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The Prebiotic Effect of Inulin on *Lactobacillus acidophylus* in Red Beet Lactic Fermented Juice

Carmen Leane NICOLESCU, Lavinia Claudia BURULEANU

Faculty of Environmental Engineering and Biotechnology, Valahia University Targoviste, 18-24 Unirii Bd., 130082 Targoviste, Romania; clnicolescu@yahoo.com, laviniaburuleanu@yahoo.com

SUMMARY

Vegetable lactic fermented juices became more and more by consumers desired probiotic drinks. The growing and survival of probiotic bacteria is more difficult like in dairy products because of the necessity of nitrogen sources that are low in vegetables. The addition of prebiotics can improve the substratum and so the viability of these bacteria. Inulin is a prebiotic which was described to stimulate the growth of some probiotics. There is consistent evidence from in vitro and in vivo studies that inulin is not digested by normal human enzymes, but is readily fermented by anaerobic bacteria in the large intestine like *Lactobacillus acidophyllus* which is unspecific to epiphytic microbiota of vegetables.

The aim of this study was to analyse the influence of inulin on the growth and metabolic activity of *Lactobacillus acidophylus* during the lactic fermentation of red beet juice. To investigate the bacterial growing, there was used red beet juice obtained by mechanical extraction from fresh vegetables after the inactivation of the ephyphytic microbiota by thermal treatment at 80^oC/10min. The at 40^oC cooled juice was suplimented with 3% (w/v) Raftiline HP inulin (a long-chain inulin) provided by Enzymes & Derivates and inoculated with 0,2g/l thermophilic *Lactobacillus acidophilus* LA-5 lyophilized pure culture, provided by Christian Hansen (P). The control probe was without inulin (C). The lactic fermentation was performed at 37^oC, in anaerobiotic conditions, during 48 hours. The bacterial growth was investigated during the lactic acid fermentation by direct counting the microorganisms on the microscope using a Burker-Turk counting chamber and expressed as cells/ml juice after 2, 4, 6, 8, 24 and 48 hours. In addition, the pH value and the lactic acid production of the samples were determined at the same time. The inoculum containing $1,6x10^8$cells/ml needed a lot of time for accommodation in the red beet juice where seems to be present some inhibitors. In the absence of inulin these period was about 4 hours. The presence of inulin decrease the accommodation time with 2 hours because the bacteria can utilise inulin as sugar supply. In the following fermentation time the growing rate was low, but constant until 8 hours. In the following period the bacterial number decreased drastically in the absence of inulin (until $6,4x10^6$ in (C)). Inulin sustained the bacterial growth in the following 24 hours when a high viability was observed (max. $3.32x10^8$ in (P)). The tested bacteria strain used the substrate even for cell synthesis and lactic acid production. The ability of producing lactic acid fermentation was sustained by the decrease of the pH value from 6.29 to 4.28 in (C) and 4.24 in (P), values that assure even the shelf life of the product and also a good taste. The product contained also the minimal standard value of 10^6–10^7 alive probiotic bacteria/g for a healthy influence on the human organism.

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