snare wounds of animals affected by illegal snaring activities within the Protected Areas (Nimmo 2020).

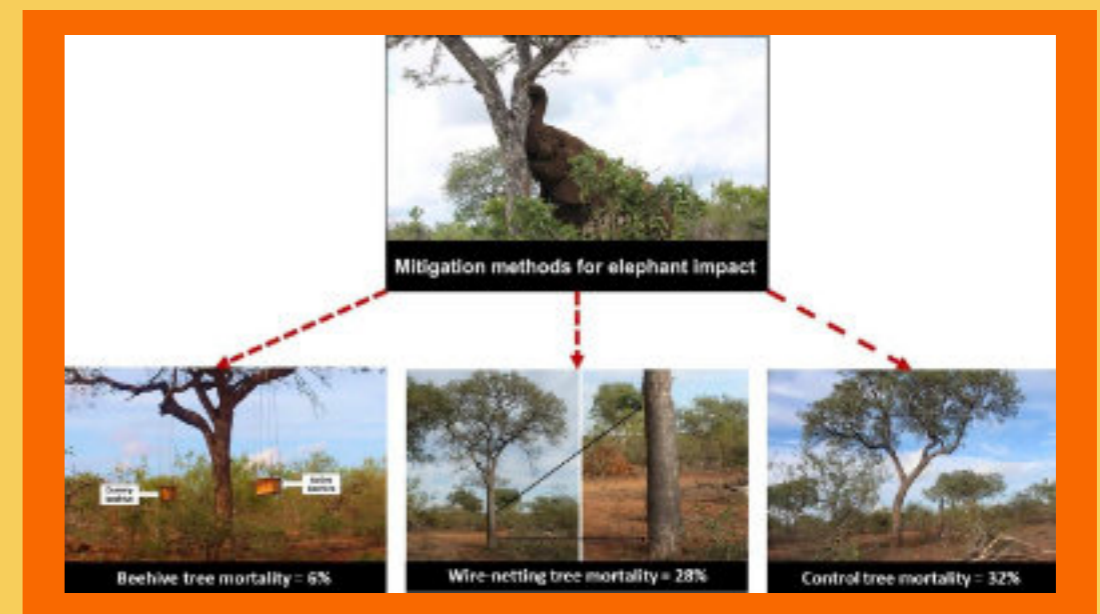


Figure 1. Two different mitigation methods used to protect Marula trees. The most successful method is the use of beehives (Cook et al. 2018).

Melissopalynology

Several articles in the South African Bee Journal have highlighted the importance of discovering methods to detect the adulteration of honey and to determine its origin (Guelpa and Manley 2017). Honey is an easy target for fraud, which entails the addition of adulterants such as sugar syrups, molasses, and natural syrups to increase yield for economic gain. Since South African beekeepers can only produce 50% of the market demand for honey, the remainder is supplied by imports. Additionally, the masking of botanical and geographical origin is another fraudulent practice that impacts the authenticity of honey (De Beer et al. 2021). The market value of wild, natural honey is high and its value can be demonstrated as a rare commodity. Stable carbon isotopic ratio mass spectrometry (SCIRA) is one of the methods that can be used to determine the authenticity of honey. However, this method is costly and time-consuming (Guelpa and Manley 2017). Melissopalynology, on the other hand, is an alternative method and important means (based on the identification of pollen and

their concentration on a slide) for determining honeys' botanical and geographical origin applying light microscopy. This method is far less expensive and it only requires 10g of honey which is processed in the lab for pollen analysis. Beekeepers such as those at Elephants Alive can get their honey quality assured by a melissopalynologist at a much lower financial cost.

This project was carried out using 36 honey samples that were harvested from three different seasons (19th March, 1st July and 26th October) from the Associated Private Nature Reserves of the Greater Kruger National Park. The processing of the 36 honey samples (12 beehives for 3 different seasons) was done using standard melissopalynological methods (acetolysis). Melissopalynology can provide the answers to many questions including which plant species bees prefer as fodder, and which pollination pathways exist in the savanna biome.

Which plants do the bees of the savanna biome prefer as fodder?

