

ISOLATION OF ANTHOCYANINS FROM BARBERRY (*BERBERIS TURCOMANICA*) FRUITS AND PREPARATION OF FOOD COLORANTS

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Abstract: now, 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 densiflora*). It contains anthocyanin pigments with powerful antioxidant property. During the course of the work, anthocyanin pigments were extracted from barberry fruit in various ways. Which method can be useful for high pigment yield was calculated by comparing the 219nm 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.

Keywords: barberry, anthocyanin, food colorant, pigment extraction, vacuum dryer, spectrophotometry.

Barberry is one of the plant, that has sufficient stock in Turkmenistan. Annually 5-12 kg yield can be obtained from each individual plant which grow in Sunt-Hasardag. In our country 3 species of barberry can be encountered. *Berberis densiflora* contain high amount of anthocyanins in their fruits [1, 2].

Due to antioxidant properties anthocyanins prevent cardiovascular and other chronic diseases. Also, anthocyanins have antimicrobial, antihepatic, anti-inflammatory, antitumor and antiestrogenic properties, defense from mutations, decrease blood sugar level, enhance capillary circulation, prevent platelet aggregation [3].

The aim of this research, to isolate anthocyanins and prepare food colorant from barberry fruits, thus decrease the import and usage of synthetic colorants in our country. Accordingly, usage of synthetic dyes causes different diseases, but coloring of food products with natural dyes enrich, as well make them more attractive [4].

Materials and methods.

The first step is gathering raw materials. As a raw material, mature barberry fruits were collected from mountain gorges of Magtymguly district in Balkan region. Work was conducted at the laboratory of General and Applied Biology Institute. To avoid loss of color, barberry fruits were dried in an oven at 50°C for 60 hours. Dried fruits were mechanically grinded to obtain powdered form.



Fig.1. Barberry plant and dried fruits of Barberry

Powder was used for extraction. 5 g of barberry fruit powder were mixed with 20-40 ml of solvent. During experiment, four different extraction methods were examined. They are according to type of solvent (water or ethanol (96%)), presence or absence of light, pH (3 or 1,5), temperature (25 Or 50°C). To achieve desired pH standard titer of nitric acid was used. Extraction time was 38 hours. Then extract was filtered through filter paper. Excess was removed.

Extract containing pigments were dried and powdered by two ways. In first way it was dried in vacuum evaporator. In second way used freeze drier.



Fig.2. Drying method of barberry fruits and barberry powder



Fig.3. Ready anthocyanin extraction and filtering part of natural pigment

Results of experiment.

Powdered pigment used for spectrophotometry analysis. In this method 0,4 mg powder dissolved in 3,6 ml buffer. Buffer was prepared from sodium acetate and KCl. pH equalled to 1 and 3,5 by HCl. Extraction method that will yield high amount of pigments, was evaluated by measuring 519 nm absorbance in spectrophotometer. By formulating of obtained data, we determined the most effective extraction method.



Fig.4. Spectrophotometric results of extraction.

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

Here A (A519 (pH1.0)-A519 (pH3,5)), MW – molecular mass of anthocyanins (433,2g/mol), DF – dilution factor (10), ϵ – disappearance coefficient (31600 L sm⁻¹mol), L – length of cuvette (1 sm) [5, 6].

Conclusion

As we can see from experiment results, high amount of anthocyanin pigments from barberry fruits was extracted when extraction carried on under the dark, at 25°C and 3,5 pH value using alcohol. Dried anthocyanin powder can be maintained in light impermeable containers for a long time and utilized for coloring food products.

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