



# Important developments in Romanian propolis research: studies of Apiculture and Sericiculture Department and APHIS Laboratory USAMV Cluj-Napoca

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# State of the Art

## Propolis component sources:

- (i) vegetal: plant exudates collected by the bees resins secreted by the buds of poplar, pine, birch, chestnut, maple, lipophilic substances secreted by plant wounds, resins, or gums;
- (ii) animal: substances secreted by the bees (wax, saliva);
- (iii) incidental materials introduced during propolis production (pollen, nectar or honey) .

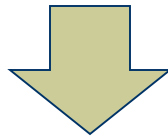


# State of the Art

Propolis type	Geographic origin	Plant source	Main constituents
Poplar	Europe, North America, Asia (non-tropical regions), New Zealand	<i>Populus</i> sp.	Flavones, flavanones, cinnamic acids and their esters
Green	Brazil	<i>Baccharis</i> sp.	Prenylated p-coumaric acids, diterpenic acids
Birch	Russia	<i>Betula verrucosa</i>	Flavones and flavonols (other than in poplar)
Red	Cuba, Brazil, Mexico	<i>Dalbergia</i> sp.	Isoflavonoids
Clusia	Cuba, Venezuela	<i>Clusia</i> sp.	Polyprenylated benzophenones
Pacific	Pacific region, Taiwan, Indonesia, Japan	<i>Macaranga tanarius</i>	C-prenyl-flavanones

# Romanian Propolis

As most of the propolis samples from Central and Eastern Europe, Romanian propolis plant sources are resins secreted by buds of *Populus nigra*, *Quercus*, *Aesculus hippocastanum*, *Ulmus*, *Picea*, and *Fraxinus*



## Poplar type Propolis



# Romanian Propolis – Research projects

1. *Quality control methods of propolis used as additive in food products*
2. *Using bee products as biologically active substances in micro propagation of plant material*
3. *Establishing and implementation of a quality system and certification of bee products used as food additives and pharmaceutical preparations*

# **Romanian Propolis – PhD Thesis**

- ❖ T. Dabija, **The improvement of extracting technology propolis and its usage in apiterapy** [Ph.D. thesis], **2006.**
- ❖ Laura Stan, **Evaluation of propolis quality and authenticity markers** [Ph.D. thesis], USAMV Cluj-Napoca, Romania, **2007.**
- ❖ Gabriela Birtas, **Footprint of bioactive compounds from poplar, birch, willow and pine buds, comparative with propolis** [Ph.D. thesis], USAMV, Cluj Napoca, Romania, **2011**
- ❖ Cristina Manuela Mihai, **Evaluation of propolis quality from Transilvania with regards to standardization** [Ph.D. thesis], USAMV Cluj-Napoca, Romania **2011.**
- ❖ Flaviu Dragla, **The use of bioactive compounds from propolis and venom as therapeutic options in human breast cancers**, [Ph.D. thesis], USAMV Cluj-Napoca, Romania **2016**

# Romanian Propolis – Research papers

Early studies (**since 1980**) were focused on:

- the effects of certain **blood constituents** and **lymphatic system**, **hepatotoxic** and **hepatoprotector effects**; **antibacterial**, **antiviral**, and **antiinflammatory effect**.
- action of a **standardized propolis extract (SPE)** on **rat liver**
- **action in agriculture: germinative effect** in different **plant seeds** and **vine**.
- effects as **germination substrates** and **stimulatory effect** upon **germination**

