APPENDICES

Appendix 1

Details of soil-inhabiting arthropods collected from 8 sampling units at 12 study sites in the surrounding area of Mae Moh Power Plant

Class/Order/Family	Species Number	Study site											
Class : Arachnida/		N1	N2	N3	N4	N5	N6	S1	S2	S3	S4	S5	S6
Order : Araneae/ Family : Erigonidae	1	0	0	0	0	0	0	0	1	2	0	0	0
Order : Araneae/ Family : Oxyopidae	2	1	0	0	0	0	0	0	0	0	0	0	2
Order : Araneae/ Family : Oxyopidae	3	0	0	0	1	0	0	0	0	0	0	0	0
Order : Araneae/ Family : Oxyopidae	4	0	0	0	0	0	0	0	1	2	0	0	0
Order : Araneae/ Family : Oxyopidae	5	0	0	0	0	0	0	0	2	3	1	0	0
Order : Araneae/ Family : Oxyopidae	6	0	0	0	0	0	0	0	0	0	0	1	0
Order : Pseudoscorpiones/ Neobisiidae	7	0	0	0	0	1	0	0	0	0	0	0	0
Order : Pseudoscorpiones/ Coliferidae	8	0	0	0	0	1	0	0	0	0	1	0	0
Class : Chilopoda/													
Order : Lithomorpha/ Family : Henicopidae	9	0	0	0	0	1	0	0	0	0	1	0	0
O: Scolopendromorpha/F.: Scolopendridae	10	0	0	0	0	0	0	0	0	0	0	1	0
Class : Diplopoda/													
Order : Polyxenida/ Family : Polyxenidae	11	0	0	0	0	0	0	0	1	0	0	0	0
Class : Insecta/													
Order : Blattaria/ Family : Blattidae	12	0	0	1	0	0	0	0	0	0	0	0	0
Order : Collembola/ Family : Sminthuridae	13	1	0	0	0	0	1	0	0	1	0	0	1
Order : Collembola/ Family : Sminthuridae	14	0	0	0	0	0	0	0	1	0	0	0	1
Order : Coleoptera/ Family : Byrrhidae	15	0	0	0	0	0	0	0	0	1	0	0	0
Order : Coleoptera/ Family : Carabidae	16	0	4	0	0	0	0	0	1	1	0	2	0
Order : Coleoptera/ Family : Carabidae	17	0	0	1	0	2	0	0	0	1	0	1	0

Appendix 1 (Continued)

Order : Coleoptera/ Family : Carabidae	18	0	0	1	0	0	0	1	0	2	0	0	0
Order : Coleoptera/ Family : Carabidae	19	0	0	1	1	4	0	1	1	0	0	1	0
Order : Coleoptera/ Family : Carabidae	20	0	0	1	0	1	0	0	0	1	0	0	0
Order : Coleoptera/ Family : Carabidae	21	0	0	1	0	0	2	0	0	0	2	2	0
Order : Coleoptera/ Family : Carabidae	22	0	0	1	0	2	0	0	0	0	0	1	0
Order : Coleoptera/ Family : Carabidae	23	0	0	1	0	0	0	0	0	0	0	0	0
Order : Coleoptera/ Family : Carabidae	24	0	0	1	0	1	0	0	0	0	0	0	0
Order : Coleoptera/ Family : Carabidae	25	0	0	1	0	1	0	0	1	0	1	1	0
Order : Coleoptera/ Family : Carabidae	26	0	0	1	0	0	0	0	0	0	0	1	0
Order : Coleoptera/ Family : Carabidae	27	0	0	0	1	0	0	0	0	0	0	0	0
Order : Coleoptera/ Family : Carabidae	28	0	1	0	0	0	1	4	0	0	2	0	0
Order : Coleoptera/ Family : Carabidae	29	0	0	0	0	0	1	0	0	0	0	0	0
Order : Coleoptera/ Family : Carabidae	30	0	2	0	0	0	7	3	5	0	2	0	0
Order : Coleoptera/ Family : Carabidae	31	0	0	0	0	0	0	0	0	1	0	0	0
Order : Coleoptera/ Family : Carabidae	32	0	0	0	3	0	0	0	0	0	0	0	0
Order : Coleoptera/ Family : Carabidae	33	0	0	0	0	0	0	0	0	0	0	1	0
Order : Coleoptera/ Family : Carabidae	34	0	0	1	1	0	0	0	1	0	0	0	0
Order : Coleoptera/ Family : Carabidae	35	1	0	0	0	1	0	0	0	0	0	0	1
Order : Coleoptera/ Family : Carabidae	36	0	0	0	1	0	0	0	0	0	0	0	0
Order : Coleoptera/ Family : Cicindelidae	37	0	0	0	1	1	0	0	0	2	0	0	0
Order : Coleoptera/ Family : Curculionidae	38	0	1	1	0	1	0	0	0	0	1	1	0
Order : Coleoptera/ Family : Curculionidae	39	0	0	0	1	0	0	0	0	0	0	0	0
Order : Coleoptera/ Family : Monommidae	40	0	0	0	3	1	0	0	0	0	0	0	0
Order : Coleoptera/ Family : Pselapidae	41	0	0	0	0	0	0	0	1	0	4	0	0
Order : Coleoptera/ Family : Ptiliidae	42	1	0	0	0	1	0	0	0	0	0	0	1
Class : Coleoptera/ Family : Scaphiidae	43	0	0	0	1	0	0	0	0	0	0	2	0
Order : Coleoptera/ Family : Staphylinidae	44	1	1	1	1	1	1	0	1	1	1	1	0

Appendix 1 (Continued)

Order : Coleoptera/ Family : Staphylinidae	45	0	0	1	0	0	0	0	0	0	1	0	1
Order : Coleoptera/ Family : Staphylinidae	46	0	2	0	2	0	14	0	10	3	8	1	0
Order : Coleoptera/ Family : Staphylinidae	47	0	0	0	0	0	1	0	0	0	0	0	0
Order : Coleoptera/ Family : Staphylinidae	48	0	0	0	2	0	1	0	1	0	0	0	0
Order : Coleoptera/ Family : Tenebrionidae	49	0	0	0	0	0	0	0	0	0	0	0	1
Order : Coleoptera/ Family : Tenebrionidae	50	0	1	1	0	1	0	0	0	1	2	1	0
Order : Coleoptera/ Family : Tenebrionidae	51	0	0	0	0	0	0	0	1	0	1	0	0
Order : Diptera/ Family : Bibionidae	52	0	0	1	0	0	0	0	1	1	0	2	0
Order : Diptera/ Family : Chironomidae	53	1	0	0	0	0	0	2	0	0	1	0	0
Order : Diptera/ Family : Culicidae	54	0	1	1	2	2	2	3	3	4	5	1	0
Order : Diptera/ Family : Dolichopidae	55	0	0	0	1	0	0	0	0	0	0	0	0
Order : Dermaptera/ Family : Forficulidae	56	1	0	0	0	0	0	0	0	0	0	0	1
Order : Diptera/ Family : Japygidae	57	1	1	0	0	0	0	0	0	0	0	0	2
Order : Diptera/ Family : Mycetophilidae	58	12	2	3	0	3	3	0	6	0	2	2	8
Order : Diptera/ Family : Mycetophilidae	59	0	1	1	3	0	6	0	1	1	4	0	0
Order : Diptera/ Family : Mycetophilidae	60	0	0	0	0	1	0	0	0	0	0	0	0
Order : Diptera/ Family : Mycetophilidae	61	0	0	0	0	1	0	1	2	2	0	0	0
Order : Diptera/ Family : Mycetophilidae	62	0	3	0	0	2	1	1	0	0	0	0	0
Order : Diptera/ Family : Mycetophilidae	63	3	2	0	0	4	1	6	1	3	3	1	1
Order : Diptera/ Family : Syrphidae	64	2	0	0	0	0	0	0	0	2	0	0	2
Order : Embioptera/ Family : Oligotomidae	65	0	0	0	0	0	1	0	0	0	0	0	0
Order : Hemiptera/ Family : Miriidae	66	0	0	1	0	1	0	0	0	0	0	1	0
Order : Hemiptera/ family : Miriidae	67	0	0	0	0	0	0	0	0	1	0	0	0
Order : Hemiptera/ Family : Thyreocoridae	68	0	0	1	1	1	1	0	4	4	2	1	0
Order : Hemiptera/ Family : Vellidae	69	1	0	0	0	0	0	0	0	0	0	0	0
Order : Hemiptera/ Family : Veliidae	70	0	0	0	0	0	1	0	0	0	0	0	0
Order : Homoptera/ Family : Aleyrodidae	71	2	0	0	3	0	0	6	4	2	6	0	1
Order : Homoptera/ Family : Aleyrodidae	72	0	0	0	0	1	1	1	1	0	0	0	0

