

The Effect of Ultrasounds on the Extraction of Proteins form Bee Pollen

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Abstract

The pollen harvested by the bees represents a valuable source of proteins, from quantitative as well as qualitative point of view, because the proteins in pollen are complete proteins that contain all the essential amino acids.

The pollen contains between 7-35% proteins, depending on the plant species from which it originates. The nutrition qualities of the pollen proteins are similar to animal proteins, but they lack some methionine.

For the intensification of the extraction process, usually, the mixture is stirred mechanically, increasing in this way the substance transfer, according to Fick's law. It was observed that by applying an ultrasound field in the extraction process, there is a high increase in the substance transfer and also, the extraction velocity. This is a result of the acoustic cavitation phenomenon that appears in a liquid exposed to an ultrasound field that has enough intensity. The acoustic cavitation takes place by forming cavitation bubbles, which, in the first phase, increase their volume and then suddenly implode, creating a strong shock wave that propagates in the solution. Because of these shock waves, where the pressure can go up to 10000 atm, the cell walls are destroyed and the cell content goes in the external environment. Also, because of the acoustic cavitation, in the solution appear strong currents that mix the solution components. In the case of the pollen protein extraction it was used the comparative extraction through classical methods and also in ultrasounds field. The determination of the extracted protein quantity was done through the Lowry method, based on the color reaction between proteins and cooper salts (the burette method). The color intensity is proportional with the amount of extracted proteins. By applying an ultrasonic field in the pollen proteins extraction, it was observed an increase in the extraction yield.

Key words: bee pollen proteins, proteins extraction, ultrasound extraction, ultrasonic extraction

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