

## YIELD AND PHYSICO-CHEMICAL PROPERTIES OF PECTIN OBTAINED FROM APPLE POMACE IN NON-TRADITIONAL WAYS

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The commercial, nutritional, and health benefits of apples are the objectives of growing these fruits on the territory of the Republic of Moldova. During the processing of apples, apple pomace is formed, which is a rich source of carbohydrates, fiber, pectin, and phenolic acids. The significant amount of agro-industrial waste produced in the world has directed research to develop new methods to effectively add value to pomace. Conventional techniques for obtaining pectin from apple pomace require large amounts of solvents, high energy expenditure, and long realization time. As an alternative, non-traditional methods are known, such as extraction using ultrasound, microwaves, pulsed electric field, the use of enzymes, which provide increased pectin yield and reduced environmental impact. The aim of the research was to study the influence of microwave assisted extraction (MAE) and ultrasound (UAE) conditions on the physicochemical characteristics and yield of pectin obtained from apple pomace of the "Gold delicious" variety.

The pomace obtained as a result of juice extraction was dried to a moisture content of  $12.0 \pm 0.05\%$  and shredded to a grain size of  $140 \pm 10 \mu\text{m}$ . For the extraction of pectin in the presence of microwaves and ultrasound, apple pomace and a solvent with pH 1.5, 2 and 2.5 (adjusted with citric acid) were used in the ratio (RS) 1:10, 1:15, 1:20 (m/v). In the case of microwave extraction, the power of the magnetron was 450–650 W at exposure times of 5 and 10 min. In the case of ultrasound, the parameters were as follows: amplitude - 100%; frequency - 37 kHz and duration of extraction 15 and 30 min.

Analyzing the obtained results, it was found that with an increase in the power of the magnetron from 450 to 650 W, at the same pH value and at the same RLS coefficient, the extraction yield increased by 12%, due to the rupture of cell walls and fragmentation of macromolecules in the acid medium. An increase in the number of methoxyl groups in the analyzed samples was also demonstrated. At pH 1.5, in the samples obtained under the conditions of UAE and MAE extraction, a decrease in the equivalent mass of pectin, an increase in the content of galacturonic acid, and a decrease in alkalinity were observed. A direct dependence between pectin yield and extraction conditions was shown. Regarding to the extraction of MAE, it was proved that in the presence of UAE at pH 1.5, the pectin yield decreased by 7.3%, and the pectin equivalent mass increased. It was also demonstrated that prolonged exposure to ultrasound (30 min) led to a decrease in the amount of galacturonic acid in all analyzed samples. It was shown that the highest yield of pectin was obtained by the MAE process. The physicochemical properties (content of galacturonic acid, methoxyl groups, equivalent mass, degree of esterification, etc.) of pectin obtained by microwave extraction with commercial pectin were compared. At the same time, it was found that all pectin samples obtained in the course of this research retained an increased amount of phenolic acids and showed more pronounced antioxidant properties compared to commercial pectin.

**Keywords:** apple pomace, pectin, extraction, microwave, ultrasound, degree of esterification.

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