EFFECT OF HEAT TREATMENT AND pH FACTOR ON PHENOLIC COMPONENTS OF POMEGRANATE JUICE

Samir Gharib Hafizov[1*], Gharib Kerim Hafizov[2]

[1]Research Institute of Horticulture and Tea Industry of the Ministry of Agriculture, 4035 Zardabi village, Quba district, Azerbaijan Republic

[*]e-mail: hafizovsamir@bk.ru

Abstract

Valuable biologically active components of pomegranate juice can degrade during its processing and storage. Therefore, it is important to learn how to manage these undesirable processes. The effect of heat treatment at different temperatures and pH on anthocyanins and flavanols (catechin isomers) of freshly squeezed pomegranate juice and color retention of model solutions simulating juices of the same sample under artificially created pH conditions was studied.

Fresh juices of pomegranate seeds were kept for 5 - 120 minutes in the open air or in a thermostat at temperatures of +5 - +105 ^{0}C. Model solutions were stored for 1 month in the refrigerator at a temperature of +1 ^{0}C. Anthocyanins were determined by pH-differential spectrophotometry based on changes in light absorption with a wavelength of 510 - 520 nm when the acidity of juice solutions with a pH from 1.5 to 4.5. The determination of flavanols was carried out by a method based on differential calorimetry of the red complex of vanillin with hydrogen molecules of polyphenols at the positions C_6 and C_8, pH - a potentiometric method, chromaticity - by optical density at a wavelength from 510 to 520 nm.

It was found that heat treatment significantly affects the rate of hydrolysis of anthocyanins to aglycone and sugar. The more individual anthocyanidins appear in the medium, the more intense the color of the test samples becomes. At +5 ^{0}C, these processes are slow; at temperatures of 20 and 35 ^{0}C, the anthocyanin content and color intensity increases within 1 hour and 45 minutes, respectively, after which it begins to decrease. Anthocyanins are less tolerant of thermal effects than flavanols. At 35 ^{0}C, the processes that lead to an increase in the number of flavanols that turn red when reacting with a vanillin reagent takes 75 minutes, which is more than the time of hydrolysis of anthocyanins at this temperature by 30 minutes. During 30 days of storage at a temperature of +1 ^{0}C, the color intensity of the model solutions as their pH increased from 1.8 to 8 fell to 57 - 17% of the initial color intensity of the control solution with pH 2.2, while the color of the solution imitating the juice with pH 2 was almost the same as at the time of its manufacture.

Thus, the preservation of labile phenolic components of pomegranate juice can play a positive role in its cooling during settling, as well as the choice of varieties on the principle of low pH of their juice, close to 2.

***Key words**: Pomegranate juice, Phenolic components, Degradation, Heat treatment, pH factor.*