Appendix 1 (Continued)

Order : Homoptera/ Family : Cercopidae	73	2	6	0	0	0	8	6	1	10	5	0	1
Order : Homoptera/ Family : Chermidae	74	4	1	0	0	0	2	0	1	0	6	0	1
Order : Homoptera/ Family : Chermidae	75	0	0	0	3	0	0	2	0	1	0	0	0
Order : Homoptera/ Family : Cicadidae	76	1	0	5	0	4	1	0	1	0	1	3	0
Order : Homoptera/ Family : Cixiidae	77	4	1	13	3	4	3	5	1	12	4	6	1
order : Homoptera/ Family : Cycadellidae	78	4	0	0	4	1	1	1	2	2	1	1	5
order : Homoptera/ Family : Cycadellidae	79	0	0	0	0	1	0	0	0	0	0	0	0
order : Homoptera/ Family : Cycadellidae	80	6	5	9	4	7	1	0	0	5	1	2	4
order : Homoptera/ Family : Cycadellidae	81	0	0	6	0	0	0	3	1	5	9	0	0
order : Homoptera/ Family : Cycadellidae	82	0	6	0	0	0	7	8	3	4	10	1	0
Order : Hymenoptera/ Family : Formicidae	83	1	0	1	2	0	0	0	0	0	0	0	0
Order : Hymenoptera/ Family : Formicidae	84	1	0	0	0	0	0	0	19	0	2	0	0
Order : Hymenoptera/ Family : Formicidae	85	1	0	0	0	0	0	0	0	1	1		1
Order : Hymenoptera/ Family : Formicidae	86	0	0	2	0	0	0	0	0	0	0	0	1
Order : Hymenoptera/ Family : Formicidae	87	0	0	0	0	0	1	0	0	0	1	0	0
Order : Hymenoptera/ Family : Formicidae	88	0	0	0	1	0	0	0	0	0	0	0	0
Order : Hymenoptera/ Family : Formicidae	89	0	0	0	0	0	1	0	2	0	4	0	0
Order : Hymenoptera/ Family : Formicidae	90	0	0	0	0	3	0	0	0	0	0	0	0
Order : Hymenoptera/ Family : Formicidae	91	0	8	0	0	0	9	0	10	0	6	0	0
Order : Hymenoptera/ Family : Formicidae	92	0	0	0	0	0	0	0	0	0	0	2	0
Order : Hymenoptera/ Family : Formicidae	93	0	0	0	0	0	0	0	0	0	0	6	0
Order : Hymenoptera/ Family : Formicidae	94	0	0	0	0	0	0	0	0	0	0	2	0
Order : Hymenoptera/ Family : Formicidae	95	0	0	0	0	0	0	0	0	0	0	3	0
order : Hymenoptera/ Family : Pteromalidae	96	2	0	0	0	0	0	0	0	0	0	0	2
order : Hymenoptera/ Family : Pteromalidae	97	0	3	0	3	0	0	0	0	0	0	0	0
Order : Isoptera/ Family : Termitidae	98	0	0	0	0	0	0	0	0	0	0	5	0
Order : Isoptera/ Family : Termitidae	99	0	0	0	0	0	0	0	0	0	0	4	0

Appendix 1 (Continued)

Order : Isoptera/ Family : Troctidae	100	8	9	1	1	6	3	0	3	1	7	11	6
Order : Lepidoptera/ Family : Coleophoridae	101	0	0	0	0	0	0	0	1	0	1	0	0
Order : Lepidoptera/ Family : Gelechidae	102	0	2	0	0	0	3	0	0	0	2	0	0
Order : Lepidopetra/ Family : Noctuidae	103	3	2	8	2	4	3	1	1	2	3	6	2
Order : Lepidoptera/ Family : Oechoporidae	104	0	0	1	0	1	1	0	2	3	1	0	1
Order : Lepidoptera/ Family : Plutellidae	105	1	0	0	0	0	0	0	0	0	0	0	0
Order : Lepidoptera/ Family : Teneidae	106	0	0	1	1	2	0	0	0	1	0	0	0
Order : Lepidoptera/ Family : Zygaenidae	107	0	0	0	0	0	0	0	0	0	1	0	0
Order : Orthoptera/ Family : Gryllidae	108	0	0	1	0	0	0	0	0	0	0	0	0
Order : Tysanura/ Family : Campodeidae	109	0	0	0	0	0	0	1	0	0	0	0	0
Class : Malacostraca/													
Order : Isopoda/ Ligiidae	110	0	0	0	0	0	1	10	0	0	1	0	0
Order : Isopoda/ Oniscidae	111	0	0	0	0	4	8	0	0	0	0	0	0
Class : Symphyla/													
Order : Myriapoda/Scentigerellidae	112	0	0	0	0	0	0	0	0	4	0	0	0

Appendix 2

Number of individuals per order at the study sites

Order	N1	N2	N3	N4	N5	N6	S1	S2	S3	S4	S5	S6
Araneae	1	0	0	1	0	0	0	4	7	1	1	2
Pseudoscorpiones	0	0	0	0	2	0	0	0	0	1	0	0
Lithomorpha	0	0	0	0	1	0	0	0	0	1	0	0
Scolopendromorpha	0	0	0	0	0	0	0	0	0	0	1	0
Polyxenida	0	0	0	0	0	0	0	0	1	0	0	0
Blattaria	0	0	1	0	0	0	0	0	0	0	0	0
Collembola	1	0	0	0	0	1	0	1	1	0	0	2
Coleoptera	3	12	15	18	18	28	7	23	14	25	16	4
Diptera	19	10	6	6	13	13	13	14	13	15	6	13
Dermaptera	1	0	0	0	0	0	0	0	0	0	0	1
Embioptera	0	0	0	0	0	1	0	0	0	0	0	0
Hemiptera	1	0	2	1	2	2	0	4	5	2	2	0
Homoptera	23	19	33	17	18	24	32	15	41	41	13	13
Hymenoptera	5	11	3	6	3	11	0	31	1	14	13	4
Isoptera	8	9	1	1	6	3	0	3	1	7	20	6
Lepidoptera	4	4	10	3	7	7	1	4	6	8	6	3
Orthoptera	0	0	1	0	0	0	0	0	0	0	0	0
Tysanura	0	0	0	0	0	0	1	0	0	0	0	0
Isopoda	0	0	0	0	4	9	10	0	0	1	0	0
Myriapoda	0	0	0	0	0	0	0	0	4	0	0	0
TOTAL	65	65	71	55	74	99	67	81	93	116	78	50

