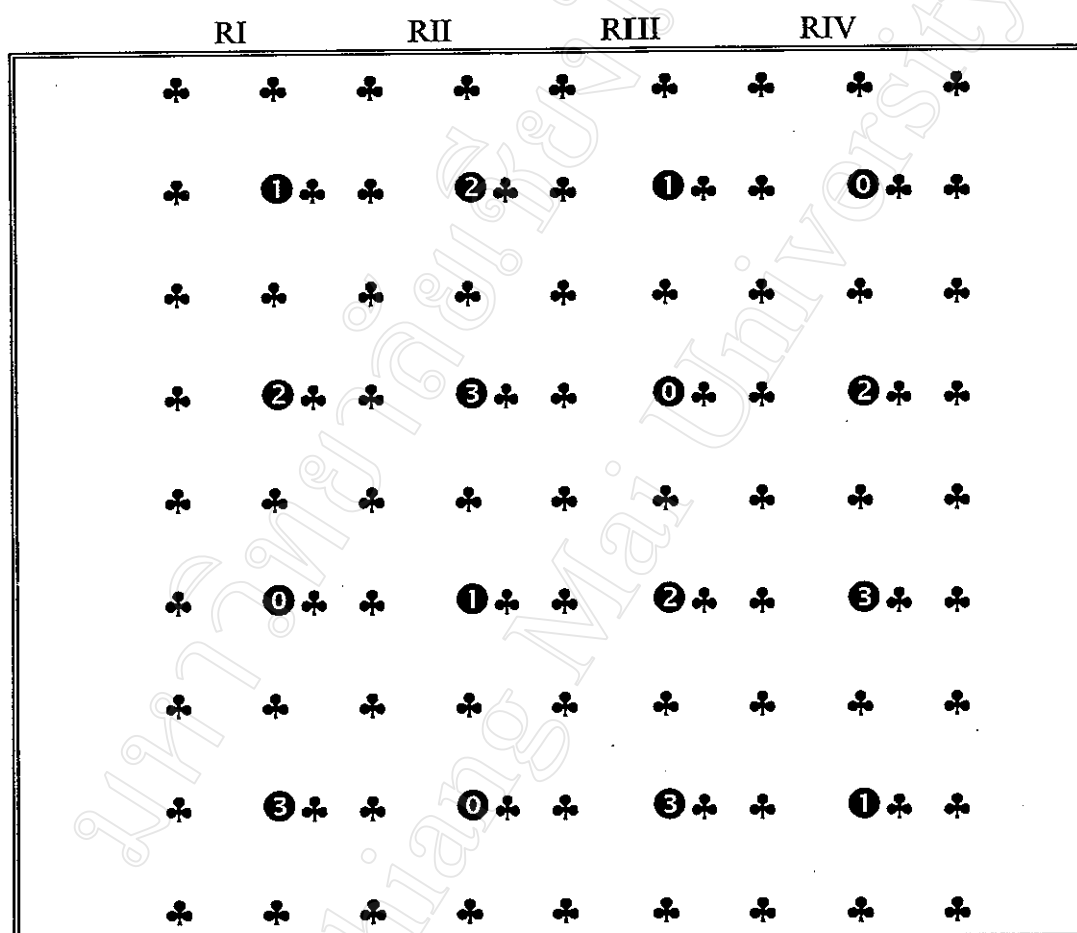

APPENDICES

Appendix -A Layout of Field Experiment



Note: RI = replication I
 RII = replication II
 RIII = replication III
 RIV = replication IV

① = B0=0 g borax tree⁻¹
 ② = B40=40 g borax tree⁻¹
 ③ = B80=80 g borax tree⁻¹
 ④ = B160=160 g borax tree⁻¹