# Romanian Propolis – Research papers

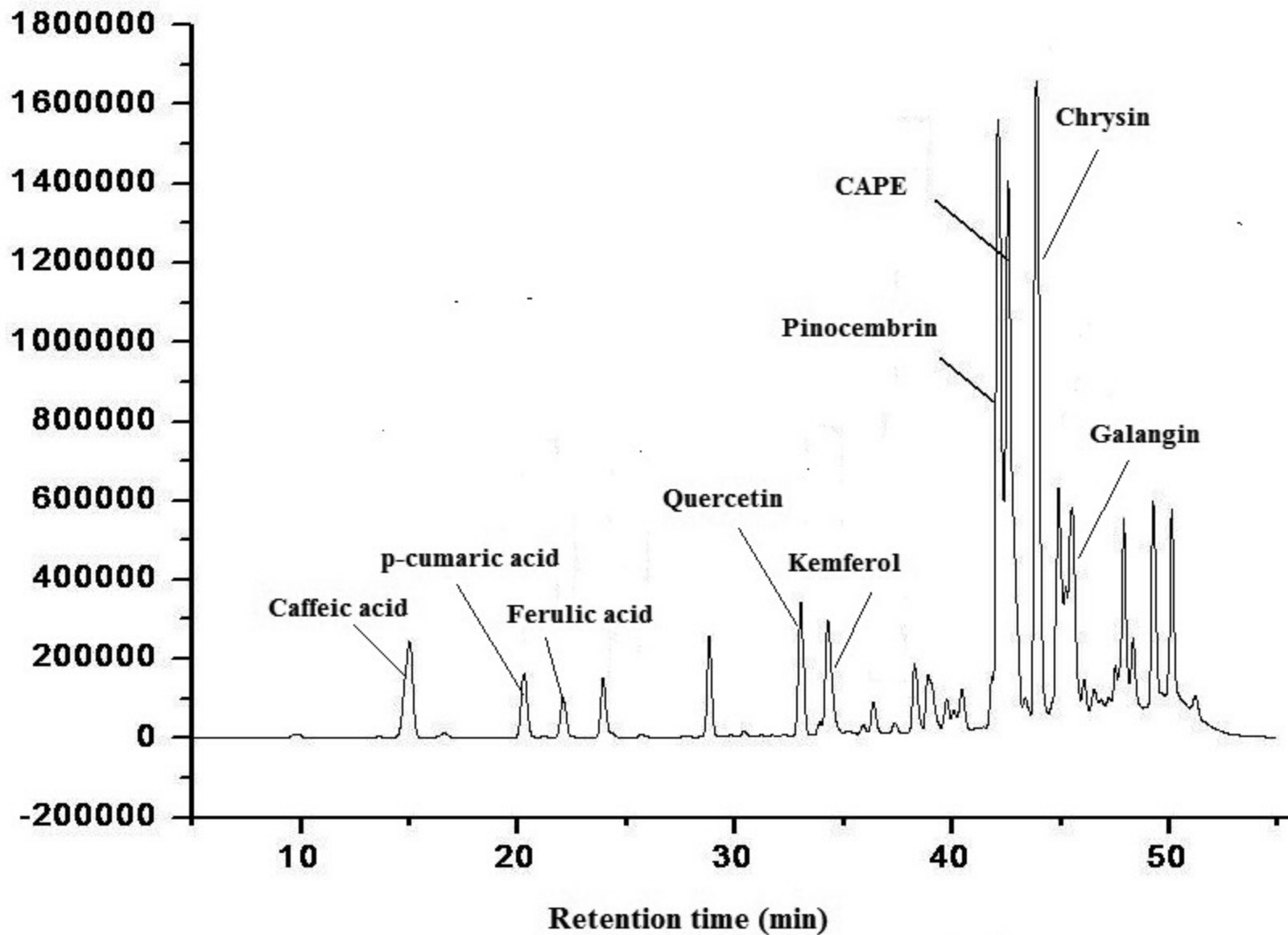
Recent studies (**after 2000**) were focused on:

- chemical composition determination for different propolis samples
- antioxidant activity using different techniques
- antibacterial effect on different bacteria (human, bee or other animals)
- antitumoral effect of propolis extracts
- nanoemulsions based on aqueous propolis and lycopene extract in the skin's protective mechanisms against UVA radiation



# Methods:

- **Physico - chemical parameters according to research studies and Argentinian Standard for Propolis**
- **Total phenolic content, flavone content and total flavonoids – spectrophotometric assays**
- **LC-MS analysis of individual phenolic acids and flavonoids**
- **Antioxidant activity – Spectrophotometric methods**
- **Antibacterial activity - Inhibition zone measurement**
  - **Minimum inhibitory concentration**
  - **Minimum bactericidal concentration**



