COMPARISON OF THE ANTIOXIDANT ACTIVITY AND THE CONTENT OF PHENOLIC COMPOUNDS IN LIGHT AND DARK HONEYS

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Introduction

Fast pace of life, environmental pollution and smoking significantly influences our wellbeing, appearance and health. This kind of life style creates perfect conditions for formation of free radicals. Incorporating antioxidants in everyday diet can provide protection against negative effects of free radicals activity. Antioxidants protect cells and DNA from damage and slow down the process of aging.

The aim of the study was to determine the antioxidant activity against the $DPPH^+$ radical and the content of phenolic compounds in light and dark honeys.

Material and methods

As a material for the study, samples of honey from the Research Institute of Horticulture, Apicultural Division were used. Samples of the following honey varieties were studied: acacia, rape, lime, honeydew, heather and buckwheat.

While studying the antioxidant properties of the chosen honey varieties, their capability of inactivation of the $DPPH^+$ radical was determined and the total content of polyphenols using Folin-Ciocalteu method was estimated. In addition, phenolic compounds were identified using high-performance liquid chromatography with diode array detector (HPLC-DAD).

Results

The antioxidant activity (Fig. 1.) against $DPPH^+$ was from19.1% to 44.1% for light honeys (acacia, rape, lime) and from 45.3% to 85% for dark honeys (honeydew, heather, buckwheat).

The total phenolic content (Fig. 2.) expressed as gallic acid was 24.0 - 40.4 mg/kg for light honeys (acacia, rape, lime) and 64.9 - 186.4 mg/kg for dark honeys (honeydew, heather, buckwheat).

The content of phenolic compounds identified by HPLC-DAD (Fig. 3.) differed between studied honeys. In all varieties salicylic acid, p-coumaric acid, quercetin, and hesperetin were found. The highest content of salicylic acid was determined in acacia (8.97 mg/kg), heather (14.14 mg/kg) and buckwheat honey (12.38 mg/kg); p-coumaric acid - in buckwheat (11.47 mg/kg), heather (5.36 mg/kg) and lime honey (5.21 mg/kg); quercetin - in lime (9.04 mg/kg), honeydew (7.93 mg/kg) and buckwheat honey (6.61 mg/kg); and hesperetin - in lime (424.20 mg/kg), buckwheat (28.41 mg/kg) and honeydew honey (24.40 mg/kg).

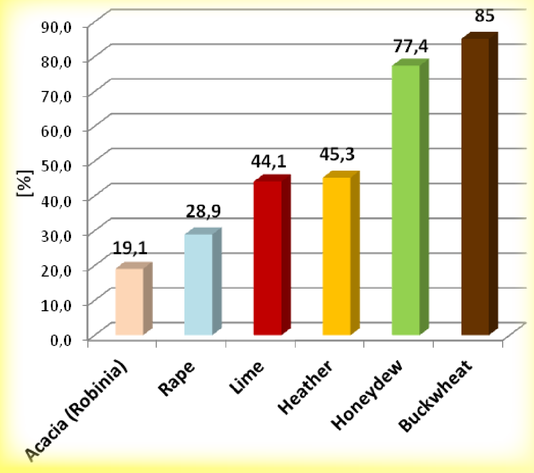

Fig. 1. Antioxidant activity against the DPPH+ radical.

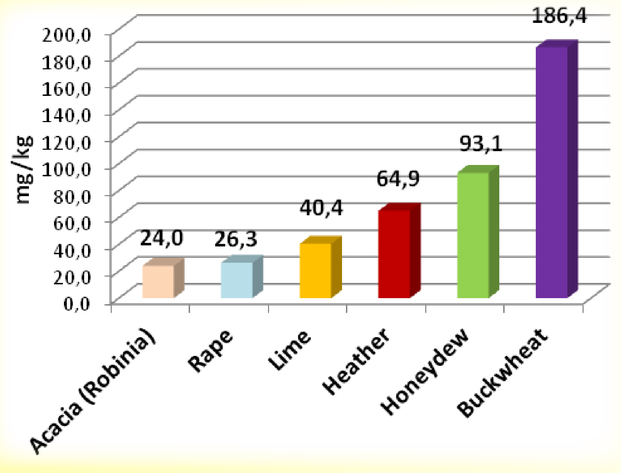

Fig. 2. The total content of phenolic compounds in light and dark honeys.

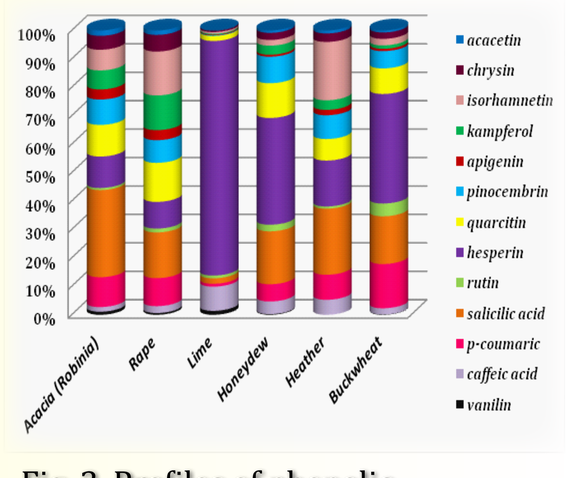

Fig. 3. Profiles of phenolic compounds identified by HPLC-DAD in the studied honeys.

Summary

1. The results indicate that there is an interrelation between the total content of polyphenols in honey and its antioxidant activity against the $DPPH^+$ radical. Dark honeys (buckwheat, heather) had higher content of polyphenols and showed higher antioxidant activity than light honeys (acacia, rape).
2. The content of biologically active phenolic compounds gives the honey its high antioxidant efficacy.
3. Dark buckwheat honey has much higher antioxidant activity than the very light acacia honey. Thus,it can be concluded that honey color indicates the content of antioxidants, the darker color the higher the antioxidant activity.