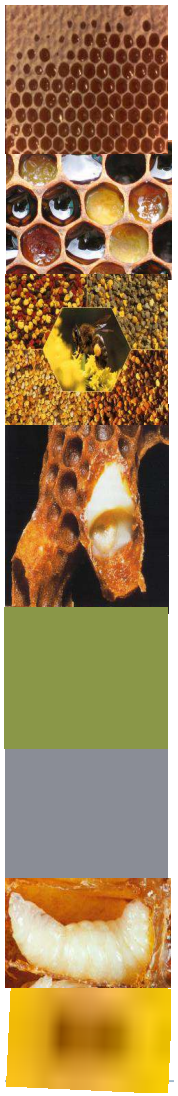
Key messages on Bee products

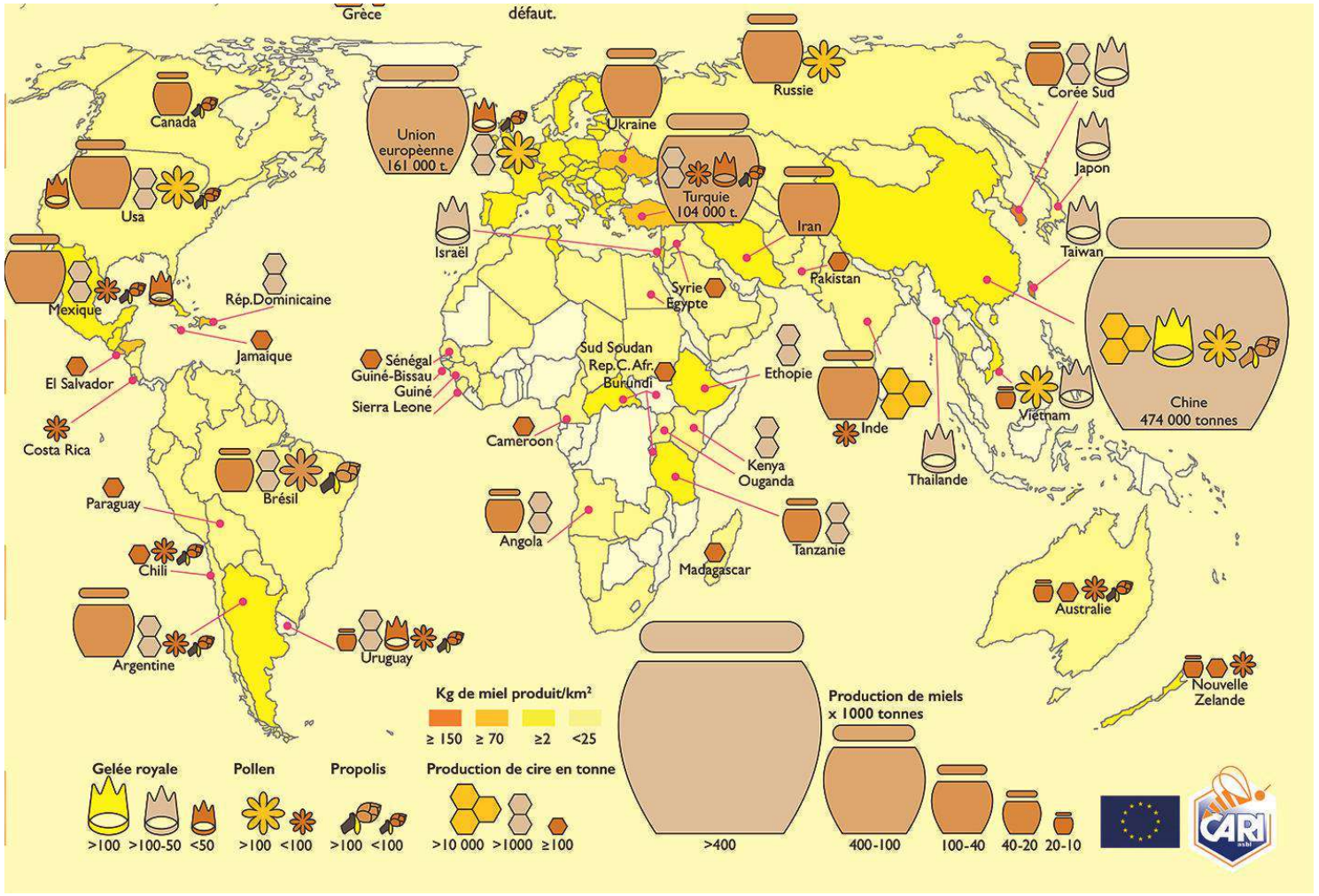
Apiquality Sibiu 11 October 2018

Bee products, few questions

- How can we characterize the bee products ?
- What's their image and the reality ?
- What's our impact as beekeeper, packers or consumer ?
- This analyse can help us to define
  The key messages for the bee products

The bee products in the world

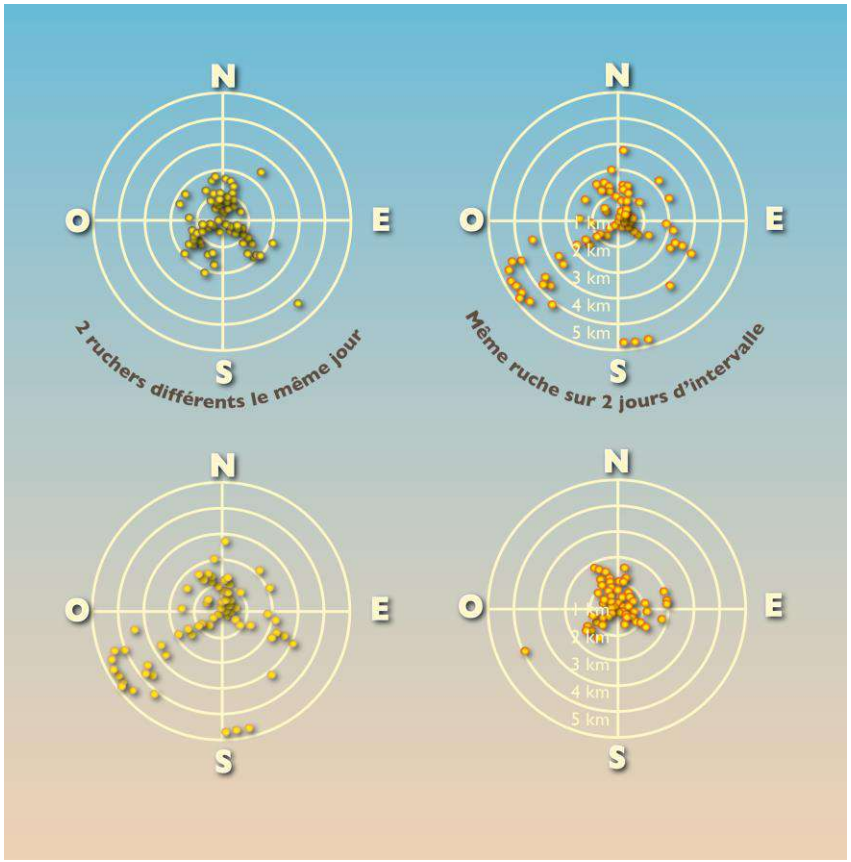




Charaterisation of bee products

How can we characterize the bee products ?

- Honeybees are environmental social insects.
  - They harvest:
    - pollen,
    - nectar,
    - propolis,
    - water
  - They can visit a surface
  - of ± 50 km^2 around the hive



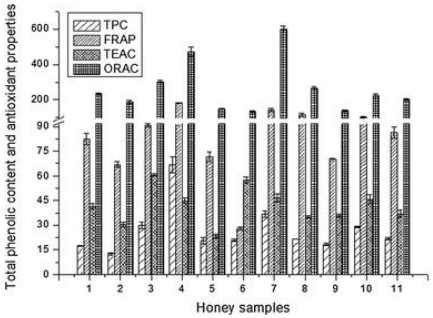
How can we characterize the bee products ?

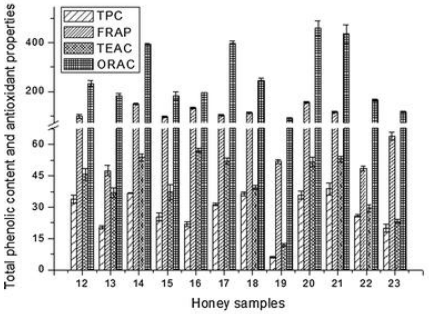
- ➔ Environmental conditions: flora, climate, pollution will have a big impact on honey, pollen, beebread, propolis
  - Geographical position will influence the climate, the soil and the flora.
- And other parameters can also have some importance for all the bee products like genetic origin of the bees.
- ➔ Origin of the bee products (botanical, geographical and genetic of bees) is a key to explain their composition and activity.

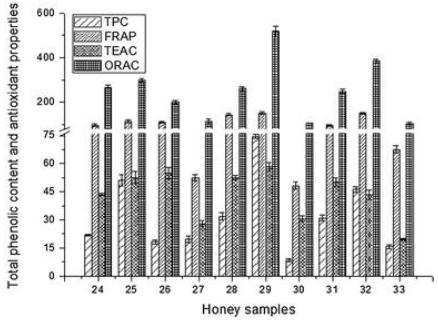
Origin of bee products - Honey

- If honey is define by CODEX Alimentarius, the actual definition cover a large diversity of honeys produced everywhere in the world.
  - For fresh honey, differences in physico-chemical parameters, pollen and organoleptic spectrum and biological activity are **mainly due to the botanical origin**.
  - Geographical origin has a direct impact on the flora and some soil constituents can influence the composition of honey.
  - Honey produce by other bees like Mellipona have different compositions.