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# Results: Composition



Talanta

Stan L. et. al./Scientific Papers: Animal Science and Biotechnologies, 2011, 44 (2)

Ecosystem discr  
propolis by hiera  
TLC patterns

Costel Sârbu  , August  
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## Quality Criteria for Propolis Standardization

Laura Stan, Liviu Al. Mărghitaș, Daniel Dezmirean

*University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca - 400372 Cluj-Napoca,  
Calea Manastur 3-5, Romania*



olis:

### Abstract

Propolis is a natural resin produced by honeybees with high biological value for human kind. Although propolis is intensively used in medicine, cosmetics and lately in food industry also, there is no quality standard (Romanian or European) for this specific bee product. This article presents the quality criteria for Romanian raw propolis.

Choose an option to locate/access this article:

# Results: Antioxidant activity

Bulletin UASVM Animal Science and Biotechnologies, 66 (1-2)/2009  
Print ISSN 1843-5262; Electronic ISSN 1843-536X

## DPPH Method for Evaluation of Propolis Antioxidant Activity

**Liviu Al. MĂRGHITAȘ, Daniel DEZMIREAN, Adela MOISE,  
Cristina M. MIHAI, Laura STAN LASLO**

University of Agricultural Sciences  
Biotechnologies, 3-5 Manastur Street

Bulletin UASVM Animal Science and Biotechnologies, 67(1-2)/2010  
Print ISSN 1843-5262; Electronic ISSN 1843-536X

**Abstract.** Propolis samples from 2004-2007 and were analyzed for total phenolic content and stable radical for evaluation of propolis antioxidant activity.

## Food Composition and Analysis

2011, Pages 516–522

Quality food composition data, analysis



## Antioxidant Capacity of Transylvanian Propolis

**Cristina M. MIHAI, Liviu Al. MĂRGHITAȘ**

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[mihaicristinamanuela@yahoo.com](mailto:mihaicristinamanuela@yahoo.com)

**Abstract.** Propolis samples, used as biological material in the present study, were collected from different areas in Transylvania and investigated in order to establish their antioxidant capacity. The antioxidant properties were evaluated using 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging capacity assay. IC50 values were also determined for the studied propolis samples. The

# Results: Antibacterial activity



Journal of Invertebrate Pathology

Volume 110, Issue 1, May 2012, Pages 68–72



www.notulaebotanicae.ro

Print ISSN 0255-965X; Electronic 1842-4309

Not Bot Horti Agrobo, Cluj 38 (3) 2010, 40–44

Notulae Botanicae Horti Agrobotici

Notulae Botanicae Horti Agrobotici  
Cluj-Napoca

## Interactions among flavonoids of propolis and their antibacterial activity against the honeybee pathogen *Paenibacillus larvae*

Cristina Manuela Mihai<sup>a</sup>, Liviu Al. Mărghițaș<sup>a</sup>, Da  
Robin F.A. Moritz<sup>a, c</sup>, Helge Schlüns<sup>a, d</sup>

<sup>a</sup> Department of Apiculture and Sericulture, University of Agricultural Sciences, Cluj-Napoca, Romania

<sup>b</sup> Department of Microbiology, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca

<sup>c</sup> Institut für Biologie, Martin-Luther-Universität Halle-Wittenberg, 06083 Halle, Germany

<sup>d</sup> Behavioural Biology, University of Osnabrück, 49076 Osnabrück, Germany

<http://dx.doi.org/10.1016/j.jip.2012.02.009>, How to Cite or Link Using  
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## Abstract

Propolis is derived from plant resins, collected by honeybees and has various biological properties. Here we test the antibacterial effects of ethanolic extracts of propolis against *Paenibacillus larvae*, the bacterial pathogen that causes



Available online: [www.notulaebotanicae.ro](http://www.notulaebotanicae.ro)

Print ISSN 0255-965X; Electronic 1842-4309

Not Bot Horti Agrobo, 2015, 43(2):327-334. DOI:10.15835/nbha43210074

## *In vitro* Synergistic Antimicrobial Activity of Romanian Propolis and Antibiotics against *Escherichia coli* Isolated from Bovine Mastitis

