

Melissopalynological Study of Albania's Honey

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Abstract

A total of 30 samples of honey were collected from the beekeepers throughout different regions of Albania and analysed for their pollen grains content and control of botanical origin. Honey sediments obtained from honey samples were processed based on the method of basic fuchsin and acetolysis. Quantitative and qualitative analysis of pollen grains in honey was done based on the methodology given by Maurizio and the terms of the pollen grains frequencies approved by the International Commission for Bee Botany. 16 out of 30 samples of honey were polyfloral and the rest unifloral. The majority of monofloral honey was characterised by the presence of genus of *Castanea*, *Arbutus* and *Erica* pollen. The presence of few pollen grains of genus such as *Tilia*, *Rubus* and *Artemisia*, were identified in only one honey sample. It was concluded that the most preferable plants for the bees are those of the genus of *Erica*, *Arbutus*, *Castanea*, *Artemisia*, *Tilia*, *Rubus*, *Lotus*, *Trifolium*, *Filipendula*, *Crepis*, *Thymus*, *Quercus*, *Rosa*, *Centaurea*, *Coronilla*, *Anchusa* etc. Honey samples collected from different regions of Albania were natural, pure and unprocessed termically.

Keywords: Pollen grains, pollen frequency, melissopalynological analysis, monofloral and polyfloral honey.

1. Introduction

Melissopalynological studies are necessary not only to identify the natural, geographical and botanical origin of honey, but also to identify the contamination of honey with certain elements such as: brood, dust, soot, etc.; yeast content (fermentation); and other microscopic particles not usually present in honey.

The determination of the botanical origin is based on the identification and counting of the pollen grains. The presence of the other elements is also important to be investigated and counted. Based on the fact that the value and the quality of honey mainly depend on the variety and quantity of its pollen grains, their presence in honey is an element that shows its pureness.

Numerous qualitative and quantitative data were produced by this study about the presence of the pollen grains in honey provided by bee-keepers from 30 stations located in different regions of Albania, during the period of time 2015-2016.

The object of this study was the identification of variety and quantitative content of pollens in some honey samples taken from different regions of Albania, by the melissopalynological analysis.

This study aims to:

- Determine botanical origin of honey in different regions of Albania through a melissopalynological study;
- Determine the most important plants in Albania, preferred by honey-bee as main food source;
- Determine naturalness and quality of Albania's honey; and
- Induce responsible institutions that certify the quality of honey to set and implement market standards, and protect customers from false honey.

2. Material and Methods

The honey samples have been taken from 30 stations located in different regions of Albania. The laboratory processing of the honey samples was done based on the "Methods of Melissopalynology" designed and published by the International Commission for Bee Botany, (Louveaux *et al.*, 1978), by the method of basic fuchsin (Smoljaninova Gollubkova, 1953) and acetolysis (Avetisjan, 1950; Erdtman, 1956). The indetification of pollen grains in honey has been done based on the data from the literature Erdtman, 1956; Faegri *et al.*, 1989; Kapidani, 1996; Pupuleku, 2001; Ricciardelli D'Albore, 1998; Moore *et al.*, 1978, Ferrazi *et al.*, 1990, Ricciardelli D'Albore *et al.*, 1991).

The quantitative pollen analysis were conducted based on the pollen frequency classes as follows:

- D Predominant pollen more than 45 %;
- S Secondary pollen 16 – 45 %;
- s Important minor pollen 3 – 15 %;
- r Minor pollen less than 3 %;
- i Present pollen less than 1 %.

The pollen spectrum and the comparative one of the honey studied were designed based on the above frequency classes.

The studied stations were as follows:

- | | |
|-----------------|-----------------|
| 1. Kukës | 16. Çermenikë |
| 2. Bajram Curri | 17. Rrajcë |
| 3. Pukë | 18. Korçë |
| 4. Koplik | 19. Prespë |
| 5. Mat | 20. Starovë |
| 6. Burrel | 21. Ersekë |
| 7. Lezhë | 22. Voskopojë |
| 8. Krujë | 23. Tepelenë |
| 9. Priskë | 24. Mallakastër |
| 10. Krrabë | 25. Libofshë |
| 11. Elbasan | 26. Divjakë |
| 12. Gjinat | 27. Alarup |
| 13. Gramsh | 28. Gjirokastrë |
| 14. Librazhd | 29. Llogara |
| 15. Steblevë | 30. Sarandë |



Figure 1. The map of the studied stations

3. Results and Discussions

Table 1. The pollen and comparative spectrum of honey samples studied

No.	Pollen grains according to family and genus	Kukës	Bajram Curri	Pukë	Koplik	Mat	Burrel	Lezhë	Krujë	Priskë	Krrabë	Elbasan	Gjinat	Gramsh	Librazhd	Steblevë	Çermenikë	Rrajcë	Korçë	Prespë	Starovë	Ersekë	Voskopojë	Tepelenë	Mallakastër	Libofshë	Divjakë	Alarup	Gjirokastrë	Llogara	Sarandë				
1.	Abies																																		
2.	Acer	r																																	
3.	Achillea																																		
4.	Ajuga																																		
5.	Alkanna													s																					
6.	Alchemilla																																		

