

UNIVERSITI TEKNOLOGI MARA

**HEAVY METAL CONTAMINATION
AND HEALTH RISK ASSESSMENT IN
ORGANIC AND COMMERCIAL CABBAGE
(*Brassica Oleracea*) AT CAMERON HIGHLANDS**

NUR AIN BINTI NURRY

**Project paper submitted in partial fulfillment of the requirements
for the Degree of
Bachelor in Environmental Health and Safety (Hons.)**

Faculty of Health Sciences

MAY 2011

Declaration by Student

Project Entitled "Heavy Metal Contamination and Health Risk Assessment in Organic and Commercially Cabbage (*Brassica Oleracea*) at Cameron Highlands" is a presentation of my original research work. Wherever contributions of others are involved, every effort is made to indicate this clearly, with due reference to the literature, and acknowledgment of collaborative research and discussion. The project was done under the guidance of En Ahmad Razali Bin Ishak as Project Supervisor and Prof Madya Rodziah Bt Ismail as Co-supervisor. It has been submitted to the Faculty of Health Sciences in partial fulfillment of the requirement for the Degree of Bachelor in Environmental Health and Safety (Hons).

Student's Signature:



(Nur Ain Binti Nurry)
2007287944
880802295372

Date: 27 MAY 2011

ACKNOWLEDGEMENT

In the name of Allah, The Most Gracious, The Most Merciful

Alhamdulillah, all praise is to Allah. Peace and blessings to Nabi Muhammad S.A.W., all the prophets, their families and all the Muslims.

Firstly, I wish to thanks my project supervisor, En Ahmad Razali Ishak for the input, guidance and support from the beginning till the end and the submission of this thesis. To my co-supervisor, Associate Professor Rodziah Ismail, thanks you for the opinions and guidance regarding this project. Not forgetting all the Department of Environmental Health lecturers who have been through thick and thin with me for their expertise and guidance on making this research possible to be completed.

I also want to thanks En Muhamad Azwat Abdullah and En Shafie Md Latep for their guidance and good cooperation regarding the laboratory procedures and equipment. Thanks you for being there and helping me.

Thanks also to all my entire dearest course mate and special mate for always sharing the happiness and sorrows and generously offer me comfort of being around them all these years.

Last but not least, special appreciation I dedicated to my beloved parents En Nurry B Muhammad, Pn Nor Arizan Bt Zakaria and my siblings for always believing in me in finishing my study. Without all of you, I would have never reached the end today.

Thank you.

TABLE OF CONTENTS

TITLE PAGE	
ACKNOWLEDGEMENT	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	ix
LIST OF FIGURES	xi
LIST OF APPENDICES	xiii
LIST OF ABBREVIATION	xiv
ABSTRACT	xv
CHAPTER ONE: INTRODUCTION	
1.1 Background	1
1.2 Problem Statement	3
1.3 Study Justification	4
1.4 Study Objective	5
1.5 Study Question	6
1.6 Study Hypothesis	6
1.7 Scope of the Study	7
1.8 Conceptual Framework	8

Abstract

A Study of Heavy Metal Contamination and Health Risk Assessment in Organic and Commercially Cabbage (*Brassica Oleracea*) at Cameron Highlands

NUR AIN BT NURRY

Introduction: Dietary exposure to heavy metals, namely cadmium (Cd), lead (Pb) and zinc (Zn) has been identified as a risk to human health through the consumption of vegetable crops. This study was to determine the level of heavy metals in organic and commercial cabbage (*Brassica Oleracea*) which involved three species of cabbage that is green cabbage, cauliflower and broccoli at Cameron Highlands.

Methodology: The study was conducted in Cameron Highlands, Pahang. The study location was in six vegetables farm at organic and commercial farm of vegetable plantation around Cameron Highlands. The study design of this study is cross-sectional study. Sampling technique involved sampled of three species of cabbage from both organic and commercial farm. The sample will be analyzed for their concentrations of zinc, cadmium and lead using an Atomic Absorption Spectrophotometer (AAS). Data of the people consume the vegetable as their meal was collected by using Food Frequency Questionnaire (FFQ) and oral interview. A statistical analysis that is statistical package for the social science (SPSS) version 17.0 was used in this study.

Results: The result show that levels ranged from 17 to 19.88 mg/kg for zinc, 0.425 to 0.725 for cadmium and 1.675 to 6.375 mg/kg for lead concentration. The levels of Zn, Cd and Pb varied between each species of cabbage and from the technique of plantation which is organic and commercial technique. There was no significant different ($p>0.05$) between heavy metal concentration with the three species of cabbage. There was a significant different ($p<0.05$) in the level of heavy metal concentration between organic and commercial farm's vegetables. And there were no significant different ($p>0.05$) between heavy metal concentration in organic and commercial green cabbage, cauliflower and broccoli. The level of lead concentration for each samples were exceeding the maximum permissible limit as stated in Food Regulation, 1985 except organic green cabbage. Cadmium and Zinc concentration were found to be below the maximum permissible limit for vegetable product.

Conclusion: In conclusion, from health risk assessment done, all those vegetables were safe to consume since the tolerable daily intake of each individual were below the standard set by FAO/WHO for lead.

Keywords: Heavy metal, cabbage (Brassica Oleracea), permissible limit, tolerable daily intake