

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

Projekt realizowany w ramach Norweskiego Mechanizmu Finansowego na lata 2014-2021,

Nr Umowy: NOR/POLNOR/QualityBerry/0014/2019-00

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

Effect of ultrasound application on the content of phenolic compounds in the juice of selected berries

Authors: Jan Piecko, Monika Mieszczakowska-Frać, Justyna Szwejda-Grzybowska, Karolina Celejewska

Name of conference: XIV Conference of Technologists of Fruit and Vegetable Processing

Date: 20-22.05.2024;

Place: Krzyżowa, Poland

Abstract

There are many potential applications of ultrasound in food processing, for example: freezing, drying, degassing, filtration, and emulsification. The main advantage of using ultrasound-based technology is that it reduces process time and improves process efficiency and hygiene levels. Aim of the study was to examine effect of using ultrasound treatment of fruit pulp on the extraction of phenolic compounds during the production of strawberry, black currant and raspberry juice. Juice pressing was carried out after pulp pretreatment in the following combinations: 1. heating to 20°C (20°C Control); 2. heating to 55°C (55°C Control); 3. ultrasound treatment (UD); 4. application of enzyme preparation at 55°C (Maceration); 5. ultrasound treatment and enzyme application (UD + Maceration). The experiment was conducted on 3 fruit species: strawberry (*Fragaria x pineapple*) cv. 'Florence', raspberry (*Rubus idaeus*) cv. 'Polka' and black currant (*Ribes nigrum*) cv. 'Tihope'. The content of phenolic compounds in the juices was determined by HPLC method. In the case of raspberry juice, the content of phenolic compounds in “UD” and “UD + Maceration” juices, increased by 40.3% and 34.2%, respectively, compared to the “20°C Control” sample. In the case of strawberry juice, the “UD” showed a 19.7% increase in cyanidin-3-glucoside content and a 14.9% increase in pelargonidin-3-(6"-malonylglucoside) content compared to the “20°C Control.” From black currant fruit, juice extrusion was possible only from material subjected to enzymatic maceration. The additional application of ultrasound to enzyme-treated black currant pulp (UD + Maceration) did not affect the content of phenolic compounds compared to juice obtained from pulp subjected only to enzyme treatment (Maceration). Ultrasonic treatment of raspberry fruit pulp enable juice with a higher content of phenolic compounds. The higher retention level of anthocyanins in strawberry juice obtained after ultrasound treatment was influenced by the process temperature. In the case of black currant juice pressing, it is not possible to replace enzymatic maceration of the pulp with ultrasound treatment, while the combination of the two treatments does not increase the content of phenolic compounds in the obtained juice.

Acknowledgments Research funded by the Norwegian Financial Mechanism, project title: Improving plant quality and economy for a more sustainable and efficient berry production. contract number: NOR/POLNOR/QualityBerry/0014/2019-00.