

EFFECT OF VARIETY OF PROCESSING ON KEEPING OF BETALAIN PIGMENTS OF TABLE BEETROOT

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Abstract

Vegetables are rich sources of minor compounds with antioxidant properties, represented by substances of various chemical nature: polyphenols, tocopherols, carotenoids, sulfides, mineral compounds, plant pigments, etc. Among vegetables with a proven effect on the physiological functions of the human body, beetroot (*Beta vulgaris* L.) occupies one of the first places, and betalain pigments, which are responsible for the rich red-crimson color of beets, have pronounced antioxidant properties. To use beetroot for food, it is traditionally required preliminary heat treatment of root crops - boiling or baking until soft, while betalain pigments, as thermolabile components, degrade during processing. The study of the influence of various modes of culinary processing on the preservation of betalain pigments in semi-finished beet products is a vital task for increasing of nutritive value of ready food. The aim of this work was the assessment of the effect of heat treatment parameters (temperature, humidity, contact with the environment, duration of processing) on the keeping of betalain pigments and on the summary oxidant capacity in semi-finished beetroot products.

The materials for this study were commercial batches of the fresh table beet, semi-finished products prepared using various methods of heat treatment: traditional cooking in water (98 ± 2 °C), steam convection heating (120 ± 2 °C), low-temperature slow cooking in Thermomix (86 ± 2 °C) and freezing (-18 ± 2 °C). The mass fraction of dry substances was determined by drying in a laboratory oven at a temperature of 105 °C to constant weight. The content of betalain pigments was determined with using a serial spectrophotometer PE-5300VI at wavelengths of 480 nm (betaxanthin) and 535 nm (betanin). Investigations of the summary oxidant capacity in semi-finished products from beets after heat treatment were carried out by a coulometric method according to the certified method (MVI.01-44538054-07) on a serial coulometer "Expert-006". Ascorbic acid, which occupies an intermediate position among antioxidants of polyphenolic and non-phenolic nature was chosen as an indicator of summary oxidant capacity. The experiment was carried out in five reiteration. The results were processed by the methods of mathematical statistics. The experiment was carried out in five reiteration. The results were processed using the STATISTICA application package.

It was found that heat treatment of beets leads to the loss of betalain pigments in comparison with the initial raw material. The intensity of losses is influenced by the processing method, therefore, with different processing modes, betanin losses range from 20.5% (cooking in Thermomix) to 40.5% (boiling in water); loss of betaxanthin ranged from 16.3% to 54.7%, respectively. To compare the results of the study of different samples, the pigment content was calculated on a dry matter basis. Decrease dynamics the antioxidant activity of samples depends on the temperature and duration of processing and storage of semi-finished products and ranged from 16.9% (steam convection treatment) to 44.1% (cooking in water). When stored in a refrigerator at a temperature of 4 °C for 7 days, the amount of betaxanthin in semi-finished products from boiled beets decreased by 30%, and betanin - by 21.5%.

The use of resource-saving low-temperature beet processing technologies allows to minimize the loss of betalain pigments, which are natural antioxidants, and to preserve the nutritional value of finished beet products. The indicator of the total antioxidant activity makes it possible to judge the nutritional value of plant products and can be used to monitor compliance with the technology and storage conditions of culinary products in public catering.

Key words: Beetroot, Betalain pigments, Summary oxidant capacity, Careful processing.