PREFACE

Transgenic technology is a powerful tool in the hand of breeders for improving the crop where conventional methods of genetic improvement are laborious and time-consuming. Recombinant DNA and transformation techniques allow the use of genes from any source as tools for crop improvement. Transgenic methods enable the insertion of well characterized genes for specific traits into Hevea genome producing highly specific change only in the trait of interest, where only small variations in the genetic makeup is expected. In contrast, many of the unknown genes are introduced into the genome of Hevea in conventional methods while attempting the transfer of a desired gene. Hevea breeding programmes mainly aim at improving the latex yield of the plant combined with abiotic/biotic tolerance, resistance to tapping panel dryness and development of latex timber clones. The latex biosynthetic pathway starting from sucrose to polyisoprene is controlled by many enzymes among which the activity of one of the upstream enzymes catalyzing the conversion of 3-Hydroxy 3-Methylglutaryl Coenzyme A to mevalonate, an irreversible step, was reported to be lower. Several studies supported this view and linked this gene to the latex yield of Hevea. Thus the present study was undertaken with an objective of developing transgenic plants overexpressing laticifer specific hmgr1 gene. For achieving this goal, suitable Agrobacterium strain and the callus type giving better transformation efficiency were optimized. The transgenic plants were validated for transgene integration and expression using different molecular and biochemical methods.

The thesis contains six chapters; the first chapter briefly introduces the crop, describes the limiting factors of latex yield and the importance of this gene for transgenic work. The second part details relevant studies carried out by other researchers in this direction. This part reviews the work done in the isoprenoid pathway in general; Agrobacterium mediated genetic transformation and
transgenic plant development. The experimental details followed are dealt in the third section of the thesis. The fourth chapter critically scrutinizes the results under different experiments and these results are discussed in the fifth part of the thesis with probable explanations. In the final part of the thesis, various results are summarized with a road map on the future prospects of the work.