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ANTIOXIDANT ACTIVITY AND TOTAL PHENOLIC CONTENT IN POLLEN LOADS AND BEE BREAD COLLECTED FROM ECOLOGICAL APIARY

INTRODUCTION

In recent years, there has been an intensive search for neuroprotective substances, i.e. those that are intended to protect neuronal cells from damage leading to their death. Due to their multidirectional mechanism of action, phenolic compounds of plant origin exhibit good neuroprotective properties. Bee products, such as pollen collected by bees and bee bread, play an important role in the human diet due to their nutritional and health-promoting properties. Phenolic compounds present in these products exhibit strong antioxidant effects, which can contribute to protecting the body from oxidative stress.

The aim of the study was to investigate the antioxidant properties and total phenolic content of pollen and bee bread collected from an ecological apiary.

MATERIAL AND METHODS

Material

The pollen loads and bee bread samples were collected in 2024 beekeeping seasons in an ecological apiary of the National Research Institute of Horticulture, Apiculture Division in Pulawy, located in the Poleski National Park.

Methods

Palynological analysis were conducted by microscopic analysis according Pokajewicz et al. (2024).

The radical scavenging activity of the extract of pollen loads and bee bread samples was assessed by using 2,2-Diphenyl-1-picrylhydrazyl assay according to the method reported by Kahraman et al. (2022). The principle of the method is based on the measurement of the reducing ability of antioxidant components toward DPPH radical.

TPC was determined in aqueous extracts of pollen loads and bee bread samples by using the Folin–Ciocalteu method which was described by Pelka et al. (2021). The principle of the method is to use the ability of phenols to form a colored blue complex with the reactants of the Folin-Ciocalteu reagent and a saturated solution of sodium carbonate (Na_2CO_3).

CONCLUSIONS

1. Bee bread obtained from an ecological apiary compared to pollen loads is characterized by higher biological value determined by antioxidant activity and total phenolic content.

2. The results obtained in this work constitute the basis for continuing research into the use of bee bread in human nutrition and the treatment of civilization diseases.

RESULTS

The results showed that bee bread samples from ecological apiaries contained a higher total phenolic content (mean 1439.7 mg GAE/100 g) compared to pollen loads (mean 304.8 mg GAE/100 g) collected from the same apiary. Antioxidant activity expressed as the percentage of DPPH reduction, was also higher in bee bread samples (mean reduction 94.4%) compared to samples of pollen loads (mean reduction 87.9%).

Fig.1. Standard curve of galic acid (0 – 200 µg/L)

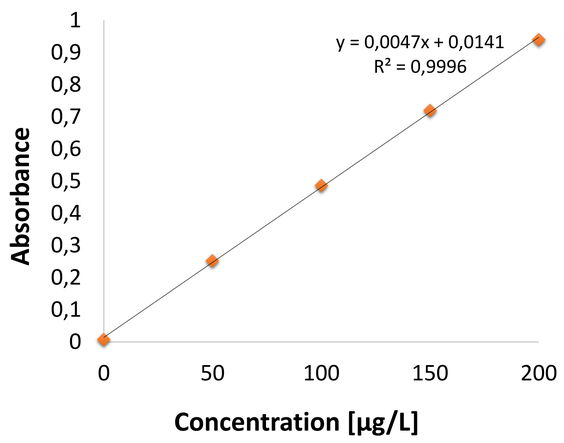

Table 1. Total phenolic content (mg GAE/100 g) and antioxidant activity (DPPH %) of pollen loads and bee bread samples from ecological apiary

	Total phenolic content (mgGAE/100 g)		Antioxidant activity (DPPH %)	
	Bee Bread	Pollen	Bee Bread	Pollen
Mean	1439,7	304,8	94,4	87,9
SD	259,8	73,0	1,8	0,5
Min	1053,9	216,2	91,3	87,1
Max	1728,3	381,4	96,5	88,5
CV	18,0	23,9	1,9	0,5

