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PP-240 [Beekeeping Technology and Quality]

EUCALYPTUS HONEY FROM THE FORESTS OF PORTUGAL. WHAT IS IMPORTANT TO KNOW? WHAT REMAINS TO BE DONE!

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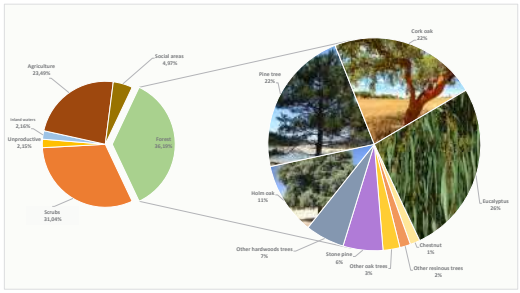
INTRODUCTION

In Portugal, *Eucalyptus* is a forest species of significant economic relevance, covering about 25% of the forest area. These forests are also a significant resource for bees, and specifically for *Apis mellifera iberiensis*, providing abundant nectar, pollen and propolis. This study aimed to evaluate the foraging patterns of *A. mellifera* in eucalyptus forests, as well as the physicochemical, microbiological, and palynological characteristics of the honey produced.



Portugal main land uses and surfaces occupied by forest species

METHODS

During 2024, pollen samples were collected biweekly from two hives in the same apiary, and capped honey samples were obtained during the eucalyptus flowering season. Samples of *eucalyptus* honey were also collected from different regions of the country. Pollen analysis was used to identify associated flora and all honeys were characterized by microbiological, physical-chemical and pollen evaluation. The results are presented and discussed in the context of forestry and beekeeping practices, the honey produced and the impacts on both species, man and *Apis mellifera iberiensis*, from the perspective of One Health and Planetary Health.

Location of sampled apiaries

Honey bee pollen loads

Honey sample collection

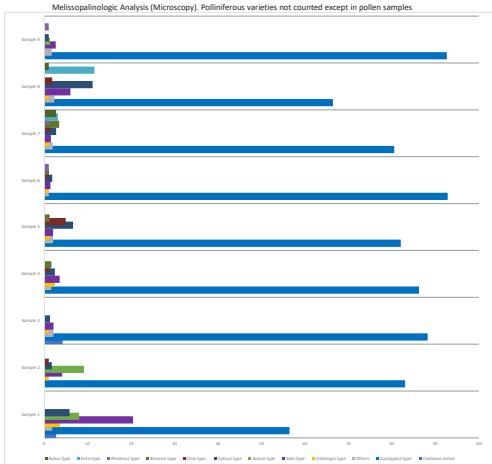
RESULTS & DISCUSSION

Characterization of 9 Eucalyptus monofloral honeys by microbiological, physicochemical and pollen evaluation

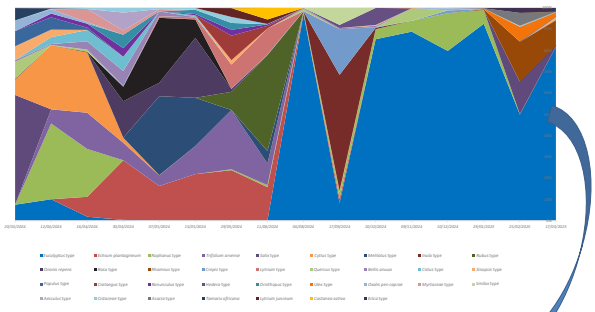
Physical - Chemical parameters	Average	±	SD	Units
Conductivity (20°C)	5,62	±	0,72	x10⁻³ S/cm
pH	3,99	±	0,12	UpH
free acid	23,42	±	4,26	meq/kg
Hidroxymethylfurfural (HMF)	4,00	±	1,09	mg/kg
Moisture (20°C)	17,48	±	0,72	%
Carbohydrates	81,80	±	0,40	
Fructose	40,17	±	1,36	%
Glucose	29,67	±	1,73	%
Sucrose	1,23	±	0,85	%
Maltose	1,70	±	0,27	%
Fructose / glucose ratio	1,36	±	0,10	-
Fructose + Glucose	69,78	±	2,48	%
Diastase activity	19,48	±	1,82	U Gothe/Schade
Color	65,33	±	18,22	mmPfund
Antioxidant capacity ABTS (SCSO)	208,82	±	41,82	mg/ml
Trolox equivalent antioxidant capacity (TEAC)	8,11	±	1,18	µMolTE/g
Total polyphenols	10,90	±	1,33	mgGÁ/100g
Methylglyoxal (MGO)	32,67	±	1,09	mg/kg
Catalase Activity	38,24	±	24,60	U/g
Peroxidase activity	1,10	±	0,12	U/mg protein
Protein	0,42	±	0,07	%
Fat	<0,1			%
Saturated fatty acid	<0,1			g/100g
Salt	17,90	±	11,86	mg/100g
Energy	329,00	±	1,55	Kcal/100g
Sodium (Na)	71,40	±	47,45	mg/kg

