Incorporation of probiotic into a food matrix

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Introduction

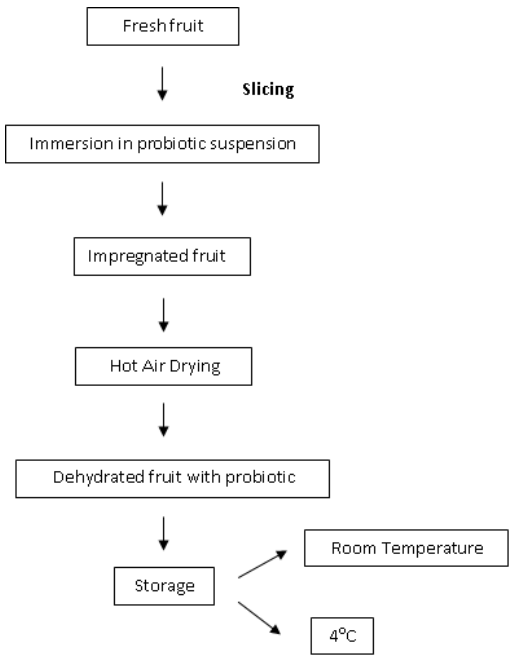
In recent years, the relation between fruits and vegetable intake and health has been the focal point of much scientific investigation. Nowadays, dairy products are the main aim of the development of novel probiotic foods, since their consumption is increasing all over the world (Puente *et al.*, 2009).However, a lot of intolerances, like lactose intolerance, are reported and an alternative to dairy products is desirable. So, fruits and vegetables became an ideal vehicle for incorporation of probiotics (Rößle, 2010), combining the nutritional value of fruit with the beneficial effect of probiotics. For that reason, a fruit was selected that is easy to handle and has a high porous matrix, like apple.

The definition of probiotic is relatively recent and consists of live microorganisms that can confer health benefits to the host (Reid and Hammond, 2005). To be considered as probiotic organisms, these must have certain characteristics, e.g. not pathogenic, and not having any kind of antibiotic resistance or cause adverse reactions in the host. They also must be resistant to stomach acids and bile salts, reaching the intestine alive and in high concentrations, where they must adhere to the intestinal mucosa to stimulate the immune system (Harun-ur-Rashid *et al.*, 2007).

For incorporation into apple cubes, two probiotic strains were used from the genus of *Lactobacillus*, *L. plantarum* and *L. kefir* with the aim of creating a dried snack with beneficial properties for the consumer
Until now, the most common drying method employed for food products is hot air drying (Femenia *et al.*, 2009). A tray dryer was used, allowing drying of wet solid products by passing a stream of hot air over the trays.

The major objective of food drying processes, is to reduce the moisture in the products, but producing a dehydrated product with high quality, safety and nutritional values (Cohen and Yang,1995).

Material and Methods



Results

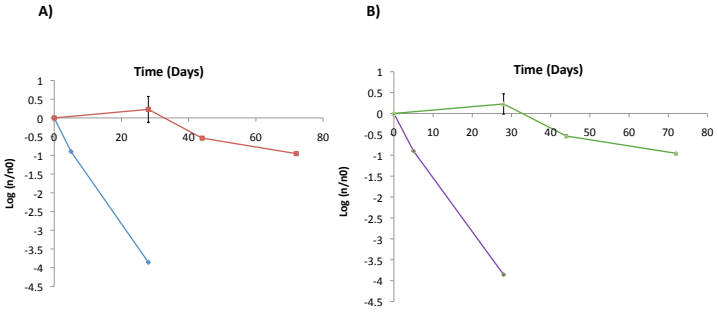


Figure 1 - Comparing the effect of temperature on the cells viability during storage of dried samples, incorporated with *L.plantarum* (A) Storage at room temperature; Storage at 4ºC; Storage of dried samples incorporated with *L.kefir* (B) Storage at room temperature; Storage at 4ºC.

Conclusion

In this research work the objective of incorporating probiotics in a fruit matrix was successful.

The probiotic organisms are normally added to fresh foods with high water activity (aw), but also to dry foods that have a low value of aw. The fresh foods normally have a shelf-life of weeks, like yogurts, while in dry foods the shell-life of this kind of product increases to months, as in the case of powdered milk (Weinbreck *et al.*, 2010).

In this research, probiotic bacteria were incorporated into a fresh fruit (apple), and when dried and stored at 4°C, the viability of the incorporated organisms declined only slightly (approximately 3 log cycles) during three months.

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