PREFACE

The present study that extended over little less than five years (2009-2013), was designed to generate further knowledge in the field of association mapping and molecular breeding in wheat. The study was conducted with the following three major objectives, which have largely been fulfilled: (i) Association mapping for some important agronomic traits including pre-harvest sprouting tolerance (PHST) using simple sequence repeat (SSR) markers, (ii) Association analysis for grain weight using SNPs in TaGW2 in Indian wheat genotypes, (iii) Evaluation and characterization of bread wheat lines containing high GPC gene Gpc-B1 and leaf rust resistance genes (Lr24 and Lr28) derived following MAS. For convenience of presentation, the thesis is organized into seven chapters. Chapter 1, entitled ‘General Introduction’ outlines the importance of the crop and the subject taken up for study, covering all the three objectives. In Chapter 2 entitled ‘Review of Literature’, the available literature on the subject covering all the three objectives is presented along with a critical discussion, describing the major breakthroughs and also the scope of further work in each area under study. The results of the present study covering the above three objectives are presented and discussed in Chapters 3-5, each chapter having an independent sections entitled Introduction, Material and Methods, Results and Discussion, but no Literature Review, since Chapter 2 covers the literature pertaining to all the three objectives. Chapter 3 covers results of association mapping in two parts: (i) association mapping for pre-harvest sprouting tolerance (using 242 Genotypes) and (ii) association mapping for 14 other agronomic traits, using 230 genotypes; the results of association mapping for PHST have already been published (Jaiswal et al. 2012) and those for other agronomic traits have been submitted for publication. Chapter 4 covers results of the study on association mapping for grain weight involving the gene TaGW2 and the SNPs that were detected in this gene, where a specific SNP and a haplotype has been found to be associated with grain weight; the results of this study have also been written in the form of a manuscript, which is ready to be submitted for publication. Chapter 5 covers the results of a major study involving evaluation and characterization of 124 wheat lines that were improved in an earlier study by introgression of a grain protein content gene, Gpc-B1, and leaf rust resistance genes, Lr24 and Lr28. These improved wheat lines were grown on multiple locations for three years, and data were collected on grain protein content, leaf rust resistance and a number of agronomic traits; some of these lines had improved protein content without any yield penalty and may be eventually released for commercial cultivation. A summary of the results and salient features of the present study are presented in Chapter 6, and a list of ‘References’ cited in the thesis is presented in Chapter 7. In addition to these seven chapters, two appendices are included list of genotypes used for association mapping, and motifs present in promoter sequence of TaGW2-6A respectively. Reprints of publications are also appended at the end of the thesis. The candidate hopes and looks forward that the results presented in this thesis will be used in future by wheat researchers and may also prove useful for wheat improvement.