The surrounding vegetation influences the plants that bees prefer when collecting nectar (for honey), pollen or exudates (for propolis). Seasonality determines which plants grow in a specific biome. Consequently, each vegetation biome produces a characteristic pollen spectrum which might be reflected in a honey sample. This study has explored the pollen spectra of the savanna biome reflected in honey samples which might inform beekeepers about preferred bee plants (see Johannsmeier 2016: Beeplants of South Africa). After Fynbos, the Mixed Bushveld offers the greatest variety of bee plants (Johannsmeier 2016). The savanna biome

has many plants that cater for the needs of bees like the Combretaceae (Bushwillow Family), Poaceae (Grass), Harpephyllum caffrum (Wild Plum, Cashew Family-Anacardiaceae), Sclerocarya birrea (Marula tree, Anacardiaceae), Gerbera (Daisy Family-Asteraceae), Lannea (Anacardiaceae), Euphorbiaceae (Spurge Family), Senegalia type and Vachellia type (Acacias, Bean Family-Fabaceae), and Peltophorum africanum (Weeping Wattle, Fabaceae) (Figure 2). These are important indicators of the savanna woodland, Lowveld bushveld region of the Kruger National Park in South Africa.

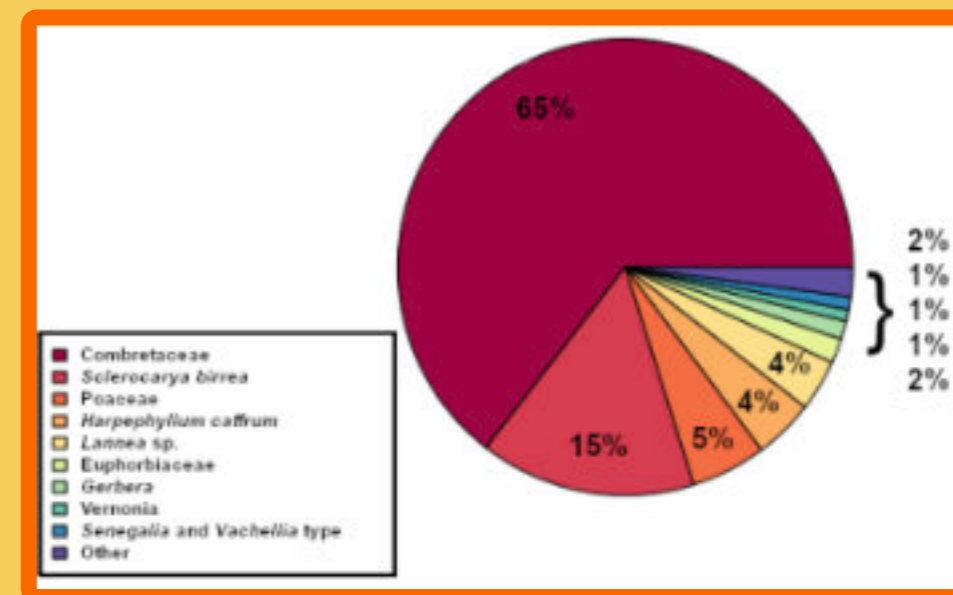


Figure 2. Percentage composition pie chart of pollen taxa found in Lowveld honey from the 2020 harvest

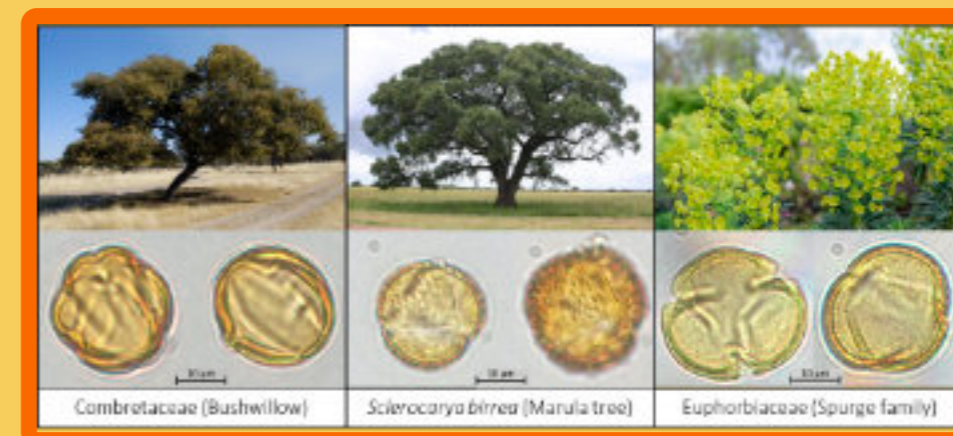


Figure 3. Pictures of pollen grains from the Combretaceae (Bushwillow Family), Sclerocarya birrea (Marula tree) and Euphorbiaceae (Spurge family) below their respective typical plant pictures.

