Preface

Plants are unable to move from one place to another as animals do. Environmental changes put plants into stressful conditions. Plants have evolved to respond to various kinds of abiotic and biotic stresses by changes in molecular, biochemical and physiological factors.

In the first chapter a review of current research literatures has been covered which is relevant to the thesis. Various aspects of the test system *Vigna radiata* (L.) Wilczek, different types of abiotic stresses, gamma irradiation as a stress system, role of polyamines and SAMDC gene in stress management have been discussed. The ITS region is discussed as a tool of molecular phylogeny to aid in development of stress tolerant high yielding varieties.

The second chapter describes the effect of gamma irradiation on seeds and seedlings of *V. radiata* IPM 99-125 (Meha). Gamma radiation results in abiotic stress, which is evidenced by loss of germination, morphological changes and loss of photosynthetic pigments. Level of polyamines also changed depending on the stage of the lifecycle of the plant indicating the role of polyamines in stress response.

In the third chapter the role of putrescine treatment in partially alleviating oxidative stress caused by gamma irradiation in *V. radiata* was studied. Gamma irradiation generates oxidative damage by generating free radicals and reactive...
oxygen species. Treatment with polyamine putrescine resulted in increased Put and Spd and partial alleviation of oxidative stress.

The fourth chapter is about the study of the expression of SAMDC gene which is a rate limiting enzyme in higher polyamine biosynthetic pathway. We have partially sequenced SAMDC in V. radiata and developed primers for real time PCR. Real time PCR by using SYBR green chemistry showed that treatment with 1 mM putrescine resulted in increase in SAMDC expression compared to control.

The fifth and final chapter is based on molecular phylogenetic studies of the internal transcribed spacer region. A better understanding of phylogeny among the closely related species and varieties will help in developing better varieties through breeding. The ITS1 and ITS2 sequences from V. radiata IPM 99-125 (Meha) was sequenced and submitted to NCBI nucleotide database. We have used this sequence and other sequences submitted by other researchers in online databases to compare detailed phylogenetic relation among the genus Vigna.