Origin of bee products - Honey







Springer Link

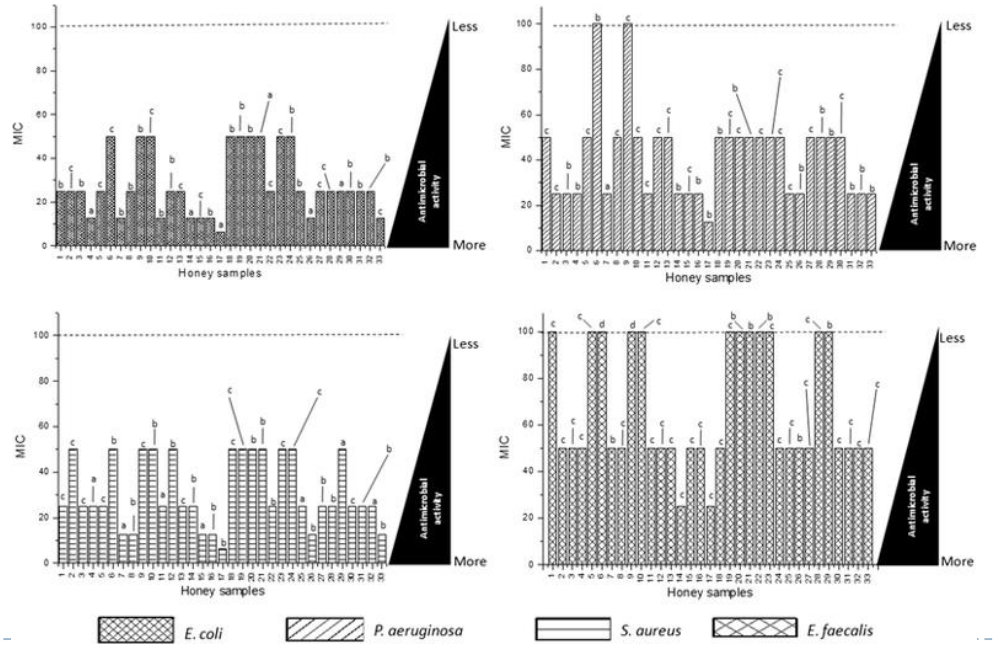
European Food Research and Technology

June 2017, Volume 243, Issue 6, pp 1019–1030 | Cite as

Physicochemical properties and biological activities of honeys from different geographical and botanical origins in Iran

Authors | Authors and affiliations

Elaheh Mahmoodi-Khaledi, Jesús Lozano-Sánchez, Abdelhakim Bakhouche, Mehran Habibi-Rezaei, Issa Sadeghian, Antonio Segura-Carretero



Origin of bee products - pollen

- These 2 articles illustrate the impact of diversity linked to the environment on pollen pellets linked to variation in pollen lipids, proteins, carbohydrate, sporopollenins

ELSEVIER

Food Research International

Volume 77, Part 2, November 2015, Pages 82-91

Impact of origin on bioactive compounds and nutritional composition of bee pollen from southern Brazil: A screening study

José Augusto Gasparotto Sattler [a], Illana Louise Pereira de Melo [a], Daniel Granato [b], Elias Araújo [a], Alex da Silva de Freitas [c, d], Ortrud Monika Barth [d, e], Aroni Sattler [f], Ligia Bicudo de Almeida-Muradian [a]

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OPEN ACCESS PEER-REVIEWED

RESEARCH ARTICLE

Infrared Spectroscopy of Pollen Identifies Plant Species and Genus as Well as Environmental Conditions

Boris Zimmermann, Achim Kohler

Published: April 18, 2014 • https://doi.org/10.1371/journal.pone.0095417

Origin of bee products - propolis

- We don't know today all the existing sources of propolis in the world. The botanical and geographical origin are important to characterize them.
- Bees can harvest with their mandibles. They are not very sharp (this limit the possible sources).
  - Plant resin from:
    - apical buds of poplar (brown propolis),
    - *Clusia stigmata* (black propolis),
    - stems of *Dalbergia ecastophyllum* (red propolis),
  - Tender plant parts, such as:
    - leaf primordia and apical buds of *Baccharis dracunculifolia* (green propolis),
    - *Mimosa tenuifolia* (green propolis 2).

Origin of bee products - propolis

- This article illustrate the impact of diversity linked to the botanical origin of Brazilian propolis and we can find this kind of diversity in articles on Chinese, Italian… propolis (Apiquality China and Italy)

2502 J. Agric. Food Chem. 2002, 50, 2502−2506

JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY

Botanical Origin and Chemical Composition of Brazilian Propolis

YONG K. PARK,* SEVERINO M. ALENCAR, AND CLAUDIO L. AGUIAR

Department of Food Science, College of Food Engineering, State University of Campinas, 13081-970, Campinas, Sao Paulo, Brazil

Brazilian propolis has been classified into 12 groups based on physicochemical characteristics: five in the southern Brazil group (group 3), one in the southeastern Brazil group (group 12), and six in the northeastern Brazil group (group 6). The plant origins of these groups were investigated using reversed-phase high-performance thin-layer chromatography (RPHPTLC), reversed-phase high-performance liquid chromatography (RPHPLC), and gas chromatography−mass spectrometry (GC−MS). It was concluded that the origins of propolis group 3, group 6, and group 12 are resins of the poplar tree, *Hyptis divaricata*, and *Baccharis dracunculifolia*, respectively.

KEYWORDS: Propolis; flavonoids; Africanized *Apis mellifera*; bud resin; leaf resin

Origin of bee products – Gland secretions

- Royal jelly, wax and bee venom are gland secretions of honey bees.
- Here, the local flora does not seem to have a strong influence on the composition of the products.
- Variations could be related to the race of bees
- The environment (flora - food and climate) will mainly affect
  - The quality of alimentation and the production of some microelements and the spectrum of sugars (royal jelly)
  - The contamination of these products.

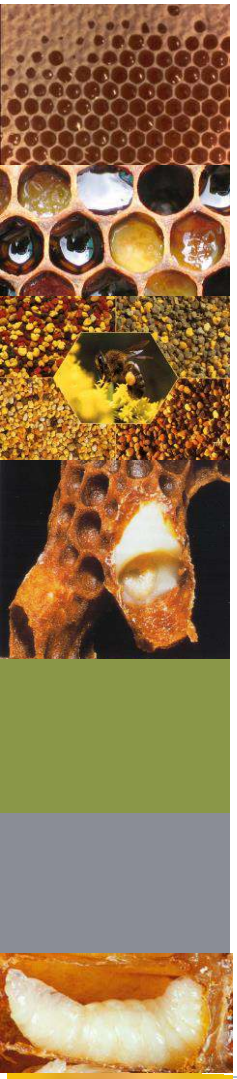
- Illustration with honeybee venom:
  - The variation of its chemical composition depend on different honeybee races and strains, place of origin, years and season of venom collection

Origin of bee products – Bee larvae

- Bee larvae can be used in some countries.
  - The composition will vary between the different caste: drones, workers and queen.
  - The age of the larvae is also important.
- Very few (no) publications present the influence of environment on bee larvae composition.

- NB: At European level they are considered as Novel food and they need a specific agreement.

Key messages (1)



- The most important bee products are a "balance" between bee secretions and botanical origin
- Natural environment will have an impact on all of them but not at the same level
  - Royal jelly, wax, bee venom, bee larvae are less linked
  - Honey, propolis, pollen (bee bread) are directly linked to the flora (type and diversity) harvested by bees.
    - **Composition can be very different and the approach to characterize them must take their great diversity and their specificity into account**.
  - Homogenization of these products is not THE solution

Image and reality

Image of bee products = "Nature" and "Health"

- Healthy = ?
  - "**Bioactivity**" of bee product is a key point
  - Used as medicine for a very long time
- Natural = ?
  - Collected and/or produced by bees without processing or external inputs.
  - Without foreign substances or damage.
- Consumer ask traceability of the product

Bioactivity of Honey

Major honey bioactives include: phenolics, methylglyoxal, royal jelly proteins (MRJPs), and oligosaccharides.

