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Production and Characterization of Probiotic Juice from Star Fruit

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***Abstract*:-This review primarily focuses on the technology of commercially available milk-based probiotic beverages including acidophilus milk, bifidus milk, acidophilus-yeast milk, acidophilin, etc. Results of the scientific studies on probiotic whey-based beverages are promising and these products are expected to find spaces in the functional beverages market in the near future. Probiotics are microorganisms that provide health benefits when consumed. The use of probiotics has moved from concept to application. Probiotic bacteria have become increasingly popular during the last two decades as a result of the continuously expanding scientific evidence pointing to their beneficial effects on human health. As a result they have been applied as various products with the food industry having been very active in studying and promoting them. Within this market the probiotics have been incorporated in various products, mainly fermented dairy foods. In light of this ongoing trend and despite the strong scientific evidence associating these microorganisms to various health benefits, further research is needed in order to establish them and evaluate their safety as well as their nutritional aspects. The purpose of this paper is to review the current documentation on the concept and the possible beneficial properties of probiotic bacteria in the literature, focusing on those available in food.**

Keywords: Probiotics, bifidus milk, dairy products

INTRODUCTION

1.1 Probiotics

Probiotic bacteria have become increasingly popular during the last two decades as a result of the continuously expanding scientific evidence pointing to their beneficial effects on human health. As a result they have been applied as various products with the food industry having been very active in studying and promoting them. Within this market the probiotics have been incorporated in various products, mainly fermented dairy foods. In light of this ongoing trend and despite the strong scientific evidence associating these microorganisms to various health benefits, further research is needed in order to establish them and evaluate their safety as well as their nutritional aspects. The purpose of this paper is to review the current documentation on the concept and the possible beneficial properties of probiotic bacteria in the literature, focusing on those available in food.

Armachius James &Yousheng Wang et al. (2019) Work has done inthe research of probiotics based onImmune system, anti-inflammatory effect, improved bowel function, prevention of infections and treatment of diseases such as diarrhea

Probiotics are mainly separated from the human microbiota pool, feces, breast milk and fermented products. Also, boiled fruits and vegetables described as prebiotic are among the probiotic sources (*Choque Delgado., &Tamashiro).* They are rich in active antioxidants that provide health benefits to humans. In the present work, fruits and probiotic vegetables, segregation, marking, health benefits and their use are reviewed. Alternatively, fruit and vegetable juices represent promising carrier for probiotic bacteria; however, probiotic bacterial stability is difficult to maintain during cold storage that could preclude their industrial production. Current review discusses the various factors affecting the survival of probiotics throughout storage period in diverse fruit and vegetable juices, the possible impact of probiotics on the sensory attributes as well as on the overall acceptance of the products,and perspective technologies to improve the viability of probiotics.

1.2 Various probiotics

Mango juice is rich in minerals such as iron, magnesium, calcium, and sodium. It is also a natural source of vitamins, minerals, dietary fibres, phytochemicals, polyphenols and carbohydrates. As such, they are an excellent substrate and functional food matrix for the growth of probiotics bacteria such as *Pediococcuspentosaceus* and *Pediococcusacidilactici* as investigated Gayakapriya Mohan *et al.,* 2013) research on the selection of varieties includes a variety of methods such as adapting to biosafety factors, last-minute performance, low pH tolerance and antimicrobial activity. Problems were separated from the milk curd (Kiruththica, Sandhya *et al.,*2012) and compared to that tradition achieved in the Microbial Type Culture Collection and Genbank, Chandigarh. Acidified varieties were closed with Sodium Alginate and was incorporated into various fruit juices that served as probiotic fermentation substrates .Characters of the inspired substrates were read and tested for shelf life(Anita S. *et al.,* (2009)) YienYien Ong and Eugene Lee *et al.,*(2019)selection of study of Dragon fruit (Hylocereus known as a tropical fruit that offers a variety of health benefits, especially in heart health.The role of balanced nutrition for health maintenance has attracted the attention of the scientific community, which in turn has produced numerous studies in order to prove the performance of certain foods in reducing the risk of Some diseases. There has also been considerable growing interest in encouraging research into new natural components (Thamer and Penna*et al.,*2006).

