Object & Scope of the Study
3.0 OBJECT AND SCOPE OF THE STUDY

Use of microorganisms in preparing foods based cereals and legumes are in practice since pre-historic times. With the growing health consciousness and idea of health promotion without associated health risks, the concept of probiotic food has attracted much attention. Probiotic food can be defined as “Food containing live microorganism believed to actively enhance health by improving the balance of microflora in the gut”. Most commonly, species of *Lactobacillus*, *Bifidobacterium* and *Saccharomyces / Candida* have been used as probiotics in humans. The key factor for the effective use of their strains in food is the maintenance of the culture viability and activity of the bacteria that have to survive in the food during its shelf-life, during transit through acidic condition of the stomach, the enzyme and bile salts in the small intestine. It has been found that slowly absorbed and non-absorbed sugars act as substrates that are utilized by beneficial microflora and thus help in their proliferation. Such substrates are referred to as ‘prebiotics’.

A few studies conducted on the interactions between probiotics and prebiotics in the same *in vitro* environment such as culture broths or bioreactors have revealed that there is a good degree of selectivity as the oligosaccharides are fermented by the probiotic bacteria and thus used as a carbon source for their survival. A few studies on similar lines in milk products are also available, but literature on their interactions in cereal and legume-based foods have only been postulated to be good as legumes are a good source of oligosaccharides that escape digestion in the human digestive tract.

This ability of the probiotic organisms, especially the lactobacilli, has been attributed to the presence of α-galactosidases, apart from the presence of the usual β-galactosidases, which are capable of breaking the α-glycosidic linkage in carbohydrates such as stachyose, raffinose, verbascose, trehalose and others resulting in the formation of simple sugars that are subsequently suitably metabolized. The fermentation of such
carbohydrates leads to the formation SCFAs which have great physiological importance. They have a tropic effect on the intestinal epithelium, decrease the rate of production and number of aberrant crypt foci. All the three main fatty acids (acetate, propionate and butyrate) stimulate epithelial cell proliferation and differentiation in both, the small and large intestines under *in vivo* conditions. Although conclusive evidence is lacking, SCFAs play an important role in preventing certain pathological conditions like chronic ulcerative colitis and colonic carcinogenesis.

The different cereal based fermented traditional foods are prone to contamination with undesirable microorganisms, where in the quality characteristics of the products are affected. In view of the natural fermentation as well as undefined microflora, these problems continue to persist in these foods. Besides, certain factors which possess strong chelating properties tend to decrease the bioavailability of nutritionally important minerals. Biotechnological approaches have enabled in enhancing the nutritional/health status of many of these foods through the interaction between probiotic and prebiotic. The use of potent microbial cultures with desirable traits has better applications in obtaining quality consistent products, mainly in terms of microbiological safety and availability of minerals and/or vitamins. This could be achieved through the use of desirable microbial cultures of *Lactobacillus* spp., *Bifidobacterium* spp. and *Saccharomyces* spp. In this background, the objectives of present Ph.D. programme were as follows:

- Isolation and characterization of native cultures of lactic acid bacteria, bifidobacteria and yeasts for desirable attributes by conventional and nucleic acid based detection approaches
- Characterization of phytase, α-D-galactosidase and antibacterial principles elaborated by microbial cultures
- Biotechnological approaches to study the interaction between prebiotics and probiotics in cereal and legume based foods