Front Pharmacol. 2017; 8: 412.
Published online 2017 Jun 28. doi: 10.3389/fphar.2017.00412
PMCID: PMC5487425
PMID: 28701955

Therapeutic Properties of Bioactive Compounds from Different Honeybee Products

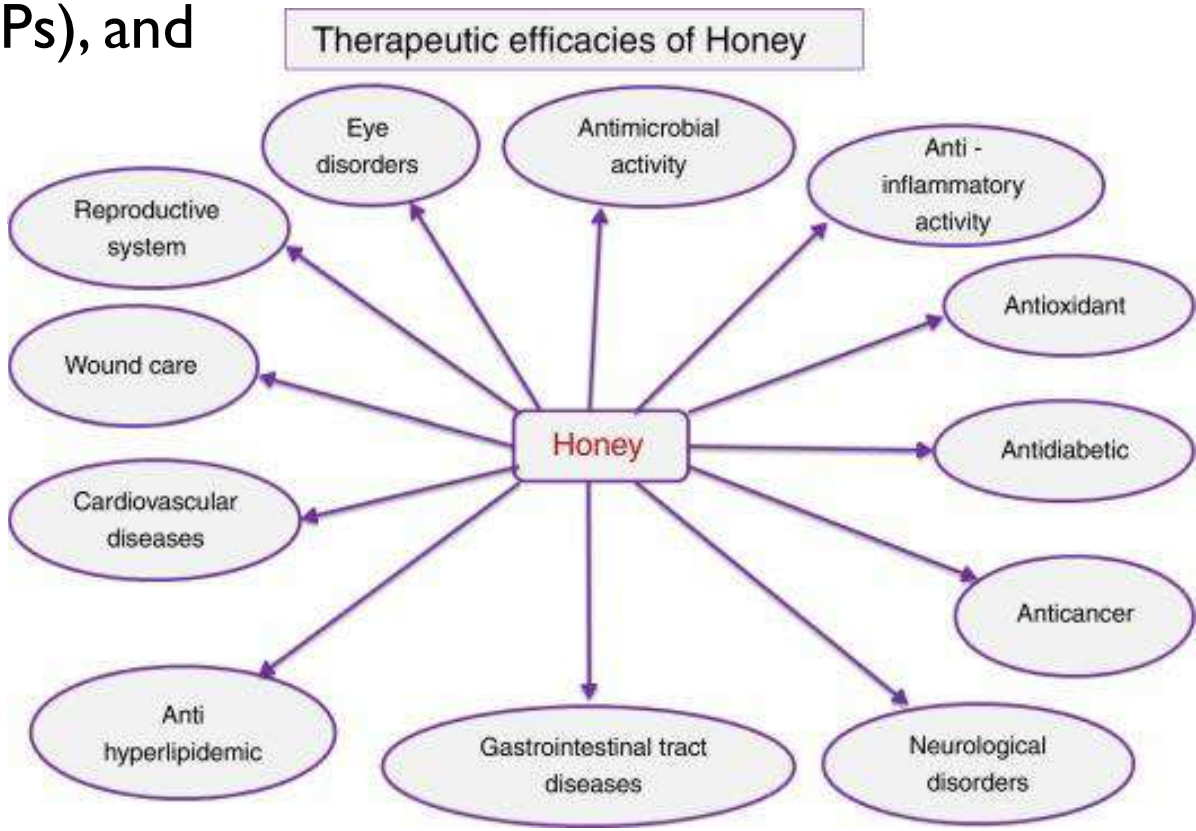
Laura Cornara,[1,*] Marco Biagi,[2] Jianbo Xiao,[3] and Bruno Burlando[4]

Revista Brasileira de Farmacognosia
Volume 26, Issue 5, September–October 2016, Pages 657-664
open access

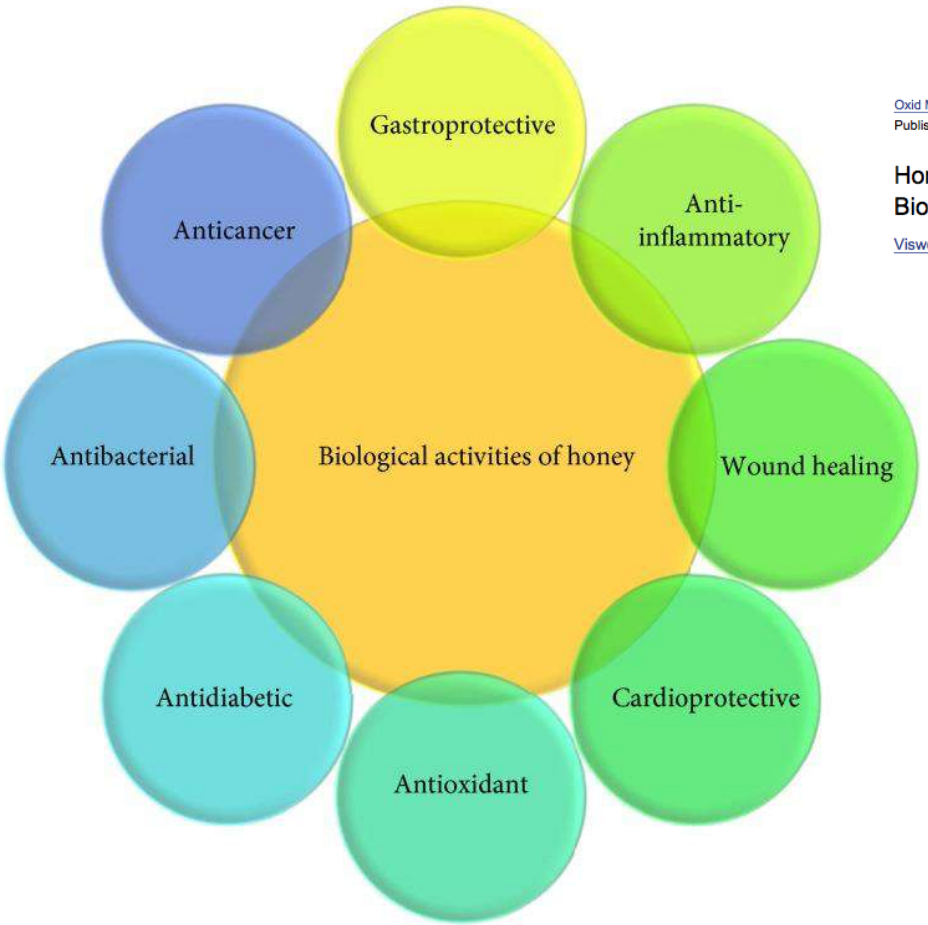
Review

Biological and therapeutic effects of honey produced by honey bees and stingless bees: a comparative review

Pasupuleti Visweswara Rao [a], Kumara Thevan Krishnan [a], Naguib Salleh [b], Siew Hua Gan [c]



Bioactivity of Honey



Oxidative Medicine and Cellular Longevity
IMPACT FACTOR 4.94

Oxid Med Cell Longev. 2017; 2017: 1259510.
Published online 2017 Jul 26. doi: 10.1155/2017/1259510
PMCID: PMC5549483
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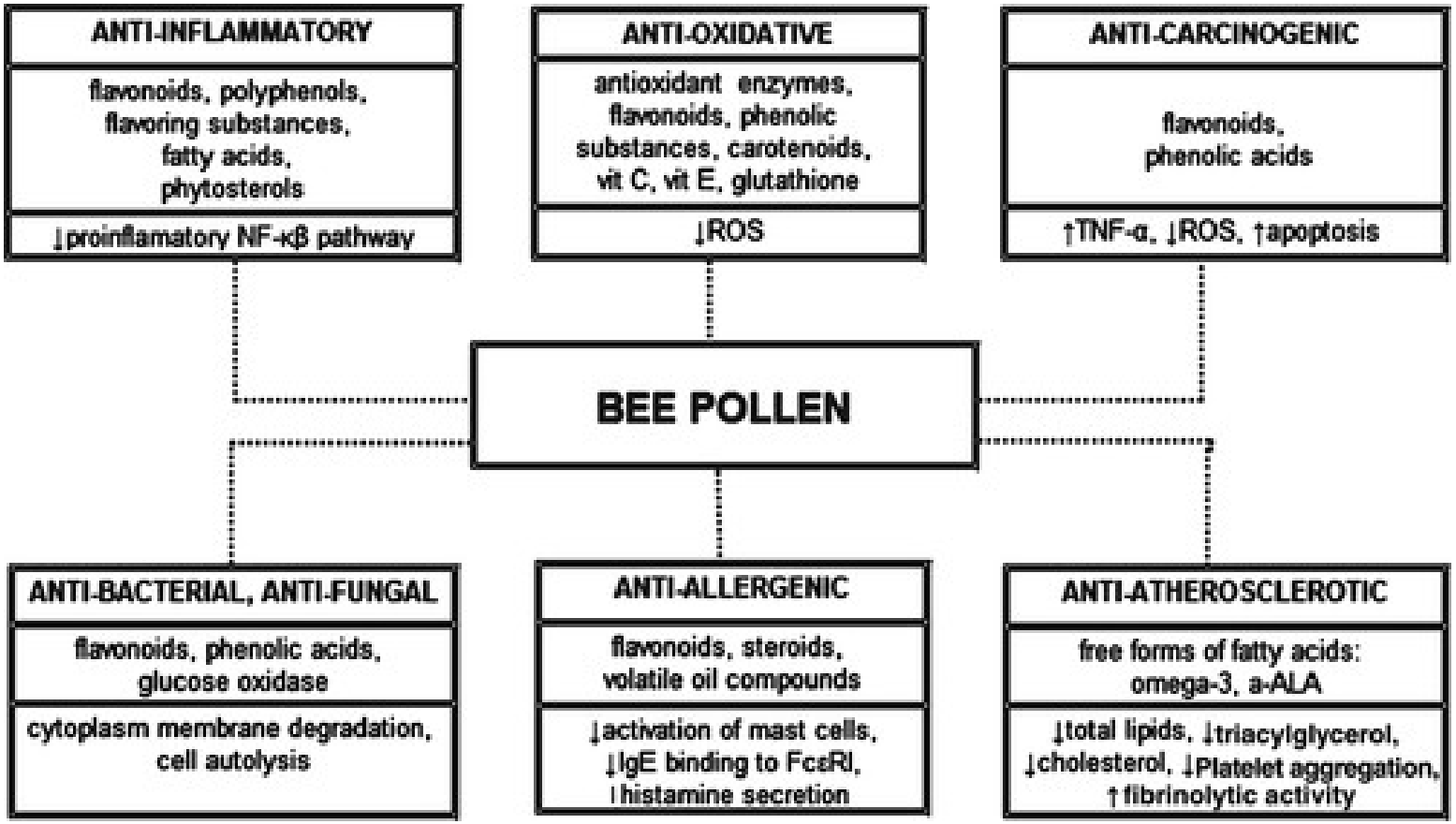
Honey, Propolis, and Royal Jelly: A Comprehensive Review of Their Biological Actions and Health Benefits