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Pineapple is an economically significant plant and the third most important fruit crop in the tropical and subtropical regions of the world. In this study, fermentation of pineapple juice with probiotic bacteria Lactobacillus and Bifidobacterium strains as well as changes of some properties in the beverage during storage. Cashew nut milk was tested as a matrix to introduce commercial probiotic species to develop a non-probiotic milk drink Formulate and utilize banana flowers and banana leaves of the kluthuk type to become a functional food product in the form of fermented drinks. In addition, it is also to determine the levels of antioxidants (especially vitamin C) in fermented products in vitro.

1.3 Applications of probiotics

In a healthy host, a balance exists among members of the gut microbiota, such that potential pathogenic and non-pathogenic organisms can be found in apparent harmony. In the case ofbacterial infection, this balance can become disturbed, leading to often dramatic changes in the composition.

For most bacterial infections, nonspecific antibiotics are used, killing both non-pathogenic members of gut microbiota as well as pathogenic members. This can lead to a substantial delay in the restoration of healthy gut microbiota (Reid *et al.*, 2011). The restoration of the gut microbiota balance is believed to be important because maintaining a healthy and balanced gut microbiota throughout life is thought to help preserve health and favor longevity.

There is a growing body of evidence that ingested beneficial bacteria, called probiotics, can beneficially modulate chronic intestinal inflammation, diarrhea, constipation, vaginitis, irritable bowel syndrome, atopic dermatis, food allergies and liver disease (Wallace *et al.*, 2011, Nutrition reviews).

Probably the most promising area is the alleviation of symptoms linked to inflammatory bowel diseases (IBD), a growing health concern. As an example, the probiotic preparation VSL#3 induced remission in children (n=18) with mild to moderate ulcerative colitis (UC) (Huynh *et al.*, 2009, Inflamm. Bowel Dis.) Accordingly, VSL#3 was tested in a 1-year, placebo-controlled, double-blind clinical study on UC children (n=29). Remission was achieved in 36.4% of children receiving IBD therapy and placebo, but in 92.8% of children receiving IBD therapy and VSL#3 (Milele*et al.*, 2009, Am J Gastroeterol.) Similar promising results were obtained with the probiotic Escherichia coli Nissle 1917 strain (Kruis*et al.*, 2004,Gut; Do *et al.*, Ann Pharmacother, 2010). However, a review of available data indicates that more clinical studies are needed to confirm the beneficial effects of these products in UC and in inactive pouch patients (Jonkers*et al.*, 2012, Drugs). This review also states that there is no evidence to support the use of probiotics in Crohn's disease.

Fermented foods, particularly dairy foods,are commonly used as probiotic carriers. Fermented beverages provide an important contribution to the human diet in many countries because fermentationis an inexpensive technology which preserves food, improves its nutritional value and enhances its sensoryproperties (Gadaga*et al.*, 1999). However, the increasing demand for new probiotic products has encouraged the development of other matrices to deliver probiotics, such as ice cream, infant milk power and fruit juice.

Davidson *et al.*, (2000) evaluated the viability of probiotic strains in low-fat ice cream. They usedcultures containing *Streptococcus salivarius* ssp. thermophilus and *Lactobacillusdelbrueckii* ssp. Bulgaricus, Bifidobacterium longum and *Lactobacillus acidophilus*, and verified that culture bacteria did not decrease inthe yogurt during frozen storage. Also, the presence of probiotic bacteria did not alter the sensory characteristics of the ice cream. The icecream matrix may offer a good vehicle for probiotic culturesdue to its composition, which includes milk proteins, fat andlactose, as well as other compounds. Moreover, its frozen state contributes to its efficiency. However, a probiotic ice cream product shouldhave relatively high pH values –5.5 to 6.5, in order to favour an increased survival of lactic cultures during storage.Thelower acidity also results in increased consumeracceptance, especially among consumers who prefer milder Products. (Cruz *et al.*, 2009).

