DEVELOPMENT OF ANALYTICAL PROCEDURES FOR DETERMINING ORGANOPHOSPHORUS INSECTICIDE RESIDUES IN VEGETABLES USING SOLID PHASE MICROEXTRACTION AND GAS CHROMATOGRAPHY

SASITHORN TANTONG

DOCTOR OF PHILOSOPHY IN PHARMACY

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่ Copyright © by Chiang Mai University All rights reserved

> GRADUATE SCHOOL CHIANG MAI UNIVERSITY SEPTEMBER 2005 ISBN 974-9886-59-3

DEVELOPMENT OF ANALYTICAL PROCEDURES FOR DETERMINING ORGANOPHOSPHORUS INSECTICIDE RESIDUES IN VEGETABLES USING SOLID PHASE MICROEXTRACTION AND GAS CHROMATOGRAPHY

SASITHORN TANTONG

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

GRADUATE SCHOOL CHIANG MAI UNIVERSITY
SEPTEMBER 2005

ISBN 974-9886-59-3

DEVELOPMENT OF ANALYTICAL PROCEDURES FOR DETERMINING ORGANOPHOSPHORUS INSECTICIDE RESIDUES IN VEGETABLES USING SOLID PHASE MICROEXTRACTION AND GAS CHROMATOGRAPHY

SASITHORN TANTONG

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

EXAMINING COMMITTEE

Assoc.Prof. Dr. Nuchnart Jonglakha

Assoc.Prof. Dr. Nuchnart Jonglakha

MEMBER

Assoc.Prof. Dr. Prachya Kongtawelert

B. Lawrung ath MEMBER

Assoc.Prof. Dr. Boonsom Liawruangrath

Nah fari Choke haworn MEMBER

Asst.Prof. Dr. Nantarit Chokethaworn

20 September 2005 © Copyright by Chiang Mai University

ACKNOWLEDGEMENT

The author wishes to express her sincere thanks and profound appreciation to her supervisor, Asst. Prof. Dr. Surapol Natakankitkul for his invaluable guidance, kind supervision and constant encouragement throughout this research work. The author also would like to extend her sincere thanks to the followings:

To Assoc. Prof. Dr. Nuchnart Jonglakha for her kindness, allowing the author to use her laboratory, spending her valuable time on correction of the manuscript of this thesis.

To Assoc. Prof. Dr. Prachya Kongtawelert for his useful advice.

To all of the author's friends at Chiang Mai University and Petchabun Rajabhat University for their help and encouragement in the laboratory and during the thesis preparation.

To Petchabun Rajabhat University, Plant Protection Center, Royal Project Foundation and Faculty of Pharmacy, Chiang Mai University, the author is grateful for giving her an opportunity to pursue this research successfully.

Finally, and most of all, the author would like to express her profound gratitude to her parents for their tender love and care.