INDIVIDUAL PHENOLIC COMPOUNDS COMPARISON OF BUCKWHEAT HONEY AND FLORAL SOURCE

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Honey's nutritional, physical, and bioactive characteristics are strongly shaped by the plant from which its nectar is collected. Variations in nectar sugars, phenolics, and volatiles substances – determine the honey's color, flavor, texture, and biological activity. Monofloral honeys reflect the properties of a single plant species, whereas polyfloral honeys show mixed profiles [1]. The aim of this study is to compare the phytochemical composition of buckwheat honey with that of its floral source.

Buckwheat honey samples were collected in 2023 from five apiaries, and buckwheat flowers were obtained from two Lithuanian fields. Extracts were prepared by extracting 1 g of each sample with 70% ethanol, sonicating for 20 minutes, filtering under vacuum into 10 mL flasks, and adjusting to volume with ethanol. Before UHPLC-MS/MS analysis, all solutions were filtered through 0.22 µm membranes. Statistical analysis was performed using MS Excel 2023, $P<0.05$ was taken as the level for significance.

Both samples: honey and buckwheat flowers contained quercetin, p-coumaric, ferulic, chlorogenic and protocatechuic acids. The amounts of quercetin, chlorogenic, and protocatechuic acids were markedly higher in flowers than in honey (36.33±3.17 vs. 2.43±2.85 µg/g; 330.07±25.35 vs. 0.74±1.02 µg/g; 22.11±1.75 vs. 0.64±0.58 µg/g, respectively). Quercetin was found mainly in the flowers (36.33±3.17 µg/g), while its concentration in honey was significantly lower (2.43±2.85 µg/g). In contrast, honey showed higher levels of p-coumaric and ferulic acids (6.82±1.98 and 2.34±3.04 µg/g) than flowers (0.12±0.15 and 0.93±0.16 µg/g). Isorhamnetin, acacetin, luteolin, kaempferol, and apigenin were detected only in honey (1.61±2.55, 0.90±0.23, 0.91±0.97, 0.64±0.42, 0.11±0.04 µg/g), likely reflecting pollen from other plant species. In addition to these compounds, several phenolics were detected exclusively in buckwheat flowers, including neochlorogenic acid, caffeic acid, vanillic acid, quercitrin, hyperoside, rutin, isoquercitrin, quercetin-3-O-arabinopiranoside, vitexin, isovitexin, kaempferol-3-O-rutinoside, kaempherol-3-O-glucoside, orientin, luteolin-7-O-rutinoside, luteolin-3,7-diglucoside, isorhamnetin-3-O-rutinoside, myricitrin, procyanidin B1, procyanidin B2, procyanidin C1, (+)-catechin, (−)-epicatechin, phloridzin.

In conclusion, buckwheat flowers demonstrated significantly higher concentrations of quercetin, chlorogenic and protocatechuic acids and a markedly broader spectrum of flavonoids and proanthocyanidins than honey, whereas the exclusive detection of specific flavonoids (acacetin, apigenin, isorhamnetin, luteolin, and kaempferol) in honey, together with elevated p-coumaric and ferulic acid levels, indicates contributions from other plant sources and underscores the complex botanical origin shaping its bioactive profile during nectar foraging.

Keywords: Biochemical properties, Buckwheat honey, Phenolic compounds, Buckwheat flowers, Biochemical profile

[1] Y. Cheung, M. Meenu, X. Yu, and B. Xu, "Phenolic acids and flavonoids profiles of commercial honey from different floral sources and geographic sources," International Journal of Food Properties, vol. 22, no. 1, pp. 290–308, Jan. 2019, doi: 10.1080/10942912.2019.1579835.