

**EFFECT OF PURPLE RICE BRAN EXTRACT ON  
MICRONUCLEUS FORMATION IN RAT  
LIVER INDUCED BY AFLATOXIN B<sub>1</sub>  
AT A MOLECULAR LEVEL**

**NATTAWAN SUWANNAKUL**

**MASTER OF SCIENCE**

**IN BIOCHEMISTRY**

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่  
Copyright© by Chiang Mai University  
All rights reserved

**GRADUATE SCHOOL  
CHIANG MAI UNIVERSITY**

**MAY 2015**

**EFFECT OF PURPLE RICE BRAN EXTRACT ON  
MICRONUCLEUS FORMATION IN RAT  
LIVER INDUCED BY AFLATOXIN B<sub>1</sub>  
AT A MOLECULAR LEVEL**

**NATTAWAN SUWANNAKUL**

**A THESIS SUBMITTED TO CHIANG MAI UNIVERSITY IN PARTIAL  
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF  
MASTER OF SCIENCE  
IN BIOCHEMISTRY**

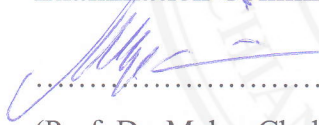
**GRADUATE SCHOOL, CHIANG MAI UNIVERSITY  
MAY 2015**

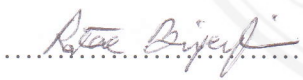
**EFFECT OF PURPLE RICE BRAN EXTRACT ON  
MICRONUCLEUS FORMATION IN RAT  
LIVER INDUCED BY AFLATOXIN B<sub>1</sub>  
AT A MOLECULAR LEVEL**


NATTAWAN SUWANNAKUL


THIS THESIS HAS BEEN APPROVED TO BE A PARTIAL FULFILLMENT OF  
THE REQUIREMENTS FOR THE DEGREE OF  
MASTER OF SCIENCE  
IN BIOCHEMISTRY

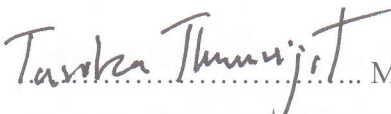
**Examination Committee:**

 ..... Chairman  
(Prof. Dr. Malyn Chulasiri)


 ..... Member  
(Assoc. Prof. Dr. Ratana Banjerdpongchai)

 ..... Member  
(Asst. Prof. Dr. Rawiwan Wongpoomchai)

 ..... Member  
(Asst. Prof. Dr. Teera Chewonarin)

 ..... Member  
(Asst. Prof. Dr. Tarika Thumvijit)

**Advisor:**

 .....  
(Asst. Prof. Dr. Rawiwan Wongpoomchai)

12 May 2015

Copyright © by Chiang Mai University

## ACKNOWLEDGEMENTS

First and foremost I would like to express my sincere gratitude and appreciation to my members of the advisory, Asst. Prof. Dr. Rawiwan Wongpoomchai, and the examining committee, Prof. Dr. Malyn Chulasiri, Assoc. Prof. Dr. Ratana Banjerdpongchai, Asst. Prof. Dr. Teera Chewonarin and Asst. Prof. Dr. Tarika Thumvijit for their advantageous guidance, valuable suggestion, encouragement and have supported me throughout the course of my study.

The thesis was supported by the Endowment Fund for Medical Research, Faculty of Medicine, Chiang Mai University and National Research University Project Office of the Higher Education Commission, Ministry of Education, Thailand (NRU). Furthermore, I would like to thank Dr. Korawan Sringam, Chiang Mai University, Chiang Mai, Thailand for providing of purple rice bran cultivar Phayao.

Appreciation is extended to Department of Biochemistry, Laboratory Animal House, Faculty of Medicine and Department of Agriculture, Chiang Mai University for all support of scientific chemicals and instruments in this thesis. Additional thanks to the finest technical advice from the laboratory of Assoc. Prof. Dr. Kanokwan Jarukamjorn, Faculty of Pharmaceutical Science, Khon Kaen University.

I would be really grateful to all of my colleagues from Department of Biochemistry, Dr. Charatda Punvittayagul, Ms. Sirinya Taya, Ms. Orapin Insuan and Ms. Arparmas Chariyakornkul for their assistance and recommendation.

Finally, I really appreciate my family for their understanding, encouragement and support that inspired me to reach the goal.

Nattawan Suwannakul