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Iulia Maria BALACI<sup>1</sup>, Sevastița MUSTE<sup>2</sup>, Marina SPÎNU<sup>1</sup>

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<sup>2</sup>University of Agricultural Sciences and Veterinary Medicine, Faculty of Food Science and Technology, 3-5 Mănăsturel Street, 400372, Cluj-Napoca, Romania; [laurastan@usamvcluj.ro](mailto:laurastan@usamvcluj.ro) (\*corresponding author)

## Abstract

The study was aimed to characterize the chemical composition and the antimicrobial activity of Romanian propolis ethanolic extracts (EEP) against antibiotic-sensitive and antibiotic-resistant *E. coli* strains isolated from bovine mastitis. The

# Results: Medical uses

Butnariu and Giuchici *Journal of Nanobiotechnology* 2011, **9**:3  
<http://www.jnanobiotechnology.com/content/9/1/3>



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### Article

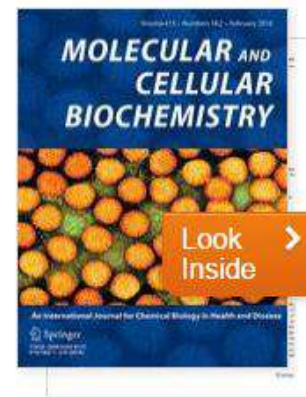
Molecular and Cellular Biochemistry

February 2016, Volume 413, Issue 1, pp 189-198

First online: 02 February 2016

## Caffeic acid phenethyl ester activates pro-apoptotic and epithelial–mesenchymal transition-related genes in ovarian cancer cells A2780 and A2780cis

Claudia Gherman, Ovidiu Leonard Braicu, Oana Zanoaga, Anca Jurj, Valentina Pileczki, Mahafarin Maralani, Flaviu Drigla, Cornelia Braicu, Liviuta Budisan and 2 more



Journal of  
Agroalimentary Processes and  
Technologies

es: synthesis,  
analyses

niel I. Hădărugă<sup>d\*</sup>,  
<sup>d</sup>, Lavinia Urșica<sup>a</sup>,  
scu<sup>e</sup>, Carmen Lazău<sup>e</sup>,

## Article Metrics

🗨 Social Mentions

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# Results: Medical uses



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### SYNERGISTIC EFFECTS INDUCED BY COMBINED TREATMENTS OF AQUEOUS EXTRACT OF PROPOLIS AND VENOM

Flaviu Drigla, Ovidiu Balacescu, Simona Visan, Simona Elena Bisboaca, Ioana Berindan-Neagoe, Liviu Alexandru Marghitas

#### Abstract

**Background and aims.** Breast cancer is a heterogeneous disease and the leading cause of cancer mortality worldwide. Triple negative breast cancer (TNBC) is considered to be one of the most aggressive breast neoplasia due to failure of chemotherapy response. Thus, there is an urgent need of finding alternative therapies for TNBC. This study was designed to

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Redox Report: Communications in Free Radical Research

Volume 14, Issue 6, 2009

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Research articles

## Redox reactivity in propolis: direct detection of free radicals in basic medium and interaction with hemoglobin

DOI: 10.1179/135100009X12525712409814

Augustin-Catalin Mot<sup>a</sup>, Grigore Damian<sup>b</sup>, Costel Sarbu<sup>a</sup> & Radu Silaghi-Dumitrescu<sup>a</sup>  
pages 267-274

**Publishing models and article dates explained**

Published online: 02 Dec 2013

Preview

PDF

Access options

# Results

Hindawi Publishing Corporation  
Evidence-Based Complementary and Alternative Medicine  
Volume 2013, Article ID 159392, 9 pages  
<http://dx.doi.org/10.1155/2013/159392>



## *Review Article*

## **Important Developments in Romanian Propolis Research**

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Received 9 January 2013; Revised 8 May 2013; Accepted 16 May 2013

