

Acknowledgment

I would like to take this opportunity to express my deep gratitude to all those who have contributed to the successful completion of my doctoral thesis. Their support, guidance, and encouragement have been invaluable throughout this learning journey.

First and foremost, my esteemed PhD guide, Prof. Susy Albert, whose expertise, guidance, and unwavering support have been instrumental in shaping the direction of my research. Your mentorship has been invaluable, and I am deeply grateful for your contributions to my academic growth. Your wisdom and guidance have greatly enriched my research experience. Thank you for your guidance and unwavering support.

I extend my heartfelt gratitude to the dedicated individuals within the Botany department, The Maharaja Sayajirao University of Baroda who have played a crucial role in my academic journey. The Head of the Botany Department, Prof. NSR Krishnayya, for providing leadership and fostering an environment of academic excellence. I would also like to express my appreciation to senior professors, Prof. Neeta Pandya and Prof. Arun Arya, for their valuable insights, encouragement, and mentorship throughout my doctoral studies. Your collective contributions have been indispensable in helping me achieve this significant milestone in my academic journey.

I want to extend my sincere gratefulness to Prof. P.S Nagar, Garden Superintendent, for generously allowing and providing the necessary space within the Botanical Garden to conduct my on-field experiments. Prof. Ranjitsinh Devkar from the Zoology Department, for generously allowing me to use his lab facilities for my research purposes. Additionally, I want to express my sincere appreciation to Dr. Priya Pillai for her assistance in providing access to essential instruments and her invaluable help in overcoming research obstacles. Your cooperation and support have been essential in the successful execution of my research work.

I am indebted to my exceptional lab mates, whose support has been a constant source of motivation. I want to extend my sincere appreciation to Dr. Bhavana Sharma, Dr. Amee Taunk, Dr. Dhara Zaveri, and Dr. Bhavika Pandya, for sharing your expertise, offering valuable guidance, and contributing to the depth of my research. Ms. Minal Bambhaniya, Ms. Divya Das, and Ms. Sanobar Mansuri for your company and countless hours we spent working together in the lab. Your contributions have been essential to my success.

I want to express my deepest gratitude to my beloved family, who have been my unwavering support system throughout this journey. My loving spouse, Karan Shah, whose constant encouragement, and understanding have been my rock. My dear mother, Nayana Mewada, and father, Vinod Mewada, for their endless love, guidance, and belief in me. Although my father-in-law, Late Yogesh Shah, is no longer with us, I want to acknowledge the support he provided. My dear mother-

in-law, Hema Shah, cheering me up during the tough days. My elder sister, Pratishta Kawa, and brother-in-law, Umang Kawa, whose presence has brought joy and inspiration into my life. My adorable niece, Anandi Kawa, whose innocent smile has brightened my toughest days. My brother-in-law, Krunal Shah, and sister-in-law, Foram Shah for their warmth and encouragement.

I am also grateful to my friends, who have stood by me as pillars of strength. Komal Thakkar, Rajvi Thakkar, Shivangi Joshi, Shyam Patel, Mansi Patel, Mitul Soni, and Darshita Patel your friendship and unwavering support have been a source of comfort and inspiration.

I am immensely grateful to the organizations and institutions that provided financial and technical support for my research. GSFC Science Foundation for their initial funding support. I am thankful to GSFC Science Foundation for granting funds to Prof. Susy Albert (Principal Investigator) and Dr. Ameer Padhiar (Co-Investigator), under which I had opportunity to conduct my research. Special thanks to Dr. KD Bhatt, Member Secretary of GSFC Foundation, for their crucial role in this support. Vadodara Municipal Corporation (VMC), under the leadership of Mr. Lakshank Nedariya, for granting permits for landfill and dumpsite visits and for facilitating waste collection, which was integral to my research. Gujarat Industrial Research and Development Agency (GIRDA) for generously providing access to their instrumental facilities, which significantly contributed to the success of my research. ONGC Petro Additions Ltd. (OPAL) in Dahej, Gujarat, Reliance Pvt. Ltd. in Jamnagar and Billion Flex Pvt. Ltd. in Halol, Gujarat, India, for their provision of polyethylene materials for my research experiments. The National Fungal Culture Collection Of India (NFMCC) at ARI, Pune, for their assistance in sending fungal cultures and identifying the fungal strain, which was essential for my research. The Sophisticated Instrumentation Centre for Applied Research & Testing (SICART) and the Center for Research in Nano Technology and Science (CRNTS) at IIT Bombay, for their exceptional role in analyzing my experimental samples. Mr. Jaimin Dilip Shah, CEO, and the R & D team, including Mr. Subodh Falnikar and Mr. Bhumi Fadia, at Sabar Insulating Kit Center, for their invaluable assistance in providing a tensile strength testing facility and offering guidance during the analysis phase of my research.

To all of you, your presence in my life has been invaluable, and I could not have reached this milestone without your love, encouragement, and understanding. Thank you for being my rock and my source of strength.

Mitu Mewada