CHAPTER 7:

FUTURE SCOPE
Scope of future work

The present investigation has extensively dealt with isolation, characterisation and application of several oligosaccharides in general and inulin in particular as effective prebiotic of a selective Lactic acid bacterium, *Pediococcus acidilactici*. By judicious selection of few serials and like materials viz., garlic, wheat, oat, dalia, Isabgol, basil leaf, betel leaf, indigenous techniques have been developed for isolation of target oligosaccharide in its utmost pure form. Present investigation further deals with effectiveness of these isolated oligosaccharides towards the growth rate of *Pediococcus acidilactici* by providing the prebiotic effect. It is expected that the present investigation will not only help in isolating the selective prebiotic in a cost effective route, design of bioreactor for the growth of the probiotic *Pediococcus acidilactici* can be carried out with more structured way using the cell dynamics equations taking care of synbiotic effects of prebiotic-probiotic conjugate.

Although the present investigation is expected to pave the way on general understanding of synbiotic interaction between prebiotic and probiotic, the real challenge lies on the application of these isolated prebiotics as additives in food products. The present practice is to isolate and purify oligosaccharides from natural sources using a highly expensive route, which in results makes the end product prohibitively expensive. The food products containing these prebiotics for the obvious reason becomes so expensive that these become out of reach of majority of population in developing and under developed countries.

Understanding the present scenario it is suggested that the following future work may be undertaken as follow up action of the present investigation.

Studies on isolation of different oligosaccharides may be conducted in bench scale and the isolation strategy may be developed in quantitative way so as to apply them for further study in pilot plant scale. While investigating on bench scale, special attention must be paid towards more precise control parameters, strategies and on selection and operation of supporting accessories viz., agitator, cooling or heating system and downstream processing. The real challenge will then lie on the
puriﬁcation of isolated product. While standard puriﬁcation techniques for bio-
macromolecules like gel chromatography, HPLC, centrifugation and other related
process will be studied in detail, more emphasis will be paid on developing a
cheaper puriﬁcation route by extensive experiments on process parameters or by
suitably designing the existing separation unit to suit the purpose.

Application of these isolated prebiotics on the probiotics will then be studied in
terms of cell growth rate under symbiotic effects. It is expected that application of
nanotechnology as conducted in the present investigation will play a major role in
this respect. Here the challenge will lie to evolve a suitable strategy for recovering
the nanoparticles without an appreciable loss from the bioreactor.

The proposed quantitative cell dynamics equations will then be tested for their
application in large scale bioreactor design. Once these objectives are well
established the probiotics enriched with prebiotics will be further tested for their
prebiotic scores to establish quantitative effectiveness of these probiotics against
known pathogenic cells. The outcome of these investigations will then be compared
with the standards laid down by the different statutory bodies Central and State
Governments responsible for observing safety of food materials. Once the standards
are made the puriﬁed prebiotics will be supplemented with the food materials
following the laid down standards. The samples of these food materials will be
tested on patients following the bioethics. It is expected that the outcome of the
investigation will lead to the commercialization of the process to produce prebiotics
at a cost affordable by majority of populations all over the world.