



ANTHOCYANIN ISOLATION FROM BERBERIS TURCOMANICA FRUITS AND PREPARATION OF FOOD COLORANTS

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Introduction. In Turkmenistan, it is important to develop and use appropriate scientific methods of extracting eco-friendly natural food colorants from plants growing in Turkmenistan. There are more than 300 species of coloring plants in the flora of Turkmenistan. One of these plants is barberry (*Berberis turcomanica*). It contains anthocyanin pigments with powerful antioxidant property [1, 2]. Anthocyanin pigments can be mostly used in pharmaceuticals, food industry, cosmetic products etc. During the course of the work, anthocyanin pigments were extracted from barberry fruit in various ways. Useful method for high pigment yield was calculated by comparing the 219 nm standard peak using spectrophotometer. Obtained extract was dried by vacuum dryer and freeze dryer and brought to a ready state for use in food production [3, 4].

Importance. Nowadays it's significant to discover new scientific methods for isolation and effective application of environmentally friendly, natural food colorants from plants which are encountered in Turkmenistan. Moreover, this work hasn't done before in our country, also, food colorants, which are utilized in food industry of our country imported from overseas, furthermore, we have sufficient raw materials for production of food colorants [5].

Aims. To obtain pure and mixture form of natural coloring pigments by extraction method using different solvents and to get their liquid, powder, paste and gel forms for ready-to-use.

Materials and methods. The first step is gathering raw materials. As a raw material, mature berberis fruits were collected from mountain gorges of Magtymguly district in Balkan region. To avoid loss of color, berberis fruits were dried in an oven at 50°C for 60 hours. Dried fruits were mechanically blended to obtain powdered form.

Powder was used for extraction. At each flask, 5 g of berberis fruit powder mixed with 20-40 ml of solvent. During experiment, four different extraction methods were examined. They are according to type of solvent (distilled water or ethanol (70%)), presence or absence of light, pH (3 or 1,5), temperature (25 or 50°C). To reveal the effect of such factors to extraction efficiency 16 combinations were prepared. To achieve desired pH standard titer of nitric acid was used. Extraction time was 38 hours. Then extract was filtered through filter paper [6-10]. Excess was removed (figure 1).

Extract containing pigments was dried and powdered by two ways [11]. In first way it was dried in vacuum evaporator. In second way used freeze drier (figure 2).

Experimental part. Powdered extract analyzed by spectrophotometry. In this method 0,4 mg powder dissolved in 3,6 ml buffer. Buffer was prepared from sodium acetate and KCl. pH equaled to 1 and 3,5 by HCl. To analyze in which method amount of extracted pigments will be high, was evaluated by measuring 519 nm absorbance in spectrophotometer. By formulating of obtained data by given formula was determined the most effective extraction method (figure 3).

Quantity of anthocyanins: $(mg/ml) = (A \times MW \times DF \times 1000) / \epsilon \times L$

Quantity of anthocyanins (mg/ml) = $((0,1708 \times 433,2 \text{ g/mol} \times 10 \times 1000)) / (31600 \text{ L/cm} \times 1 \text{ cm}) = 739905,6/31600=23,4 \text{ mg}$

Here A (A519 (pH 1.0)-A519 (pH 3,5)), MW – molecular mass of anthocyanins (433,2 g/mol), DF – dilution factor (10), ϵ – disappearance coefficient (31600 $L/cm^{-1} mol$), L – length of cuvette (1 cm) [12,13].



Figure 1. Fresh and dried berberis (*Berberis turcomanica*) fruits and their grinding, sieving, extracting and filtering moments



Figure 2. Freeze drying and vacuum rotary evaporation of berberis extract



Figure 3. Spectrophotometry analysis of anthocyanin content

Result. As we can see from experiment results, high amount of anthocyanin pigments from berberis fruits was extracted when extraction carried on under the dark, at 25°C and 3,5 pH value using 70% ethanol. Powdered pigments were used for spectrophotometric analysis. Quantity of anthocyanins in 70% ethanol extract was 23,4 mg/ml . Dried anthocyanin powder can be maintained in light impermeable containers for a long time and utilized for coloring food products.

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