Antioxidant activity and total phenolic content in pollen loads and bee bread collected from an ecological apiary

Katarzyna Jaśkiewicz, https://orcid.org/0000-0002-4494-1991

Teresa Szczęsna, https://orcid.org/0000-0002-0161-0287

The National Institute of Horticultural Research, Apiculture Division

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
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
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 Puławy, located in the Poleski National Park.

Methods
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).

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%).

Conclusion
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. 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.

Keywords: TPC, DPPH, bee pollen, bee bread.