Visweswara Rao Pasupuleti, [1,2,*] Lakhsmi Sammugam, [2] Nagesvari Ramesh, [2] and Siew Hua Gan [3]

Bioactivity of pollen

Biological and therapeutic properties of bee pollen: a review



Biological and therapeutic properties of bee pollen: a review, Volume: 96, Issue: 13, Pages: 4303-4309, First published: 25 March 2016, DOI: (10.1002/jsfa.7729)

Bioactivity of Propolis

- Antimicrobial action
  - Antibacterial, antiviral effects, antifungal effects, antiparasite activity
  - Apigenin, caffeic acid, chrysin, moronic acid, protocatechuic acid, *p*-coumaric acid and volatile compounds (esters, phenols and terpenoids) may exert antimicrobial activities
- Antitumor action
  - Caffeic acid phenethyl ester (CAPE) and artepillin C and antiproliferative activity of propolis have been pointed out, such as chrysin, nemorosone, galangin and cardanol, among others
- Immunomodulatory activities
- Antiinflamatory
- Antioxydant
- Wound healing

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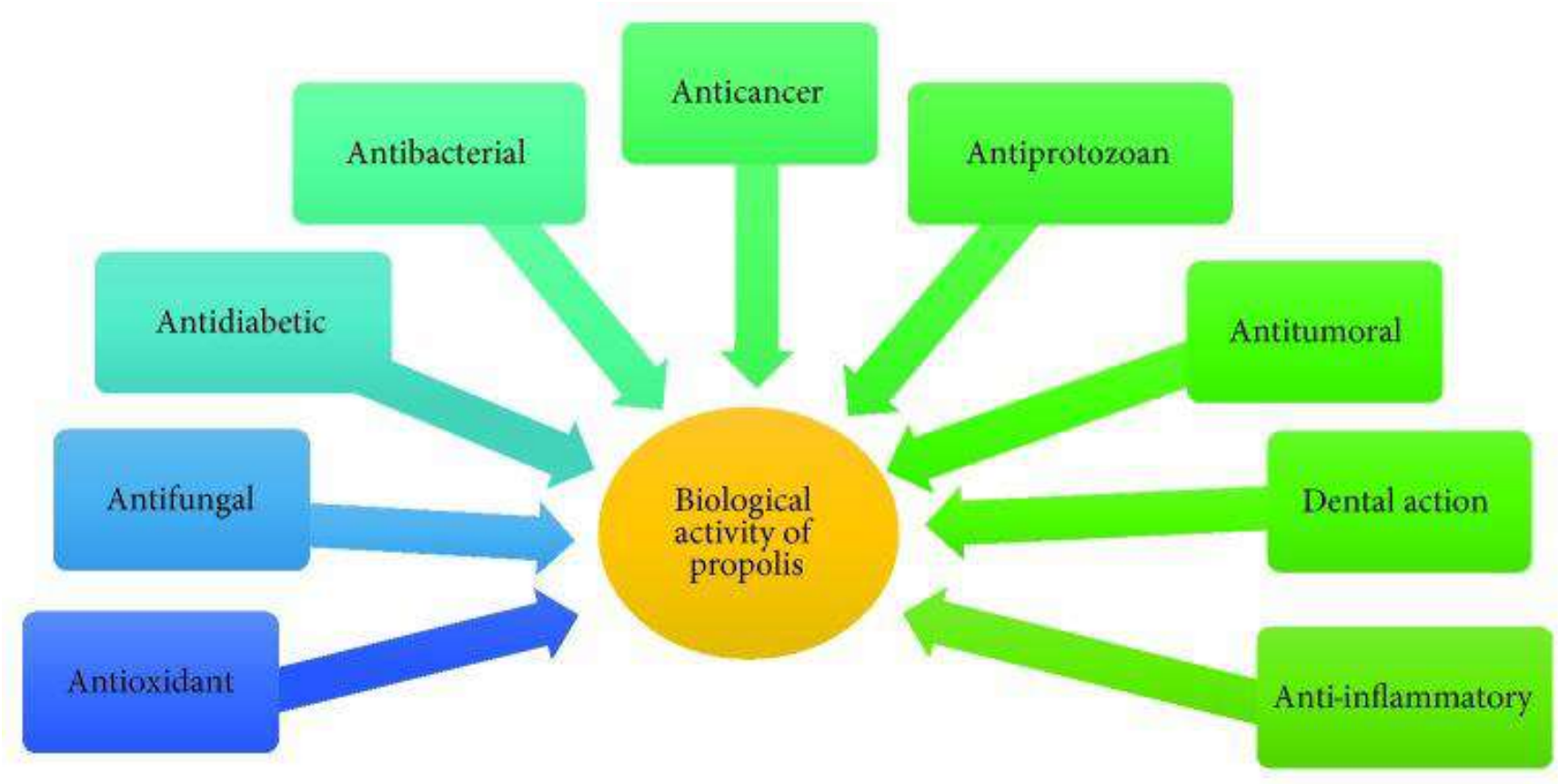

Bioactivity of Royal jelly

- In royal jelly there are:
  - antimicrobial jelleins and
  - royalisin peptides,
  - MRJPs, and
  - hydroxy-decenoic acid derivatives, notably 10-hydroxy-2-decenoic acid (10-HDA),

frontiers in Pharmacology

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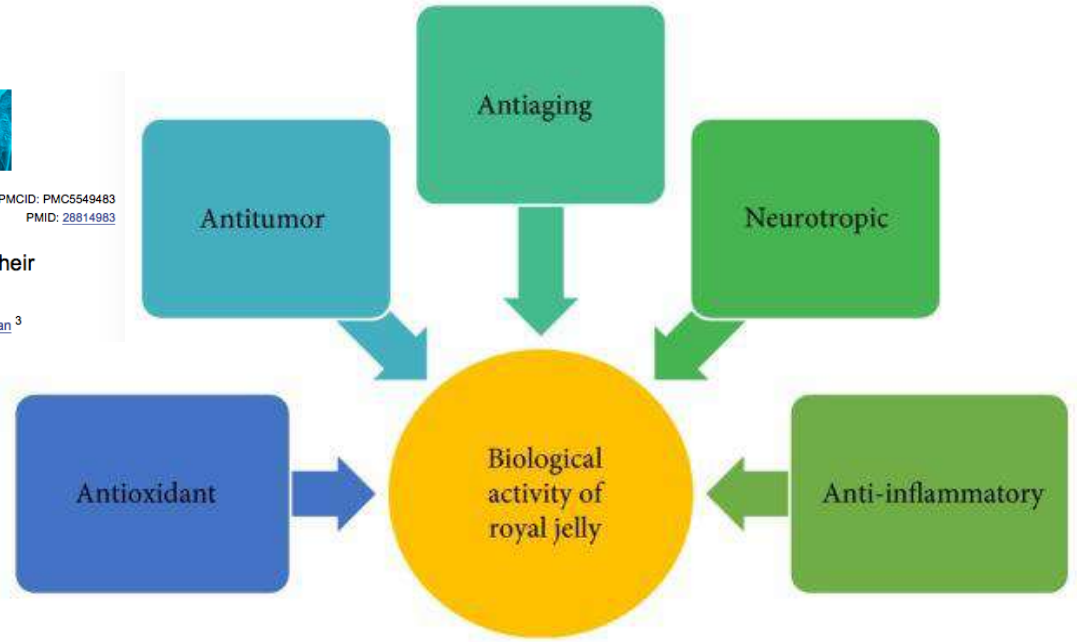


Bioactivity of Bee larvae

Comparative Study on Quality Parameters of Royal Jelly, Apilarnil and Queen Bee Larvae Triturate

Rodica MĂRGĂOAN[1], Liviu Al. MĂRGHITAŞ[2], Daniel S. DEZMIREAN[2*], Otilia BOBIŞ[2], Victoriţa BONTA[2], Corina CĂTANĂ[1], Adriana URCAN[2], Carmen I. MUREŞAN[2], Mirela G. MARGIN[2]

Abstract

Given their beneficial effects in terms of health, the natural products, especially beehive products, have drawn the attention of consumers since long time ago. In order to guarantee the quality of these products on the market, their chemical composition needs to be analyzed. Thus, this current research had as objective the establishment of quality parameters for beehive brood food derived products: apilarnil and queen bee larvae triturate. These two products were compared with royal jelly which is the basis of brood food in the first 3 days of larval stage. The carbohydrates were determined by HPLC-IR and allowed the identification of seven carbohydrate compounds, predominantly glucose, fructose and sucrose. The lipid profile was analyzed by the Soxhlet method. The total protein content was determined by the Kjeldahl method. Free amino acids were analyzed by LC-MS. A total of 31 amino acids were identified of which nine are essential amino acids for humans.

