DEVELOPMENT OF FRUIT JUICES FERMENTED BY PROBIOTIC BACTERIA

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INTRODUCTION

The development of probiotic juices has been increasing as an alternative to the dairy based probiotic foods (Espirito Santo et al., 2011). Probiotics are live microorganisms that when administered in adequate amounts are able to colonize the gastrointestinal tract and confer health benefits to the host such as traveler’s diarrhea prevention, lowering serum cholesterol, reduction of the duration of rotavirus diarrhea, immune system stimulation and/or colon cancer prevention (FAO, 2001; Farnworth, 2008).

The fermentation of juice by probiotic bacteria is a challenge, mainly because of its acidic environment, but also due to some natural antimicrobials that can be present in the fruit, including some polyphenolic compounds which are also responsible for large part of the antioxidant activity of the fruits (Guyot et al., 2002; Xie et al., 2007). Soluble and insoluble fibers present in fruits may contribute positively to growth and viability of probiotic bacteria strains. In fact, recent studies indicate the positive effect of plant ingredients on the viability of probiotic bacteria and the high applicability of apple juice and pomace as matrix for probiotication (Espirito Santo et al., 2011; Espirito Santo et al., 2012).

Some authors report that polyphenols may have effects on gut microbiota and vice versa. When submitted to fermentation phenolic compounds can suffer structural modifications which can lead to an increase in the anti oxidant activity (Bisakowski et al., 2007; Parkar et al., 2008). Besides, polyphenols can form complexes with proteins as well as with polysaccharides such as those of plant cell walls composed by cellulose/xylloglucan, pectin and glycoproteins (Le Bourvellec et al., 2009).

Considering this scenario, this project aims to shed light on some underexplored aspects about the influence of the fermentation of fruit juices by commercial probiotic bacteria on cell wall and polyphenol complexes. Using the apple model, cell walls and polyphenols will be isolated from the cloudy juice. Complexes will be made in varying ratios of polyphenols/cell walls and then, the complexes suspension will be used as substrates for fermentation. The apple model will then be applied to other fruit juices, notably to açai juice.

REFERENCES


RESEARCH SUBJECTS

Probiotic Lactobacilli species

Objectives

- Appraise the nutritional and functional benefits of fermentation of fruit juices by probiotic bacteria regarding the simply addition of probiotics to the fruit juices.
- Evaluate the effect of fermentation by probiotic bacteria on the complex made by cell wall polysaccharides and polyphenolics in fruit juices.
- Develop fermented probiotic fruit juices that may have sensorial parameters similar to the non-fermented juice.

EXPERIMENTS

- Fermentation of fruit juices by different species of Lactobacilli and determination of kinetic parameters for process optimization.
- Enumeration of probiotic bacteria during fermentation and shelf-life.
- Analysis of the products of fermentation through HPLC-MS (sugars, organic acids) and electrophoresis (proteins, oligopeptides and free amino acids).
- Analysis of fatty acids profile through GC; CG-MS of the fermented beverages.
- Analysis in HPLC-MS of the phenolic compounds profile before and after fermentation of fruit juices.
- Evaluation and quantification of the production of folates during fermentation.
- Evaluation of the anti-oxidant activity in vitro of the fermented and non-fermented fruit juices.
- Quantification of the production of exopolisaccharides during fermentation.
- Appraise the viability of probiotic bacteria in fermented fruit juices submitted to simulated conditions of the gastro-intestinal tract.
- Determination of the colorimetric parameters and flow behavior of fermented fruit juices.
- Analysis through CG-MS of the volatile compounds produced during fermentation.
- Sensorial analysis of the fermented fruit juices by a trained panelist.: acceptance test.

The project will be developed in 24 months.