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QUALITATIVE CRITERIA OF THE ENDEMIC *ARBUTUS PAVARII* PAMP. LIBYAN HONEY

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ABSTRACT

Arbutus pavarii Pamp. (Ericaceae) is one of the endemic species in El-Jabel El-Akhdar area, Libya and it is known as one of important forage plants for honey bees to produce specific honey type. The honey samples of A.pavarii were provided by professional beekeepers and mellisopalynology method was used to determine its qualitative criteria. The qualitative analysis of the samples revealed the presence of very frequent pollen content of A. pavarii with more than 77 % of the total presence of the pollens which reflected the honey purity. In addition, other qualitative characteristics such as color, PH, viscosity and moisture content were also assayed.

KEY WORDS: *Endemic plant, Arbutus pavarii, Mellisopalynology, Honey color, Libya.*

INTRODUCTION

Arbutus pavarii Pamp. (Ericaceae) is one of the endemic species in El-Jabel El-Akhdar, Libya (Bouls 1975; El shatshat 1997; El shatshat 2009; El shatshat 2015; Gimingham & Walton 1954; Keith 1965 and Qaisor & Elgadi 1986). It is an evergreen shrub or small tree, 1.5 to 3 m tall (Siddiqi 1997). The bark is reddish brown fissured and peeling in small flakes. The self-fertile flowers are drooping bells approximately 5 cm, generally white. They appear from late October to February and they have an attractive scent like honey (a good source of nectar and pollen for bees). The fruit takes around 8 months to ripen. These "strawberries" are edible directly as fruits or can be made into jam but the taste is somewhat insipid. The fruits are irregularly with 15-20 mm in diameter and they have many seeds.

Because of its endemism, physical factors "climatic factors especially the uncertainty of rainfall" and human activities "wood gathering, charcoal making, agriculture expansion, urbanization, overgrazing, etc." (El shatshat *et al*., 2009), it was classified as threatened plant on the IUNC red list (Walter & Gellitt 1997).

A. pavarii species is known as one of important forage plants for honey bees. The produced honey using this plant as forage source, which locally called "ASHMARI", is very expansive and widely used for medicinal purposes in folk medicine (El shatshat 2009).

The quality of honey can be determined normally based on its physical, botanical and chemical properties and this can be achieved by analysis of pollen content and physical/ chemical characteristics. Pollen analysis of honey, or melissopalynology, is a method of quality control in which pollens can play an important role in determining the commercial value of honey in the international market (Louveaux *et al* 1970).

In this study, we evaluated the Libyan honey type of *A. pavarii* Pamp., which produce only in the eastern part of Libya (and not else) to shade some light on its qualitative characteristics and to find out some standards which can be used

as qualitative criteria in production of this local honey type.

MATERIALS AND METHODS

Honey samples collection:

This study was conducted at the faculty of science, department of botany, university of Benghazi, Libya. The honey samples were collected from local beekeepers in Benghazi city, Libya. The data of place of forage plant resource, production date, methods of harvest… etc. were also collected.

Determination of pH:

The pH of honey samples were determined by measuring out 10 mL of the sample into a clean beaker and its pH was determined using a pH meter. **(**Hanna, Germany)

Determination of moisture content:

The moisture content of the sample was determined by measuring 5g of the sample and placed into a pre- weighed aluminum drying dish. The sample was dried to constant weight in an oven at 105 Cº for 4 h under vacuum and calculated.

Determination of ash content:

Five gram of the sample was weighed out into a porcelain crucible previously ignited and weighed. Organic matter was charred by igniting the sample on a hot plate in the fume cupboard. The crucible were then placed in the muffle furnace and maintained at 600 Cº for 6 h. They were then cooled in a desiccator and weighed immediately. The percentage of Ash was calculated.

Honey color:

Color intensity was determined according to (Ferreira *et al.,* 2009). 50% (w/v) of the honey sample was diluted with distilled water, homogenized, and centrifuged at 3200 rpm for five minutes. Absorbance was measured at different wave lengths using a spectrophotometer (Hanna Germany), and color was determined using the Pfund scale according to (U.S.D.A).

Determination of viscosity:

The viscosity of honey was measured by timing how long it takes for a mass to fall through a fixed volume. 50 ml of the honey sample was placed into separate measuring cylinder. Left over night to rest, Placed into a water bath at 37 Cº and bring to temperature. Placed a marble on top of the honey and time how long it takes for the object to touch the bottom of the measuring cylinder was determined. The viscosity was calculated.