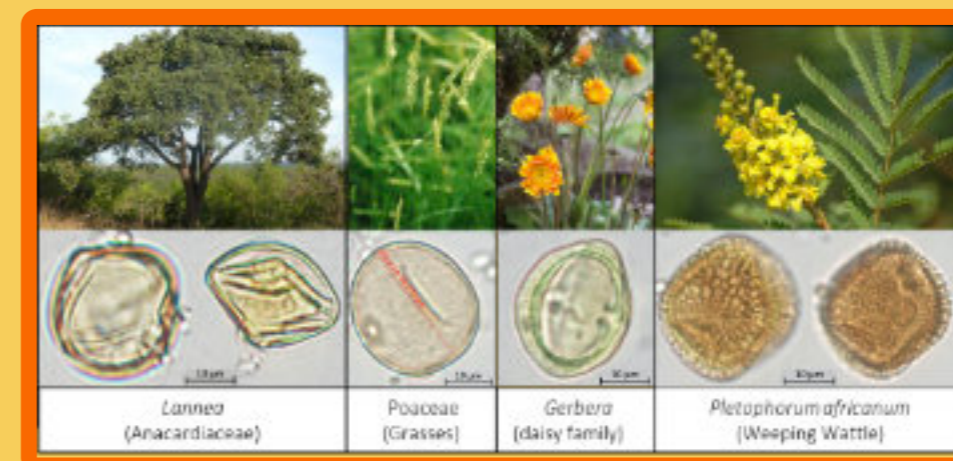


Figure 4. Pictures of pollen grains from the Lannea (Anacardiaceae-cashew nut family), Poaceae (Grasses), Gerbera (Asteraceae-Daisy Family) and Peltophorum africanum (Weeping wattle, Caesalpiniaceae-Pea Family) below their respective typical plant pictures.

Pollen characteristics of honey in the savanna biome?

Not surprisingly, the pollen content in honey tends to be an overrepresentation of insect-transported pollen rather than wind-transported pollen. As a result, wind transported pollen tends to be underrepresented in honey relative to its presence in the environment. Poaceae (Grasses) are heavily foraged by bees for their pollen and *Senegalia nigrescens* (Knob-thorn) is frequently visited by bees,

hence the pollen is continuously present throughout all honey-harvest seasons. The attractive nectar from the *S. nigrescens* is available during spring when the flowers are present (Johannsmeier 2016). Although both grasses and acacias are mainly wind-pollinated, bees forage for their pollen but in lower quantities than insect pollinated plants.

Conclusion

Therefore, having explored the role of melissopalynology in determining the pollen spectra of Lowveld honey and its potential to characterize the origin of honey, this method can be used as an effective means to explore the foraging behaviour of bees and to determine pollen composition within honey. These techniques hold great value in using honey and pollen spectra as biodiversity indicators for Protected Areas. Bees are sensitive to pesticides (Tosi et al. 2016), as are Protected Areas to the excessive impact of elephants (Cook et al. 2017). People are concerned about the effects of excessive elephant impact on biodiversity (Henley & Cook 2019). Likewise, the use of pesticides is threatening the diversity of most pollinators (Brittain et al. 2010, Tosi et al. 2016). Mellissopalynology can therefore be used to tell us not only about the diversity of plants that are available to both bees and elephants. In combination with vegetation surveys, it could potentially be used to indicate how

far bees are prepared to forage to add diversity to their diet. This in turn may help us to understand how bees meet their nutritional requirements amid rapidly changing environments as monoculture practices and the use of pesticides are rapidly expanding in the agricultural sector.

This study showed that the Combretaceae (Bushwillow), Poaceae (Grasses), Harpephyllum caffrum (Wild Plum), Sclerocarya birrea (Marula tree), Gerbera (Daisy Family), Lannea (Anacardiaceae), Euphorbiaceae, *Senegalia* type and *Vachellia* type (acacias), *Peltophorum africanum* are some of the important bee plants in the savanna biome that are good for wild-honey production. When linked to a tree protection project such as the Elephants Alive project, the market value of the raw wild honey source increases due to the conservation story of protecting trees, bees, and elephants in the process. How this can be used to upskill and benefit local communities is currently being explored.

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