Preferred microorganisms for the probiotics from dairy products

ORGANISMS	ORIGIN
Lactobacillus casei Shirota	Yakult, Japan
Lactobacillus reuteri MM53	BioGaia, Sweden
Bifidobacterium lactis HN019	Danisco, France
Lactobacillus rhamnosus GG	Valio, Finland
Lactobacillus acidophilus NCFM	Nestle, Switzerland
Lactobacillus casei DN-173 010	Danone, France
Lactobacillus casei CRl-431	Chr. Hansen, USA
Bifidobacterium animalis BB12	Chr. Hansen, Denmark
Bifidobacterium animalis DN173010	Danone, France

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S.No	SOURCE	BIOLOGICALNAME	ORGANISMS	CELL COUNT	HIGH CONTENT NUTRIENTS
1.	Mango	Magnifera indica	*Pediococcuspentosaceus Pediococcusacidilac tici*	1.0*10^7 Cfu/ml	Carbohydrates
2.	Dragon fruit	Hylocereusundatus	*Lactobacillus casei*	2.5*10^{10} cfu/ml	Vitamins MineralsFibres
3.	Milk	Lactose	*Lactococcus*	8.75-9.55 10^{10}cfu/ml	Carbohydrates
4.	Pineapple	Ananus sativus	*Lactobacillus Bifidobacterium*	3.5*10^8 cfu/ml	Protein
5.	Cashew milk	Anacardium occidentale	*BifidobacteriumLactobacillus acidophilus Lactobacillus plantarum*	8*10^{10} cfu/ml	Vitamin-B
6.	Apple	Malus	*Lactobacillusplantarum Streptococcus thermophilus*	3.2*10^6 cfu/ml	Vitamins Magnesium Zinc
7.	Banana leaves and flowers	Musa	*Lactobacillusparacesei*	-	Vitamin-CFibres Starch
8.	Pomegranate	Punica granatum	*Lactobacillusplantarum Lactobacillusdelbruekii Lactobacillus paracasei*	3.9* 10^8cfu/ml	PotassiumVitamins
			Lactobacillus acidophilus		
9.	Carrot	Daucas carota	*Lactobacillus casei Bifidobacterium*	9.00 cfu/ml	Protein
10.	Cocoa juice	Theobroma cacao	*Lactobacillus casei,*	7..05 ±0.04 log cfu/ml	Carbohydrates
11.	Lemon juice	Citrus limonium	*Lactobacillus plantarum*	5*10^8 cfu/ml	Fibres pectin
12.	Sapota	sapodilla	*Lactobacillus plantarum*	8.0 ±0.1 10^8 cfu/ml	Vitamins
13.	grapes	grapevines	*Lactobacillus paracasei*	6 log cfu/ml	Vitamins copper

CONCLUSION

An enlarged interest of food industry to find new probiotics non-diary vehicles led to increased use of fruit juices as new matrices, representing a new type of functional foods with a great potential for providing even more health benefits for the consumers and for those seeking a healthy lifestyle. Design of functional fruit beverages with probiotics is still a challenging task, but with current and future technological solutions, it should be possible to derive nutritional and economic benefits for consumers and industry from these types of product.

Probiotic juice could differ in their antioxidant and antidiabetic activity. Studies revealed that good quality probiotic beverages prepared using various fruits. All bacteria consumed dextrose as the carbon- energy source where glucose was the preference. Results obtained in this study will be helpful for developing an appropriate probiotic juice using cfu count with more health benefits. Results also showed that the beverages fermented with strains had better properties. On the basis of above results revealed in the present study it might be concluded that the formulated probiotic juice beverages ispossible to satisfied application.

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REFERENCES

[1] Vanderzant, C. (1992) 'Splits Toesser, ed. Compendium of methods for microbiological examination of foods', Amer Public Health Assoc Vol.14, pp.919- 927.
[2] Almeida, K. E, Tamime, A. Y. (2007) 'Influence of total solids contents of milk whey on the acidifying profile and viability of various lactic acid bacteria', Journal of Food Science Technology Vol.42, pp.672-678.
[3] Holzapfel, W. H., Haberer, P., Snel, J. and Schillinger, U. (1998) 'Overview of gut flora and probiotics', Int J Food Microbiol Vol.41, pp.85-101.
[4] Klaenhammer, T. R. (1998) 'Functional activities of lactobacillus probiotics: Genetic mandate', International Dairy Journal Vol.8, pp.497-507.
[5] Kumar, R. S. and Manimegalai, G. (2003) 'A study on storage behavior of whey based pineapple juice RTS beverage', Ind Food Packer Vol.7, pp.51-53.
[6] Singh, S., Singh, A. K., Patil, G. R. (2005) 'Whey utilization for health beverage'Indian Food Industry Vol.21, pp.38-41.
[7] Srivastava, M. K., Trimurtulu, N., Lohani, P. P., (1985) 'Utilization of by-products by Dairy Industries-Whey and Butter Milk' Journal of Dairy and food