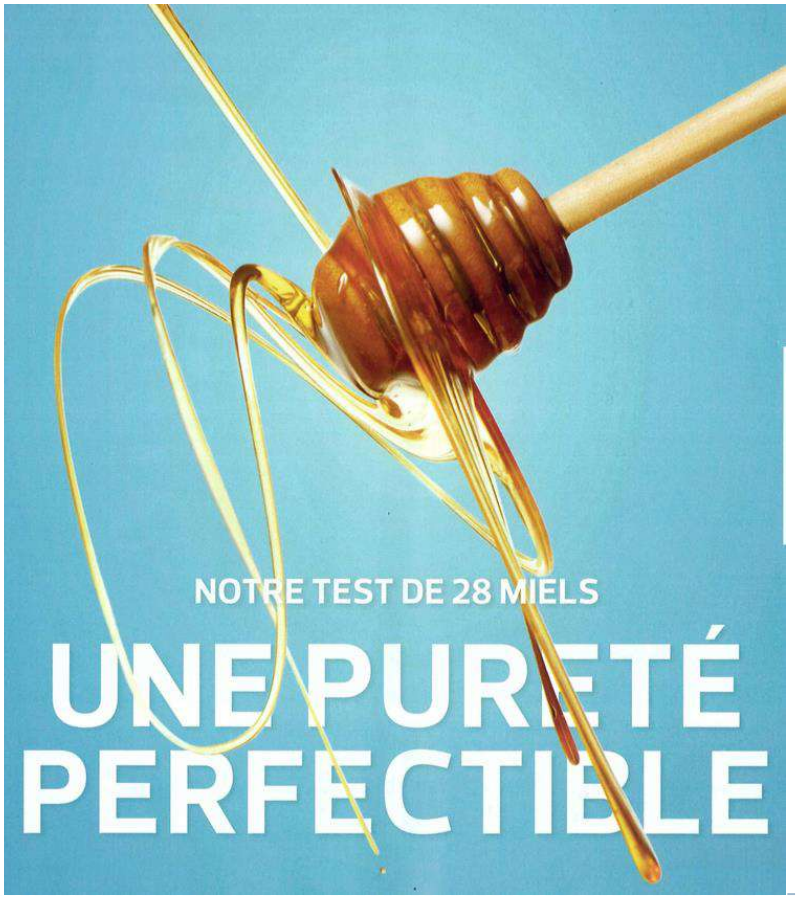
Bioactivity of Bee venom

- Bee venom consists of toxic peptides like:
  - pain-inducing melittin,
  - SK channel blocking apamin,
  - allergenic phospholipase A2.

- The venom has been traditionally, used in acupuncture and apitherapy, consisting in its injection to the patient as **analgesic**, against chronic pain and inflammation, and for other purposes such as **immunotherapy** and **Parkinson's treatment**. A number of **anticancer** effects have been reported, together with **antimutagenic**, **antinociceptive**, and **radioprotective** properties.

Reality: Market - Adulteration

- Consumer magazines present results of honeys adulterated



Reality: Market - Adulteration

TOP STORY

INTELLECTUAL PROPERTY RIGHTS

06/30/2016

HSI Chicago seizes nea imported from China

CHICAGO — Special agents with U.S. Im Security Investigations (HSI) seized nearl was destined for U.S. consumers.

The smuggled honey was contained in 19 from Vietnam to evade anti-dumping dutie

LE FI

Le miel : une den colossale... et une c n'arrive pas à su

Par lefigaro.fr, AFP agence | Mis à jour le 30/10/2016 à 16:0

LE FIGARO PREMIUM > 1€ le premier mois

101 commentaires

Pour pouvoir répondre à la demande, le marché internat produits frauduleux : faux étiquetage, origine trafiquée sucre... L'exportation de miel dans le monde a augmenté

«Le miel adultéré (modifié ou falsifié), c'est le principal fl apicole, plus que les pesticides ou les problèmes sanitai professeur argentin Norberto Garcia, invité au 21e Cong l'apiculture française (Unaf), à Clermont-Ferrand. M. Gar président de l'Organisation internationale des exportate que les exportations de miel ne cessent de croître: alors a augmenté dans le monde de 8% de 2007 à 2013, l'expo monde a augmenté de 61%.

R.it **FIRENZE**

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Miele »

Caccia al miele degli dei: l'ultima corsa all'oro della Nuova Zelanda

Via la stanchezza di fine inverno, con i "fantastici 4" che danno

In Toscana aumentano le frodi sul miele

di Maurizio Melani

Lo leggo dopo

03 febbraio 2016

Il settore agroalimentare italiano, per l'importanza strategica che ricopre e l'appeal sul mercato estero, è sottoposto a continui tentativi di frode. La palma d'oro va naturalmente al vitivinicolo e al settore oli e grassi che staccano tutti gli altri. Miele compreso. Qualche dato? Nel 2015 l'ICQRF, Ispettorato Centrale della tutela della Qualità e Repressione Frodi, organismo con attività ispettiva, analitica e sanzionatoria, ha effettuato quasi 34.000 controlli analizzando circa 9.000 campioni. Il tasso di irregolarità si attesta sul 9,5%. Leggermente più bassa la media nel comparto miele col 9,2%. Dato rispecchiato anche in Toscana.

Reality: Market - Adulteration

- Top 10 of the adulterated products (Journal of Food Science)
  - 1. Olive oil
  - 2. Milk
  - **3. Honey**
  - 4. Saffron
  - 5. Orange juice
  - 6. Coffee
  - 10. Apple juice
  - 10. Grape wine
  - 10. Maple syrup
  - 10. Vanilla extract

CBS NEWS NEWS SHOWS VIDEO MORE SEARCH

Honey is not safe for children under the age of 1 because of the risk of infant botulism, but it may help soothe an older child's throat and cough. In a 2007 study, giving half a teaspoon of honey to children ages 2 to 5 at bedtime seemed to suppress coughing, although more research is needed. (In the study, children ages 6 to 11 and 12 to 18 also benefited from 1 and 2 teaspoons of honey, respectively.) "In my experience, while there isn't a lot of medicinal evidence that honey works to stop a cough, it may help the child feel a little better," says Dr. Cardiello. More from Health.com: 12 vaccines your child needs ISTOCKPHOTO

3. Honey

Percentage of total records adulterated: 7

Types of honey fraud

- Dilution with different syrups (corn, cane sugar, beet sugar, rice, etc.).
- Harvesting of immature honey, which is further dehydrated by the use of vacuum devices.
- Using Ion Exchange Resins to remove residues and lighten honey color.
- Masking and/or mislabeling the geographical and/or botanical origin of honey.
- Artificial feeding of bees during a nectar flow.

EU COORDINATED CONTROL PLAN ON HONEY (DG SANTE, DG JRC, Member States)

- All Member States + CH and NO participated
- 2237 samples tested
- Non compliances:

Non-compliance	Physico-chemical parameters	Botanical source	Geographical origin	Sugar	Other labelling	**Total**
% non-compliant samples	2%	7%	2%	6%	2%	**19%**

- *Suspicions of non-compliances:*

Nature of the suspicion	Pollen content and declared geographical origin	Adulteration with sugar	**Total**
% suspect samples among the remaining samples	2%	11%	**13%**

""The results concerning adulteration with sugar are only preliminary and further investigations were conducted on 1200 samples that will be tested with advanced laboratory methods.""

Impact: Market - Adulteration

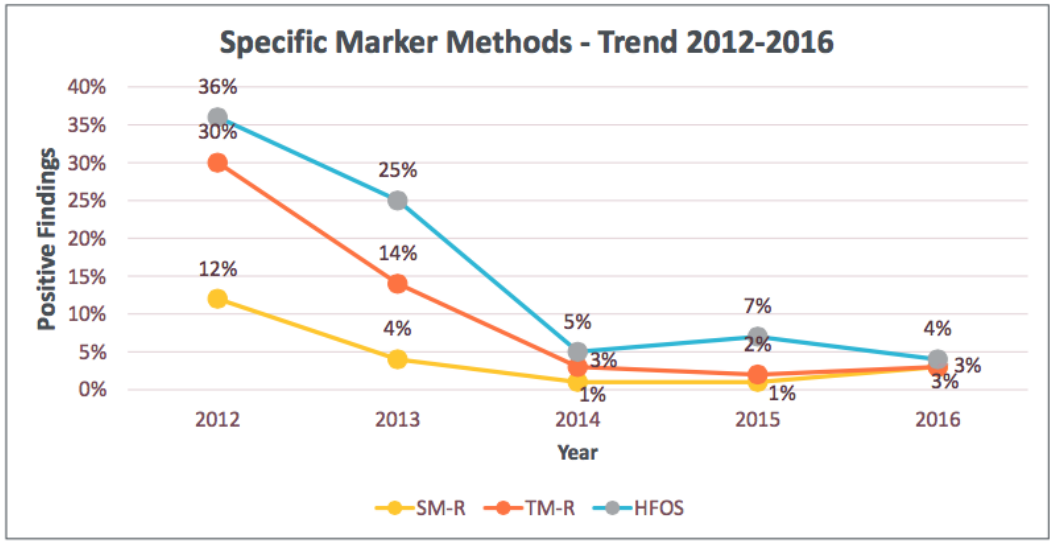
- Results of the JRC on 893 honeys: **14 %** of the honey samples checked **did not conform** to published benchmark purity criteria indicating that foreign sugars may have been added. The applied analytical method only indicates the presence of foreign sugars; it does not allow quantifying the level of addition

Origin	Samples (n)	Suspicion of non-compliance (n)	(%)
Blend of EU honeys	96	19	19.8
Blend of EU and non-EU honeys	426	40	9.4
Blend of non-EU honeys	30	3	10.0
Single EU Member State	275	53	19.3
Single non-EU country	55	11	20.0
Unknown	*11*	*1*	*9.1*
TOTAL	893	127	14.2

Table 7. Prevalence of suspicion of non-compliant honeys depending on their declared origin (n, number of samples).

