

Acknowledgements

“All failed be lost but not all lost the unconquerable will”

- Robert Frost

Notwithstanding all the efforts that have been bestowed in the execution of this thesis, I was round the clock benefited by my respected teacher and supervisor Dr. Eklabya Sharma FNASc, Scientist “D” and In-charge, Sikkim Unit of GBPIHED with high degree of excellence and a holistic approach for analyzing the problems and incessant endeavor to solutions. I am deeply obliged to pay my honour and gratitude to him. It is my great fortune to pay respect to Dr. K. K. Singh, my co-supervisor for his useful criticism, valuable suggestions and constant guidance during the course of this investigation.

I have the privilege to strongly pay deep respect to Dr. (Mrs.) Rita Sharma for her constant involvement and indispensable help without whose share of merit, this work would not have been possible.

I am highly grateful to Prof. J. S. Singh and Prof. A. N. Purohit for their visionary ideas of research towards the role of N₂-fixers in large cardamom and mandarin agroforestry systems and their suggestions when they visited Sikkim. I thank Dr. L. M. S. Palni, Director GBPIHED for taking keen interest on the theme of this work and for providing necessary facilities.

I highly appreciate the encouragement and guidance received from the Department Research Committee (Botany),

University of North Bengal. I thank my respected teachers Prof. K. B. Dutta, Prof. P. K. Sarkar, Prof. B. N. Chakraborty, Prof. A. P. Das Prof. P. K. Basu and Dr. U. Chakraborty for their support and help. Thanks are due to the Indian Council of Agricultural Research (ICAR) New Delhi for funding this work.

I express sincere thanks to Er. A. P. Krishna, Mr. L. K. Rai, Mr. R. Lepcha, Dr. S. C. Rai, Dr. Y. K. Rai, Mrs. S. Krishna and Mr. R. K. Das for their co-operation and support. I also thank Santosh Purnima, Birkumar, Alka, Nakul, Bidhya, Bhanu, Sanjib, Sagar, Pankaj, Jyotsana, Onkar, Prem, Mohan, Shyambir and Sunil for their selfless help and support. Irrespective of all the hardships with burning sensation caused by *Urtica dioica* (a nettle plant locally called 'sisnu') and leeches sticking at every parts of the body during rainy season, Jagannath, Arun and Krishna were always instrumental in the field. Special thanks are due to Mr. M.V.S. Manian for his on-line assistance.

Inestimable thanks are extended to Dr. R. C. Sundriyal, Dr. (Mrs) M. Sundriyal and Dr. D. Chaudhury for their unpayable helps and guidance.

I express my sincere thanks to my respected teacher Dr. J. P. Tamang and Mrs. Namrata Tamang for their invaluable encouragement. I cannot scale the inspirations given by Mr. I. L. Khatiwara, Mr. H. L. Bhandari, Mr Somnath Panday and Mr. Madhusudhan Pandey. Thanks are due to Mr. Ram Prashad Dhakal, Mr. P. L. Khatiwara and their families for their moral support and inspiration.

I sincerely thank Prof. Dan Binkley for providing recently published literature. I was highly benefited from the published materials sent in bulk by Prof. C. T. Wheeler, Dr. D. S. DeBell, Prof. Anita Sellsdt, Prof. J. C. Gordon, Prof. K. M. Goh and Prof. C. Giardina.

I have no words to acknowledge my sincere thanks to the cardamom growers for tirelessly maintaining the cardamom plantations which have provided a readymade playground for this research. I am proud of them for having such plantations and express gratitude for allowing me to make field samplings.

I am fortunate to have been constantly inspired by my wife Radhika and son Devdarshan. The intrinsic strength and strong inspiration for this work was given by my grandfather Late Shri D. P. Banstola. I offer my most valuable depth of respect to my parents- Shri M. L. Banstola, Smt. Kamala Banstola and Banstola family of Bering for their never-ending support and inspirations. I remember them for the tonnes of hard work and sacrifice they had to make for me.

Lastly, I would like to thank those whose names have not appeared above but have helped me directly or indirectly in completing this thesis.

Date & Place: *Jadong, 24 Aug, 2001*


(Ghanashyam Sharma)