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Fermented mango and passion fruit juices bio-enriched with selenium using selenized lactic acid bacteria

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Fruits are fundamental sources of bioactive compounds and their consumption can prevent the development of chronic pathologies. Selenium (Se) is a vital micronutrient for humans; however, excessive intake of Se salts can be toxic. Lactic acid bacteria (LAB) are able to biotransform inorganic Se into Se-nanoparticles and Se-amino acids. The objective of this work was to formulate a mango-passion fruit juice bio-enriched with Se. *Lactiplantibacillus paraplantarum* CRL 2051 and *Fructobacillus tropaeoli* CRL 2034 were grown in MRS with fructose and with the addition of 10 mg/L sodium selenite, and were incubated at 30 °C for 24h. *L. paraplantarum* CRL 2051 accumulated 1.68 ± 0.08 mg Se/L intracellularly, while *F. tropaeoli* CRL 2034 2.18 ± 0.04 mg/L (ICP-MS). Selenized and control cells (without selenite) of the assayed strains, were inoculated alone or in co-culture in pasteurized mango-passion fruit juices. The strains grew between 1.43 and 2.04 log cfu/mL and decreased the pH between 0.93 and 1.34 U after 24 h fermentation. The °Brix of the non-inoculated juice was 4.90 ± 0.14 and decreased to 4.07 ± 0.12 and 4.67 ± 0.28 after fermentation. The titratable acidity of the fermented juices increased, being higher when using non-selenized cells of *L. paraplantarum* CRL 2051 ($76 \pm 5,66$ °D) and the co-culture ($71,00 \pm 7,07$ °D). Carbohydrates present in non-inoculated pasteurized mango-passion fruit juice were sucrose (33.08 ± 2.97 g/L), glucose (5.94 ± 0.63 g/L) and fructose (6.00 ± 0.63 g/L). *L. paraplantarum* CRL 2051 showed homofermentative behavior producing only lactic acid (5.13 ± 0.99 g/L) and no differences were observed between control and selenized cells. On the other hand, an increase of 0.42 g/L of lactic acid and 0.22 g/L of acetic acid was detected using the selenized fructophilic strain compared to the control cells, while no difference was observed in the production of mannitol ($6,94 \pm 0,23$ g/L). The total content of soluble phenolic compounds in the juices fermented with selenized mixed cultures increased 30% compared to the non-fermented juice. The highest 2, 2-azinobis-(3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) values were observed when the juice was fermented by the selenized mixed culture (15%), while the highest 2,2 - diphenyl-1-picrylhydrazyl (DPPH) values were observed for the *L. paraplantarum* CRL 2051 fermented juices, and the ones inoculated with the selenized cells of *F. tropaeoli* CRL 2034 (14.78 ± 0.07 ; 13.16 ± 0.01 and 14.78 ± 0.04 TEAC, respectively). The total Se concentration in the non-inoculated mango-passion fruit juice pellets was 20 µg/mL while it was higher in the fermented juices by selenized cells ($60,58 \pm 0,44$; $64,77 \pm 0,40$ and $68,27 \pm 0,24$ µg/mL for *L. paraplantarum* CRL 2051, *F. tropaeoli* CRL 2034 and the mixed culture). Results show that selenized cells of the studied LAB could be used as a starter culture for fermenting a mango-passion fruit beverage enriched with Se; 200 mL of the obtained beverage offers 40% of the Sedaily requirements, according to the Argentinean CODEX.

Keywords: Beverage, Fruits, Selenium, LAB, Fermentation.