Appendix -B Field Experimental Results

Table B-1 Effects of borax application on apple yield components at harvest

B treatment (g borax tree ⁻¹)		Drop Rate (%)	No. tree ⁻¹	Fruit diameter (cm)	Fruit length (cm)	Weight (g)	Yield (kg tree ⁻¹)
B(0)	Rep I	84.7	331	7.35	7.13	157.3	48.9
	Rep II	83.8	335	7.31	7.19	162.7	51.2
	Rep III	82.7	332	7.51	7.21	164.1	51.2
	Rep IV	83.5	341	7.39	7.08	153.4	49.2
B(40)	Rep I	78.4	379	7.43	7.20	162.2	58.2
	Rep II	79.1	376	7.37	7.13	159.0	56.6
	Rep III	78	388	7.45	7.30	166.9	61.4
	Rep IV	79.9	382	7.50	7.13	170.7	61.8
B(80)	Rep I	69.6	398	7.73	7.24	174.6	69.5
	Rep II	70.8	400	7.81	7.33	175.5	70.2
	Rep III	71.4	390	7.85	7.35	180.3	70.3
	Rep IV	70.0	381	7.84	7.30	173.4	66.1
B(160)	Rep I	64.9	384	7.84	7.59	177.9	68.3
	Rep II	65.9	399	7.87	7.60	176.6	70.5
	Rep III	65.8	405	7.80	7.6	184.1	74.6
	Rep IV	64.5	391	7.93	7.54	185.4	72.5

Note:

B0, B40 etc. refer to 0 g borax tree⁻¹, 40 g borax tree⁻¹ etc.

Table B-2 Effects of borax application on quality components and seed number at harvest

B treatment (g borax tree ⁻¹)		SS (%)	TS (%)	TA (%)	Firmness (kg cm ⁻²)	V.C	Seed number
B(0)	Rep I	13.4	9.82	0.30	12.5	2.24	8.9
	Rep II	13.9	9.68	0.32	12.8	2.20	9.1
	Rep III	13.8	9.61	0.31	12.6	2.38	10.7
	Rep IV	13.7	9.69	0.33	12.9	2.34	7.3
B(40)	Rep I	13.2	9.77	0.29	12.0	2.20	8
	Rep II	13.0	10.00	0.30	12.1	2.08	10.4
	Rep III	12.7	9.91	0.31	11.9	2.22	11.6
	Rep IV	12.9	9.39	0.28	11.6	2.40	9.5
B(80)	Rep I	13.4	10.25	0.27	12.0	2.36	10
	Rep II	13.2	10.18	0.27	11.1	2.14	11.5
	Rep III	13.0	10.21	0.28	11.8	2.46	13
	Rep IV	13.5	10.23	0.27	11.9	2.34	11.4
B(160)	Rep I	12.7	10.15	0.23	10.8	2.14	11.6
	Rep II	12.3	10.17	0.24	9.4	2.18	11.1
	Rep III	12.4	10.22	0.23	10.5	2.20	12.9
	Rep IV	12.8	10.11	0.24	10.4	2.36	12.0

Note:

B0, B40 etc. refer to 0 g borax tree⁻¹, 40 g borax tree⁻¹ etc.

SS=Soluble solids, TS = Total sugar, TA = Titratable acidity (% malic acid equivalent),

V.C = Vitamin C (mg per 100g fresh fruit)

Table B-3 Effects of storage time on fruit quality of 160 g borax tree⁻¹ after 25 days storage under room temperature (20°C)

B treatment (g borax tree ⁻¹)	SS (%)	TS (%)	TA (%)	Firmness (kg cm ⁻²)	V.C
Rep I	13.9	11.10	0.22	8.0	1.7
B(160) Rep II	13.6	11.00	0.23	7.5	1.74
Rep III	13.8	10.99	0.21	8.2	1.72
Rep IV	14.0	11.01	0.22	8.5	1.80

Note:

SS = Soluble solids, TS = Total sugar, TA = Titratable acidity (% malic acid),

V.C = Vitamin C (mg per 100g fresh fruit)

Table B-4 Effects temperature on fruit quality of 160 g borax tree⁻¹ after 25 days storage under refrigerator (4-5°C)

B treatment (g borax tree ⁻¹)	SS (%)	TS (%)	TA (%)	Firmness (kg cm ⁻²)	V.C
Rep I	13.6	11.00	0.20	8.9	1.90
B(160) Rep II	13.0	11.00	0.21	8.2	1.94
Rep III	13.2	11.50	0.20	8.8	1.92
Rep IV	13.4	11.70	0.20	9.1	2.04

