

Conceptual Editorial

Harnessing of Functional Food Strategies from Traditional Food Processing

For the last few decades, the scientific community has been in frenzy and as a food biotechnologist I dare say its becoming impossible not to get pulled into the beautiful world of designing and development of functional foods which is getting creative and innovative with each passing day. New functional food ingredients are being discovered every day and consumer demand for 'food with a healthy function' is a growing trend. While the novel foods are absolutely irresistible with its color, texture, aroma, let's not ignore the potential of traditional foods which have a long history of safe use and consumer acceptability.

Recently there has been a resurgence and worldwide interest in development and therapeutic aspects of functional beverages. To explore this emerging area of functional beverages, we have been working towards development of two potential functional beverages (antioxidant rich wine (I) and probiotic fortified beverage (II)).



The application of fermentation technology has the potential to transform the perishable, seasonally available, fruit into relatively non-perishable beverage with novel and potential functional properties. The co-fermentation process was standardized in our lab for seabuckthorn wine and the physico-chemical attributes of the seabuckthorn wine were comparable with the commercial red wine, (Cabernet Shiraz). Fruit wines containing flavonoids have emerged as potential sources of antioxidants in reducing free radical induced tissue injury. Consequently, the health benefits of the antioxidant potential of wines have received considerable attention. The protective effects of seabuckthorn wine against phorone-induced oxidative stress and high-cholesterol diet induced hypercholesterolemia in male LACA mice were also examined. Oral administration of seabuckthorn wine increased the redox ratio accompanied by reduction of oxidized glutathione levels indicating attenuation of phorone-induced oxidative stress. Furthermore, the seabuckthorn wine supplementation reduced hepatic lipid peroxidation and increased the superoxide dismutase activity indicating improved resistance to oxidative stress. This study also provided important evidence that seabuckthorn wine exerts protective effects against hypercholesterolemia.

Probiotics are increasingly used in functional foods, nutraceutical and in microbial interference treatment. We have also undertaken studies to develop a probiotic fortified beverage from seabuckthorn berries. To the best of our knowledge, there are no probiotic beverages based on seabuckthorn juice so far in the Indian market.

In order to harness functional food strategies from traditional food processing techniques, three things need to be considered (i) processing of starter cultures with desirable functional properties including probiotics (ii) processing of foods with desirable functional characteristics (iii) processing of foods containing probiotics. Keeping these at the core, another research focus and our aim is to design tailor-made or functional starters from the traditionally used microbial cultures.

Bacillus sp. is known to be present in a large repertoire of alkaline fermented food products. This genus has also been in focus for their probiotic efficiencies. The spores of *B subtilis* have found its application as oral bacteriotherapy and

bacteriophylaxis for gastrointestinal disorders (mostly as a direct result of antibiotic treatment). *Bacillus sp.* have long been used for various traditional fermented foods like Natto, Thua-nao, Bikalga, Kinema. Studies have established that *Bacillus*-fermented food products have enhanced contents of vitamin B1, B2 and B3 especially in products like kinema and bikalga. *Bacillus* fermented natto shows the presence of nattokinase, a pro-fibrinolytic enzyme, and the extract has also demonstrated preventive action against cardio- and cerebrovascular diseases. More recently, studies on soumbala, a fermented african locust bean food condiment have reported that *B subtilis* and *B pumilus* isolated from soumbala, were able to inhibit and inactivate both Gram-positive and Gram-negative bacteria including *Micrococcus luteus*, *Staphylococcus aureus*, *Bacillus cereus*, *Enterococcus faecium*, *Listeria monocytogenes*, *Escherichia coli*, *Salmonella typhimurium*. Thus, *Bacillus sp.* have been crucial in the food industry as starter cultures, co-cultures or bioprotective cultures and is evolving as a viable probiotic which may be incorporated in various food products. Work has been initiated on evaluation of the probiotic efficiency of two isolates from fermented Bamboo, *B.subtilis* (MTCC 2451) and *B.licheniformis* (MTCC 2450). The two strains were compared with *L.plantarum* (ATCC 8041) and *L.rhamnosus* (ATCC 7469) to assess their probiotic potential. A comparative phylogenetic analysis has also been performed in our lab on strains of *Lactobacillus* and *Bacillus* on the basis of following biomarker genes: bile salt hydrolase (BSH), maltose-6-phosphate glucosidase, luxS gene, lpsA gene and fibronectin binding. Interesting results have emerged from the phylogenetic study indicating a degree of relatedness among the strains of the two genera for the genes of BSH and maltose-6-phosphate glucosidase that are important from probiotic nature. There is considerable degree of relatedness as observed in the distance matrix, especially in genes BSH and Maltose 6 phosphate glucosidase which indicates the degree of conservativeness in the corresponding genes among the 2 genera. A lot more is still to be unearthed.

Increasing healthcare costs, rise in lifestyle diseases and a rising interest in attaining dietary remedies for chronic diseases are some of the reasons of consumer interest in functional foods. The good news is that many of our traditional foods, the process technology and the starter cultures can be innovatively manipulated or improvised upon to harness successful strategies for development of functional foods.

So let the future slogan be “*Let food be thy medicine and medicine be thy food*”

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