Beekeeping Definitions, controls and practices impact on the quality of bee products.

Pr Badiaa LYOUSSI
University Sidi Mohamed ben Abdallah
Fez, Morocco

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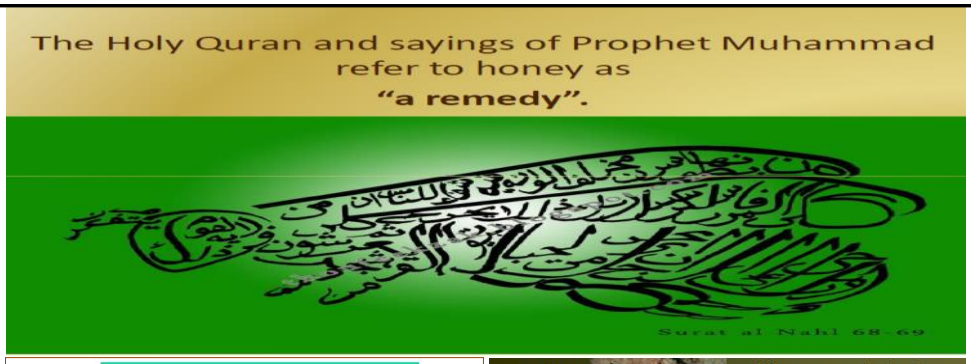

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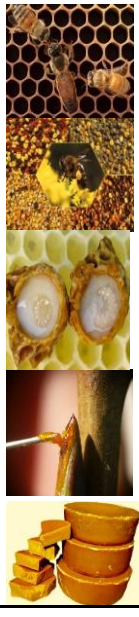
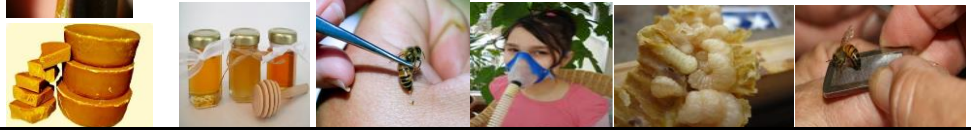
Bee products
Nutritional and/or therapeutic value

Bee Product	Nutritional value	Therapeutic value
HONEY	FOOD	**Medicine** External applications
BEE POLLEN BEE BREAD	FOOD	**Medicine**
ROYAL JELLY	Food	**Medicine**
PROPOLIS	Physiologic effects	**MEDICINE**
BEE VENOM	-	**Medicine**

Quality assurance of apitherapy products



- Consistent chemical composition
- Standardized biological activity
- Absence of contaminating chemicals
- Absence of contaminating microbes
- Traceability of components



Authenticity of Honey

A Major Analytical Challenge

- Honey is a natural and almost unprocessed food
- Honey is esteemed as an authentic , naturally pure and healthy product
- Highly demanded by consumers
- Also increasing demand from the industry as replacement of sugar
- Different standards for honey in different countries , no international harmonization
- Deficient traceability of the supply chain

All these factors increase the risk and possibility of honey adulteration

HONEY

Quality problems (for apitherapy)

Contamination :

- Pollution – heavy metals, agricultural pesticides
- Acaricides
- Antibiotics
- Microbes – bacteria, fungi

PHYSICOCHEMICAL CHARACTERIZATION OF HONEY

- Moisture (%)
- Ash (%)
- Conductivity (mS/cm)
- Color (mmPfund)
- pH & Acidity (mEq NaOH/Kg)
- Proline (mg/kg)
- Diastase (DN)
- Sugar (g/kg)
- HMF (mg/kg)

➡ However , all these parameters /tests are only indication and no proof for adulteration

➡ **Further analysis are required to detect and prove admixtures of foreign sugars to honey**

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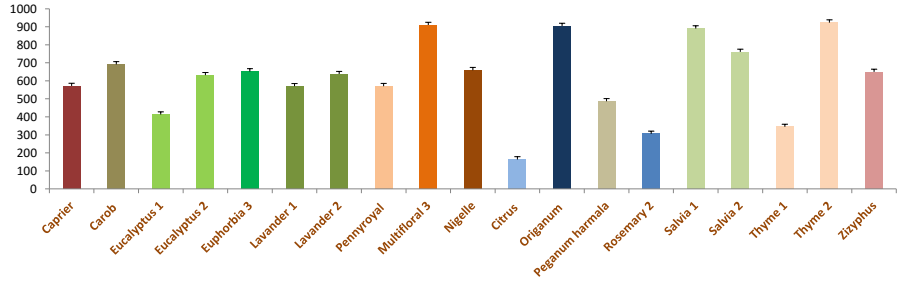
Flavonoids (mgQE/100g)