SD standard deviation

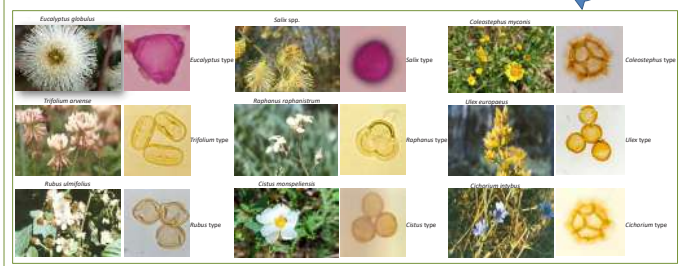
Melissopalinologic Analysis (Microscopy). Polliniferous varieties not counted except in pollen samples



Plant species foraged by honey bees - associated with the sampled pollen



Some species observed in apiaries and types of pollen



CONCLUSION

- ✓ All honeys present values within the limits permitted by regulamentation;
- ✓ *Eucalyptus* spp. was a predominant source used by honeybees, and was detected in 100% of the analysed samples;
- ✓ The relative frequency of the *eucalyptus* pollen in these honeys exceeds 45%, and therefore been considered monofloral *eucalyptus* honey (Von Der Ohe W, et al., 2004);
- ✓ Monofloral honeys contained several pollen types with a considerable percentage of pollen grains from *Eucalyptus* type, and also from *Erica* type, *Acacia* type, *Salix* type, *Cytisus* type, *Castanea sativa*, *Rubus*, and other minoritary species;
- ✓ Honeys showed significant antibacterial activ typeity, associated with low pH and low protein content;
- ✓ High-quality honeys were confirmed by low HMF content (a parameter related to freshness and food quality) and high diastase activity.;
- ✓ High value of methylglyoxal, catalase and peroxidase activity and total polyphenols gives these honeys high medicinal value;
- ✓ Monofloral honey from *Eucalyptus* spp. was characterized by its high pollen content, antimicrobial properties and high antioxidant power.

PERSPECTIVES

- ✓ Pollen and honey data provided a reliable fingerprint of the environment from which the *eucalyptus* honey originated;
- ✓ As *eucalyptus* pollen represents the majority of the detected pollens, these honeys could be further enriched with undergrowth and/or ecological corridors and still be considered monofloral;
- ✓ A greater abundance of floral species could increase honey production.

REFERENCES

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Harmonized methods of melissopalynology. Apidologie. 2004; 35:S18–S25.

Work carried out within the scope of Portugal's Recovery and Resilience Plan, measure RE-C05 - Mobilizing Agendas for Innovation, project code C644865735000000007 - "Transform - Digital transformation of the forestry sector for a resilient and low-carbon economy" - 4.1 Innovation in non-timber forestry product value chains (funding entity: IAPMEI). Anabela Nave is supported by National Funds by FCT –Portuguese Foundation for Science and Technology, under the projects UID/04033: Centro de Investigação e de Tecnologias Agro-Ambientais e Biológicas and LA/P/0126/2020 (https://doi.org/10.54499/LA/P/0126/2020).

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In Portugal, Eucalyptus is a forest species of significant economic relevance, occupying about 25% of the total forest area. Eucalyptus forests are also a significant resource for bees, and specifically for Apis mellifera iberiensis, providing floral nectar, pollen and propolis in abundance. Monofloral honey from Eucalyptus spp. is particularly valued for its high pollen content, antimicrobial properties and high antioxidant power. However, the effect of climate change on beekeeping activity is being increasingly considered, whether due to problems associated with the ecosystem where apiaries are located, or due to the health of colonies and good beekeeping management practices. All this possible impact is reflected in the activity of bees, in the pollen they collect and in the honey they produce. This study aimed to evaluate the foraging patterns of A. mellifera iberiensis in eucalyptus forests, as well as the physicochemical, microbiological, and palynological characteristics of the honey produced. During 2024, pollen samples were collected from two hives in the same apiary was sampled biweekly and during the eucalyptus flowering season, capped honey samples were collected. Samples of eucalyptus honey were also collected from different areas of the country associated with the production of this honey. The flora associated with the sampled pollen was identified by pollen analysis and all honeys were characterized by microbiological, physical-chemical and pollen evaluation. The results obtained are presented here and the data are analyzed in relation to forestry and beekeeping practices and the honey produced and the impacts on both species, man and A. mellifera iberiensis, from the perspective of One Health and Planetary Health.