Preparation of honey samples for mellisopalynology:

Honey sample was prepared followed the standardized method which described previously by different authors (Andrara and Cristina 2005, Bilisik *et al*., 2008 and Louveaux *et al*., 1970). Briefly, 10 g of homogenized honey were dissolved in 20 ml of distilled water and centrifuged for 10 min at 1000 g at ca. 25000 rpm. To completely dissolve the remaining sugar crystals, the decanted sediment were washing with 10 ml of distilled water. After another centrifugation, the sediment were suspending in 5 ml of 1:1 glycerin:distilled water and then centrifuged again, decanted, and mounted with glycerin jelly on microscope slides which sealed with paraffin.

Microscopic analysis:

The analysis of the pollen slides was carrying out with an optical microscope at X400, in order to make sound identification of the pollen types. The amounts and percentage of pollens were counted.

RESULTS AND DISCUSSIONS

According to pfund scale, the results showed that the color of investigated honey type of *A. pavarii* was extra light amber (Figure2). The transparency of the sample at 635

nm was 99.78, while the Absorption value was 0.22 (Table 1). The results of viscosity, PH, moisture and ash content of *A. pavarii* honey are shown in table number 2.

Mellissopalynology investigation showed that the sample had a number of variations in pollen content between very frequent, frequent and isolated, but not rare and they were 77.58%, 18.1% and 4.23%, respectively (Table 3). The sample reflected very high purity because of the content of pollens of *A. pavarii* species those appeared distinctive and featured prominently in the sample.

Table (1). Transparency and absorption values of *A. pavarii* honey at different wave lengths using colorimeteric method.

wave length/nm	*Abs*	*T%*
440	0.70	99.3
470	0.59	99.41
490	0.47	99.53
520	0.40	99.6
550	0.33	99.67
580	0.31	99.69
590	0.24	99.76
635	0.22	99.78
680	0.21	99.79

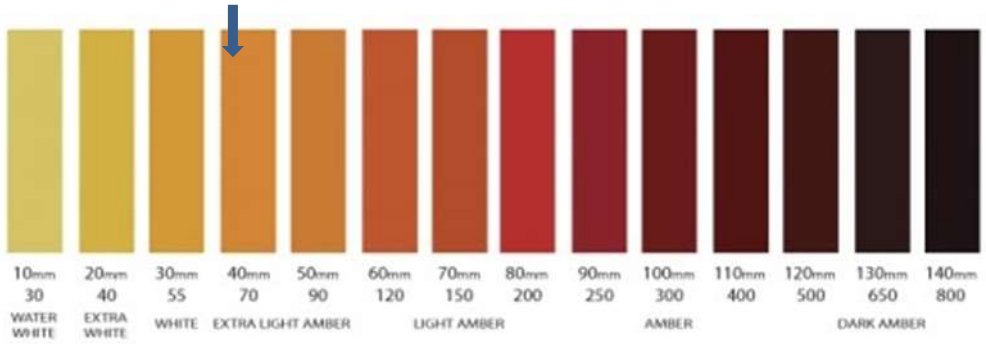

Figure (2). The color of honey sample. It was ranged from 40 mm to50 mm (extra light amber) according to pfand scale of USAD

Table (2). Showed some chemical/physical characteristics of *A. pavarii* honey sample.

Viscosity (Pa. s)	PH	Moisture	Ash
41.63	4.44	16.60%	83.04%

Table (3). The pollens content according to the number of pollen type in *A. pavarii* honey sample.

Pollen type	%
very frequent	77.58%
Frequent	18.103%
Isolate	4.32%
Total	232

An important parameter of honey is its color, which reflects the floral source (Bertoncelj *et al.*, 2007) and it plays a major role in determining the quality and market value of honey sample. Because of the climatic conditions in El-Gabal El-Akhdar area (El shatshat *et al.*, 2009), its plants have a number of strategies to control or avoid the long drought period. Anatomically, the presence of phenolic compounds which found in different plant parts is a feature for these plants in facing such this climatic conditions. *A. pavarii* anatomical study revealed presence of special cells contain phenolic component (El shatshat 1997). The phenolic components are responsible of the honey color (Ponits *et al.,* 2013) and, therefore, the honey sample of *A. pavarii* had relatively dark color (extra light amber), in addition, secretion of these

compounds is clear in the honey of *A. pavarii* with acrid and bitter taste.

Honey normally has low moisture content and it depends on the materials collected by the bees during foraging on the flora (Terrab *et al.,* 2004). Assaying the moisture of this honey type revealed this fact while it was (16.60%). The results showed also that the pH value (4.44) was fell within the prescribed acidic range of 3.54 to 5.5 (Bogdanov *et al.,* 2004).

Pollen grains are always found in natural honey processed by standardized methods. The pollen content of the honey not only reflects the floral diversity and species composition of the plants foraged by the honey bees, but the quality and purity of the honey type.