Test Results of Target Analyses

HONEY AUTHENTICITY – TEST RESULTS

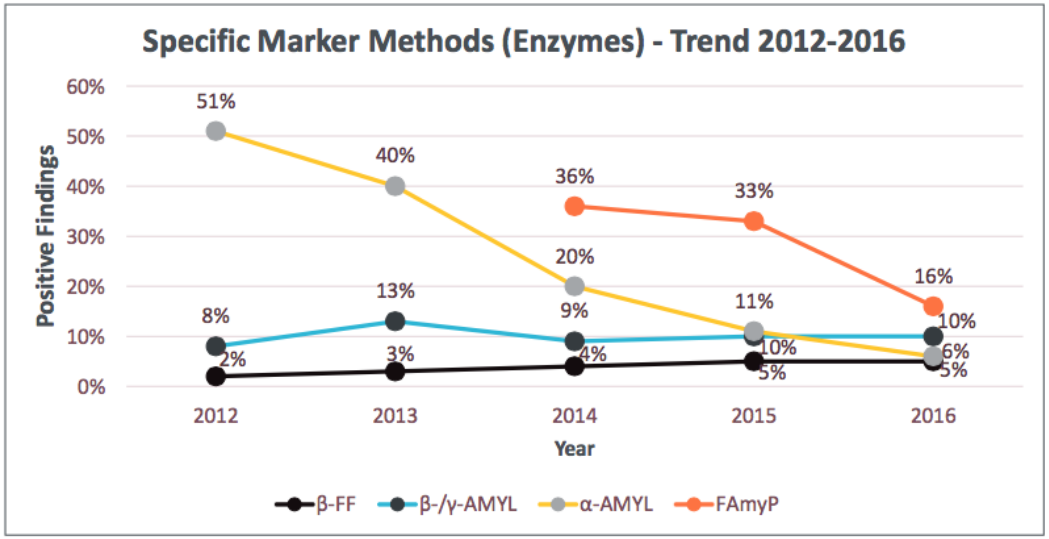


COO test recommendations (not exhaustive):

- **SM-R:**
  CN, IN, TH, US,…
- **TM-R:**
  CN, IN, TH, US,…
- **HFOS:**
  CN, IN, RO, HU, BG, AR…

Test Results of Target Analyses

HONEY AUTHENTICITY – TEST RESULTS

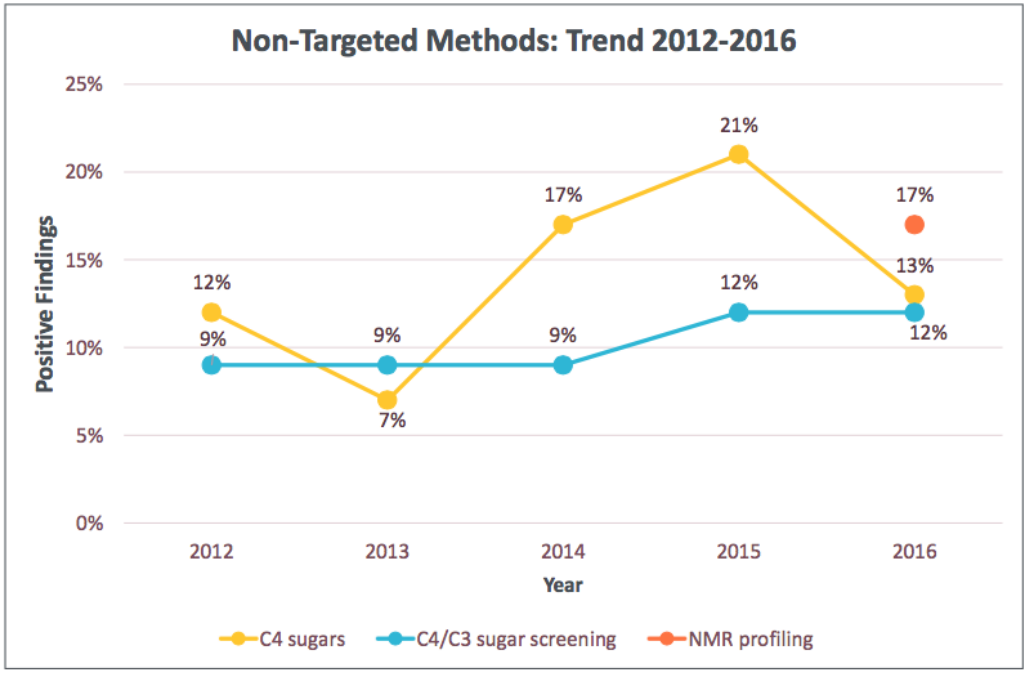


COO test recommendations (not exhaustive):

- **β-FF:**
  BG, TH, ZM, GR, CN, HU, FR, RS, RO, SI…
- **β-/γ-AMYL:**
  BG, TR, GR, CN, SI, RO, LT, HU, SK, UA, RS, HR,…
- **α-AMYL:**
  CN, TH, IN, TR, CZ, RO,…
- **FAmyP:**
  CN, CZ, TH…

Test Results of non Target Analyses

HONEY AUTHENTICITY – TEST RESULTS

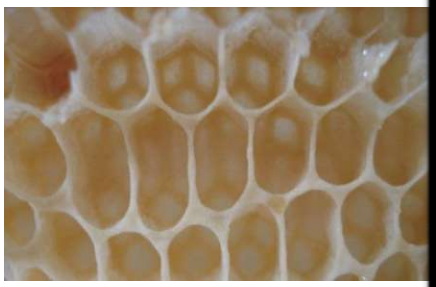


COO test recommendations (not exhaustive):

- **C4 sugars:**
  IN, VN, USA, GR, TR, HU, FR,…
- **C3/C4 sugar screening:**
  IN, MX, BG, CN, VN, FR, UK, GT, SV, HU, ES, AR, RS, RO, SA, TH, TW, USA, GR, TR, AR, CZ, PL, IR, IT, BR, AU,…
- **NMR profiling:**
  CN, IN, TH,…

Reality: Problems with **waxes** 2016

- Problems revealed in NL, BE, DE, FR, I, RO:
  - Brood development (mosaic)
  - Difficulty to build combs...
  - Destroyed comb,
  - Disrupted chemical communication
  - Decreased honey production…

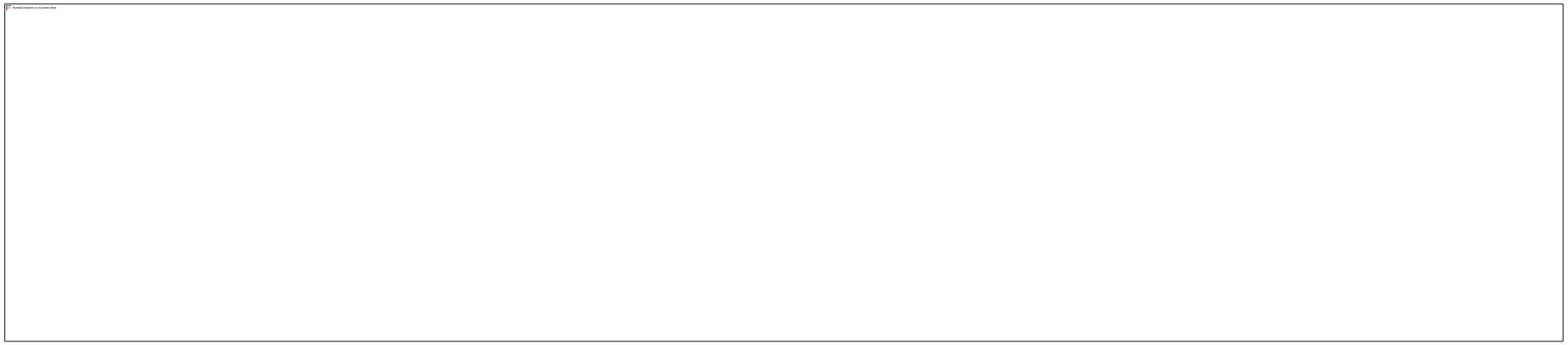


- Replies sent to national and European authorities
- => Analyzes: chemical residues, waxes composition, wetting products ...

Beeswax adulteration

- Categorization and distribution of analysed comb foundation samples

  by adulteration level (category)



- **70.5 %** samples **adulterated with paraffin**
- **up to 94.2 % of** paraffin
- **Stearic acid** (20-35 %) found in 6 samples (Netherlands)
- Prevalence of the paraffin adulteration on the market

Beeswax on the EU Market

European Commission

FOOD GRADE

Beeswax - **natural wax** obtained by melting the walls of the honeycomb made by the honey bee.

Authorised food additive under Reg. (EU) 231/2012

Natural beeswax is limited and expensive – bees produce only 1 kg of wax for each 8 kg of honey.

European production of beeswax is not sufficient to cover demand.

