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Editorial

Lead Contamination in Honey: A Hot Issue

Ioannis K Karabagias*

Post Doctoral Researcher, Department of Chemistry, Laboratory of Food Chemistry, University of Ioannina, Ioannina, Greece

***Corresponding Author:** Ioannis K Karabagias, Post Doctoral Researcher, Department of Chemistry, Laboratory of Food Chemistry, University of Ioannina, Ioannina, Greece.

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Beekeeping or apiculture has been practiced and well developed for many centuries, since at least the times of glorious civilizations such as Ancient Egypt and Ancient Greece. Apart from honey and pollination, honeybees (*Apis mellifera*) produce beeswax, royal jelly and propolis. Bees have appeared in mythology and folklore, through all phases of art and literature, from ancient times to the present day. Even in music, we often hear lyrics referring to honeybees: "I got stung by a sweet honey bee…", mentioned Elvis Presley in the homonymous song (I Got Stung, 1958).

Bees in search of pollen sources fly in a radius of up to 3 km [1]. Given that, the forage area of the beehives is sometimes very large (more than ca. 7 km^2) [2], the estimated area of flying is enormous, based on the formula:

$$Area = \pi \times r^2 \quad .....[3],$$

where π is the constant of Archimedes, equal to approximately 3.14, and r is the radius (km).

Honeybee may then cover an area of over 30 acres. In that sense, honeybees come in contact with not only air but also with soil and water of unknown purity. Hence, honey could serve as a good biomonitor of environmental pollution by the determination of certain heavy metals such as lead, cadmium, copper, nickel, hydrargyrus, etc. The main mineral components of honey are oxides of potassium, phosphorus, calcium and sodium. There are also many microelements and trace elements such as Pb, Cd, Zn, Fe, Mg, Mn, Al, Si, B, Sn, Ba, Ag, Mo, Cr and As, which are important in the daily human diet when assumed in low levels [1].

Metal contamination of foodstuffs (i.e. with Cu, Pb, Cd) is a hot issue in the modern and highly "technologized" world [4]. Before 15 years ago for example, there were no specific maximum residue limit (MRL) values for Pb and Cd in honey, but values of 0.1 mg/kg for Cd and 1 mg/kg for Pb were suggested by some European Authorities [5].

Exposure to lead is well known to have adverse effects on human health, especially on the nervous system of young children, cardiovascular effects and nephrotoxicity in adults. Children are particularly vulnerable and an elevated blood lead level has been associated with a reduced Intelligence Quotient score (IQ) and reduced cognitive functions [6].

However, more recently the maximum level of lead content in honey was set at 0.1 mg/kg [7]. If we take a look in the past literature involving mineral content of honey, we might realize that the upper level of 0.1 mg/kg for lead was surpassed in certain types of honeys, produced all over the world.

Given the great evolution in instrumental methods of analysis, such as elemental inductively coupled plasma sector field mass spectrometry [5], flame atomic absorption spectrometry [8], inductively coupled plasma optical emission spectroscopy [9], inductively coupled plasma mass spectrometry [10], heavy metals may be determined with a high degree of accuracy and repeatability, in a short time of analysis.

Therefore, to maintain the nutritional and medicinal offers/properties of this ''blessed'' natural product, along with its flourishing market distribution, beekeepers or their associations in cooperation with the honey industry and research community, should develop novel strategies.

Some typical suggestions include, but are not restricted to:

i) Since, honey is an acidic product, it may react with surfaces containing lead, allowing lead to be absorbed by the honey. Therefore, lead-bearing equipment should be avoided [11].

ii) A reconsideration of beehives location, far away from areas with a high traffic degree, incinerators or industrial activities, which may result in the release of lead in the environment.

iii) Beekeepers' training, regarding biological practices for honey production, in terms of a controlled domestic apiculture which may be finally developed in a global level.

iv) A new e-label containing information about the soil of the regions where honey was harvested, along with the level of lead determined in each honey batch that will enter the market.

v) However, uncontrolled parameters like a consecutive dry weather, which favors the heavy metal pollution, and accumulation, should also be considered on the aforementioned efforts [6].

Conflicts of Interest

The author needs financial support to develop the research program entitled: "Lead-in".

Bibliography

1. Madejczyk M and Baralkiewicz D. "Characterization of Polish rape and honeydew honey according to their mineral contents using ICP-MS and F-AAS/AES". *Analytica Chimica Acta* 617.1-2 (2008): 11-17.

2. Ioannidou MD., *et al*. "Direct determination of toxic trace metals in honey and sugars using inductively coupled plasma atomic emission spectrometry". *Talanta* 65.1 (2005): 92-97.

3. Arndt J and Haenel C. "Pi-Unleashed". Springer, USA (2001): 3-30.

4. Commission Regulation EC No. 1881/2006 setting maximum levels of certain contaminants in foodstuffs.

5. Bogdanov S., *et al*. "Minerals in honey: environmental, geographical and botanical aspects". *Journal of Apicultural Research and Bee World* 46.4 (2007): 269-275.

6. Martinello V., *et al*. "Retrospective evaluation of lead contamination in honey from 2005 to present in northeastern Italy and future perspectives in the light of updated legislation". *Food Additives and Contaminants: Part B* 9.3 (2017): 198-202.

7. Commission Regulation (EU) No. 2015/1005 of 25 June 2015 amending Regulation (EC) No 1881/2006 as regards maximum levels of lead in certain foodstuffs. Official Journal of the European Union L 161/9-13.

8. Lachman J., *et al*. "Analysis of minority honey components: Possible use for the evaluation of honey quality". *Food Chemistry* 101.3 (2007): 973-979.

9. Louppis A., *et al*. "Botanical discrimination of Greek unifloral honeys based on mineral content in combination with physicochemical parameter analysis, using a validated chemometric approach". *Microchemical Journal* 135 (2017): 180-189.

10. Chudzinska M and Baralkiewicz D. "Application of ICP-MS method of determination of 15 elements in honey with chemometric approach for the verification of their authenticity". *Food and Chemical Toxicology* 49 (2011): 2741-2749.

11. Canadian Food Inspection Agency (2016).

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