

„Improving plant quality and economy for a more sustainable and efficient berry production”

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„Wspólnie działamy na rzecz Europy zielonej, konkurencyjnej i sprzyjającej integracji społecznej”

Effects of ultrasonic and high-pressure homogenization on the rheological properties and content of bioactive compounds in strawberries juice.

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Abstract

BACKGROUND: Turbidity is an important quality parameter of fruit juices, and the problem of turbidity stabilization is a challenge for many producers. Sedimentation of particles suspended in juice during storage causes a significant loss of visual quality of products. Methods to reduce this phenomenon can be the use of stabilizing additives or technological processes that shape product properties. Increasing consumer awareness favors solutions that reduce the amount of additives in food, making the topic of juice homogenization the subject of much research. This study investigated the effects of high-pressure and ultrasonic homogenization on the rheological properties, particle size distribution and content of bioactive compounds in strawberry juice

Objectives of the study: to use homogenization to increase the turbidity of the juice while not causing significant losses of bioactive compounds.

Material and methods: the fruits of strawberries of the variety “Grandarosa” were used for the study. Maceration of crushed fruits was carried out using Pectinex® Ultra Passover enzyme (Novozymes), juice was obtained using a sandwich press. The pressed juice was then homogenized using both methods, bottled and immersion pasteurized. High-pressure homogenization was carried out using a laboratory Atomo 3.0 homogenizer (Bertoli).

Ultrasonic homogenization was carried out with a VCX 750 sonicator (Sonics & Materials). The samples were analyzed for particle size distribution by laser diffraction (Bettersizer S3), viscosity, turbidity stability, total anthocyanin content and ascorbic acid content by HPLC

Results: Both types of homogenization resulted in a reduction in particle size. In the case of ultrasonic homogenization conducted for 2 minutes as well as 8 minutes, 70% of the particles detected were less than 25µm in size, compared to 25% in juice not homogenized. High-pressure homogenization had a higher efficiency, with 90% of the particles detected being less than 25µm in size. Homogenized juice had a higher viscosity than non-homogenized juice. A pressure of 200bar resulted in the highest viscosity value of 6.5 ± 0.07 cP. Higher turbidity levels than the other juices were characterized by ultrasonically homogenized juices whose turbidity was 1774 NTU for juice sonicated 2 minutes and 2110 NTU for juice sonicated 8 minutes. The content of total anthocyanins (6 mg/100ml) and ascorbic acid (16.8 mg/100ml) did not change under homogenization.

Conclusions: High-pressure and ultrasonic homogenization have similar efficiencies in reducing particle size for strawberry juice. The observed increased turbidity of the juice is correlated with higher juice viscosity and particle size reduction during the homogenization

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process. The reduction in particle size under both analyzed homogenizations can be seen as a tool to improve the stability of naturally cloudy strawberry juices. However, none of the analyzed homogenization combinations guaranteed high turbidity stability of the juice, so it is advisable to perform storage tests.

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