Note:

SS = Soluble solids, TS = Total sugar, TA = Titratable acidity(% malic acid), V.C = Vitamin C (mg per 100g fresh fruit)

Table B-5 Effects of borax application on fruit length in apple

B treatment (g borax tree ⁻¹)		4W	8W	12W	16W	20W
B(0)	Rep I	1.76	3.61	4.71	6.00	7.13
	Rep II	1.82	3.73	4.81	6.03	7.19
	Rep III	1.85	3.80	4.83	6.11	7.21
	Rep IV	1.77	3.64	4.76	6.05	7.08
B(40)	Rep I	1.89	3.81	4.92	6.17	7.20
	Rep II	1.88	3.74	4.90	6.11	7.13
	Rep III	1.91	3.84	5.00	6.22	7.30
	Rep IV	1.87	3.72	4.89	6.10	7.13
B(80)	Rep I	1.93	4.05	4.93	6.30	7.24
	Rep II	1.94	4.17	5.03	6.33	7.33
	Rep III	1.90	3.96	4.97	6.24	7.35
	Rep IV	1.89	3.97	5.01	6.23	7.30
B(160)	Rep I	1.99	4.21	5.11	6.40	7.49
	Rep II	2.01	4.29	5.11	6.47	7.60
	Rep III	2.00	4.26	5.05	6.48	7.62
	Rep IV	2.04	4.30	5.13	6.56	7.64

B0, B40 etc. refer to 0 g borax tree⁻¹, 40 g borax tree⁻¹ etc.

4W, 8W etc. refer to 4 weeks after full bloom, 8 weeks after full bloom etc.

Table B-6 Effects of borax application on fruit diameter in apple

B treatment (g borax tree ⁻¹)		4W	8W	12W	16W	20W
B(0)	Rep I	1.39	3.33	4.91	6.11	7.35
	Rep II	1.41	3.37	5.01	6.15	7.31
	Rep III	1.45	3.41	5.04	6.20	7.51
	Rep IV	1.43	3.35	4.78	6.17	7.39
B(40)	Rep I	1.49	3.38	5.02	6.18	7.43
	Rep II	1.44	3.44	5.00	6.21	7.37
	Rep III	1.46	3.39	5.10	6.27	7.45
	Rep IV	1.39	3.45	4.99	6.20	7.50
B(80)	Rep I	1.44	3.65	5.13	6.41	7.73
	Rep II	1.54	3.71	5.21	6.45	7.81
	Rep III	1.48	3.51	5.08	6.54	7.85
	Rep IV	1.47	3.74	5.10	6.52	7.84
B(160)	Rep I	1.49	3.77	5.11	6.50	7.84
	Rep II	1.47	3.66	5.16	6.57	7.87
	Rep III	1.51	3.76	5.05	6.58	7.80
	Rep IV	1.56	3.80	5.32	6.61	7.93

B0, B40 etc. refer to 0 g borax tree⁻¹, 40 g borax tree⁻¹ etc.

4W, 8W etc. refer to 4 weeks after full bloom, 8 weeks after full bloom etc.

Table B-7 Effects of borax application on shoots length in apple

B treatment (g borax tree ⁻¹)		4W	8W	12W	16W	20W
B(0)	Rep I	19.3	34.8	42.7	45.8	46.5
	Rep II	20.4	35.9	43.8	46.1	47.3
	Rep III	18.7	36.7	44.0	46.5	47.0
	Rep IV	20.4	37.00	45.0	46.9	47.1
B(40)	Rep I	22.2	38.8	44.8	47.4	47.6
	Rep II	21.8	39.2	45.0	47.0	47.3
	Rep III	20.5	39.0	44.5	47.3	47.5
	Rep IV	19.7	37.0	45.8	47.7	47.9
B(80)	Rep I	21.7	40.5	47.4	49.3	49.3
	Rep II	23.3	41.1	48.6	50.0	50.4
	Rep III	22.4	41.9	49.0	50.1	50.7
	Rep IV	22.8	42.0	49.6	50.2	50.5
B(160)	Rep I	22.4	43.9	50.0	50.3	51.4
	Rep II	23.4	43.1	49.9	50.9	50.9
	Rep III	22.9	44.0	50.1	50.6	51.7
	Rep IV	23.7	44.9	50.6	51.5	51.6

B0, B40 etc. refer to 0 g borax tree⁻¹, 40 g borax tree⁻¹ etc.

