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ЕКСТРАГУВАННЯ ЛІКАРСЬКОЇ РОСЛИННОЇ СИРОВИНИ

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EXTRACTION OF MEDICINAL PLANT MATERIAL

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Extract of horse chestnut is widely used in pharmacology, because it contains saponin escin, which has anti-inflammatory and rheological properties, and also has a positive effect on venous tone.

According to the results of the literature review, it is established that the extraction of horse chestnut is not sufficiently studied for effective production in industry. Therefore, the purpose of this research was to select the optimal parameters, namely temperature, hydromodule and type of extractant for maximum extraction of target components.

To obtain and analyze the experimental data, an active multifactor experiment was planned. Having determined the factors that significantly affect the process, their variation levels were chosen and a three-factor experiment matrix was constructed (fraction, temperature and hydromodule).

The raw material prior to extraction was crushed in a laboratory mill LMZ-1 and fractionated by a set of sieves with hole sizes of 5, 3, 1 mm in diameter. For the study, the extraction temperature of the medium was adopted by 20 ° C and 40 ° C, that corresponds to the lower and upper level of variation, taking into account the possible thermolability properties of the target components. The value of the hydromodule was different for the investigated fractions of the raw material, for the large fraction, this value was chosen from 3 to 10, and for the small from 8 to 20, in order to completely cover the volume of the raw material by the extractant. We decided to investigate extraction process, in this case the substance may have a different solubility characteristics, therefore, as an extractant is accepted water and alcohol with a concentration of 90% vol., to assess the removal of water- and alcohol-soluble substances, respectively.

Based on the results obtained, were constructed dependencies of the content of extractive substances in the extract from the investigated process factors.

The regression equations for the large fraction have the form:

$$C_1 = 2{,}2857 + 0.0714 \cdot g + 0{,}0257 \cdot t - 0{,}0213 \cdot E - 0{,}00357 \cdot g \cdot t - 0{,}00121 \times\times g \cdot E + 0{,}000127 \cdot t \cdot E + 0{,}000068 \cdot g \cdot E \cdot t \qquad (1)$$

for small fraction:

$$C_2 = 1{,}9833 + 0{,}121 \cdot g + 0{,}030833 \cdot t - 0{,}00611 \cdot E - 0{,}001042 \cdot g \cdot t - -0{,}00236 \cdot g \cdot E - 0{,}000213 \cdot t \cdot E + 0.000044 \cdot g \cdot t \cdot E. \qquad (2)$$

In the equations (1) and (2) the notation: g – hydromodule; t – temperature; E – extractant.

Constructed response surface, which summarizes the results of experiments and are shown in Fig. 1.

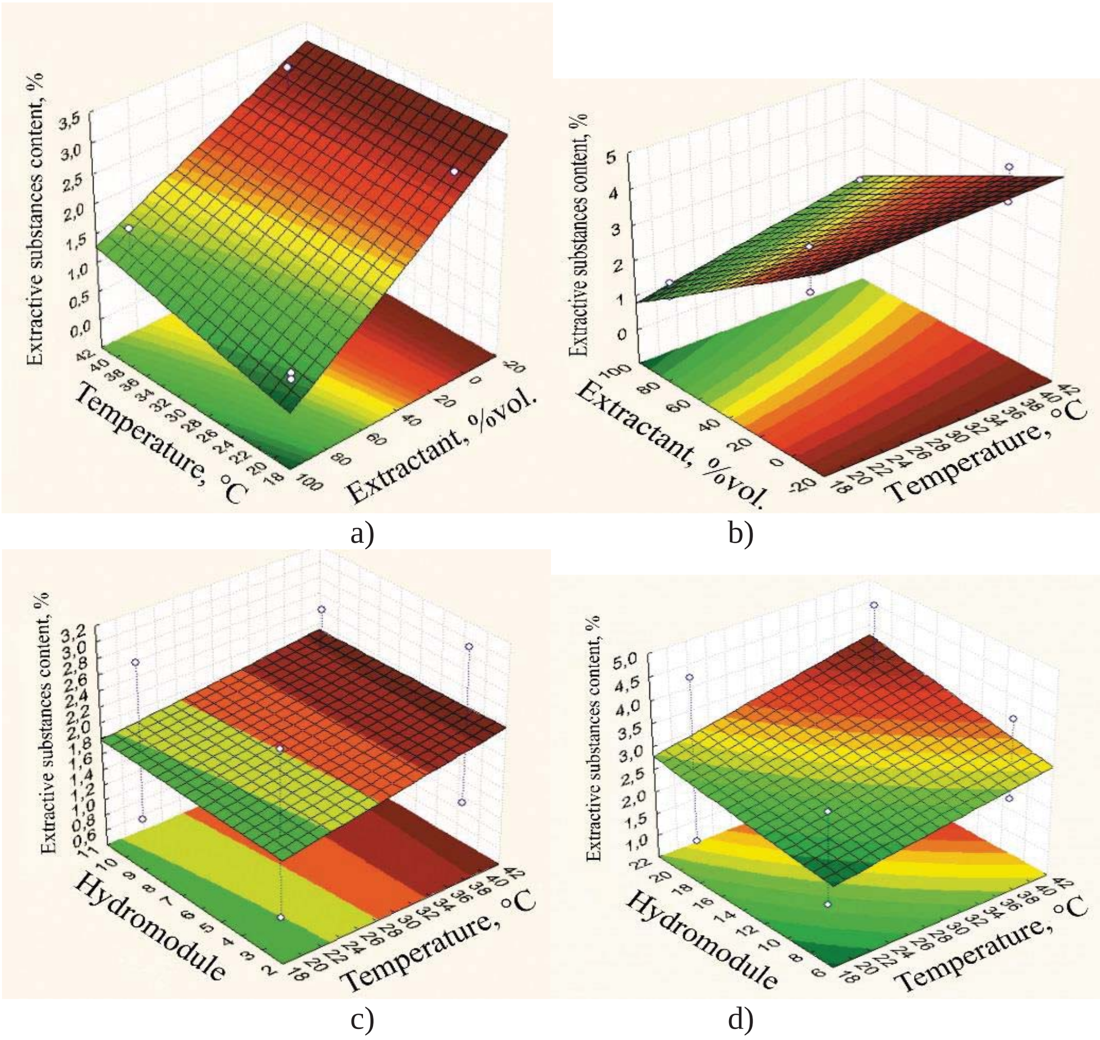

Fig.1. Dependence of extractive substances content on: temperature and extractant in horse chestnut seeds with particle sizes of 3-5mm (a) and particle sizes <1mm (b); hydromodule and temperature in the fruits of horse chestnut with particle sizes of 3-5 mm (in) and particle sizes <1 mm (g);

Based on the results obtained, the following parameters can be recommended to extract the greatest amount of valuable substances from horse chestnut seeds: crushed fraction - <1 mm; temperature - 40 ° C; hydromodule - 20; extractant - water. This work is interesting for further development with obtaining a second-order mathematical model and determining the content of the target component of escin in extracts.