## EFFECTS OF MONASCUS STRAINS AND THEIR NUTRIENTS ON THE PRODUCTION OF ADLAY ANGKAK

PATCHAREE PATTANAGUL

# A THESIS SUBMITTED TO THE GRADUATE SCHOOL IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN FOOD SCIENCE AND TECHNOLOGY

GRADUATE SCHOOL
CHIANG MAI UNIVERSITY
APRIL 2007

### EFFECTS OF *MONASCUS* STRAINS AND THEIR NUTRIENTS ON THE PRODUCTION OF ADLAY ANGKAK

#### PATCHAREE PATTANAGUL

## THIS THESIS HAS BEEN APPROVED TO BE A PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN FOOD SCIENCE AND TECHNOLOGY

#### **EXAMINING COMMITTEE**

R. Cint	CHAIRPERSON
Assoc.Prof.Dr. Renu Pinthong Aphinah Phianneyhlul	MEMBER
Asst.Prof.Dr. Aphirak Phianmongkhol	MEMBER
Asst.Prof.Dr. Surapol Natakankitkul P. Hommengfor	MEMBER
Asst.Prof.Dr. Prasert Hanmoungjai Silfioin Bovensombul	MEMBER
A cot Duo f Du Cittinia Daving and at	

27 April 2007

© Copyright by Chiang Mai University

#### ACKNOWLEDGEMENT

Firstly, I would like to thank Department of Food Science and Technology, Agro-industry Faculty, Chiang Mai University for giving me the opportunity to do this research and the National Research Council for their financial support.

Thanks to my supervisor, Assoc.Prof.Dr. Renu Pinthong for her enthusiastic guidance, help and support during this thesis.

I am also very grateful to Asst.Prof.Dr. Surapol Natakankitkul, Asst.Prof.Dr. Aphirak Phianmongkhol, Asst.Prof.Dr. Prasert Hanmoungjai, Asst.Prof.Dr. Nisit Kittipongpatana, Asst.Prof.Dr. Noppol Leksawasdi and Asst.Prof.Dr. Sithisin Bowonsombut for their incessant supervision and for their enormous help contributed to this thesis.

I would like to thank Mr. Somsak Tarata for his kind advice in HPLC/DAD/MSD determination, helping in the discussions and friendship.

I would like to give special thanks to my parents for their love and help, which I am never going to forget. I would also like to thank my brother, Asst.Prof. Dr. Wattana Pattanagul for correcting my thesis.

Finally, I wish to thank my dear husband, Mr. Supavej Maniyom for his love, strength, patience through my good and bad times and a tremendous support and encouragement during this period.

Copyright by Chiang Ma Patcharee Pattanagul All rights reserve