Acknowledgements

I bow my head in front of the Almighty for all the blessings showered on me all through my life, particularly during the time, this study was carried out.

It gives me immense pleasure to record my great debt of gratitude and appreciation to Prof. V.N. Rajasekharan Pillai, Vice-Chancellor, Mahatma Gandhi University, Kottayam for his invaluable guidance and constant encouragement throughout the study. I take this opportunity to express my profound indebtedness to his able guidance.

I am also thankful to Dr. M. Padmanabhan, Reader-in-Charge, School of Chemical Sciences, Mahatma Gandhi University, for all the encouragement during the course of study.

I take this opportunity to thank Mr. K.J. Mathew I.A.S., Chairman, Rubber Board for his support during the study. I also thank Mrs. J. Lalithambika I.A.S., former Chairperson, Rubber Board for sanctioning me study leave to carry out the work.

I am thankful to Dr. M.R. Sethuraj, Director, Rubber Research Institute for providing necessary facilities at RRII to carry out the work.

My sincere thanks are to Dr. K.I. Punnoose, Deputy Director (Agronomy/Soils Division), RRII for his constant encouragement and advises during the study. I am thankful to Smt. M. Karthikakutty Amma, Sr. Scientist (Agri. Chemistry), RRII for all the advises and help she rendered to me during the course of study. I am also thankful to Dr. Premakumari Amma, Sr. Scientist, RRII for extending the computer facility during the study.

I am much obliged to Dr. P.R. Suresh, Asst. Professor, Kerala Agricultural University for all the advises, help and encouragement during the study.

I am thankful to Miss Liza Joseph of Statistics Division, RRII for all the help in computer work.

I am thankful to all the Research Scholars and my friends at School of Chemical Sciences, Mahatma Gandhi University for extending all sorts of help and creating a jovial atmosphere during the work. I am particularly thankful to Dr. Dominic Thomas, Reader, St. Alberts College for his friendly advises and encouragement during the study.
Many thanks to Mr. C. Arunan, School of Chemical Sciences, Mahatma Gandhi University for all the help and very valuable suggestions he gave to me during the study and during the preparation of the manuscript.

I am thankful Dr. Beena Mathew, School of Chemical Sciences, Mahatma Gandhi University for her timely advises and suggestions and for carefully examining the manuscript.

I am thankful to all the administrative and supporting personnel of School of Chemical Sciences, Mahatma Gandhi University, particularly to Mr. Baby Philip, Administrative Officer for their help during the study. I am also thankful to administrative staff of Ac.A II Section and Mr. Harikumar of Ph.D, examination wing of Mahatma Gandhi University, for all the help they rendered to me during the study.

I am very much thankful to all my friends and senior officers at RR II for extending their support to me during the study. I am grateful to Mr. M.J. Thomas for his help in chemical analysis of samples.

I am also thankful to my sisters and brothers-in-law for all the help they rendered to me during the study.

I am thankful to my parents for their prayers and blessings which is the key factor of all my success.

I am greatly indebted to my wife Liza and daughters Hanna and Miriam for their prayers, patient co-operation and esteemed support during this study was carried out.