Phenols (mg GAE/100 g)



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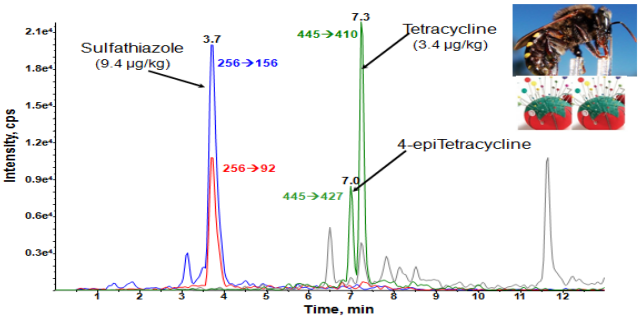
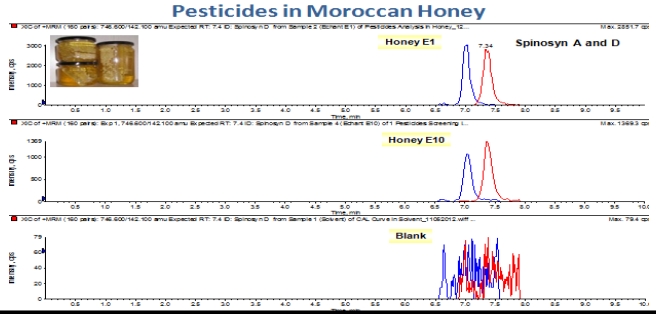
Analysis of Moroccan Honey Sample



Pesticides in Moroccan Honey



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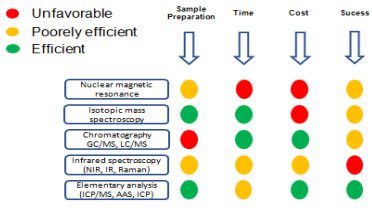
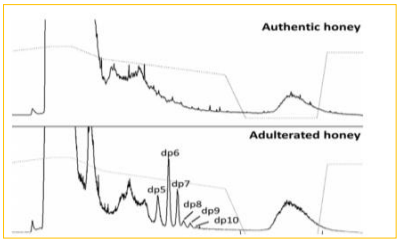
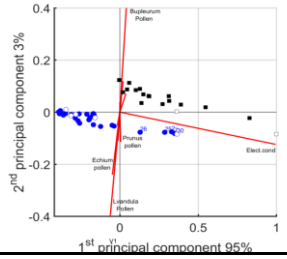
Honey authenticity methods (advantages and disadvantages).

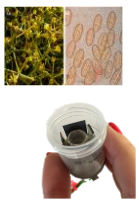


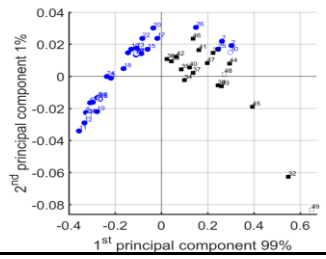


LC-ELSD chromatogram of authentic and adulterated honey (Dr. Lutz Elflein, Intertek)

The e-tongue and e-noise technologies for honey authenticity







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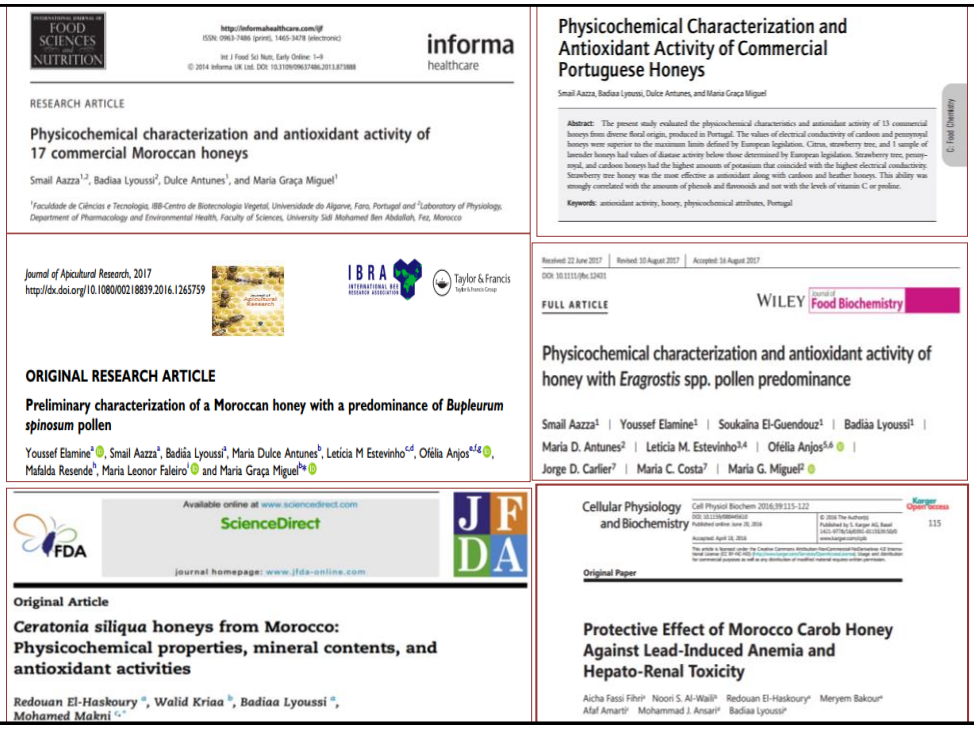