7.	Allium			i		r	r			i	i	i	i	i	i	s	r		s	r	r	i				i	i	i			
8.	Alyssun					r	r		r																		r		i		
9.	Alnus																	r	s	r	i	r									
10.	Alyssum						r									i	i														
11.	Ambrosia																									r					
12.	Amni	r																S	r	r											
13.	Anarrhinum																	r			i	r			i			i			
14.	Anchusa																														
15.	Anthemis					i	r		r		r												r			r	i		i		
16.	Arbutus	r				r				D	D					S											i	S			
17.	Arctium			i		i																									
18.	Armeria																														
19.	Artemisia	r				i				r			s	D														r			
20.	Asparagus					i																									
21.	Aster			r		i	i	i																							
22.	Astragalus			r			r																								
23.	Avena																														
24.	Bellis	r								r																					
25.	Betula																														
26.	Bidens									r																					
27.	Brassica			i		r	r																								
28.	Bupleurum																														
29.	Buxus																s														
30.	Caltha																														
31.	Campanula					r				r		r																			
32.	Capsella																														
33.	Castanea	D	D	D	D	r	s	s		r	i	s					r	D	S	S	r		S	S	r	r	D	r	S		
34.	Carduus	i								r		i																			
35.	Carex																														
36.	Carlina																														
37.	Carpinus																														
38.	Carthamus																														
39.	Centaurea									s		r																			
40.	Ceratonia					r																									
41.	Cercis																														
42.	Cerintho																														
43.	Cerastium																														
44.	Chamomilla																														
45.	Chenopodium	r																													
46.	Chicorium					r	i		s		i	s		s	i		r	r	r	r	r	r	r	i	i	r	r		r		
47.	Cirsium									r																					
48.	Cistus	i																													
49.	Clematis			r	r			i		r	r																				
50.	Convallaria																														
51.	Colchicum																														
52.	Colutea	s																													
53.	Coronilla			r		r		r																							
54.	Corylus	r	r			r	i		r								s														
55.	Crataegus			r		r																									
56.	Cornus																														
57.	Convolvulus																														
58.	Crepis	i																													
59.	Cruciferae	r																													
60.	Cucumis																														
61.	Cucurbita																														
62.	Cupressus			r	r																										
63.	Cydonia																														
64.	Cynoglossum																														
65.	Cytisus																														
66.	Cyperaceae																														
67.	Dactylis			i																											
68.	Daucus			r																											
69.	Delphinium	r																													
70.	Dipsacus																														
71.	Ditrichia			i																											
72.	Dorycnium																														
73.	Echium			r																											
74.	Ecballium									r																					
75.	Eleagnus																														
76.	Epilobium					r																									
77.	Erica	r				S	s		S	r	S	i	S	D	r							S					D		r	s	r
78.	Eryngium			r																											

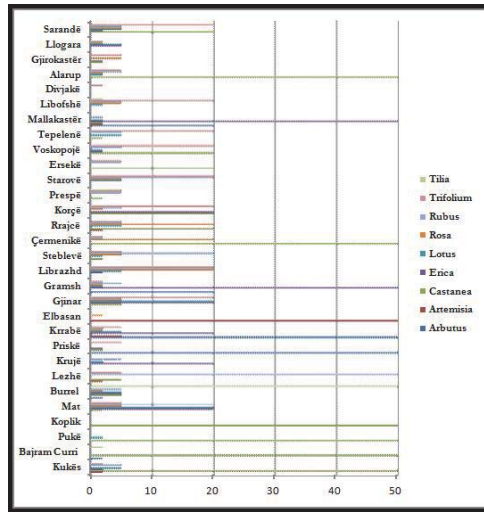


Chart 1. Pollen grains of high frequency found in studied honey samples

Table 2. Geographic location and botanical origin of studied honey

Location	Types of pollen grains	Botanical origin
Kukës	35	Monofloral of Castanea Genus
Bajram Curri	34	Monofloral of Castanea Genus
Pukë	32	Monofloral of Castanea Genus
Koplik	33	Monofloral of Castanea Genus
Mat	38	Polyfloral
Burrel	45	Monofloral of Tilia Genus
Lezhë	35	Monofloral of Rubus Genus
Krujë	32	Monofloral of Erica Genus
Priskë	27	Monofloral of Arbutus Genus
Krrabë	40	Monofloral of Ericaceae Family
Elbasan	28	Monofloral of Artemisia Genus
Gjinar	42	Polyfloral
Gramsh	40	Monofloral of Ericaceae Family
Librazhd	53	Polyfloral
Steblevë	56	Polyfloral
Çermenikë	52	Monofloral of Castanea Genus
Rrajcë	45	Polyfloral
Korçë	46	Polyfloral
Prespë	44	Polyfloral
Starovë	43	Polyfloral
Ersekë	49	Polyfloral
Voskopojë	42	Polyfloral
Tepelenë	34	Polyfloral
Mallakastër	32	Monofloral of Ericaceae Family
Libofshë	43	Polyfloral
Divjakë	22	Polyfloral
Alarup	31	Monofloral of Castanea Genus
Gjirokastër	25	Polyfloral
Llogara	45	Polyfloral
Sarandë	39	Polyfloral