Appendix 3

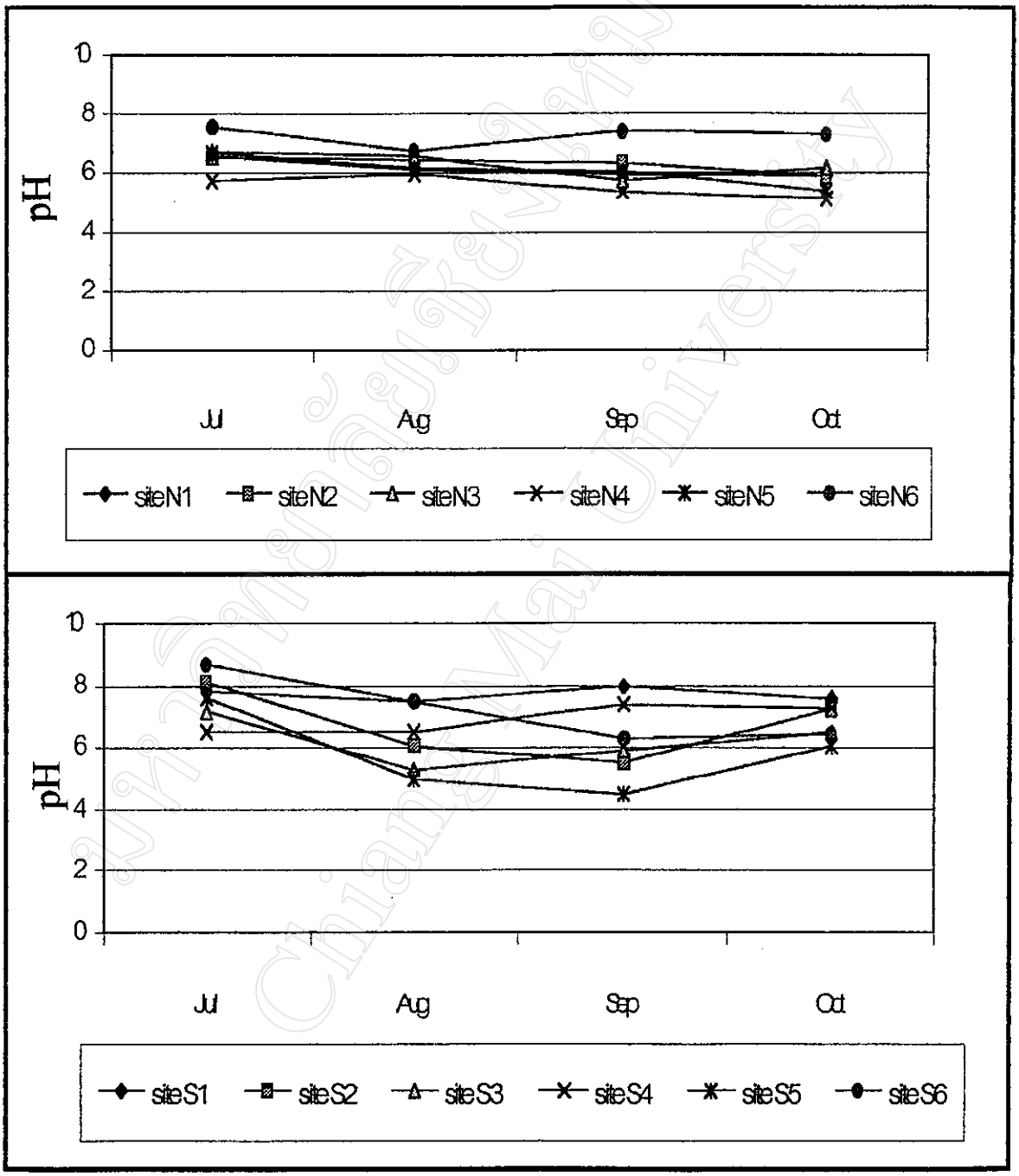
Number of individuals per family at the study sites

Family	N1	N2	N3	N4	N5	N6	S1	S2	S3	S4	S5	S6
Erigonidae	0	0	0	0	0	0	0	1	2	0	0	0
Oxyopidae	1	0	0	1	0	0	0	3	5	1	0	0
Neobisiidae	0	0	0	0	1	0	0	0	0	0	0	0
Chiloferidae	0	0	0	0	1	0	0	0	0	1	0	0
Henicopidae	0	0	0	0	1	0	0	0	0	1	0	0
Scolopendridae	0	0	0	0	0	0	0	0	0	0	1	0
Polyxenidae	0	0	0	0	0	0	0	1	0	0	0	0
Blattidae	0	0	1	0	0	0	0	0	0	0	0	0
Sminthuridae	1	0	0	0	0	1	0	1	1	0	0	2
Byrrhidae	0	0	0	0	0	0	0	0	1	0	0	0
Carabidae	1	7	11	7	12	11	9	9	6	10	10	1
Cicindellidae	0	0	0	1	1	0	0	0	2	0	0	0
Curculionidae	0	1	1	1	1	0	0	0	0	1	1	0
Monomidae	0	0	0	3	1	0	0	0	0	0	0	0
Pselapidae	0	0	0	0	0	0	0	1	0	0	0	0
Ptiliidae	1	0	0	0	1	0	0	0	0	0	0	1
Scaphiidae	0	0	0	1	0	0	0	0	0	2	2	0
Staphylinidae	1	3	2	5	1	17	0	12	4	2	2	1
Tenebrionidae	0	1	1	0	1	0	0	1	1	1	1	1
Bibionidae	0	0	1	0	0	0	0	1	1	2	2	0
Chironomidae	1	0	0	0	0	0	2	0	0	0	0	0
Culicidae	0	1	1	2	2	2	3	3	4	1	1	0
Dolichopidae	0	0	0	1	0	0	0	0	0	0	0	0
Forficulidae	1	0	0	0	0	0	0	0	0	0	0	1
Japygidae	1	1	0	0	0	0	0	0	0	0	0	2
Mycetophylidae	15	8	4	3	11	11	8	10	6	3	3	9
Syrpidae	2	0	0	0	0	0	0	7	2	0	0	2

Appendix 3 (Continued)

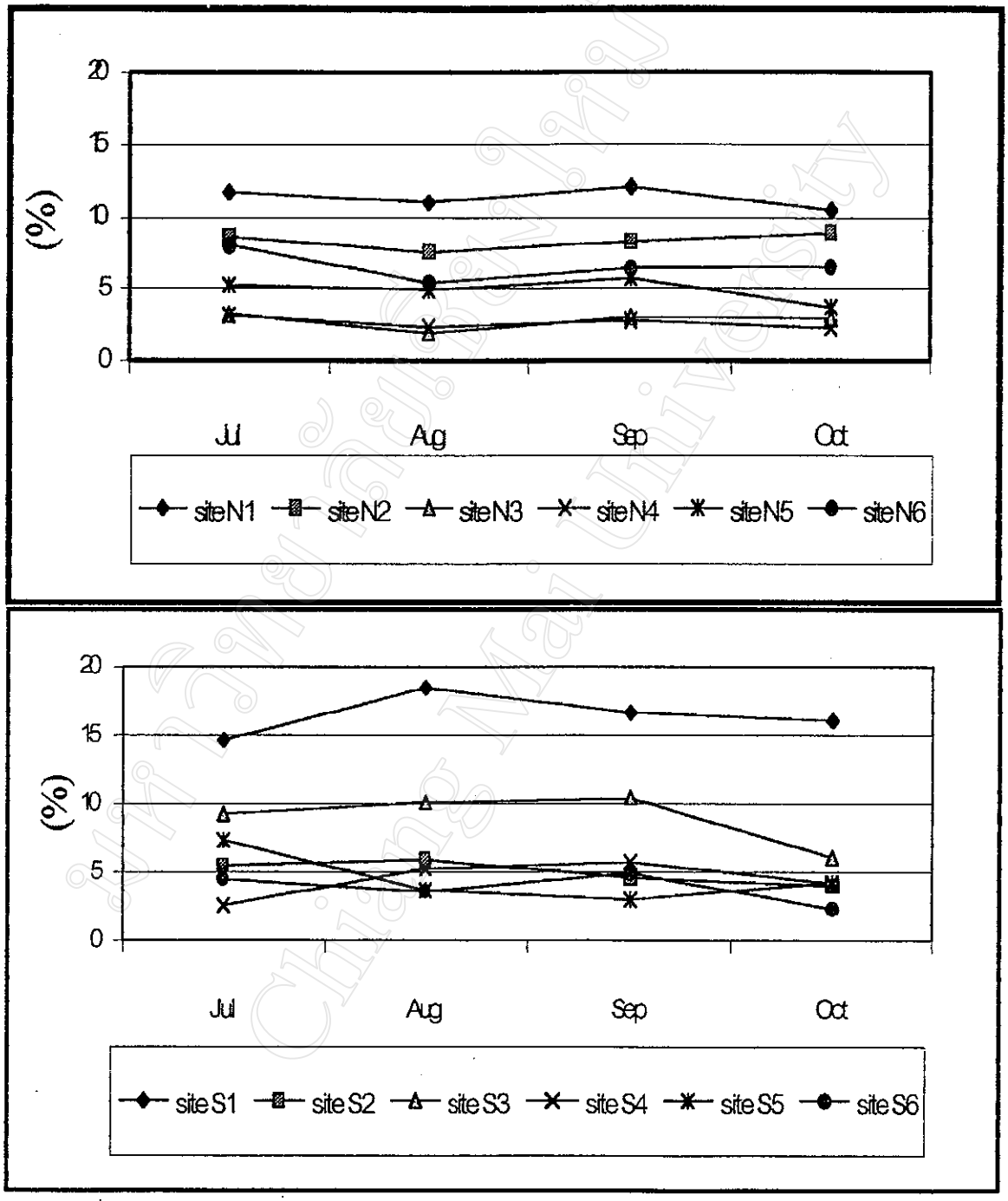
Oligotomidae	0	0	0	0	0	0	1	0	0	0	0	0
Miriidae	0	0	1	0	1	0	0	0	1	0	1	0
Thyreocoridae	0	0	1	1	1	1	0	4	4	2	1	0
Veliidae	1	0	0	0	0	1	0	0	0	0	0	0
Aleyrodidae	2	0	0	3	1	1	7	5	2	6	0	1
Cereopidae	2	6	0	0	0	8	6	1	10	5	0	1
Chermidae	4	1	0	3	0	2	2	1	1	6	0	1
Cicadidae	1	0	5	0	4	1	0	1	0	1	3	0
Cixiidae	4	1	13	3	4	3	5	1	12	4	6	1
Cycadellidae	10	11	15	8	9	9	12	6	16	21	4	9
Formicidae	3	8	3	3	3	11	0	31	1	14	13	2
Pteromalidae	2	3	0	3	0	0	0	0	0	0	0	2
Termitidae	0	0	0	0	0	0	0	0	0	0	9	0
Troctidae	8	9	1	1	6	3	0	3	1	7	11	6
Coleophoridae	0	0	0	0	0	0	0	1	0	1	0	0
Gelechidae	0	2	0	0	0	3	0	0	0	2	0	0
Noctuidae	3	2	8	4	4	3	1	1	2	3	6	2
Oechoporidae	0	0	1	1	1	1	0	2	3	1	0	1
Plutellidae	1	0	0	0	0	0	0	0	0	0	0	0
Teneidae	0	0	1	2	2	0	0	0	1	0	0	0
Zygaenidae	0	0	0	0	0	0	0	0	0	1	0	0
Gryllidae	0	0	1	0	0	0	0	0	0	0	0	0
Campodeidae	0	0	0	0	0	0	1	0	0	0	0	0
Ligiidae	0	0	0	0	0	1	10	0	0	1	0	0
Oniscidae	0	0	0	4	4	8	0	0	0	0	0	0
Scutigerallidae	0	0	0	0	0	0	0	0	4	0	0	0
TOTAL	65	65	71	55	74	99	67	81	93	116	78	50