Mix of natural beeswaxes

- ❑ **Mineral waxes (paraffin and microcrystalline waxes)**
- ❑ **Industrially-produced fatty acids (stearic acid, palmitic acid)**
- ❑ **Plant waxes (including Sumac wax)**
- ❑ **Waxes of ester type combined with mineral hydrocarbons (synthetic waxes)**

Sales of beeswax ***without indicating*** that it contains other "waxes" is ***misleading*** and thus ***illegal.*****

Animal By-Products cat. 3***

Imported beeswax and its products must be processed; apiculture by-products are **not intended for human consumption.**

Reg. (EC) 1069/2009

***Reg. (EU) 231/2012, laying down specifications for food additives listed in Annexes II and III to Regulation (EC) No 1333/2008 of the European Parliament and of the Council.**
****Directive 2006/114/EC concerning misleading and comparative advertising prohibits traders to conduct misleading advertising vis-à-vis other traders (B2B)**

Health and Food Safety

*****Reg. (EU) No 142/2011, implementing Regulation (EC) No 1069/2009 of the European Parliament and of the Council laying down health rules as regards animal by-products and derived products not intended for human consumption. Annex XIV, Table 2.**
******Art. 3 Directive 2006/114/EC**

Potential effet of stearic and palmitic acid on bee health

Various field studies appear to confirm this risk

Example: Reybroeck W.ILVO, 30 June 2017, Research Institute for agriculture, fisheries and food ILVO.vlaanderen

- Addition of > 5 % stearic acid to beeswax = Impact on brood.
- Mean larva mortality of 49-71% observed in broods where stearic acid is present.

Adulteration of other bee products

- Royal jelly:
  - Addition of drone brood, natural yogurt, pure water, starch corn slurry, a mixture of sweet condensed milk with propolis and unripe banana…
- Propolis
  - Addition of *Poplar* tree gum (66% in Chinese samples + in 2012)

Natural: without contaminants

Environment

Treated plants
(Glyphosate, neonicotinoïds…)

Contaminated plants
(Radiations, heavy metals…)

Toxic plants
(Pyrrolizidine alcaloïds)

Air
(Polycyclic aromatic hydrocarbons, pesticides…)

Water
(Pesticides, microorganism…)

Beekeeping pratices

Medicines used by the beekeeper
(miticides, antibiotics…)

Management of hives:
Feeding, smoke, microorganisme…

Material used for the production:
wax, hives …
(chemicals, …)

Honey house: Material used For the packing, water, workers, environment, jars…
(Microorganism, chemicals…)

The contaminants in the bee products

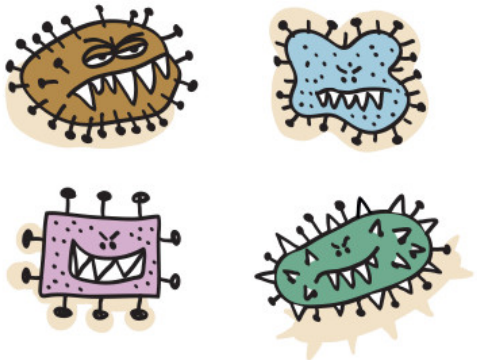
- Pesticides (included veterinary products)
  High Levels of Miticides and Agrochemicals in North American Apiaries: Implications for Honey Bee HealthChristopher A. Mullin, Maryann Frazier, James L. Frazier, Sara Ashcraft, Roger Simonds, Dennis vanEngelsdorp, Jeffery S. Pettis
  Pesticides and honey bee toxicity – USA - **Apidologie, 41 3 (2010) 312-331**
  - 121 ≠ pesticides in 887 samples of **honey, wax** and bees
    - 36 insecticides
    - 30 fungicides,
    - 17 herbicides
    - 8 miticides/insecticides,
    - 4 insect grow regulators,
    - 2 synergist
    - 6 others
  - "Pollen loads are the matrix best suited to assess the occurrence of pesticide residues in the environment"
    An assessment of honeybee colony matrices, *Apis mellifera (Hymenoptera: Apidae) to monitor pesticide presence in continental France*

The contaminants in the bee products

- Pyrrolizidinic alkaloïdes
  - 200 alkaloids identified in13 plant families.
  - A lot of them are visited by the bees.. in Europe:
    - *Boraginacae: Echium* spp, *Heliotropium* spp (pollen of *Echium vulgare*: 8000 -14000 ppm), Asteracae: *Senecio* spp
  - These substances can be found in the pollen and in honey (QSI 2010)
    - 65 % of European 381miels (Avg. 26; 1-225µg/kg)
    - 68 % of 2839 honeys of Central and South America (Avg. 67; 1-1087 mg / kg)
    - 60 % of 119 pollens (Avg. 1846; 1-37.855µg/kg)

The contaminants in the bee products

- Microbiological
  - For pollen: a lot of mycelium (*Paenicilium verrucosum*, *Aspergillus niger*, *A. carbonarius*, *A. ochraceus*, *A. parasiticum* and *Alternaria* spp) can develop aflatoxins and ochratoxins. It can be a real danger if the pollen is harvest in bad conditions and if pollen present a high level of humidity (> 6%).
  - For honey : *Clostridium botulinum* can be observed



The contaminants in the bee products

- Polycyclic aromatic hydrocarbons (PAH4):
  - Propolis, honeydew and pollen are more exposed
  - Great variability in pollen
    (average: 7,1 ppb - max 129 ppb)
  - Honey show the lowest levels
    (average: 0,8 ppb - max 5ppb)
  - Dependant of the landscape context (petrochemical industry…),
  - Evolution during the year…

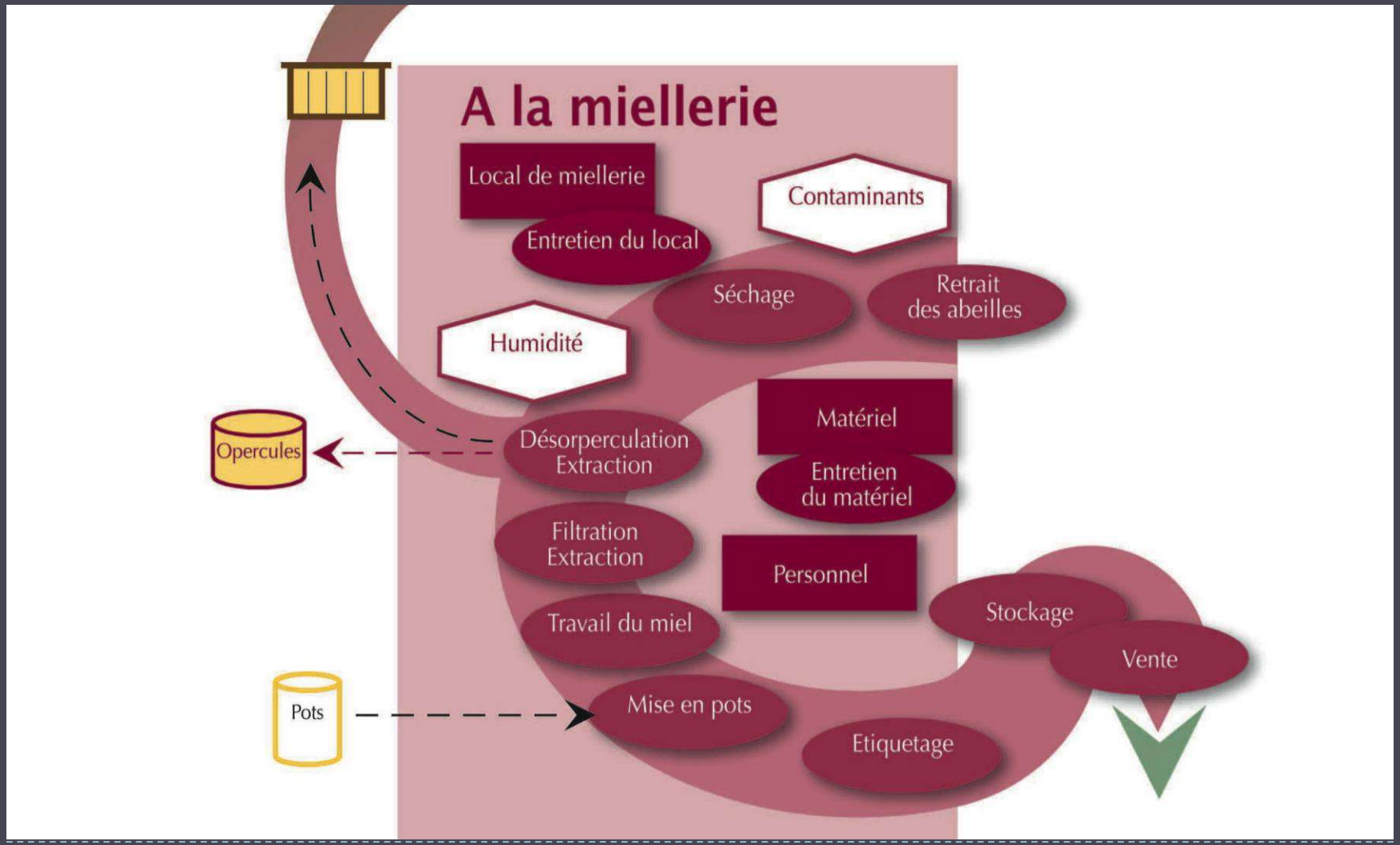
The contaminants in the bee products

- Heavy metals:
  - Lead (mg Pb/kg): honey: 0.01-1.8; pollen: 0.02-3.9; wax: 0.06-6.2; propolis: 0.003-461.0
  - Cadnium (mg Cd/kg): wax: 0.01-0.1; honey: 0.03-2.1; pollen: 0.05-2.3; propolis: 0.006-3.8.
    - Cd can be transported by the plants => nectar…
  - Propolis is the most sensible to contamination bee product by heavy metals

Key messages (2)

- The biological activity is one of the most important specificity of bee products.
- We can't accept to add other elements in natural bee products. They must only come from a botanical origin mixed with specific secretions of bees or from natural bee secretions.
- Traceability is a solution to limit the expensive controls.
- Quality of the environment is a key element because products like honey, pollen, propolis are directly linked to this quality.
- We have to limit the use of all external inputs in the hive and to forbid their usage during the harvesting period.