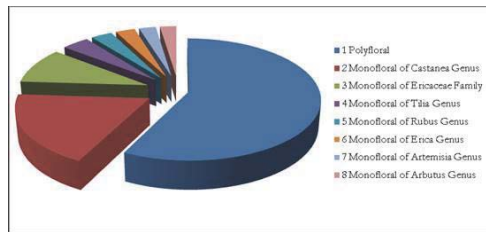


Chart 2. The frequency of monofloral and polyfloral honey in 30 samples studied

Referring to the above charts and tables, the following results were obtained:

- 14 honey samples resulted to be monofloral, respectively to the stations of: Kukës, Bajram Curri, Pukë, Koplik, Burrel, Alarup, Mallakastër, Krrabë, Elbasan, Gramsh, Çermenikë, Lezhë, Priskë and Krujë. Honey samples of the stations: Kukës, Bajram Curri, Pukë, Koplik, Alarup and Çermenikë resulted to be monofloral of the Castanea Genus, while honey of the stations: Mallakastër, Gramsh and Krrabë was monofloral of the Ericaceae Family. Honey sample of the station of Krujë was monofloral of the Erica Genus, while the honey of the station of Elbasan was monofloral of the Artemisia Genus. The Tilia Genus was presented as dominant to the honey samples of the station of Burrel, thus giving it the monofloral characteristics, while the honey of the station of Priskë was monofloral with a dominance of pollen grains of Arbutus Genus;
- Honey samples of the stations: Korçë, Prespë, Ersekë, Libofshë, Gjinar, Mat, Starovë, Voskopojë, Tepelenë, Sarandë, Steblevë, Librazhd, Rrajcë, Gjirokastrë, Llogara and Divjakë resulted to be polyfloral;
- Honey of the stations: Steblevë, Librazhd, Çermenikë, Ersekë, Korçë, Burrel, Rrajcë, Starovë and Libofshë were the most rich one with various types of pollen grains, respectively with 56, 53, 52, 49, 46, 45, 44 and 43 types of pollen grains.

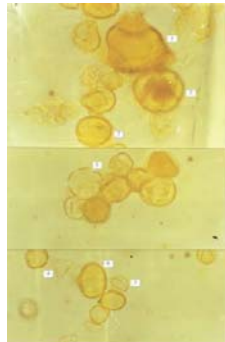


Photo 1: Station Steblevë - Polyfloral honey: 1. Epilobium, 2. Arbutus, 3. Cruciferae, 4. Eucalyptus, 5. Rosmarinus, 6. Trifolium, 7. Prunus.

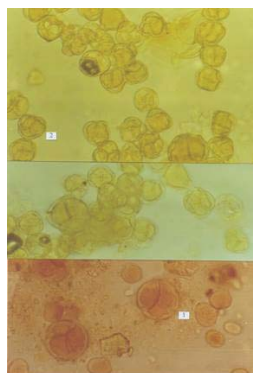


Photo 2: Station Krrabë - Monofloral honey of Ericaceae Family 1. Arbutus, 2. Erica

4. Conclusions and Recommendations

4.1 Conclusions

- Albania's honey was natural, botanically rich with bouyant variety of floral sources, pure and not thermally processed;
- About half (14 out of 30) honey samples were monofloral with a dominance of the Genus of Castanea, Arbutus, Erica, Rosa, Tilia, Artemisia, and of the Ericaceae Family;
- 16 out of 30 honey samples were polyfloral, rich with pollen grains variety; and
- The main pollen grains present in honey samples were those of the Genus of Arbutus, Artemisia, Anchusa, Castanea, Centaurea, Coronilla, Crepis, Erica, Lotus, Melilotus, Ononis, Quercus, Rosa, Rubus, Thymus, Tilia, Trifolium, which serve as the most preferred food for bees.

4.2 Recommendations

- To protect the specific characteristics of honey based on the pollen grains dominance on it, it is recommended to the bee farmers to protect natural honey.
- To protect the consumers by false honey, it is recommended that the responsible institutions not only add pollen analysis as part of the standards of honey commercialization, but they also should inspect its usage rigorously.
- Promotion of the honey quality by the institutions and the responsible organizations in the international market would create the possibility of exporting Albanian honey and it would increase the investment in this part of the economy as well.

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