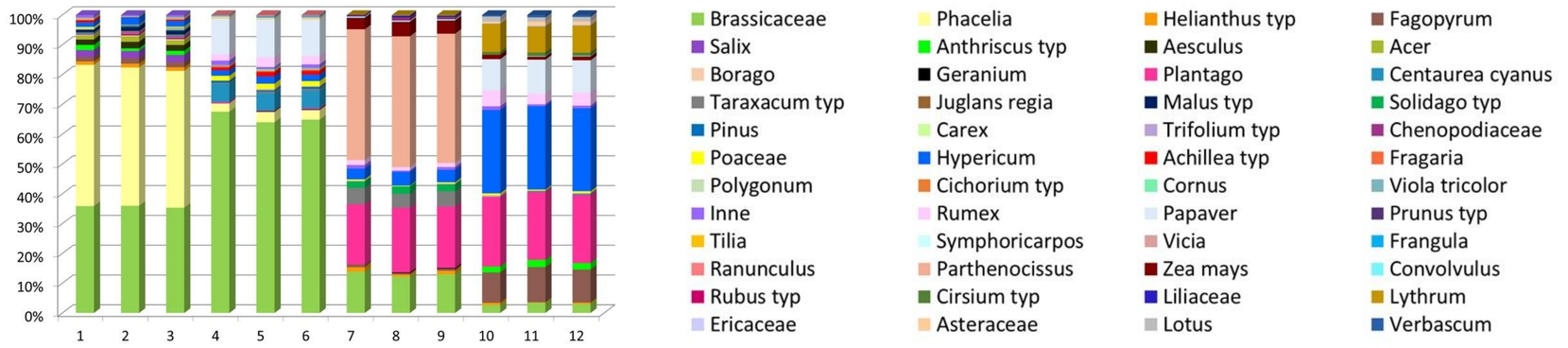

Fig. 2. Pollen spectrum of pollen loads samples from ecological apiary (%)

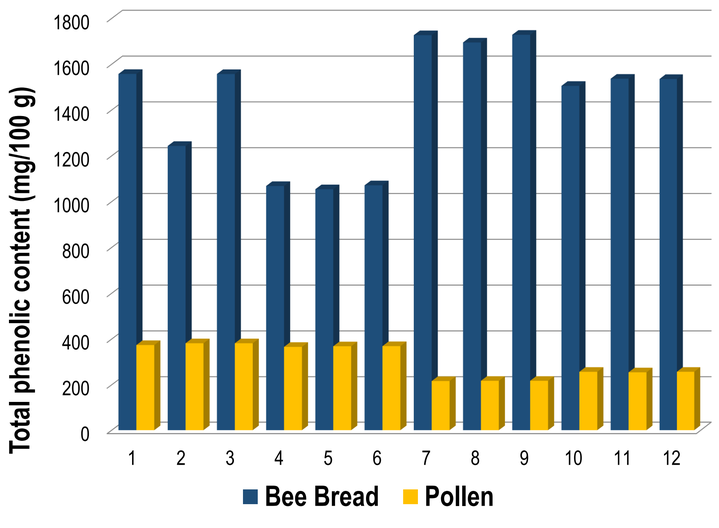

Fig. 3. Total phenolic content (mg GAE/100 g) in pollen loads and bee bread samples from an ecological apiary

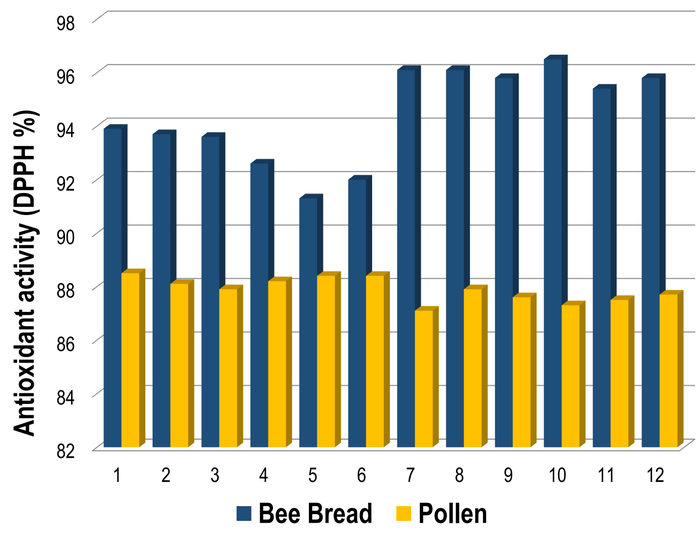

Fig. 4. Antioxidant activity (DPPH %) in pollen loads and bee bread samples from an ecological apiary

Fig. 5. Pollen spectrum of bee bread samples from ecological apiary (%)