RESEARCH ARTICLE

Physicochemical characterization and antioxidant activity of 17 commercial Moroccan honeys

Smail Aazza[1,2], Badiaa Lyoussi[2], Dulce Antunes[1], and Maria Graça Miguel[1]

[1]Faculdade de Ciências e Tecnologia, IBB-Centro de Biotecnologia Vegetal, Universidade do Algarve, Faro, Portugal and [2]Laboratory of Physiology, Department of Pharmacology and Environmental Health, Faculty of Sciences, University Sidi Mohamed Ben Abdallah, Fez, Morocco

Physicochemical Characterization and Antioxidant Activity of Commercial Portuguese Honeys

Smail Aazza, Badiaa Lyoussi, Dulce Antunes, and Maria Graça Miguel

Abstract: The present study evaluated the physicochemical characteristics and antioxidant activity of 13 commercial honeys from diverse floral origin, produced in Portugal. The values of electrical conductivity of cardoon and pennyroyal honeys were superior to the maximum limit defined by European legislation. Citrus, strawberry tree, and 1 sample of lavender honeys had values of diastase activity below those determined by European legislation. Strawberry tree, pennyroyal, and cardoon honeys had the highest amounts of potassium that coincided with the highest electrical conductivity. Strawberry tree honey was the most effective as antioxidant along with cardoon and heather honeys. This ability was strongly correlated with the amounts of phenols and flavonoids and not with the levels of vitamin C or proline.

Keywords: antioxidant activity, honey, physicochemical attributes, Portugal

Journal of Apicultural Research, 2017
http://dx.doi.org/10.1080/00218839.2016.1265759

ORIGINAL RESEARCH ARTICLE

Preliminary characterization of a Moroccan honey with a predominance of *Bupleurum spinosum* pollen

Youssef Elamine[a], Smail Aazza[b], Badiâa Lyoussi[b], Maria Dulce Antunes[b], Leticia M Estevinho[c,d], Ofélia Anjos[e,f], Mafalda Resende[b], Maria Leonor Faleiro[f] and Maria Graça Miguel[b]*

FULL ARTICLE

Physicochemical characterization and antioxidant activity of honey with *Eragrostis* spp. pollen predominance

Smail Aazza[1] | Youssef Elamine[1] | Soukaina El-Guendouz[1] | Badiâa Lyoussi[1] | Maria D. Antunes[2] | Leticia M. Estevinho[3,4] | Ofélia Anjos[5,6] | Jorge D. Carlier[7] | Maria C. Costa[7] | Maria G. Miguel[2]

Available online at www.sciencedirect.com
ScienceDirect
journal homepage: www.jfda-online.com

Original Article

***Ceratonia siliqua* honeys from Morocco: Physicochemical properties, mineral contents, and antioxidant activities**

Redouan El-Haskoury[a], Walid Kriaa[b], Badiaa Lyoussi[a], Mohamed Makni[a,*]

Cellular Physiology and Biochemistry

Original Paper

Protective Effect of Morocco Carob Honey Against Lead-Induced Anemia and Hepato-Renal Toxicity

Aicha Fassi Fihri[a] Noori S. Al-Waili[b] Redouan El-Haskoury[a] Meryem Bakour[a] Afaf Amarti[a] Mohammad J. Ansari[c] Badiaa Lyoussi[a]

Facts about Propolis

A protective resinous substance covering tree buds that is harvested by bees.