Appendix 4



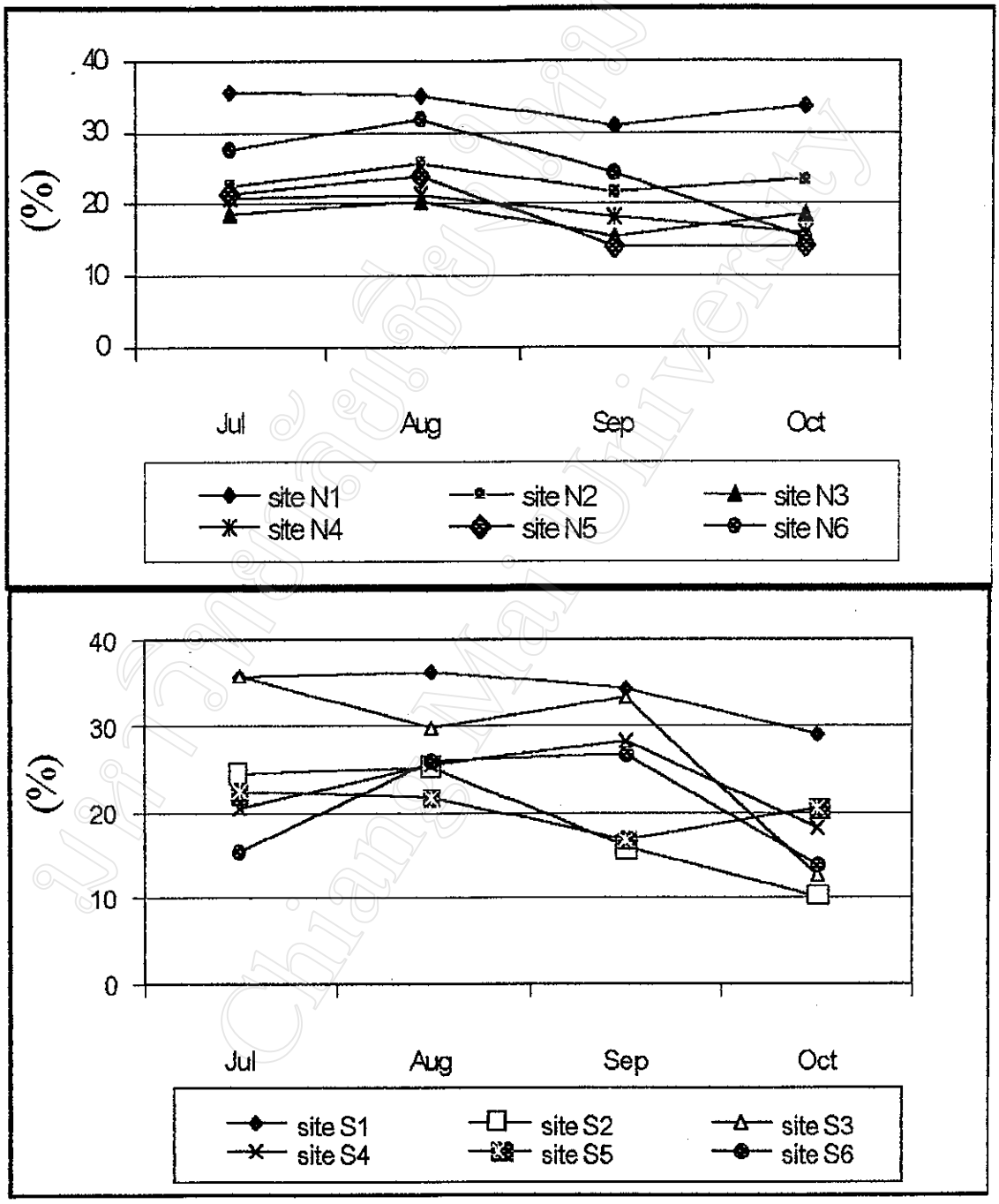
Average soil pH at sites N1-N6 and S1-S6
at different months

Appendix 5



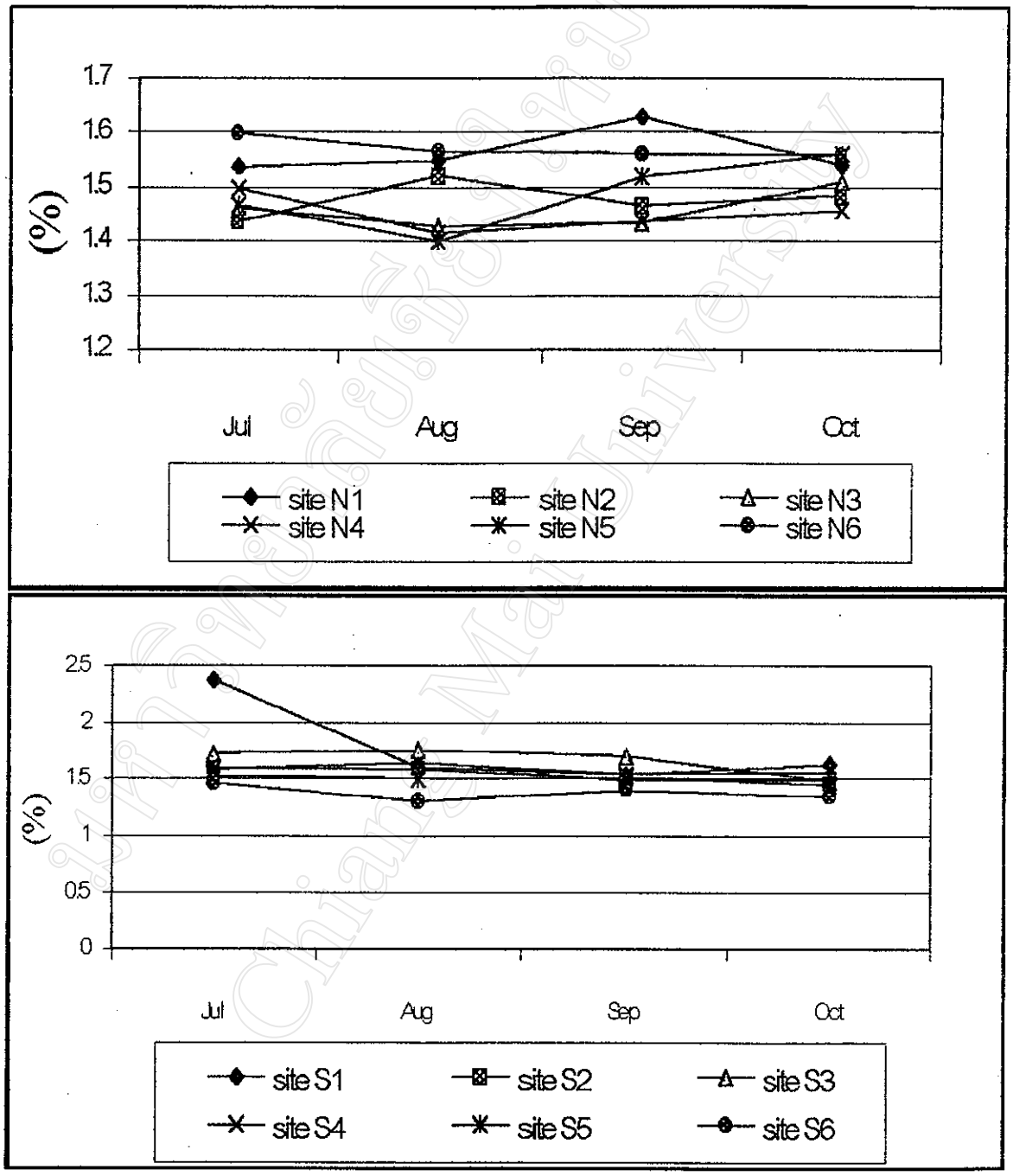
Average soil organic matter (SOM) at sites N1-N6 and S1-S6
at different months