4W, 8W etc. refer to 4 weeks after full bloom, 8 weeks after full bloom etc.

Table B-8 Effects of borax application on shoot boron concentration in apple

B treatment (g borax tree ⁻¹)		4W	8W	12W	16W	20W
B(0)	Rep I	33.13	29.34	32.26	30.22	28.03
	Rep II	34.11	30.14	33.11	29.56	27.66
	Rep III	33.46	30.55	31.99	29.21	27.21
	Rep IV	34.09	30.03	32.88	30.11	28
B(40)	Rep I	34.26	32.44	35.44	31.24	29.34
	Rep II	34.44	31.99	36.27	30.89	28.99
	Rep III	33.59	32.08	35.23	30.56	28.56
	Rep IV	35.13	32.55	35.49	31.47	29.79
B(80)	Rep I	38.22	37.41	41	36.79	34.47
	Rep II	38.89	37.18	40.11	36.99	34.99
	Rep III	37.22	37.023	40.01	37.15	35.10
	Rep IV	37.73	38.04	40.65	37.23	35.23
B(160)	Rep I	40.23	40.11	42.12	37.44	36.34
	Rep II	40.67	39.44	41.57	38.14	36.24
	Rep III	39.98	39.78	41.68	39.05	37.03
	Rep IV	40.99	40.01	41.76	38.99	37.11

B0, B40 etc. refer to 0 g borax tree⁻¹, 40 g borax tree⁻¹ etc.

4W, 8W etc. refer to 4 weeks after full bloom, 8 weeks after full bloom etc.

Table B-9 Effects of borax application on leaf boron concentration in apple

B treatment (g borax tree ⁻¹)		4W	8W	12W	16W	20W
B(0)	Rep I	13.77	12.21	14.43	13.01	13.97
	Rep II	13.22	11.99	15.06	13.22	14.67
	Rep III	13.13	12.03	15.11	13.13	15.04
	Rep IV	13.09	13.44	14.13	14.24	13.056
B(40)	Rep I	14	13.11	17.77	15.91	16.23
	Rep II	13.88	13.23	18.04	16.04	16.44
	Rep III	13.45	13.13	17.23	15.93	16.97
	Rep IV	13.67	12.89	17.07	15.69	16.01
B(80)	Rep I	17.66	16.19	23.11	20.99	21.16
	Rep II	18.34	17.16	22.60	20.76	21.51
	Rep III	17.73	16.74	22.16	20.54	21.31
	Rep IV	18.04	16.65	23.06	20.15	22.10
B(160)	Rep I	20.14	21.08	25.99	24.88	24.97
	Rep II	19.44	21.11	26.03	24.91	25.45
	Rep III	20.40	20.03	27.11	24.83	25.14
	Rep IV	20.01	20.11	25.65	25.04	26.03

B0, B40 etc. refer to 0 g borax tree⁻¹, 40 g borax tree⁻¹ etc.

4W, 8W etc. refer to 4 weeks after full bloom, 8 weeks after full bloom etc.

