

MODIFICATIONS OF ENZYME ACTIVITY IN THE POLLEN AND PROPOLIS SAMPLES UNDER THE INFLUENCE OF UV-B RADIATIONS

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Abstract

The effect of the UV ultraviolet type of radiations influence the growth and development of the plants from different geographical regions has been investigated, so that the bees harvest pure and ecological products with a high content of vitamins and minerals.

We wanted to highlight the effect of the UV B ultraviolet type radiations on the plants, as well as their influence on the apiarian products resulted from the beekeepers from these geographical areas.

The paper shows the test results of the propolis and pollen samples which have been collected as raw material by the beekeepers from various regions of Bihor County.

Keywords: UV B radiations, pollen, HPLC method

INTRODUCTION

Propolis is a resinous substance collected by bees from exudates of different plants that is rich in health-relevant phenolic compounds such as polyphenols, flavonoids, phenolic acids and their esters), terpenoids, steroids and amino acids. Propolis extracts are very complex matrices difficult to study (Bertelli et al., 2012; Markham et al., 1996). The composition of the propolis depends on the vegetation from the collection areas. The pollen is composed of a multitude of microscopic corpuscles, contained in the pollen sacs of the flower's stamens' arteries (Simionovici et al., 1983; Villanueva et al., 2002).

The bee pollen contains the following substances: vitamins (provitamin A, vitamin A, vitamin B1, B2, B3, B5, B6, B12, vitamin C, D, E, F, H, K, PP and folic acid), minerals (calcium, phosphorus, potassium, iron, copper, iodine, zinc, sulfur, sodium, chlorine, magnesium, molybdenum, selenium, bromine, silicium and titanium), amino acids, carbohydrates, fatty acids, enzymes, co-enzymes and various fats, minerals necessary to the body, even those minerals that are not usually found in dietary supplements sold in pharmacies (Haro et al., 2000; Rawhi, 2012; Simionovici et al., 1983).

Some of the species present minor deviations, morphological and structural changes in pollen structure, These small changes, as well as other exogenous factors, are able to explain the yearly increase of the allergenic potential of the plants (Blaney, Grey, 2000; Pallag et al., 2000).

The technical details are described in the article and the results conclude that the samples from the high mountainous area show the highest concentration of ascorbic acid and therefore have the best antioxidant effect.

The effect of the ultraviolet type radiations that influence the growth and development of the plants from different geographical regions has been investigated, so that the bees harvest pure and ecological products with a high content of vitamins and minerals (Marcucci, 1995; Neacșu, 2002).

The antioxidant properties depend on the level of ascorbic acid content (Leja et al., 1995).

All of these information determined the study of the effect of the UV B ultraviolet type radiations on the plants pollen and propolis ascorbic acid content.

MATERIALS AND METHODS

The samples were collected as raw materials from: Arieșeni area and Oradea area. The raw propolis was extracted with ethanol at a temperature of 65°C, for 24 hours, by default methods.

The propolis must be ground well, the pollen must be put each in a mortar (to increase the contact surface with the alcohol and to aid the extraction process) and ethylic alcohol must be added of 80-90°, 3 parts propolis (i.e. pollen), 10 parts of ethylic alcohol must be added. These substances were left in the water bath at a temperature of 65 degrees, for 24 hours. The ethanol suspension was separated by centrifugation for 10 minutes at 1000 rpm, after which the obtained solution was vacuum filtered and analyzed on the HPLC (high performance liquid chromatography) (Markham et al., 1996; Rawhi, 2012).

RESULTS AND DISCUSSION

One sample of pollen and propolis, from each of the two different regions of Bihor County, were analyzed through the HPLC method, to highlight the ascorbic acid content.

The obtained results can be observed in Figure 1 and Figure 2.

The results shows that the ascorbic acid content has a higher level in Arieseni area samples for pollen and propolis too.

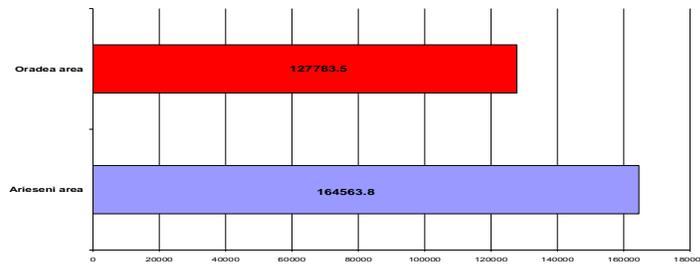


Fig. 1. Ascorbic acid content ($\mu\text{g}/\text{kg}$) in pollen samples

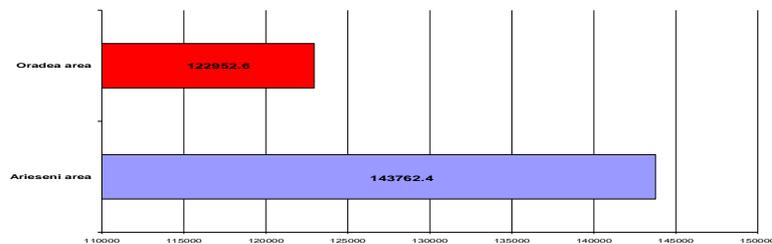


Fig. 2. Ascorbic acid content ($\mu\text{g}/\text{kg}$) in propolis samples

CONCLUSIONS

The physiological and developmental processes of the plants are affected by the UVB radiations, even by the current UVB radiation levels (Ahn et al., 2007; Bogdanov, 2006). Despite the mechanisms to reduce or mitigate these effects and a limited ability to adapt to a high level of UVB radiations, the plants' development may be directly affected (Alvarez et al., 1998; Gram, Sork, 2001).

High quality pollen and propolis must not contain impurities, must not be collected from areas polluted with pesticides, insecticides, fertilizers, industrial pollutants, areas with high ultraviolet radiations, must not be contaminated radioactively, must not come from a hive where there have been used synthetic drugs or antibiotics. The pollen and propolis, due to the substances present in their composition, exhibit a wide biological activity, although not very high, and in order to obtain a highly therapeutic result, we must have quality products.

The effects of the ultraviolet UV radiations differ slightly, depending on the geographical region, due to the fact that at high altitudes (mountains) the ultraviolet radiations reaching the plants are smaller thus increasing the ascorbic acid concentration for the pollen and propolis; a decrease in the ascorbic acid concentration, regarding the pollen and propolis.

The values obtained from the measurements that were performed revealed that the samples collected from the highest area, namely the mountainous region Arieșeni has the highest content of ascorbic acid, respectively the best antioxidant activity. In the same time the differences shows probably the higher level of pollution in Oradea's area compared with Arieseni's area.

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