Appendix 6



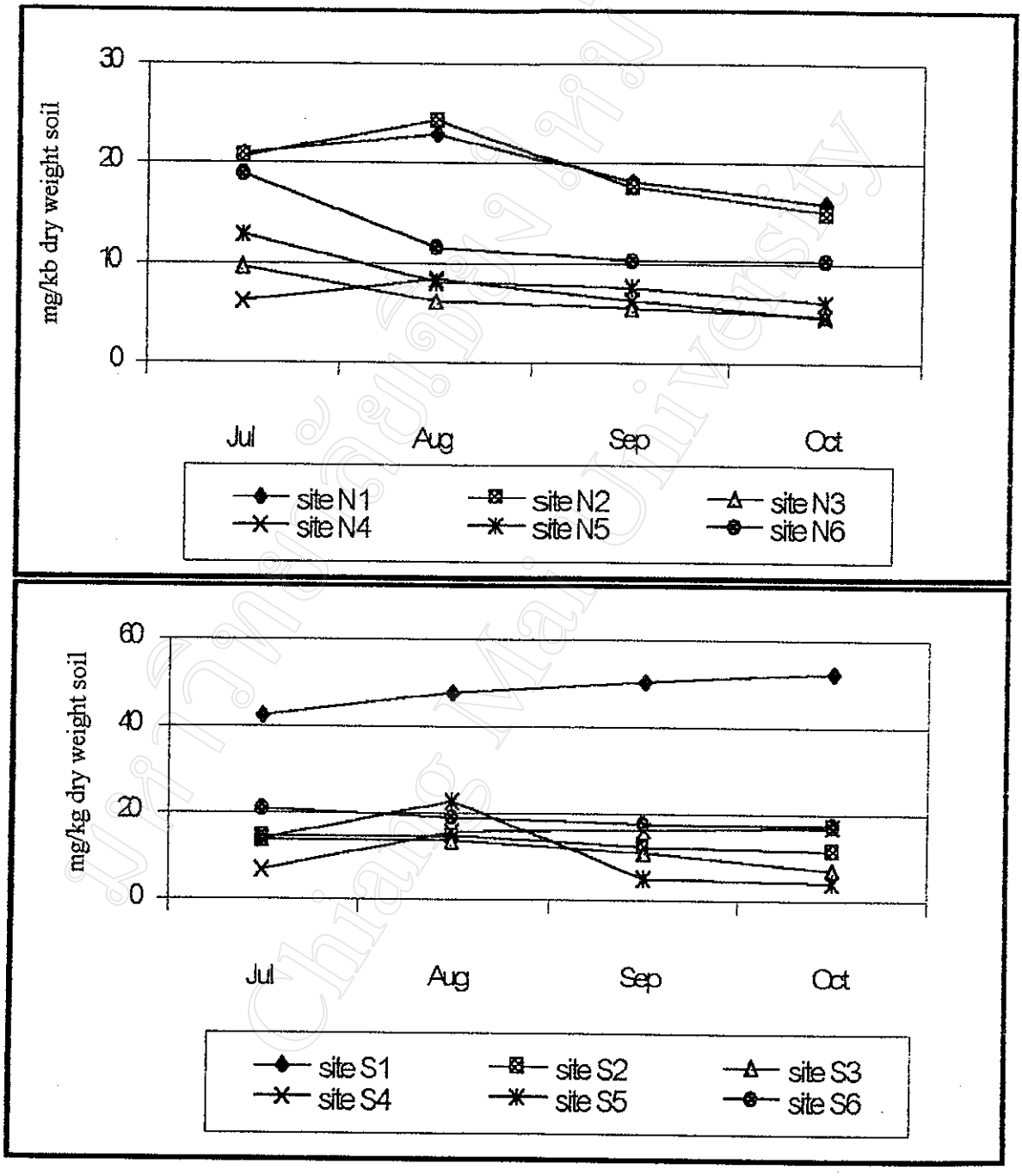
Average soil moisture content (SMC) at sites N1-N6 and S1-S6 at different months

Appendix 7



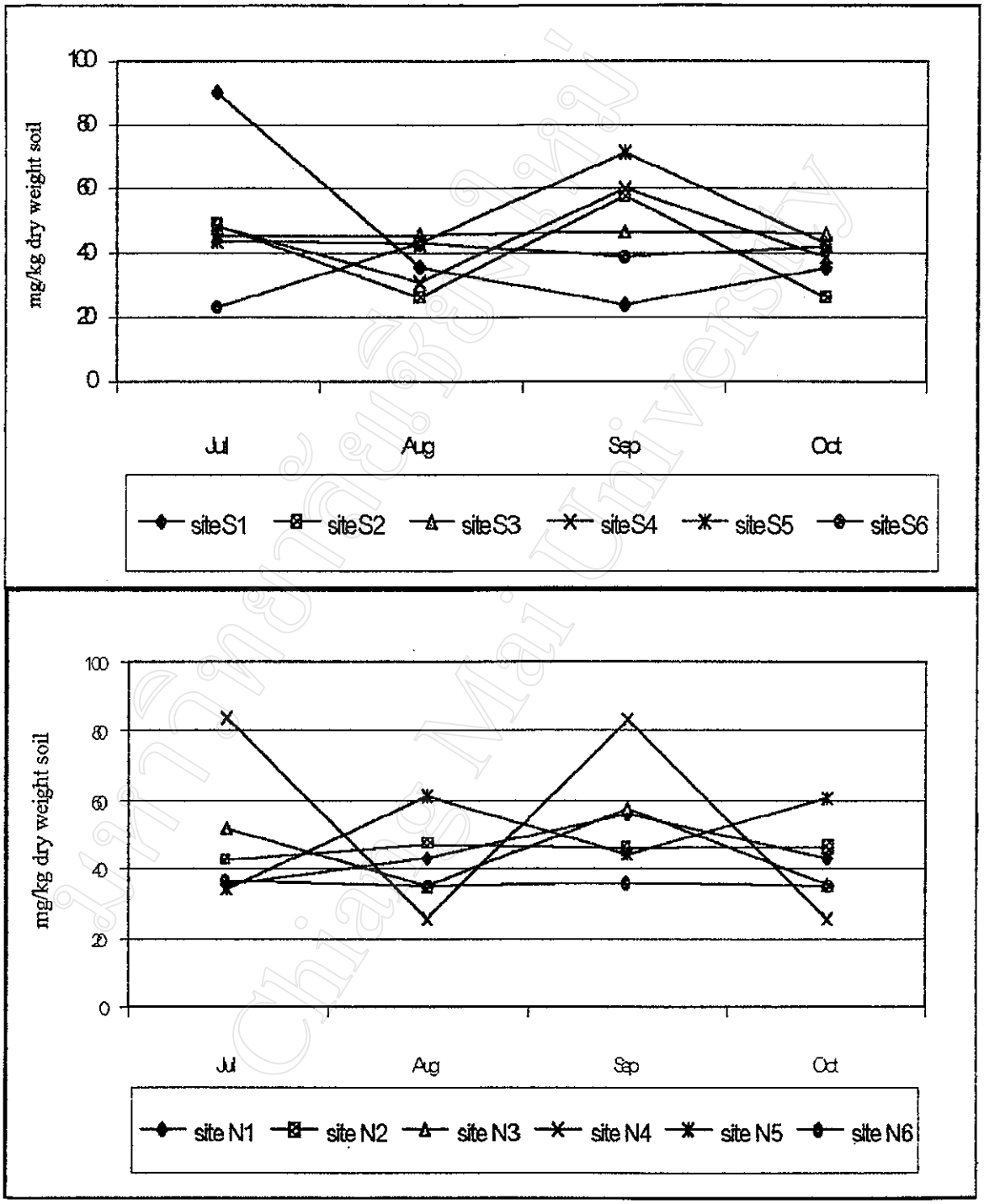
Average soil field capacity (SFC) at sites N1-N6 and S1-S6
at different months

