

**DOUBLED HAPLOIDS SYNTHETIC SEED PRODUCTION  
IN LOCAL THAI RICE GENOTYPES BY  
ANTHER CULTURE**

**PIYACHAI PREMVARANON**

**DOCTOR OF PHILOSOPHY  
IN AGRONOMY**

**THE GRADUATE SCHOOL  
CHIANG MAI UNIVERSITY  
FEBRUARY 2012**

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่  
Copyright © by Chiang Mai University  
All rights reserved

**DOUBLED HAPLOIDS SYNTHETIC SEED PRODUCTION  
IN LOCAL THAI RICE GENOTYPES BY  
ANTHER CULTURE**

**PIYACHAI PREMVARANON**

**A THESIS SUMMITTED TO THE GRADUATE SCHOOL IN  
PARTIAL FULFILLMENT OF THE REQUIREMENTS  
FOR THE DEGREE OF  
DOCTOR OF PHILOSOPHY  
IN AGRONOMY**

**THE GRADUATE SCHOOL  
CHIANG MAI UNIVERSITY  
FEBRUARY 2012**

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่  
Copyright © by Chiang Mai University  
All rights reserved

**DOUBLED HAPLOIDS SYNTHETIC SEED PRODUCTION  
IN LOCAL THAI RICE GENOTYPES BY  
ANTHER CULTURE**

**PIYACHAI PREMVARANON**

THIS THESIS HAS BEEN APPROVED  
TO BE A PARTIAL FULFILLMENT OF THE REQUIREMENTS  
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY  
IN AGRONOMY

**EXAMINING COMMITTEE**

*Suchada Vearasilp* ..... CHAIRPERSON  
Assoc. Prof. Dr. Suchada Vearlasilp

*Sa-nguansak Thanapornpoonpong* ..... MEMBER  
Asst. Prof. Dr. Sa-nguansak Thanapornpoonpong

*D. Karladee* ..... MEMBER  
Assoc. Prof. Dr. Dumnern Karladee

*Nuttha Potapohn* ..... MEMBER  
Assoc. Prof. Dr. Nuttha Potapohn

*Prawit Puddhanon* ..... MEMBER  
Assoc. Prof. Dr. Prawit Puddhanon

**THESIS ADVISORY COMMITTEE**

*Suchada Vearasilp* ..... ADVISOR  
Assoc. Prof. Dr. Suchada Vearlasilp

*Sa-nguansak Thanapornpoonpong* ..... CO-ADVISOR  
Asst. Prof. Dr. Sa-nguansak Thanapornpoonpong

*D. Karladee* ..... CO-ADVISOR  
Assoc. Prof. Dr. Dumnern Karladee

28 February 2012

© Copyright by Chiang Mai University

All rights reserved

## ACKNOWLEDGEMENTS

It would not have been possible to write this doctoral thesis without the help and support of the kind people around me, to only some of whom it is possible to give particular mention here.

This thesis would not have been possible without the help, support and patience of my principal supervisor, Associate Professor Dr. Suchada Verasilp for her guidance and supervision to complete this thesis. Thank you for your support, encouragement and invaluable comments, has not only made me more knowledgeable in this field but also to become a better person. My special appreciation and thanks to Assistant professor. Dr. Sa-nguansak Thanapornpoonpong and Associate Professor Dr. Dumnern Karladee served as supervisory committee member who have been helpful and supportive to my research work and thesis enable me to come out with this thesis. I also thank the members of my graduate committee for their guidance and suggestions, especially Assoc. Prof. Dr. Prawit Puddhanon and Assoc. Prof. Dr. Nuttha Potapohn for all their advice. Thanks are also due to Prof. Dr. Heiko C. Becker and Dr. Christian Möllers, Department of Crop Sciences, Institute of Plant Breeding unit, Georg-August-University, Germany for their kindness in helping me through experiments. I would have not achieved my work without their helpful suggestions and attitudes.

This research partially supported by the Center of Excellence on Agricultural Biotechnology, Science and Technology Postgraduate Education and Research Development Office, Office of Higher Education Commission, Ministry of Education. (AG-BIO/PERDO-CHE), particularly for awarding me the scholarship and financial that provided the necessary financial support for this research. I also thank to the Postharvest Technology Innovation Center, Commission on Higher Education, Graduate School of Chiang Mai University and Department of Agronomy, Chiang Mai University, Thailand.

Last, but by no means least, I would also like to express my special thanks to my beloved parents “Mrs. Sunee and Mr. Sunti Premvaranon”, who never endingly prays for me and also to all my family members for their moral support. I would also like to thank my colleagues and friends in AG-BIO/PERDO-CHE for their kind care and help.

Piyachai Premvaranon