TABLE OF CONTENTS

Content	
Acknowledgments	iii
Abstract	
List of Tables	viii
List of Figures	. \langle ix
List of abbreviations	. x
1. Introduction	>> 0
1.1 Airborne lead pollution and its effects on environment	
and human health	. 1
1.2 Bioindicators for monitoring of lead air pollution	. 2
1.3 Necessity of airborne lead monitoring	
1.4 Aims and objectives of this study	. 6
2. Literature review	. 7
3. Experimental	
3.1 Study sites and species selection	. 13
3.1.1 Study area and climate	. 13
3.1.2 Plant species selection	
3.1.3 Description of the study sites	14
3.2 Chemicals	. 18
3.3 Equipment	. 18
3.4 Methods	. 18
3.4.1 Sampling and frequency	. 19
3.4.2 Sample treatment	
3.4.3 Wet digestion	
3.4.4 Determination of sample solution	
3.5 Analytical quality control	
3.5.1 Recovery experiments	

3.5.2 Reference materials measurement	21
4. Results	22
4.1 Determination of lead in the five plant species	22
4.1.1 Comparison of Pb contents in unwashed samples	
between December and July	22
4.1.2 Comparison of Pb contents in washed samples	
between December and July	24
4.2 Recovery analysis	26
4.3 Reference material test	26
4.4 Calibration by curvilinear regression	27
5. Discussion	29
6.5	29
5.2 Recovery	29
5.3 Reference material measurement	30
5.4 Curvilinear calibration regression for calculation of concentrations	30
5.5 Comparison of lead contents among five species	30
5.6 Influence of distance from pollution source	
on lead contents in plants	37
5.7 Influence of seasonal variation on lead contents in plants	40
5.8 Bioindicators for monitoring lead pollution in Chiang Mai City air	43
5.9 Risk assessment by using bioindicators at sampling sites	44
6. Conclusion and recommendation	48
References -	50
Appendix A. Photographs of plant species	55
Appendix B. Statistical analysis	59
Curriculum vitae	63

LIST OF TABLES

Table	Page
4.1 Contents of lead in unwashed samples	
in December (dry season), 1995	22
4.2 Contents of lead in unwashed samples	
in July (rainy season), 1995	23
4.3 Contents of lead in washed samples	
in December (dry season), 1995	
4.4 Contents of lead in washed samples	
in July (rainy season), 1995	25
4.5 Recovery of lead in five plant samples for sample analysis	26
4.6 Results of reference materials tests	27
5.1 Site ranking of lead content in Bougainvillea at all sampling sites	47

LIST OF FIGURES

Figure Page	
3.1 Map showing the locations of the study sites	15
4.1 Relationship between peak area and mass of lead	28
5.1 Lead concentration in unwashed samples in December, 1995	32
5.2 Lead concentration in unwashed samples in July, 1995	33
5.3 Lead concentration in washed samples in December, 1995	34
5.4 Lead concentration in washed samples in July, 1995	35
5.5 Lead content of washed and unwashed samples	
for Bougainvillea in July, 1995	38
5.6 Lead content of washed and unwashed samples	
for Bougainvillea in December, 1995	39
5.7 Comparison of lead level in washed samples between seasons	41
5.8 Comparison of lead level in unwashed samples between seasons	42

LIST OF ABBREVIATIONS

<u>Abbreviation</u> <u>Description</u>

AAS atomic absorption spectrometry

⁰C degrees celcius

g gram

mg milligram

μg microgram

kg kilogram

DW dry weight

ml millilitre

nd not detected

ng nanogram

ppm parts per million

p.t.f.e. polytetrafluoroethylene

EPA Environmental Protection Agency