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ISSN: 2278-0181
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Vol.37, pp.507- 509.
[8] Tamine, A.Y., Marshall V. M. E. and Robinson, R. K. (1995) 'Microbiological and technological aspects of milks fermented by bifidobacteria', J Dairy Res Vol.62, pp.151-187.
[9] Guo, Z., Wang, J., Yan, L., Chen, W., Liu, X. and Zhang, H. (2009) 'In vitro comparison of probiotic properties of Lactobacillus casei Zhang, a potential new probiotic, with selected probiotic strains', Lebensmittel-Wissenschaft and Technologies, Vol.42, No.10, pp.1640−1646.
[10] Hoque, M. Z., Akter, F., Hossain, K. M., Rahman, M. S., Billah, M. M. and Islam, K.M. (2010) 'Isolation, Identification and analysis of probiotic properties of Lactobacillus Spp. from selective regional yoghurts', World Journal of Dairy & Food Sciences Vol.5, No.1, pp.39-46.
[11] Jan, I. and Rab, A. (2012) 'Influence of storage duration on physico-chemical changes in fruit of apple cultive', Journal of Animal and Plant Sciences Vol.22, No.3, pp.708- 714.
[12] Kohajdova, Z., Karovicova, J. and Greifova, M. (2006) 'Lactic acid fermentation of some vegetable juices', Journal of Food and Nutrition Research Vol.45, No.3, pp.115-119.
[13] Ogunbanwo, S. T., Sanni, A. I. and Onilude, A. A. (2003) 'Influence of cultural conditions on the production of bacteriocin by Lactobacillus brevis OG1', African Journal of Biotechnology Vol.2, pp.179 –184.
[14] Liu, S. Q. (2003) 'Practical implications of lactate and pyruvates metabolism by lactic acid bacteria in food and beverage fermentations', International Journal of Food Microbiology Vol.83, pp.115-131.
[15] Reddy, L. V. A., Reddy, O. V. S (2005) 'Production and characterization of wine from mango fruits (Mangifera indica L.)', World Journal of Microbial Biotechnology Vol.2, pp.1345–1350.
[16] Tezcan, F., Gultekin-Ozguven, M., Diken, T., Ozcelik, B., Erim, F. B. (2009) 'Antioxidant activity and total phenolic, organic acid and sugar content in commercialpomegranate juices', Food Chem Vol.115, pp.873–877.
[17] De Vries, W., Stouthamer, A. H. (1967) 'Pathway of glucose fermentationin relation to the taxonomy of Bifidobacteria', Journal of Bacteriol Vol.93, pp.574–576.
[18] Ekwem, O. H., Okolo, B. N. (2017) 'Microorganisms isolated during fermentation of sorghum for production of Akamu (a Nigerian fermented gruel)', Microbiol Res J Int Vol.21, pp.1–5.
[19] Osuntoki, A., Korie, I. (2010) 'Antioxidant activity of whey from milk fermented with Lactobacillus species isolated from Nigerian fermented foods', Food TechnologyBiotechnology Vol.48, pp.505–511.
[20] Wang, Y., Wu, Y., Xu, H., Mei, X., Yu, D., Wang, Y., Li, W. (2017) 'Antioxidant properties of probiotic bacteria', Nutrients Vol.9, pp.521.
[21] Thakkar, P., Modi, H. A., Prajapati, J. B. (2015) 'Isolation, characterization and safety assessment of lactic acid bacterial isolates from fermented food products', Int J Curr Microbiol App Sci Vol.4, pp.713–725.