Academic Editor: Vassya Bankova

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The most important developments in propolis analysis and pharmacological properties are discussed. In order to help in the Romanian propolis standardization, different methodologies for chemical composition analysis (UV-VIS, HP-TLC, and HPLC-DAD) are reviewed using new approaches and software (fuzzy divisive hierarchical clustering approach and ChromQuest software)



# Results

*Journal of Apicultural Research*, 2017  
Vol. 56, No. 5, 588–597, <https://doi.org/10.1080/00218839.2017.1356205>




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## ORIGINAL RESEARCH ARTICLE

### Influence of geographic origin, plant source and polyphenolic substances on antimicrobial properties of propolis against human and honey bee pathogens

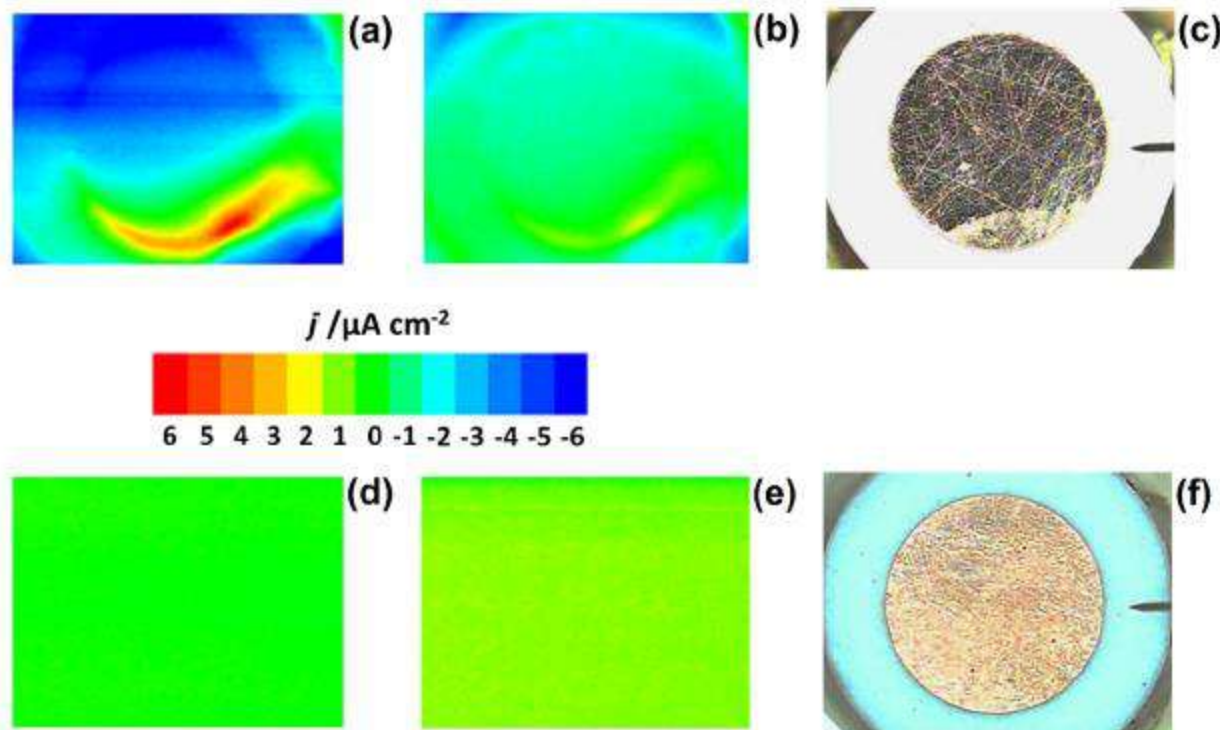
Daniel S Dezmirean<sup>a</sup>, Liviu A Mărghițaș<sup>a</sup>, Flore Chirilă<sup>b</sup>, Florina Copaciu<sup>c</sup>, Vasile Simonca<sup>d</sup>, Otilia Bobiș<sup>a,\*</sup> and Silvio Erler<sup>a,1\*</sup> 