Appendix 8



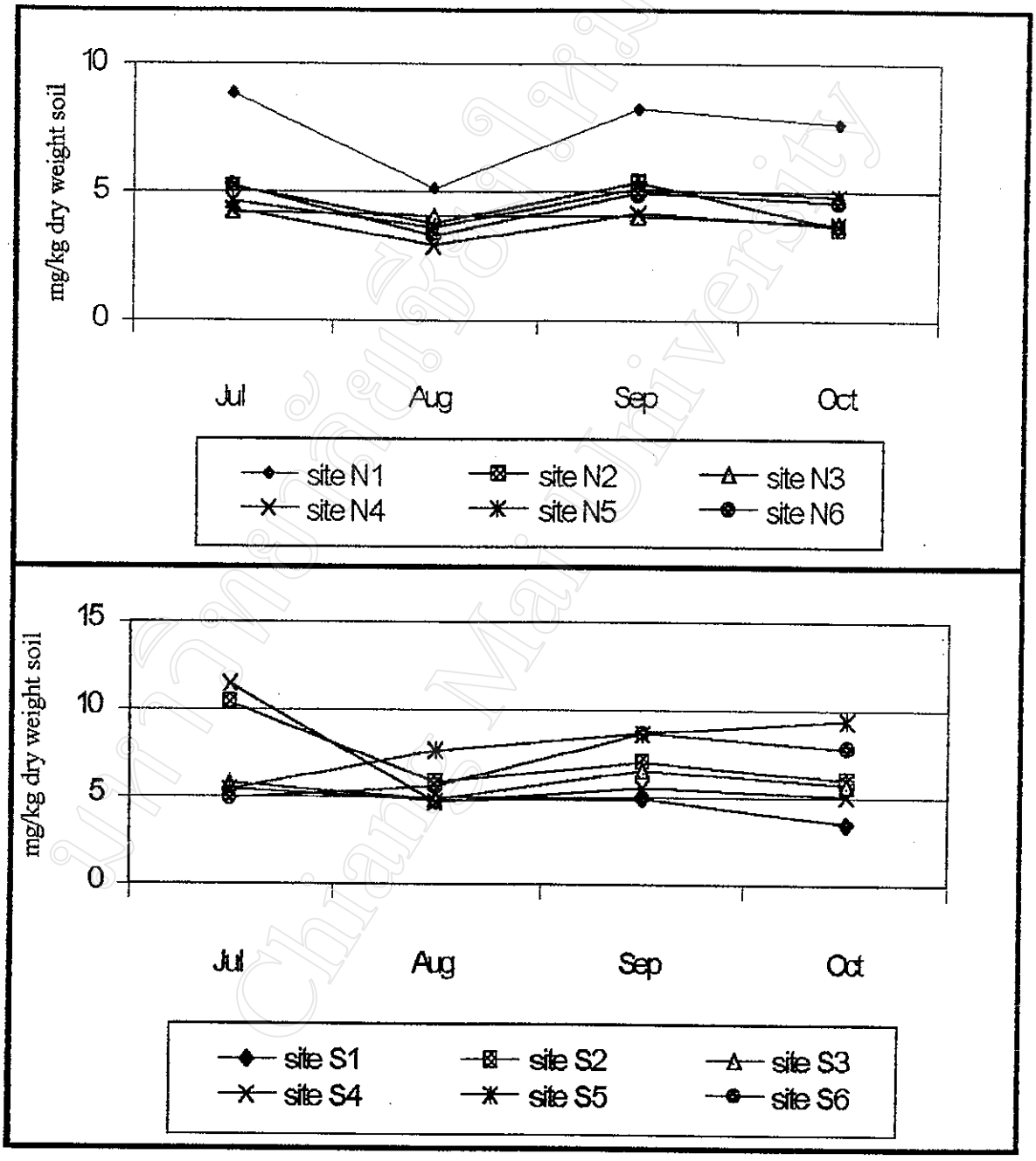
Average arsenic (As) concentration at sites N1-N6 and S1-S6
at different months

Appendix 9



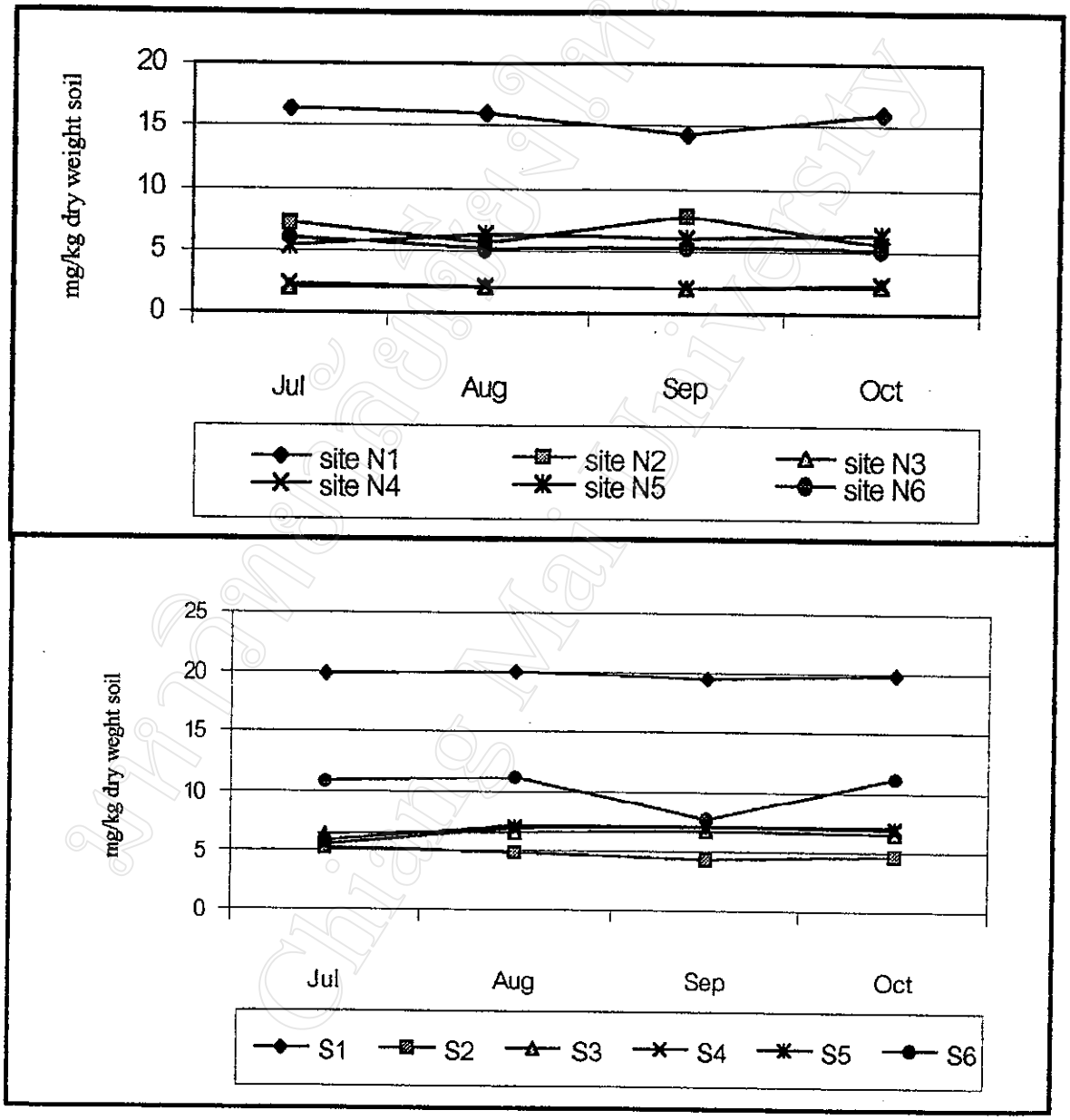
Average cobalt (Co) concentration at sites S1-S6 and N1-N6
at different months

