DETERMINATION OF ESSENTIAL AND HEAVY METALS IN KENYAN HONEY BY ATOMIC ABSORPTION AND EMMI SION SPECTROSCOPY

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Introduction

- Honey is unfermented, sweet substance produced by honeybees from their nectar of blossoms or secretion s of or on living plants, which they collect, transform and combine with specific substances, and store in honey combs.
- Honey from different sources vary in composition, but generally, all honey contains sugars, moisture, acids, minerals, enzymes and other components like proteins, pollen, colloids and heavy metals.
- Honey possesses numerous nutritional, healing and prophylactic properties.
- In order to have beneficial effects, honey must be free from any contaminating agents. High concentration of metals in honey can be a source of illness to humans. When the content of heavy metals in honey are present beyond acceptable levels

Objective

- To determine essential metals (K, Na, ca, Mg, Fe) and heavy metals (Zn, Cu, Pb,Cd,As) in honey samples form various regions in Kenya.

Methodology

Instrumentation:

Flame atomic absorption spectrophotometer (buck scientific model 210vgp), HVG-1 hydride vapor generator- Flame atomic absorption spectrophotometer (AA-6200), flame photometer (corning 410), hollow cathode lamp, air/acetylene flame

Sample collection and preparation:

Honey samples from Kitui, Ngong, Laikipia, Baringo, Nairobi, Kibwezi, Lamu, Mbeere
and Embu were collected from National Beekeeping Station in Nairobi, Kenya.
Digestion was done using nitric/perchloric acid followed by filtration.
For the determination of Ca and mg, strontium was added to reduce interference from aluminium and phosphorous.

Analysis of metal elements in honey samples:

K and Na were determined using flame photometer.
Ca, Mg, Fe, Zn, Cu and Cd were determined using flame atomic absorption spectrometer
As was determined using hydride generation atomic absorption spectrometer

Findings

- Concentration of metals varied from one sample to another depending on the botanical origin, climatic conditions, extraction and storage techniques.
- Kitui, Meru and Mbeere had higher levels of K, Na, Ca and Mg compared to other regions
- Concentration of Cd and As were low in all honey samples

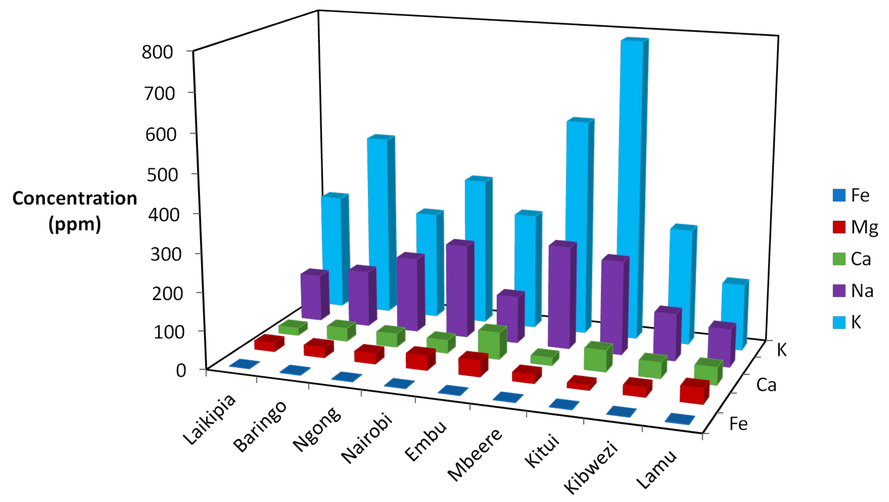

Figure 1: Concentration of essential metals in honey samples from different regions

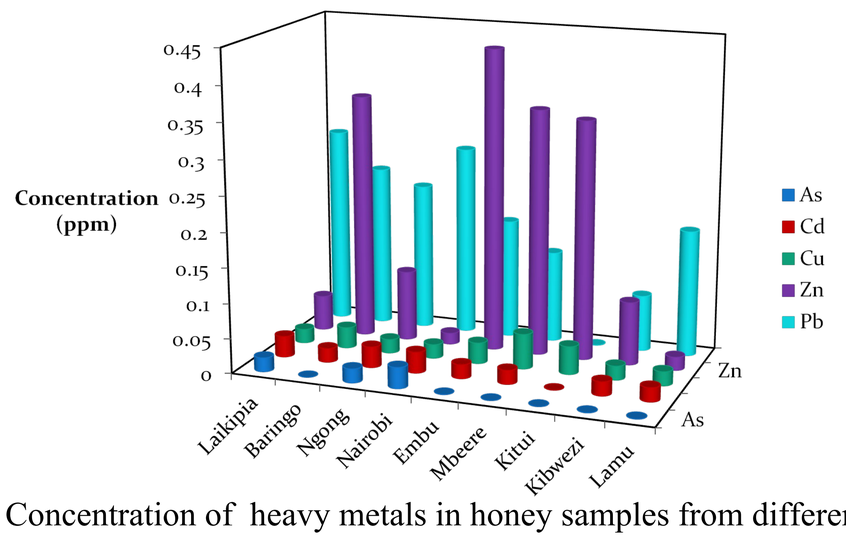

Figure 2: Concentration of heavy metals in honey samples from different regions

Conclusions

- All the samples recorded values below the maximum level of Cd permitted in foods (0.1 ppm)by Kenya Bureau of standards (KEBS).
- All values of As recorded were within the KEBS permitted value of 0.5ppm in food.

Literature cited

- Coldex Almentarius Commission (1983/84). Proposed Codex Standard for Honey (Rome: FAO/WHO) CX/PFV 84/13
- Hase S. (1973). Changes in Quality of Honey Caused by Heating and Storage, pp 248-256.
- Watton M. (1976, 1978). Effect of accelerated storage conditions on the chemical composition and properties of Australlian honeys, pp 23-28, 167-172.

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