Acknowledgements

Alhamdulillah, finally this thesis is finished. This could not happen without the support from many people, especially from the members of the Pharmaceutical Biology group, University of Groningen. Their support does not only include the scientific and academic aspects, but also the social life during the years of my stay in the nice small city (fietsstad), Groningen. I would like to express my gratitude to all of you.

I would like to thank the QUE Project of the Department of Biology, Institut Teknology Bandung (ITB) for financial support during my PhD study, especially to Dr. Agus Dana Perdana and Dr. Taufikurrahman, the directors of the project. My research was also partially supported by University of Groningen through a scholarship.

I wish to thank my promotor Prof. Dr. Wim J. Quax who gave me a chance to do research for my doctoral degree in his department, for his support and approval of this thesis. Together with Dr. Niesko Pras, you introduced me to the scientific atmosphere in your country. Although it was only for short time being supervised by Niesko, I appreciate it so much.

I would like to express my sincere appreciation to my copromotors, Dr. Herman Woerdenbag and Dr. Oliver Kayser, for patience and guidance during my PhD period. Herman, you have always tried to help me to find the solution for a problem I had. I know that you left the lab long time ago, but your knowledge in practical manners still helps me a lot. Fast in answers, immediately in responding emails, excellent in English, fast in correcting manuscript are things that I will never forget. It was nice when I tried to send you an email in Dutch, you replied in Indonesian. Good luck with your Indonesian course, and then we can continue talking in such way.

Working together in the lab with colleagues has stimulated me to finish my study. Therefore, many thanks I want to address to my colleagues especially to my roommate Mattijs Julsing for friendship, help and nice discussions. Sometime we had a quite hard discussion, but actually we were sharing ideas. I really enjoyed it, my best friend, Mattijs. Albert Koulman, I remember that you sent me much literature before I started my study here, followed by a lot of help and discussion concerning the research project. It is pity that you will not be here when I defend my thesis. My thanks also go to other colleagues, Monique (ex-roommate), Almer, Charles, Lidia, Johanna, Michiel, Asia, Agata, Ana, Ykelin, Henco, Ronald D., Ronald M., Robert, Linda, Helga, Geeske, Nickolay, Carlos, Mariana, Melloney, Mags, and Peter. I want to thank my paranimfen Mattijs and M. Chalid for helping me to arrange my defence and subsequent party.

I greatly appreciate the important assistance from Rein Bos, Sieb Battermann, Janita Zwinderman and Freeke van Putten. Rein’s expertise in analytical instruments (GC, GC-MS, HPLC) helped me a lot. You are hand van de meester and more than that, you also supervised me in many things. Sieb, you have prepared and maintained the plant cell culture that I have used for my research project. You also introduced me to some nice Gronings words. Janita, I thank you for helping me to arrange administration stuffs. Freeke, you helped me to prepare samples to be analysed. I appreciate it.

I would also like to thank Prof. Jacques Hille, Dr. Paul Dijkstra and Drs. Marcel G. Sturee who gave me an opportunity to do work at the Department of Plant Molecular Biology in Haren. Paul and Marcel your expertise in plant genetics improved my knowledge in this field that I just entered. I am glad that I have good results on this topic although the work has to be continued to yield a nice publication.

I am grateful to the members of the reading committee, Prof. Dr. F.A.J. Muskiet, Prof. Dr. T.J. Schmidt and Prof. Dr. R. Verpoorte, for the evaluation of the manuscript and for their valuable comments.
I want to thank my colleagues as well as my neighbours in Groningen, Heni Rachmawati, Ikhlasul Amal and their family for many things. My thanks also go to all members of deGromiest (the Indonesian Muslim Society in Groningen) for friendship. My family felt at home being together with you all. It was nice to have routine gathering, discussion, tadarus, sharing ideas. I hope it can be kept and developed further. To all members of PPI (Persatuan Pelajar Indonesia, Indonesian student society in Groningen), I thanks you for your moral support.

My warmest gratitude goes to my colleagues in several cities in the Netherlands, Deden, Iskandar, Zul, Zayd, Gun, Indra, Hasyim, Didin, Lukman, Satria, Iman, Billi and Oka for many helps and kind friendship. Your houses were “my hotels” when I travelled to your city.

I would like to thank Martin and Sanneke Broekhuijsen for hospitality and friendship. My wife learned Dutch from you and you learned Indonesian from her. It was nice time to have dinners at your house. Martin, you are a good cooker of lekkere dingen. Also to Henk and Aaf Euverman, I enjoyed to stay in your house before my family came. Unfortunately I miss the contact with you. Tante Ice, Tante Caroline, Mbak Nanie, Pak Ahmad, Mbak Ellis, Wak Asyah, I thank you for your moral support and we keep in contact.

My best gratitude goes to my parents and my brothers Da Manto, Da Piyan, Ef and my sister Uni Etimurni for support in many ways, praying and a lot of other things you spent to help me. You have stimulated me to develop my career.

Finally I come to address my appreciation to my wife, Yulia Helmi. It is difficult to find words to express my gratitude for you. I was happy to live in Groningen with you and our children, although we were far from our home country. My children, Fathiya Mufidah, Nurul Rahimah and Ahmad Muzakki Imanullah have made me enjoy the life. Unfortunately you will not be here when I defend my thesis, a moment when family and colleagues come together. You have to go back to work and that was our best decision. I am sure that you will enjoy it as well.

I am very sorry that I am not able to mention all people who have given a contribution to this thesis. I am sure that some people will be missing to be mentioned. I would like to thank all of you.

Thank you very much
Dank u wel
Terima kasih