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The effect of lactic acid fermentation using lactobacillus spp. on blackcurrant flavonols: quercetin, rhamnetin and isorhamnetin.

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Statement of the Problem: In recent years, there is an increasing interest in antioxidants because of their potential role in the prevention of chronic inflammation states and other diseases associated with oxidative stress. Antioxidant compounds from dietary sources are receiving tremendous attention. Among them are flavonols including quercetin, rhamnetin and isorhamnetin. They appear mainly in the glycosidic forms with residues such as: D-glucose or galactose. But the use of lactic acid fermentation of juice yielded in the higher amount of free aglycones. Free flavonols exhibit biological activities including radical scavenging and antioxidant activities. The effect of lactic fermentation using Lactobacillus spp. on the content and profile of selected flavonols in blackcurrant juice was studied. We also determined the antioxidant activity of these compounds. Methodology & Theoretical Orientation: The effect of lactic acid fermentation of blackcurrant juice by five bacteria strains was studied after 96 hours. Total flavonols content was determined using a 96-well microplate absorbance reader (Varioskan LUX, Thermo Fisher Scientific) . Ultra-high performance liquid chromatography (UHPLC) – diode array detection (DAD; Ultimate 3000, Thermo Fisher Scientific) was applied to control the flavonol profile in fermented juices. The spectrophotometric techniques were used to study antioxidant activity of flavonols against the synthetic 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical and in the ferric ion reducing antioxidant power (FRAP) assay. Findings: The fermentation process impact the flavonol content. Scavenging activity differs between tested compounds. Methyl groups in rhamnetin and isorhamnetin decrease the radical scavenging properties compared to quercetin. The location of methyl group also affect an antioxidant potential. Conclusion & Significance: The used bacteria strain play a crucial role in determining the flavonols content in the fermented juices. The presented results indicate also high antioxidant potential of pure flavonols. The highest level of radical scavenging properties exhibits quercetin.

Image:

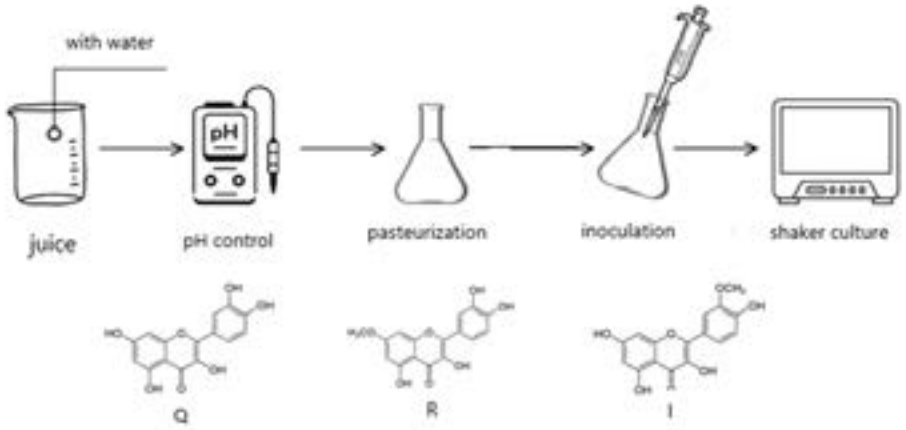

Figure 1: The effect of lactic acid fermentation on selected flavonols in blackcurrant juice (isorhamnetin, I; rhamneti, R; quercetin, Q).

Biography

Kamila Borowiec graduate of biotechnology at the University of Life Sciences in Lublin and she completed my dissertation there in 2014. She have completed two training research internships: "Breeding of zebrafish Danio rerio and cell cultures in vitro" (2023) and "Application of LC-Q/TOF-MS in the analysis of bioactive compounds from bilberry fruit" (2019/2020). She is co-author of the invention entitled "Polyphenolic composition having the application in prophylaxis and supporting treatment of neurodegenerative diseases, preferably Alzheimer's disease" (Patent no. PL 237891) and leader of two projects supported by the National Science Centre in Poland (2019-2020 and 2024-2027).