For bees, propolis is a very good antiseptic

Methods for harvesting propolis:

Scraped: risk of pesticides, hive treatments and oxidization

Grid: no pesticides, or treatments, little oxidation

⇒ **Grid propolis is of sufficient quality to be used for medical applications**

Good propolis quality means

- **low content of mechanical matter** (wood, dead bees,, etc)
- **high Resin (balsam) content**
- **high content of biologically active compounds**
- **low wax content**
- **water content –max 8%**
- **mechanical impurities –max 6%**
- **no or minimal contamination by pesticides and heavy metals**

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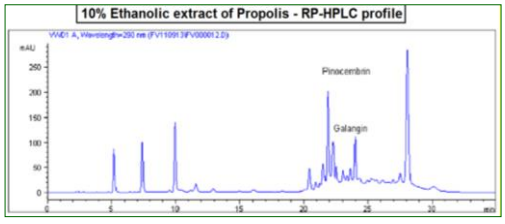
Propolis types, for which chemical parameters are proposed

Propolis type	Taxonomic marker	Profiling by
Poplar type (Populus spp)	pinostrobin, pinocembrin, galangin, chrysin, kaempferol, benzyl ferulate, phenethyl caffeate	HPLC, TLC



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Content of bioactive compounds for poplar propolis type

Total Phenolics (Folin –Ciocalteu)	**Minimum 21%**
Flavones and Flavonols (AlCl3)	**Minimum 4%**
Flavonones and dihydroflavonols (DNP)	**Minimum 4%**

RESEARCH ARTICLE

Antioxidant, Anti-inflammatory and Acetylcholinesterase Inhibitory Activities of Propolis from Different Regions of Morocco

Maria da Graça Miguel, Orsula Doughmi, Smail Aazza, Dulce Antunes, and Badiaâ Lyoussi

NPC Natural Product Communications

2015 Vol. 10 No. 11 1961 - 1964

Antioxidant and α-Glucosidase Inhibitory Properties and Chemical Profiles of Moroccan Propolis

Milena Popova, Badiaa Lyoussi, Smail Aazza, Dulce Antunes, Vassya Bankova and Graça Miguel

International Journal of Food Science and Technology 2016

Original article

Anti-acetylcholinesterase, antidiabetic, anti-inflammatory, antityrosinase and antixanthine oxidase activities of Moroccan propolis

molecules

MDPI

Article

Impact of Biohybrid Magnetite Nanoparticles and Moroccan Propolis on Adherence of Methicillin Resistant Strains of *Staphylococcus aureus*

Archives of Medical Research

ORIGINAL ARTICLE

Protective Effect of Propolis in Proteinuria, Crystaluria, Nephrotoxicity and Hepatotoxicity Induced by Ethylene Glycol Ingestion

Nawal El Menyiy, Noori Al Waili, Meryem Bakour, Hamza Al-Waili and Badiaa Lyoussi


Producers

Competion with cheap products without quality control

Public Health

(Contamination with pesticides, heavy metals, etc)

Customer/ Patient

Urgent Need to Harmonize Analytical Methods and the Legislation
(Add value to Bee Pollen)

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Bee POLLEN

Taxon passport

- Variability in the colour of the pellet
- Microscopic analysis
- HPLC/DAD phenolics profile
- Physico-chemical analysis
  - Proteins & Free aminoacids
  - Lipids
  - Sugars
  - Minerals
  - Vitamins
  - Alkaloids

Bioactivity (DPPH; ORAC; TBARS;
Anti-inflammatory, antimutagenic,
Antimicrobial, antiprotozoan,
etc

Caloric value: 381Kcal/100g

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Samples from : France, Portugal & New Zealand.Brazil, Germany, India, Mexico, Poland, Romany, Slovakia, Spain, Sultanate of Oman, **Morocco**,Ukraine, Ethiopia, Russia

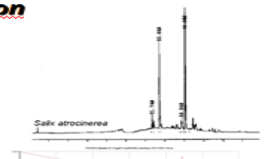
Members of Bee pollen Working Group (Bp WG) IHC Network
(www.ihc.org

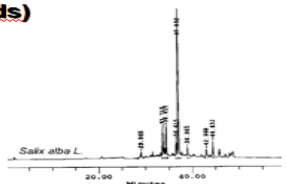
Analytical methods

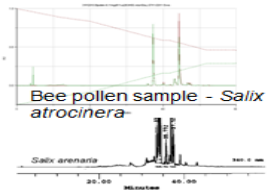
Polyphenolic profiles (phenolic acids & flavonoids) identification of the *taxon*
Herbarium samples

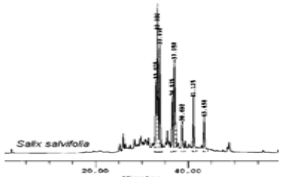


sediment









SAMPLE PREPARATION
- ✓ethanol 50%
- extraction
- ✓ vortex +
- ultrasounds
- ✓centrifugation

