

## **Application of unconventional methods for the extraction of pectin from apple pomage**

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### **Abstract**

In the Republic of Moldova, apples are one of the most cultivated fruits. Apple pomace, generated as a result of apple processing, is an important source of functional compounds (carbohydrates, dietary fibers, including pectin, phenolic compounds, etc.), used directly in food systems. The functional compounds extracted from pomage are applied in various fields: food industry, pharmaceutical, cosmetics, etc. Pectin extracted from apple pomace is the most important polysaccharide used in the food industry as an additive that promotes increased viscosity and acts as a protective colloid and stabilizer in foods and beverages.

The aim of the research was to elucidate the impact of non-conventional extraction methods assisted by ultrasound (UAE) and microwaves (MAE), on the yield and properties of pectin from the pomace of Golden delicious apples.

In this research, apple pomace obtained after squeezing the juice from Golden delicious apples, dried and shredded to a granularity of  $120 \pm 15 \mu$ , was used, which were mixed with the aqueous solution of citric acid at different liquid: solid ratios (LSR) 10, 15, 20 (v/w) and at pH 1.5, 2 and 2.5. Ultrasound-assisted extraction was performed at a frequency of 37 kHz, for 15 and 30 min, at a temperature of  $60 \pm 1^\circ\text{C}$ , and in the case of microwave extraction, the magnetron power of 450 W was applied, for 5 and 10 min. Extraction yield, equivalent weight (EW), methoxy group content (OMe), degree of esterification (DE) and anhydrogalacturonic acid content (AUA) were determined. The mutual information analysis was applied regarding the influence of the extraction conditions on the analyzed parameters.

It was established that the yield of pectin increases with the decrease of the pH, with the increase of the extraction time and the LSR ratio (v/w). By the MAE method, the yield of pectin was 2 times higher than in the case of UAE extraction. The equivalent mass of pectin extracted by UAE and MAE decreases with decreasing pH, increasing extraction time and increasing the LSR ratio. The content of OMe in the sonicated samples is more increased compared to MAE. It is also shown that the OMe content decreases with decreasing pH and extraction time, but it depends less on LSR. It was found that varying the extraction parameters allow obtaining pectin with different content of methoxyl groups. The purity of pectin, expressed by the concentration of galacturonic acid, increases with decreasing pH, increasing LSR and increasing extraction time. The degree of esterification was not essentially influenced by the extraction method. The analysis of the main information demonstrated the different influence of pH on the analyzed parameters.

Thus, the non-conventional extraction techniques increased the quality of pectin, led to the reduction of extraction time, energy and reagent consumption, compared to the traditional extraction method.

**Keywords:** Apple pectin, Ultrasound, Microwave, Extraction.

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