

Physico-Chemical Profile of Four Types of Honey from the South of the Republic of Moldova

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Abstract

There are many studies that compare the quality and biological characteristics of honey with distinct geographical and botanical origins. However, the physico-chemical and biological properties of different types of honey in the same production regions are rarely mentioned. The honey used in this study: sunflower honey, rapeseed honey, manna honey and polyflora honey, came from GT “Malai C” in Taraclia village, Causeni district in the southern part of the Republic of Moldova and belonged to the flowering season of year 2020. Following the polynecological analysis, it was found that two types of honey are monofloral with a dominant pollen content of *Helianthus spp.* (49.15% - 93.12%) in sunflower honey and *Brassica spp.* (52.17% - 70.11%) in rapeseed honey. Mana honey and polyflora contain several types of pollen. Thus, four types were identified in manna honey, including: *Acer platanoides* (29.11% - 30.11%), *Quercus robur* (28.67% - 29.99%), *Rubus idaeus* (21.55% - 28.78%), *Taraxacum officinale* (22.21% - 28.76%). Polyflora honey contains: *Helianthus annuus* (24.91% - 31.11%), *Brassica napus* (23.45% - 29.18%), *Tilia* (28.95% - 31.92%). Based on a Pfund scale, it was found that the color of the honey varied from a lighter shade for rapeseed honey (water amber 7.66 ± 3.002 mm) to a darker color for sunflower honey and polyflora (extra light amber 34.366 ± 21.01 mm and 36.04 ± 1.115 mm respectively). Spectrophotometric determination of phenolic compounds in honey samples showed that their content ranged from 38.18 mg GAE/kg honey for rapeseed honey to 831.09 mg GAE/kg honey for manna honey. At the same time, the flavonoid content ranged from 28.41 mg QUE/kg honey for rapeseed honey to 151.72 mg QUE/kg honey for manna honey. Mana honey showed a better antioxidant activity than the other honey samples in the study (72.03%). The reported results suggest that manna honey has the best potential and its consumption in the human diet as food with valuable biological properties can be

encouraged, despite the fact that in the Republic of Moldova it is in a small amount.

Keywords

Honey, Palynological Analysis, Physico-Chemical Indices, Penolic Compounds, Flavonoids

1. Introduction

Honey is a sweet, viscous substance produced by honey bees (*Apis mellifera L.*) [1]. The food is the only natural sweetener that people can use without processing [2] [3]. From ancient times, honey is considered an important food for Homo sapiens, and the relationship between bees and humans began in the Stone Age [4] [5]. During the evaluation of mankind, honey became an important commercial currency with which to pay for certain taxes [6] [7]. There has always been a strong link between humans and bees, and this relationship is largely based on the fact that 80% of plants are pollinated by bees [8] and today, beekeeping is becoming a key occupation for income generation, especially in countries developing [9] [10].

At the same time, the increased interest in honey is argued, in particular, by its therapeutic properties [11] [12] [13], including wound healing [14], treatment gastric ulcer [15], in preventing and combating cancer [16] [17] [18], and other. The anti-inflammatory properties of bee honey reduce the severity of lung manifestations in COVID-19 infections, which is quite important in the current context [19] [20] [21].

The Republic of Moldova has a rich tradition in terms of honey production, with an average of 4.000 tons per year, but which is mostly exported to the European Union [22]. The surfaces of the fruit plantations from the agricultural enterprises and the peasant households represent 44.323 ha, and for their pollination approximately 132.969 bee families are necessary.

At the same time, in the period 2008-2017 a slight increase in the number of bee families was reported, from 98.3 thousand in 2008 to 148.1 thousand in 2017. The cost of producing one kilogram of honey in the Republic of Moldova depends largely on the amount of honey obtained, which is closely related to climatic conditions and is in the range of 1.65 - 1.80 US dollars in the case of a “normal” year [23].

Studies that highlight the quality of local honey in geographical areas of the Republic of Moldova, at the moment, are not enough. The purpose of this study was: to perform pollen analysis of four types of honey from the southern part of the Republic of Moldova; to determine chromatic and physico-chemical indices: pH, free acidity, humidity, electrical conductivity, hydroxymethylfurfural (HMF) content; to determine the content of polyphenols, flavonoids and DDPH and to compare results obtained with data from the literature.