Acknowledgement

After a long journey of five years of my research work, time has come to look back again and remember all those without whom this journey would have been impossible. I feel short of words to express my deep sense of gratitude towards the Almighty God with whose grace present study has been completed.

No words can adequately measure thanks, I owe to my supervisor Prof. R. S. Chauhan, Head, Department of Biotechnology & Bioinformatics, Jaypee University of Information Technology, Waknaghat, Solan for his valuable suggestions, motivation, patience, enthusiasm and immense knowledge. His guidance helped me all the time in research and writing of this thesis. He has enlightened me through his wide knowledge of Plant Biotechnology. Thanks Sir, for believing in me and standing by me over the years.

I am delighted to express my thanks to COO, Dr. Y. Medury, for providing all the necessary facilities, and creating research environment to accomplish this scientific venture of my life.

I earnestly wish to express my deep venerable gratitude to Brig (Retd.) Balbir Singh, Director, Jaypee University of Information Technology for his constant support, not only for administrative support but also for constant inspiration.

Special thanks are due to Vice Chancellor, Dr. Ravi Prakash and Dean (A&R) Prof. T.S. Lamba for extending his facilities to carry out research and critically reviewing my synopsis.

I wish to convey my sincere thanks to all the faculty members of Department of Biotechnology & Bioinformatics, particularly Dr. P.K. Naik, Dr. Harvinder Singh and Dr. Hemant Sood for their help and guidance at the various stages of this study.

I am extremely thankful to non-teaching staff particularly Somlata mam and Mamta mam of the department for their selfless assistance. Their boundless love shall be remembered forever.

I am sincerely thankful to Dr. J.C. Rana (Scientist, NBPG Regional research station Phagli, Shimla) for providing samples to carry out this study and helping me whenever needed.

It is high time to acknowledge all my fellow colleagues especially Krishna, Anu, Tamanna mam, Anshu, Mani, Varun, Jeet, Sneha, Asha, Arun, Mamta, Kirti, Jibesh, Saras, Akangsha, Archit, Nikhil, Shivaji, Priya, Shagun, Aseem and Niharika for their problem solving attitude and healthy discussions during the course of my research work.

Friends are part of life; I am thankful to all my friends especially Arti, Payal, Saurabh, Sunil, Jatin, Bharti, Shivani and Abhishek, for their moral support and help provided by them during all ups and downs in this journey of research. I am highly indebted to Himanshu sir, Anuj sir, Anand for all their help during the tough time.

I bow my head before my esteemed parents with all reverence and gratitude for their consistent support and invaluable blessings, selfless but untold sacrifices for my better and bright future. Without the encouragement and moral support of my in-laws, I could never have been what I am today. I am also thankful to my uncle and my brothers Munish, Pranav and Siddharth for their support and encouragement.

I highly appreciate for unsolicited cooperation, support, strength and cheery assistance of my husband Mr. Asheesh Gupta who helped me to make my dream come true.

I am thankful to the Department of Biotechnology, Ministry of Science and Technology, Govt. of India, New Delhi for awarding me the research fellowship.

(Nidhi Gupta)