Appendix 10



Average chromium (Cr) concentration at sites N1-N6 and S1-S6 at different months

Appendix 11



Average nickel (Ni) concentration at sites N1-N6 and S1-S6
at different months

Appendix 12

Average soil pH at every study site during different months *)

Study site	Jul-98	Aug-98	Sep-98	Oct-98
N1 : Km. 644 (Lampang-Ngao)	6.58 c	6.12 b	5.96 a	5.91 a
N2 : Km. 637 (Lampang-Ngao)	6.52 b	6.44 b	6.32 b	5.9 a
N3 : Nong Bom (Lampang Ngao)	6.71 d	6.57 c	5.75 a	6.16 b
N4 : Ban Dong	5.76 c	5.98 d	5.37 b	5.1 a
N5 : Ban Tha Si 2 Bridge	6.68 c	6.16 b	6.1 b	5.4 a
N6 : Dumping Area	7.59 c	6.77 a	7.44 bc	7.31 b
S1 : C Road	7.78 b	7.5 a	7.94 c	7.59 a
S2 : Ban Huai Pet	8.08 d	6.04 b	5.53 a	7.22 c
S3 : Sob Moh School	7.14 d	5.27 a	5.89 b	6.47 c
S4 : Huai King Bridge	6.5 a	6.52 a	7.37 b	7.23 b
S5 : Mae Moh Police Station	7.6 d	4.98 b	4.48 a	6.03 c
S6 : Monitoring Station	8.06 d	7.49 c	6.28 a	6.45 b

**) For each row of study site, values followed by the different letter were significantly different ($P \leq 0.05$)*

Appendix 13

Average soil organic matter (%) at every study site during different months*

Study site	Jul-98	Aug-98	Sep-98	Oct-98
N1 : Km. 644 (Lampang-Ngao)	11.7 b	10.95 a	12.1 b	10.48 a
N2 : Km. 637 (Lampang-Ngao)	8.6 bc	7.52 a	8.26 b	8.89 c
N3 : Nong Bom (Lampang Ngao)	3.17 b	1.96 a	3.07 b	2.97 b
N4 : Ban Dong	3.14 c	2.35 a	2.76 b	2.31 a
N5 : Ban Tha Si 2 Bridge	5.53 c	4.91 b	5.75 c	3.68 a
N6 : Dumping Area	8.01 c	5.39 a	6.41 b	6.53 b
S1 : C Road	17.2 a	18.53 b	16.63 ab	16.1 ab
S2 : Ban Huai Pet	5.49 b	5.95 b	4.6 a	4.02 a
S3 : Sob Moh School	9.27 b	10.11 bc	10.40 c	16.1 ab
S4 : Huai King Bridge	2.61 a	5.25 c	5.75 d	4.13 b
S5 : Mae Moh Police Station	7.31 d	3.69 b	3:00 AM	4.09 c
S6 : Monitoring Station	4.51 c	3.61 b	4.95 c	2.31 a

**) For each row of study site, values followed by the different letter were significantly different ($P \leq 0.05$)*

Appendix 14

Average soil moisture content (%) at every study site during different months*

Study site	Jul-98	Aug-98	Sep-98	Oct-98
N1 : Km. 644 (Lampang-Ngao)	35.63 c	35.14 c	30.8 a	33.63 b
N2 : Km. 637 (Lampang-Ngao)	22.46 ab	25.59 c	21.58 a	23.34 b
N3 : Nong Bom (Lampang Ngao)	18.55 ab	20.31 c	15.5 a	18.66 b
N4 : Ban Dong	20.82 c	21.28 c	18.29 b	16 a
N5 : Ban Tha Si 2 Bridge	21.34 b	23.78 c	14.07 a	14.13 a
N6 : Dumping Area	27.53 c	31.8 d	24.29 b	15.33 a
S1 : C Road	35.83 c	36.13 c	34.31 b	28.83 a
S2 : Ban Huai Pet	24.29 c	25.26 d	15.89 b	9.99 a
S3 : Sob Moh School	35.83 d	29.67 b	33.33 c	12.58 a
S4 : Huai King Bridge	20.37 b	25.53 c	28.21 d	18.18 a
S5 : Mae Moh Police Station	22.36 c	21.56 bc	16.72 a	20.43 b
S6 : Monitoring Station	15.39 b	25.92 c	26.64 c	13.8 a

**) For each row of study site, values followed by the different letter were significantly different ($P \leq 0.05$)*

Appendix 15

Average soil moisture content (%) at every study site during different months *

Study site	Jul-98	Aug-98	Sep-98	Oct-98
N1 : Km. 644 (Lampang-Ngao)	1.54 a	1.55 a	1.63 b	1.54 a
N2 : Km. 637 (Lampang-Ngao)	1.44 a	1.52 c	1.465 ab	1.48 b
N3 : Nong Bom (Lampang Ngao)	1.46 a	1.43 a	1.43	1.52 b
N4 : Ban Dong	1.51 c	1.42 a	1.44 ab	1.46 b
N5 : Ban Tha Si 2 Bridge	1.47 b	1.4 a	1.52 c	1.56 a
N6 : Dumping Area	1.60 a	1.57 a	1.56 a	1.56 a
S1 : C Road	2.38 b	1.60 a	1.54 a	1.63 a
S2 : Ban Huai Pet	1.6 b	1.58 b	1.49 a	1.49 a
S3 : Sob Moh School	1.72 b	1.76 b	1.7 b	1.48 a
S4 : Huai King Bridge	1.58 ab	1.64 b	1.53 a	1.56 a
S5 : Mae Moh Police Station	1.52 b	1.5 ab	1.52 b	1.45 a
S6 : Monitoring Station	1.47 c	1.30 a	1.39 bc	1.34 ab

**) For each row of study site, values followed by the different letter were significantly different ($P \leq 0.05$)*

Appendix 16

Average arsenic (As) concentration in soils (mg/kg) at every study site during different months*

Study site	Jul-98	Aug-98	Sep-98	Oct-98
N1 : Km. 644 (Lampang-Ngao)	20.91 a	22.91 b	18.12 c	16.02 d
N2 : Km. 637 (Lampang-Ngao)	20.64 a	24.25 b	17.6 c	15.01 d
N3 : Nong Bom (Lampang Ngao)	9.44 b	6.16 a	5.52 a	4.71 a
N4 : Ban Dong	6.11 b	8.25 c	6.21 b	4.57 a
N5 : Ban Tha Si 2 Bridge	12.77 c	8.08 b	7.53 b	5.96 a
N6 : Dumping Area	18.9 b	11.51 a	10.16 a	10.21 a
S1 : C Road	42.29 a	47.71 b	50.22 bc	52.35 c
S2 : Ban Huai Pet	40.55 c	14.83 c	12.34 a	11.49 b
S3 : Sob Moh School	13.95 c	13.52 c	10.98 a	6.98 b
S4 : Huai King Bridge	6.62 a	15.58 b	16.18 b	17.1 b
S5 : Mae Moh Police Station	13.76 b	22.55 c	4.87 a	4.23 a
S6 : Monitoring Station	20.99 b	18.87 ab	17.67 a	17.46 a

**) For each row of study site, values followed by the different letter were significantly different ($P \leq 0.05$)*

Appendix 17

Average cobalt (Co) concentration in soils (mg/kg) at every study site during different months *