HPLC/DAD λ 220-400nm

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Beeswax




- **Quality problems for apitherapy**
  - **Contamination**
    - **Dross**
    - **Clean by filtering / separation**
    - **Pollution – heavy metals, agricultural pesticides**
    - **Acaricides**

  - **Overheating – discolouration and degradation**

  - **Heating in steel, aluminium, zinc, copper or lead containers**

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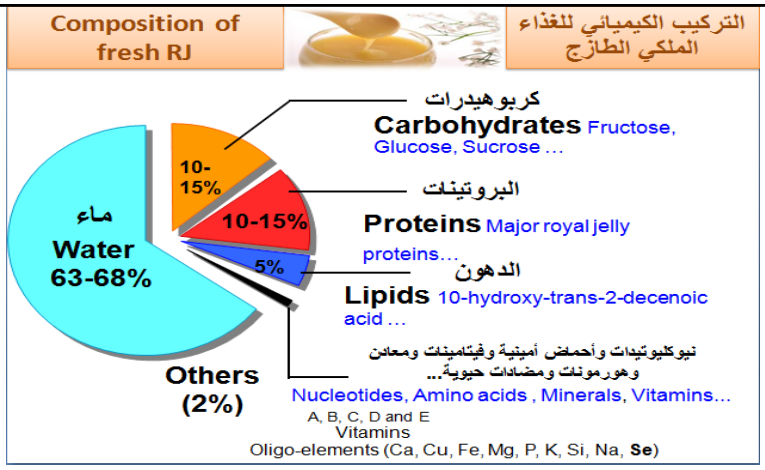

Quality problems (for apitherapy)

- Contamination: antibiotics, PDCB
- dilution / adulteration
- storage / preservation problems:
  degradation – fresh / dried?

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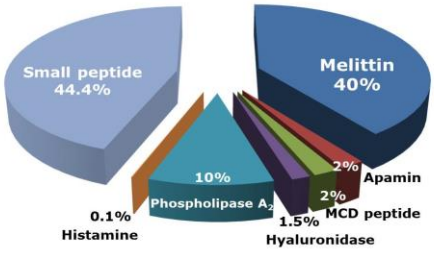
Components of bee venom

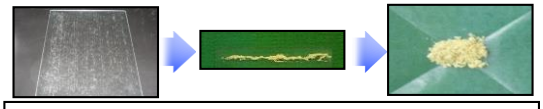


Peptides
Melittin
Apamin
Mast cell Degranulating Peptide(MCD)
Adolapin
Protease inhibitor

Enzyme
Hyaluronidase
Phospholipase A2
A-Glucosidase
Acid phosphomonoesterase
Lysophospholipase

Physiologicaly active amines
Histamine
Dopamine
Norepinephirine

Non peptide components
Carbohydrates
Lipids
r-aminobutyric acid
B-aminobutyric acid



Separated by bee venom collector

Quality problems (for apitherapy)
• Contamination:
  o Pollution – heavy metals, agricultural pesticides
  o Acaricides

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Conclusions

For all hive products :

- ❖ Avoid apiaries in areas with pollution (industrial / agricultural)
- ❖ Be careful with in hive chemical treatments
- ❖ Use good apiary hygiene and equipment

" **We do not know what the future will hold but we can be certain that the widespread acceptance of hive products as recognized medicinal treatments will depend on scientific evaluation** "

Peter Molan

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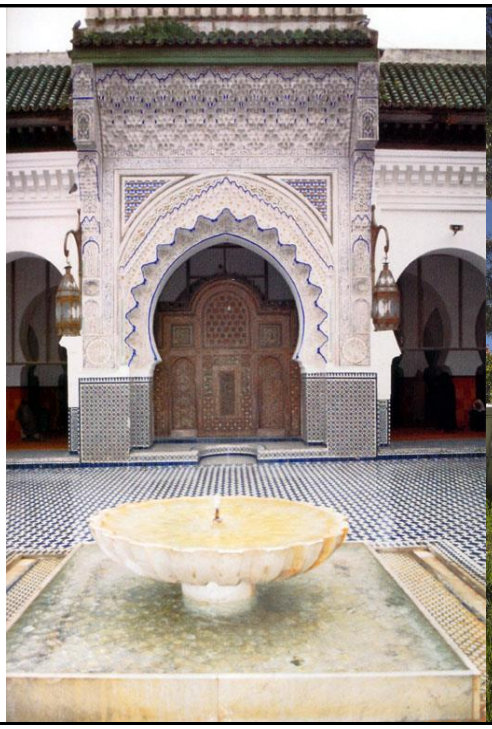

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