<sup>a</sup>Department of Apiculture and Sericulture, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania; <sup>b</sup>Department of Microbiology, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania; <sup>c</sup>Department of Biochemistry, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania; <sup>d</sup>Department of Silviculture, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania

# Results

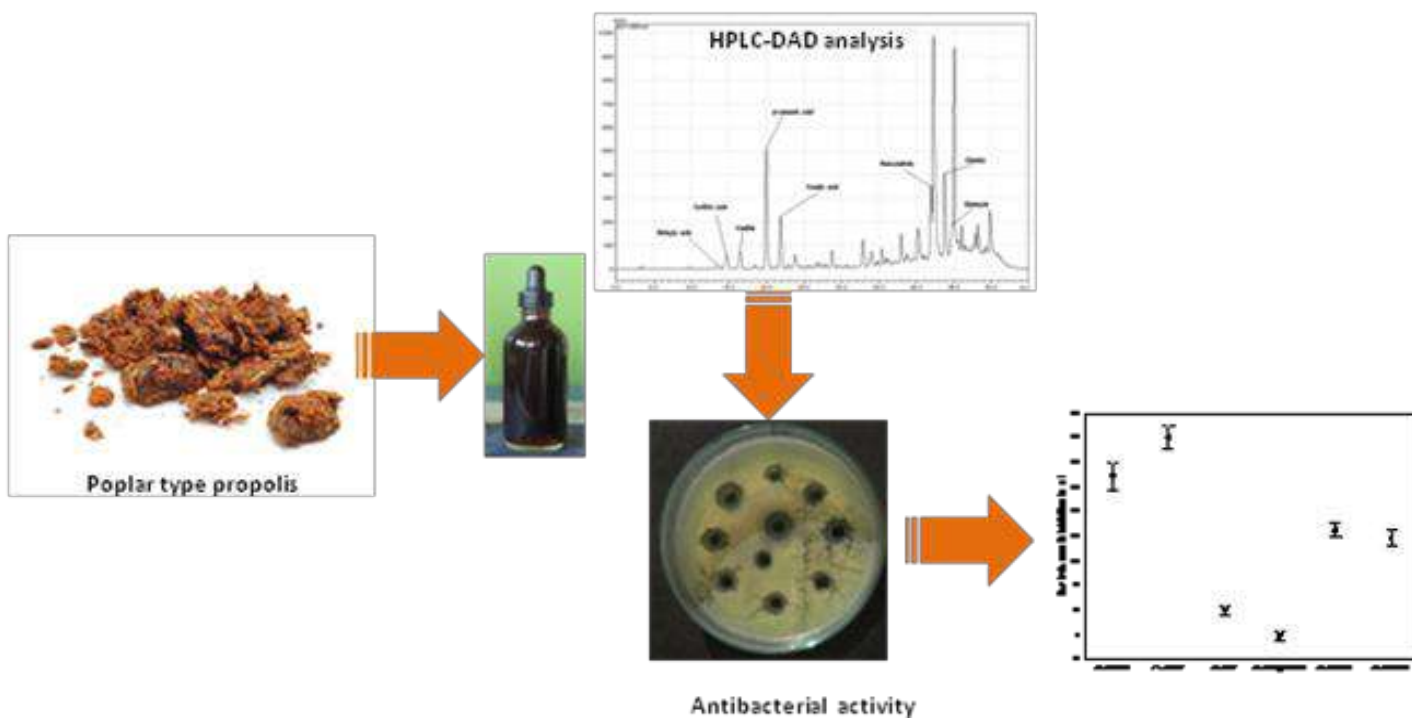
1108

S. Varvara et al. / Applied Surface Science 426 (2017) 1100–1112



**Fig. 8.** SVET images and micrographs of a circular bronze sample (area,  $28.27 \text{ mm}^2$ ) immersed in  $0.2 \text{ g L}^{-1} \text{ Na}_2\text{SO}_4 + 0.2 \text{ g L}^{-1} \text{ NaHCO}_3$  (pH 5) either in the presence or in the absence of propolis. (a–c) Bronze sample non-treated with propolis; the maps were recorded after (a) 6 and (b) 12 h exposure to the test solution. Micrograph (c) was taken after recording the SVET map shown in (b). (d) Bronze sample immersed in  $0.2 \text{ g L}^{-1} \text{ Na}_2\text{SO}_4 + 0.2 \text{ g L}^{-1} \text{ NaHCO}_3 + 100 \text{ ppm}$  propolis (pH 5) for 12 h. (e) SVET map recorded over the bronze sample of (d) after electrolyte replacement, and further exposure to  $0.2 \text{ g L}^{-1} \text{ Na}_2\text{SO}_4 + 0.2 \text{ g L}^{-1} \text{ NaHCO}_3$  (pH 5) for additional 12 h. (f) Micrograph obtained after recording the SVET image in (e). The images represent  $9750 \mu\text{m} \times 5360 \mu\text{m}$  in X and Y directions.

# Results **RoBeeTech** Project



# Results **RoBeeTech** Project

Propolis samples (n = 36)	Wax (%)	Total balsam (%)
	<b>34.23±5.56</b>	<b>71.44±8.02</b>

Propolis samples (n = 36)	Total polyphenols (%)	Flavone/flavonols (%)	Flavanone/dihidro flavonols (%)	Total flavonoids (%)
	<b>42.76±4.02</b>	<b>4.81±0.43</b>	<b>3.75±0.23</b>	<b>26.42±3.73</b>

# Results **RoBeeTech** Project

Bacteria	Inhibition (mm)	MIC (%)	MBC (%)
<i>Staphylococcus aureus</i> ATCC 6538P	<b>10.5 mm</b>	<b>0.5</b>	<b>1.0</b>