Study site	Jul-98	Aug-98	Sep-98	Oct-98
N1 : Km. 644 (Lampang-Ngao)	35.44 a	42.93 ab	56.1 c	42.84 ab
N2 : Km. 637 (Lampang-Ngao)	42.27 a	47.19 b	45.86 ab	46.65 b
N3 : Nong Bom (Lampang Ngao)	51.86 b	34.89 a	57.51 c	35.25 a
N4 : Ban Dong	83.54 b	25.44 a	83.34 b	25.39 a
N5 : Ban Tha Si 2 Bridge	34.53 a	61.21 c	43.92 b	60.73 c
N6 : Dumping Area	36.78 a	35.1 a	36.31 a	35.14 a
S1 : C Road	40.42 c	35.79 b	23.93 a	35.51 b
S2 : Ban Huai Pet	48.67 b	26.26 a	58.08 c	26.12 a
S3 : Sob Moh School	45.31 a	45.62 a	46.81 a	45.97 a
S4 : Huai King Bridge	48.47 bc	30.94 a	60.22 c	30.93 ab
S5 : Mae Moh Police Station	43.95 a	43.08 a	71.32 b	42.91 a
S6 : Monitoring Station	23.06 a	43.43 c	38.93 b	42.41 bc

**) For each row of study site, values followed by the different letter were significantly different ($P \leq 0.05$)*

Appendix 18

Average chromium (Cr) concentration in soils (mg/kg) at every study site during different months *

Study site	Jul-98	Aug-98	Sep-98	Oct-98
N1 : Km. 644 (Lampang-Ngao)	8.83 b	5.16 a	8.25 b	7.64 b
N2 : Km. 637 (Lampang-Ngao)	5.205 b	3.76 a	5.42 b	3.63 a
N3 : Nong Bom (Lampang Ngao)	4.27 a	4.05 a	4.05 a	3.73 a
N4 : Ban Dong	4.33 b	2.92 a	4.17 b	3.71 ab
N5 : Ban Tha Si 2 Bridge	4.68 b	3.58 a	5.14 b	4.81 b
N6 : Dumping Area	5.25 c	3.31 a	4.96 bc	4.6 b
S1 : C Road	5.44 c	4.78 b	4.9 b	3.51 a
S2 : Ban Huai Pet	10.35 c	5.85 a	7 b	5.98 a
S3 : Sob Moh School	5.76 b	4.87 a	6.49 c	5.68 b
S4 : Huai King Bridge	11.43 b	4.67 a	5.5 a	5.07 a
S5 : Mae Moh Police Station	5.35 a	7.66 b	10.67 c	9.41 d
S6 : Monitoring Station	4.93 a	5.61 a	8.63 b	7.84 b

**) For each row of study site, values followed by the different letter were significantly different ($P \leq 0.05$)*

Appendix 19

Average Nickel (Ni) concentration in soils (mg/kg) at every study site during different months *

Study site	Jul-98	Aug-98	Sep-98	Oct-98
N1 : Km. 644 (Lampang-Ngao)	16.38 a	16.02 a	14.35 a	15.99 a
N2 : Km. 637 (Lampang-Ngao)	7.26 b	5.64 a	7.44 b	5.57 a
N3 : Nong Bom (Lampang Ngao)	2.08 a	2.19 a	2.09 a	2.22 a
N4 : Ban Dong	2.32 a	2.11 a	2.1 a	2.36 a
N5 : Ban Tha Si 2 Bridge	5.39 a	6.32 b	6.01 ab	6.32 b
N6 : Dumping Area	6.01 b	5.14 a	5.26 a	5.14 a
S1 : C Road	19.81 a	20.01 a	19.48 a	19.85 a
S2 : Ban Huai Pet	5.08 c	4.71 b	4.36 a	4.68 b
S3 : Sob Moh School	6.41 a	6.43 a	6.73 a	6.48 a
S4 : Huai King Bridge	5.46 a	6.93 b	7.06 b	6.92 b
S5 : Mae Moh Police Station	5.85 a	6.98 b	6.96 b	7.02 b
S6 : Monitoring Station	10.72 b	11.13 b	7.79 a	11.115 b

**) For each row of study site, values followed by the different letter were significantly different ($P \leq 0.05$)*

Appendix 19

Multiple regression statistical analysis (Stepwise Method) between soil physicochemical parameters and heavy metal concentrations with order Lepidoptera showing the significance of As

Listwise Deletion of Missing Data

Equation Number 1 Dependent Variable.. LEPIDOPTERA

Block Number 1. Method: Stepwise Criteria PIN .0500 POUT .1000
AS CO CR NI OM PH SFC SMC

Variable(s) Entered on Step Number
1.. AS

Multiple R	.65429
R Square	.42809
Adjusted R Square	.37090
Standard Error	2.00441

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	30.07341	30.07341
Residual	10	40.17659	4.01766

F = 7.48531 Signif F = .0210

---------- Variables in the Equation ----------

Variable	B	SE B	Beta	T	Sig T
AS	-.148189	.054164	-.654287	-2.736	.0210
(Constant)	7.592369	1.033344		7.347	.0000

---------- Variables not in the Equation ----------

Variable	Beta In	Partial	Min Toler	T	Sig T
CO	-.137915	-.180332	.977794	-.550	.5957
CR	-.092507	-.122312	.999807	-.370	.7201
NI	-.113176	-.069961	.218538	-.210	.8380
OM	.137912	.089991	.243515	.271	.7924
PH	.424798	.413305	.541383	1.362	.2064
SFC	.382155	.372733	.544058	1.205	.2589
SMC	.161419	.162042	.576338	.493	.6341

End Block Number 1 PIN = .050 Limits reached.

Appendix 20

Multiple regression statistical analysis (Stepwise Method) between soil physicochemical parameters and heavy metal concentrations with order Diptera showing the significance of Co

```
Listwise Deletion of Missing Data

Equation Number 1     Dependent Variable..    DIPTERA

Block Number  1.  Method:  Stepwise      Criteria    PIN  .0500    POUT  .1000
   AS        CO        CR        NI        OM        PH        SFC       SMC


Variable(s) Entered on Step Number
   1..     CO


Multiple R            .62302
R Square              .38816
Adjusted R Square     .32698
Standard Error       3.30243

Analysis of Variance
                 DF        Sum of Squares        Mean Square
Regression        1             69.18941           69.18941
Residual         10            109.06059           10.90606

F =       6.34413       Signif F =  .0305

------------------ Variables in the Equation ------------------

Variable                B         SE B        Beta           T  Sig T

CO               -.442897     .175840    -.623024      -2.519  .0305
(Constant)     31.395447     7.857711                    3.995  .0025

------------- Variables not in the Equation -------------

Variable     Beta In  Partial  Min Toler         T  Sig T

AS           .253073  .319927    .977794     1.013  .3375
CR           .227831  .271271    .867397      .846  .4197
NI           .447216  .556755    .948268     2.011  .0752
OM           .411429  .523036    .988811     1.841  .0988
PH           .079179  .077706    .589296      .234  .8204
SFC          .380850  .486792    .999580     1.672  .1289
SMC          .456737  .578657    .982083     2.129  .0622


End Block Number   1   PIN =      .050 Limits reached.
```

Appendix 21

Multiple regression statistical analysis (Stepwise Method) between heavy metal concentrations with order Coleoptera showing the significance of Ni

```
Equation Number 1 Dependent Variable : COLEOPTERA

Block Number  1.  Method:  Stepwise
   AS        CO        CR        NI

Variable(s) Entered on Step Number
   1..    NI

Multiple R              .66574
R Square                .44322
Adjusted R Square       .38754
Standard Error         6.19936

Analysis of Variance
                     DF      Sum of Squares      Mean Square
Regression            1           305.92989        305.92989
Residual             10           384.32011         38.43201

F =      7.96029       Signif F =  .0181

------------------ Variables in the Equation ------------------

Variable              B        SE B       Beta          T  Sig T

NI            -1.011447    .358481   -.665745     -2.821  .0181
(Constant)    23.037300   3.289489                 7.003  .0000

------------- Variables not in the Equation -------------

Variable     Beta In  Partial  Min Toler          T  Sig T

AS           .452815  .283668    .218538       .888  .3979
CO         -.145427 -.189767    .948268      -.580  .5762
CR           .015911  .020564    .930000       .062  .9521


End Block Number   1   PIN =     .050 Limits reached.
```

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