Impact of the process used



Importance of the process used

- The final product must be
  - Stable
  - With a high biological activity
    - As close as possible from the product harvested by bees
  - With a good presentation
  - Easy to use

Importance of the process used

- Process used =
  - Extraction from the hives or the frames
  - Drying
  - Warming
  - Filtration
  - Cleaning
  - Blending
  - Extraction of active components
  - Packing
  - Storage conditions

Process: Key points for **Honey**

- Harvesting MATURE honey
- Non active drying (keep aromas…)
- No ultrafiltration (keep active elements)
- No warming: ~~PASTURIZATION~~ (keep enzymatic activity and aromas)
- Fresh honey must be valorised

Process: Key points for **Pollen**

- Harvest must be done in non polluted environment
- Collect must be done every day in perfect conditions of hygiene
- Pollen must be put in freezer as soon as possible.
- **Drying is not adapted to pollen**
- A good attention must be taken in cleaning
- Storage must be limited at 2 years (at T < -18°C)




Pollen

Journal of ApiProduct and ApiMedical Science 2 (4): 131 - 144 (2010)
DOI 10.3896/IBRA.4.02.4.01

REVIEW ARTICLE

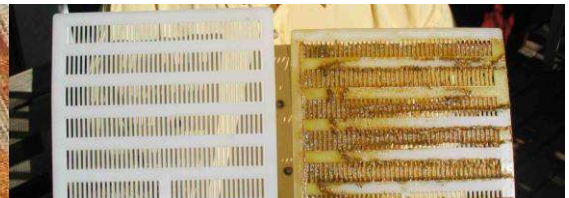
What is the future of Bee-Pollen?

Maria Graça R. Campos[1*], Christian Frigerio[2], Joana Lopes[1] and Stefan Bogdanov[3]

- Dry pollen
  - Storage of normal dried bee pollen for one year at room temperature will reduce the free radical scavenging capacity of bee pollen by 50% (Campos et al., 2003).
  - Vitamins are lost after drying bee pollen both at 42°C and 32°C: the content of the vitamins C, E, A decreased by an average of 31% under both drying conditions (Szcesna et al., 1995; Oliveira, 2006)
  - The drying time should be as short as possible in order to avoid losses of volatile compounds (Collin et al., 1995)

Process: key points for Propolis

- Harvest must be done in zones where propolis sources are present (to avoid harvest of bitume, colour…) and non contaminated (heavy metals, HAPs…)
- Harvest must be done out of treatment periods.
- Specific material must be used to harvest fresh propolis.
- Technique use to extract active ingredients of propolis. influence the composition of the final product.
- Final presentation of the final product must indicate clearly the percentage of active substance who stay in the product (not % of raw propolis), the technique used, the origin of propolis



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Quality of propolis commercialized in the informal market

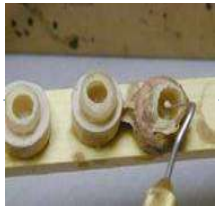
Qualidade da própolis comercializada no mercado informal

Victor Alberto TAGLIACOLLO[1]*, Ricardo de Oliveira ORSI[1]

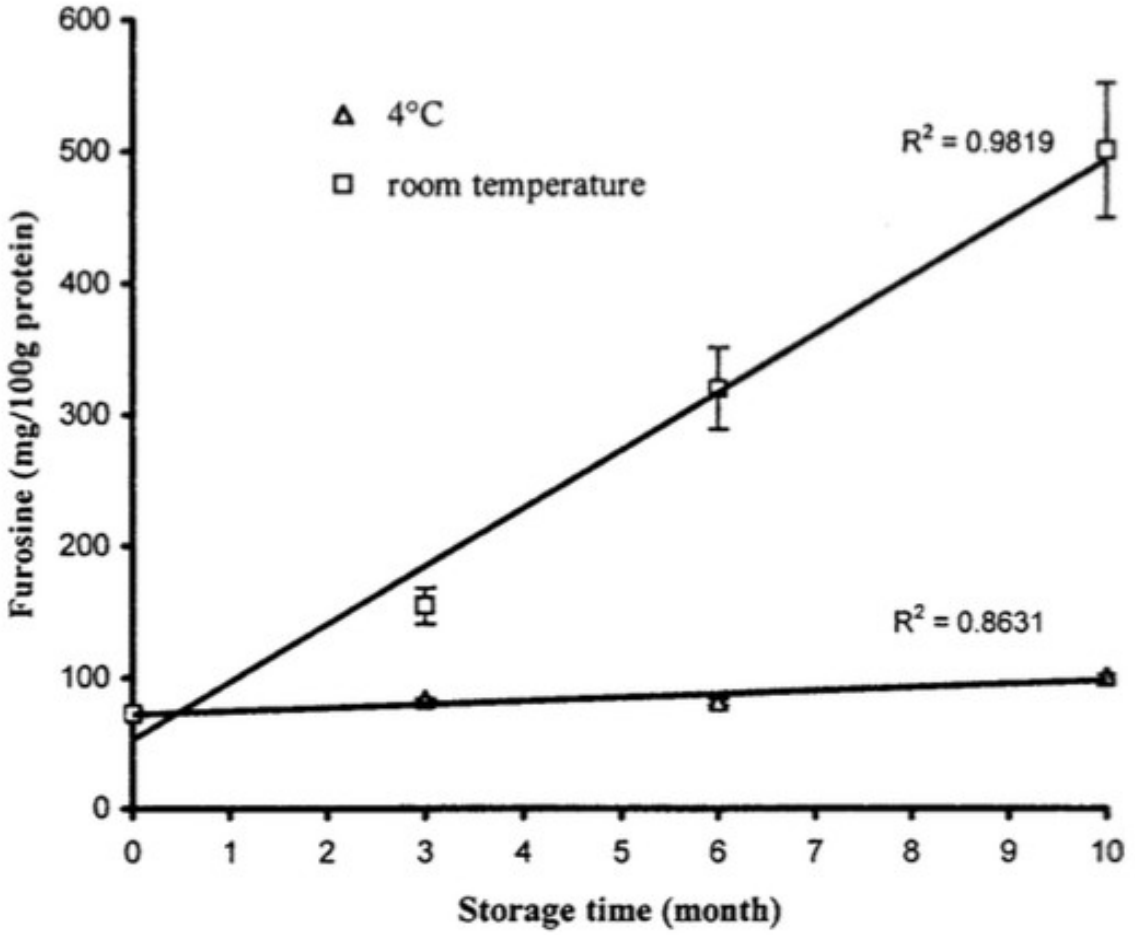
- Test in Brazil to see if samples comply with the Brazilian Norms on propolis
  - Dry extract (min 11%) 80%
  - Oxidizing property (max 22 seconds) 65,7%
  - Solubility of EEP particles in
    - lead acetate (+) and 98%
    - sodium hydroxide (+) 100%
  - Amounts of flavonoid in quercetin (min 0,5%) 96%
  - Phenolic compounds (min 0,25%) 100%

Process: key points for Royal Jelly

- Ideally, Royal Jelly must be harvested on hives without artificial feeding. If it's the case it must be written.
- The technique used can have a big impact of his activity: cooling (0-6°C) – freezing (< -18°C) – lyophilisation
- Storage conditions of fresh royal jelly are very important. The lifespan of the product will depend of these conditions
  - for cooled royal jelly: 2 - 5°C in dark - the most active in its first 6 months after harvesting.
  - for frozen royal jelly: min -15°C for 2 years




Furosine: a Suitable Marker for Assessing the Freshness of Royal Jelly



J.Agric. Food Chem. 2002, 50, 2825−2829

Figure 2. Furosine values in RJ during storage at 4 °C and at room temperature for 10 months.

Process: key points for Bee larvae

- Bee larvae must be collected before capping.
- Hygiene conditions are more important than for royal jelly or pollen. Drone larvae develop very quickly pathogens.
- The larvae must be directly stored in the freezer.
- Storage and transport in the freezer at < -18° C (max 3 years).

Process: key points for Bee venom

- The best is to work directly with bees.
- With all the other techniques you lose the volatile part of the product.
- Each bee produce a venom a little different.
- Daily harvest in new bottle directly frozen < -18°C
- Mixing of the daily harvest at the end of the season
- Colour must stay withe Perl
- 2 years in the freezer

Key messages (3)

- When all the conditions are respected by all the operators, quality of bee products can be maintain.
- The process used to stabilize the product can have very big impact on the biological activity of the products.
- All the process used to arrive to the final product with an impact on the quality of the product have to be announce to the consumer.
- Consumers must be informed of the good storage conditions and of the lifespan of the product.
- Quality ask human and material investments. This investment must be valorised.

Actions

- Give good definitions and quality norms for bee products
  - Based on their global composition and on their biological activity.
  - With clear identification of the process used and the origin.
- Detection of adulteration:
  - Use of global analyzes of bee products and non based on few substances who can be corrected.
  - Constitution of a "true" bee product bank.
  - Exchange of datas between the different labs specialized.
  - To put in place an international traceability system
- Contamination
  - Change of beekeeping practices (use of natural products…)


Thank you for
your attention
And like bees,
chose quality products

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