<i>Bacillus cereus</i> ATCC 14579	<b>11.4 mm</b>	<b>0.5</b>	<b>0.75</b>
<i>Escherichia coli</i> ATCC 10536	<b>8.5 mm</b>	<b>1.0</b>	<b>1.5</b>
<i>Pseudomonas aeruginosa</i> ATCC 27853	<b>7.5 mm</b>	<b>1.5</b>	<b>2.0</b>
<i>Paenibacillus larvae</i>	<b>12.5 mm</b>	<b>0.5</b>	<b>0.5</b>
<i>Paenibacillus alvei</i>	<b>14.5 mm</b>	<b>0.125</b>	<b>0.5</b>



# Propolis in Human and Bee Health

*Glasgow June 16 - 17, 2016*



## **Antibacterial activity of propolis extracts on normal and pathogenic microflora from milk**

**Claudia Pașca, Liviu Al. Mărghițaș, Daniel Dezmirean, Chirilă Floare, Nicodim Fiț, Otilia Bobiș**

## **Propolis: active ingredient in different formulations with pharmaceutical application**

**Liviu Al. Mărghițaș, Gabriela Birtaș, Daniel Dezmirean, Claudia Pașca, Otilia Bobiș**



## Propolis in Human and Bee Health Conference

Sofia 2018

September, 28-29

Park-Hotel Moskva

### **CORRELATION BETWEEN CHEMICAL COMPOSITION AND ANTIBACTERIAL ACTIVITY OF PROPOLIS FROM DIFFERENT LOCATIONS IN TRANSYLVANIA**

Erzsébet-Timea DOMOKOS, Adriana URCAN, Liviu Alexandru MĂRGHITAS, Daniel Severus DEZMIREAN and Otilia BOBIȘ

### **Propolis from Romania & Turkey: Comparative antioxidant and antibacterial activity**

Otilia Bobiș, Merve Keskin, Şaban Keskin, Sevgi Kolaylı, Mihaela Niculae, Adriana Urcan, Claudia Pașca, Liviu Mărghițaș, Daniel Dezmirean

# Perspectives :

- Collaboration between laboratories to establish Romanian propolis composition on a high number of samples
- Developing new methods of extraction and different solvents for using propolis in medicine and pharmacie
- Exploitation of synergistic effect between propolis and other bee products



# Conclusion:

Beside the economical value of propolis, beekeepers may obtain high advantages from this type of bee product using it entire or as an ingredient in different formulations for treatments of bacterial diseases in human or veterinary medicine.



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