From the results, it is clear that the most contents of pollens were belonging to *A. pavarii*. They were appeared distinctive and featured prominently in the sample with value of 77.58% (table 3). The results were agreed with a number of studies of honey purity using mellisopalynology as qualitative method (Andrada *et al.*, 2005; Bilisik *et al.*, 2008 and El abidi & El shatshat 2016).

This can be explained by the fact that the presence of the pollens due to the vegetation cover in the area and because of the flowering season of *A. pavarii* , which started from October to February. If we know that the area receive the precipitations in like these months from the year, and the most plants which form the vegetation cover are annuals and rainfall depends, this reflect their presence, and thus, a little numbers and types of other pollens were exist in the sample.

Clearly, and because of species endemism, the honey of *A. pavarii* is one of important special and specific honey types in Libya. According to this plant critical situation (El shatshat 2009; El shatshat 2015; El shatshat *et al.*, 2009), a number of methods should take in account using conservation programs to protect this species and others from different impacts caused by climatic changes and human activities. And subsequently, protect it as specific forage plant for bees not in the area but the world.

REFERENCES

1. *Andrada A., and T. Mari´A Cristina (2005) Pollen collected by honey bees (Apis mellifera L.) from south of Calde´n district (Argentina): botanical origin and protein content, Grana, 44: 115–122*
2. *Bertoncelj J., Doberšek U., Jamnik M., and T. Golob (2007) Evaluation of the phenolic content, antioxidant activity and color of Slovenian honey. Food Chemistry, 105, 822-828.*
3. *Bilisik A., Cakmak I., Bicakci A., and M. Hulusi, (2008) Seasonal variation of collected pollen loads of honeybees,(Apis melliferaL. anatoliaca), Grana, 47: 70–77.*
4. *Bogdanov, S., Ruoff, K. and L. P. Oddo (2004), European unifloral honeys. Apidologie, 35: (1), 4 - 17.*
5. *Bouls, L. (1975) "The Mediterranean element in the flora of Libya", in La flora De Bassin Mediterranean, Paris.*
6. *El abidi, N., and S., Elshatshat (2016), the effect of microhabitat on qualitative characteristics of the wild jujube Ziziphus lotus (L.) Desf. Libyan honey type, Journal of Chemical and Pharmaceutical Research,*
7. *El shatshat, S., (1997) Physiological Ecology of Arbutus pavarii Pamp. M.Sc. Thesis, Garyounis University, Benghazi, Libya*
8. *El shatshat, S., (2009), Biological conservation of the endemic Arbutus pavarii Pamp.: Seed germination as attempt, International Journal Of Human Geography And Environmental Studies.*
9. *El shatshat, S., (2015), Increasing anthropogenic impacts on restricted-range taxa of Libya from 2011 to 2015, Archives of Applied Science Research, 7 (5):91-96.*
10. *El shatshat S., Thabt G. and N. Elhashani (2009). Critical situation of the vegetation of EL-Gabal EL- Akhdar area: Physical and anthropogenic factors and their effects on wild utilized and endemic taxa, International Journal of Sustainability Science and Studies, 1: 61-63.*
11. *Ferreira I. C., Aires F. R., Barreira J. C. M., and L. M. Estevinho (2009) Antioxidant activity of Portuguese honey samples: Different contributions of the entire honey and phenolic extract. Food Chemistry, 114, 1438-1443.*
12. *Gimingham, C. H. & K. Walton (1954) Environment and the scrub communities on the limestone plateau of northern Cyrenaica", Journal of Ecology 42, 505-520*
13. *Keith, H. G. (1965) Preliminary check list of flora of Libya", Ministry of agriculture, Tripoli, Libya.*
14. *Louveaux J., Maurizio M. and G. Vorwohl (1970) Methods of melissopalynology, International Commission for Bee, Botany of IUBS, 51(3): 125-138*
15. *Qaisor, M. and A. Elgadi (1986) Critical analysis of the flora of Libya, Libyan journal of science 13, 32- 40.*
16. *Ponits J. A., Mendonça, L. A., Costa A., Silva J. R. and A. Flach (2013) Color, phenolic and flavonoid content, and antioxidant activity of honey from Roraima, Food Sci. Technol, Campinas, 34(1): 69-73.*
17. *Siddqi, M., A. (1977) Flora of Libya, Elfateh Uni., Tripoli, Libya.*
18. *Research, 8(8):1199-1202*
19. *Terrab A., Pontis A., Heredia F. and M. Di'ez (2004). A preliminary palynological characterization of Spanish thyme honeys, Botanical Journal of the Linnean Society, 146, 323–330.*
20. *Walter K. S. & H. J. Gellitt, "IUCN red list of threatened plants", The world conservation monitoring center, 1997.*