

## PREFACE

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This academic journey has been long but was extremely rich and fruitful to me. My research interest has taken me to the challenging word of the folic acid which is an essential water soluble vitamin for the human health. This B-group vitamin has a well-established role in the prevention of neural tube defects in the developing fetus and megaloblastic anemia. It is found in many food sources but its quantity is very less to complete the daily recommended intake on consumption of small servings of the available sources. Recommended intake of folate varies according to the different age groups of person. However folate intake is mostly below the recommended intake especially in the countries where still mandatory folic acid fortification practices is not followed properly. Several fortified cereals, breakfasts are available in the sufficient amount in the developed countries. Supplements are also there but that is not quite popular among the most of the populations due to the unfavorable conditions and distractions due to the cost issues. So in many countries, interest is being developed to innovate various ways for the natural enhancement of folate in food products.

The aim of this study is to screen the potential folic acid producing microorganisms and investigate the production, various methods to enhance the folic acid production and finally the microbial fortification in some food products to enhance the natural folate content of food.

The first phase of the work was concerned with the screening of suitable microorganisms for the folic acid production on the basis of literature survey as well as enhanced production of folic acid.

The second phase of the work involved mainly with the evaluation of probiotic potential of folate producing strains by *in vitro* methods as it can give the dual advantage to the consumers.

The third phase of the work dealt with the optimization of several parameters for enhanced production by the selected strains and validation of optimized parameters. Both conventional and response surface methodology was used for the optimization purposes.

The fourth phase of the work was concerned with the folate production studies using immobilized cells to check whether it is advantageous for maximum production.

The last phase of the work dealt with fermentative fortification of food products which was done by probiotic microbial strains and to check the stability and shelf life of fortified food products after storage.

The work incorporated in the present thesis has been arranged in five chapters. The first chapter contains the general introduction of the subject, its structure and importance. This chapter throws light on the importance of vitamins especially folic acid for the human health. Sources of folic acid, nomenclature and biosynthesis pathway have also been discussed.

Chapter two provides the exhaustive review of the up-to-date literature published related to the work on the various aspects of history of folic acid and its fortification policies and microbial production of folate. A systematic year wise literature is provided for the better understanding of the present work. Objectives of the present work have also been included in the chapter.

Chapter three discusses the material and methodology used for the entire study. General experiment set up, media formulations, different assay and protocols used in production studies, fortification schemes have been described.

The fourth chapter deals with the results obtained during the experiments carried out in the chapter three followed by discussions.

Chapter five summarizes the main findings of the above studies and overall conclusions that were obtained.

At the end, the thesis has been appended by up-to-date list of references. References have been arranged alphabetically according to the surname of the first author.

List of the publications and reprint of the publications have been attached at the end of the thesis.

In my hope and belief the entire contents of the thesis has been compiled on my research.