# DEVELOPMENT OF METHOD FOR QUICK MEASUREMENT OF MOISTURE CONTENT OF DRIED LONGAN ARIL USING ELECTRICAL PROPERTIES

### SANONG AMAROEK

### DOCTOR OF PHILOSOPHY IN POSTHARVEST TECHNOLOGY

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่ Copyright<sup>©</sup> by Chiang Mai University All rights reserved

> THE GRADUATE SCHOOL CHIANG MAI UNIVERSITY FEBRUARY 2010

# DEVELOPMENT OF METHOD FOR QUICK MEASUREMENT OF MOISTURE CONTENT OF DRIED LONGAN ARIL USING ELECTRICAL PROPERTIES

### SANONG AMAROEK

A THESIS SUBMITTED TO THE GRADUATE SCHOOL IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN POSTHARVEST TECHNOLOGY

> THE GRADUATE SCHOOL CHIANG MAI UNIVERSITY FEBRUARY 2010

### DEVELOPMENT OF METHOD FOR QUICK MEASUREMENT OF MOISTURE CONTENT OF DRIED LONGAN ARIL USING ELECTRICAL PROPERTIES

#### SANONG AMAROEK

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

EXAMINING COMMITTEE

THESIS ADVISORY COMMITTEE

Assoc. Prof. Dr. Nipon Theera-Umpon

Assoc. Prof. Dr. Akachai Sang-in

M. H. Grammember

Asst. Prof. Dr. Methinee Haewsungcharern

han **MEMBER** 

Mr. Suraweth Krisanasaranee

MEMBER

Assoc. Prof. Kajornsak Kantapanit

Assoc. Prof. Dr. Nipon Theera-Umpon

Assoc. Prof. Dr. Akachai Sang-in

M.H ...CO-ADVISOR

Asst. Prof. Dr. Methinee Haewsungcharern

na CO-ADVISOR

Mr. Suraweth Krisanasaranee

15 February 2010 ©Copyright by Chiang Mai University

#### ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to my supervisor Associate Professor Dr. Nipon Theera-Umpon for providing me the opportunity to do a Ph.D. I would like to thank the thesis examining committee: Associate Professor Dr. Akachai Sang-in, Assistant Professor Dr. Methinee Haewsungcharern, Mr. Suraweth Krisanasaranee and Associate Professor Kajornsak Kantapanit.

I thankfully acknowledge Mr.Viroj Ponglanga and Mr.Anusorn Yodjaipet for their contribution through many technical discussions. I thank Mr. Kittichai Wantanajittikul for his help in consulting on SVM and Assistant Professor Dr.Noppol Legsawad for his suggestions.

I thank Post Harvest Research Institute, Electrical Engineering department and my friends at Computational Intelligence Research Lab for their support.

Finally, but most importantly, the biggest thanks go to my father, my mother, my sister, my brothers, my wife and my daughter for all their encouragement with love throughout the years of study and during the tough times.

Sanong Amaroek

ลิ<mark>ปสิทธิ์มหาวิทยาลัยเชียงใหม่</mark> Copyright<sup>©</sup> by Chiang Mai University All rights reserved