

# Quantitative analysis of flavonoids in Slovenian raw propolis

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The chemical composition of propolis is highly variable, depending on the plant sources available to the bees, the geographic and climatic characteristics. In temperate zone bees almost exclusively collect propolis from the bud exudates of poplar trees. The main components of poplar propolis are phenolics acids and flavonoids, which are responsible for the biological activities.

There is a few reports about the contents of flavonoids in Slovenian propolis.

The aim of this work was to determinate the content of the principal groups of flavonoids in Slovenian propolis. The results are a first step to characterization of Slovenian propolis.

## MATERIALS AND METHODS

17 samples of raw propolis were analysed. The samples proceed from different regions of Slovenia (Fig. 1). Propolis samples were extracted with ethanol 80% ethanol at room temperature for a week.

### ► Colorimetric analysis

The measurements were carried out using UV-Visible spectrophotometer.

Three spectrophotometric methods for the quantitative determination of different flavonoids groups and total phenolics were used (Popova et al.)

. flavones and flavonols: method with  $AlCl_3$  (galangin as reference).

. flavanones and dihydroflavonols: method with 2,4-dinitrophenylhydrazine (pinocembrin as reference).

. Total phenolic: Folin-Ciocalteu method (pinocembrin+galangin, 2:1, as reference)

### ► Determination of principal flavonoids and phenolics acids by HPLC /UV-visible.

## RESULTS AND CONCLUSION

▪ contents of total phenolics compounds varied from 20,1% to 50,9% (average 33,8%). (Fig.1)

▪ the levels of flavones and flavonols varied from 0,6 to 9,8% (average 3,8%) (Fig.1)

▪ the content of flavanones and dihydroflavonols in propolis samples studied varied from 0,39 to 2,5%, (average 4,9%) (Fig.1)

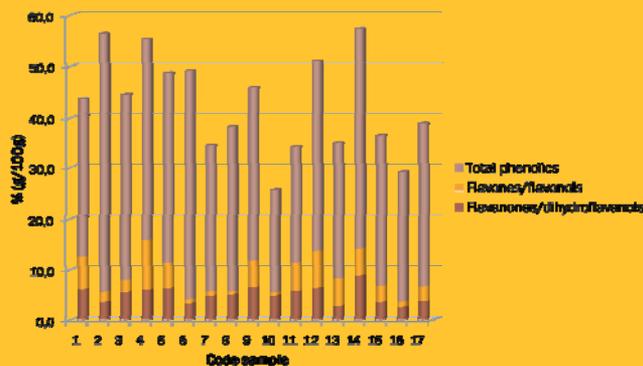


Fig.1: Levels of flavones/flavonols, flavanones/dihydroflavonols and total phenolics in propolis samples

▪ all samples had similar chromatographic pattern

▪ the samples are displayed the typical pattern of poplar propolis, characterized by the presence of phenolic acids and flavonoids

▪ the principal phenolic acids were caffeic (1), p-coumaric (2), ferulic (3) and cinnamic (4) acids

▪ the most abundant flavonoids were chrysin (5), pinocembrin (6) and galangin (7)

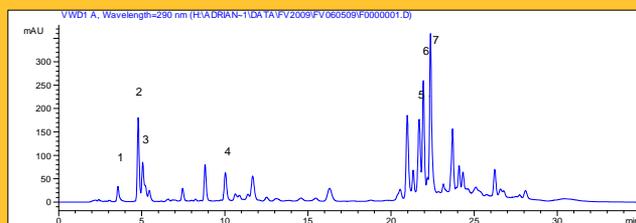


Fig.2: Typical chromatogram of Slovenian propolis