ACKNOWLEDGEMENTS

As a matter of eternal compliance, above all I would like to thank soulfully, the Almighty God who bestowed me with his blessing to accomplish this investigation. All the words in the lexicon will be futile and meaningless if I fail to mention of my adorable parents to whom my every breath and action is dedicated, who have made sacrifices all through their lives for my betterment and pampered me with love, affection, prayers and their heartfelt blessings.

I wish there could be really more befitting way than word for acknowledging the indebtedness and to express my loyal and venerable thanks and divulge my deep sense of heartfelt gratitude to Dr. S.S Kanwar, Chairman of my Advisory Committee for opening my way to new horizons. His painstaking efforts, praiseworthy guidance, scientific acumen and ever helping attitude steered the completion of this work. He taught me how to ask questions and express my ideas in a scientific way. He showed me different ways to approach a research problem and the need to be persistent to accomplish any goal. I shall always remain indebted to him for calm endurance, forbearance and above all his parental attitude. I owe him to more than I could care to admit.

I consider it a great privilege to record my respect and indebtedness to worthy members of my advisory committee Dr. P.N. Sharma (Professor and Head, Dept. of Plant Pathology, COA), Dr. K.D. Sharma (Associate Professor, Dept. of Agricultural Biotechnology, COA), Dr. Birbal Singh (Sr. Scientist, IVRI, Palampur) and Dr. O.P. Sharma (Principal Scientist, IVRI, Palampur) for their esteemed guidance, persistent encouragement, helpful suggestions and timely cooperation to the course of investigations with professional dexterity. This memorable moment also provides an opportunity to express my indebtedness to Dr. M.K. Gupta, Associate Professor, Microbiology (Retired) for his help, co-operation and all kind of support in completing this project. I also pay my cordial thanks to Dr. C.R. Sharma, Dr. Nageshwar Singh, Dr. H.L. Sharma and Rajinder Sir for their generous help and guidance in execution of essential requisites during this study.

I acknowledge my thanks to Dean, Post Graduate Studies as well as Dean College of Basic Sciences for providing the necessary facilities to complete this study.

I emphatically express my thanks to office and laboratory staff of my dept, Sh. Jairaj, Smt. Usha, Smt. Maya, Sh. Roshanlal, Sh. Sushil, Sh. Rajkumar, Manohar bhaiya and Sushil bhaiya, are also gratefully acknowledged. All these words will be futile and less meaningful, if I forget to acknowledge the enthusiastic company and untiring help of my friends, seniors and juniors who inspired me to complete this investigation. Among the galaxy of these special people I express my heartfelt thanks to Ritika, Sunita Mam, Sohini di, Natasha di, Ruchi di, Sakshi, Swati di, Vivek Sir, Aditi Mam, Ajay Sir, Shweta Sharma, Shobit, Himankshi, Gaurav, Rajni, Kalpna, Nisha, Meghna, Nandita, Poonam, Aditi, Akriti, Bindu Devi, Bindu Thakur, Anita, Ritu, Kavita and Shivani who always stayed by my side to lend a helping hand and provided me a constant source of inspiration during the entire tenure of this study.