Table B-10 Effects of borax application on fruit boron concentration in apple

B treatment (g borax tree ⁻¹)		4W	8W	12W	16W	20W
B(0)	Rep I	12.91	10.89	7.78	8.11	9.44
	Rep II	13.12	10.75	8.49	8.29	9.24
	Rep III	12.12	11.23	9.01	8.77	10.00
	Rep IV	13.03	11.02	9.82	9.01	9.32
B(40)	Rep I	13.01	13.32	11.11	12.14	13.04
	Rep II	13.23	13.39	10.26	12.44	13.34
	Rep III	13.33	14.09	10.79	11.99	13.89
	Rep IV	12.99	13.55	12.06	12.97	13.41
B(80)	Rep I	13.55	14.68	13.51	13.44	14.89
	Rep II	13.56	14.23	12.82	13.89	15.11
	Rep III	13.24	15.07	13.91	14.02	14.17
	Rep IV	14	14.63	15	13.95	14.53
B(160)	Rep I	14.36	15.11	13.95	15.28	15.44
	Rep II	14.56	15.29	14.14	16.08	16.21
	Rep III	14.23	15.01	12.92	115.11	16.13
	Rep IV	15.03	15.38	15.05	15.14	15.49

B0, B40 etc. refer to 0 g borax tree⁻¹, 40 g borax tree⁻¹ etc.

4W, 8W etc. refer to 4 weeks after full bloom, 8 weeks after full bloom etc.

Table B-11 Effects of borax application on dropped fruit boron concentration at pea-size drop, June drop and pre-harvest drop

B treatment (g borax tree ⁻¹)		Pea-size drop	June drop	Pre-harvest drop
B(0)	Rep I	10.14	7.11	7.27
	Rep II	10.16	6.95	7.05
	Rep III	10.08	6.67	7.13
	Rep IV	10.21	7.24	6.79
B(40)	Rep I	10.26	8.13	8.07
	Rep II	10.23	8.12	8.23
	Rep III	10.27	8.05	8.14
	Rep IV	10.30	8.28	7.88
B(80)	Rep I	11.71	8.85	10.21
	Rep II	11.55	8.693	10.09
	Rep III	11.46	8.78	10.35
	Rep IV	11.97	8.91	10.44
B(160)	Rep I	12.19	8.92	11.68
	Rep II	112.23	9.01	11.72
	Rep III	12.62	8.99	12.05
	Rep IV	12.71	9.07	11.74

B0, B40 etc. refer to 0 g borax tree⁻¹, 40 g borax tree⁻¹ etc.

Table B-12 Effects of borax application on boron concentrations in skin, internal cortex, external cortex and core of apple fruit at harvest

B treatment (g borax tree ⁻¹)		Skin	Internal cortex	External cortex	Core
B(0)	Rep I	8.3	7.5	9.5	10.8
	Rep II	8.0	8.5	8.5	11.3
	Rep III	9.00	8.2	9.6	12.4
	Rep IV	8.7	7.0	8.4	11.5
B(40)	Rep I	12.2	11.2	14.0	16.8
	Rep II	13.0	11.7	14.4	17.6
	Rep III	11.9	10.8	15.0	18.4
	Rep IV	13.1	12.2	13.4	19.8
B(80)	Rep I	13.5	14.6	15.4	22
	Rep II	13.7	13.6	14.8	24.1
	Rep III	12.9	13.2	16.0	23.5
	Rep IV	14.3	15.2	14.2	24.4
B(160)	Rep I	15.0	16.1	16.8	25.3
	Rep II	15.8	15.7	16.2	22.9
	Rep III	14.2	16.7	17.1	24.9
	Rep IV	15.4	15.1	15.9	25.1

B0, B40 etc. refer to 0 g borax tree⁻¹, 40 g borax tree⁻¹ etc.

Appendix-C Analysis of Variance (ANOVA) of Field Experiment

Appendix C-1 ANOVA for shoot length, fruit length and fruit diameter

Source of variance	DF	Shoot length		Fruit length		Fruit diameter	
		MS	P	MS	P	MS	P
Replication	3	2.02	0.2	0.011	0.077	0.009	0.057
Boron (A)	3	119.7	0.001	0.467	0.007	0.457	0.001
Time (B)	4	6077.02	0.003	68.97	0.000	92.67	0.000
A*B	12	2.48	0.001	0.022	0.008	0.0029	0.003
Error	57	0.35		0.0025		0.0034	
CV%			25		45		39

Appendix C-2 ANOVA for B concentration in shoots, leaves and fruit

Source of variance	DF	Shoots		Leaves		Fruit	
		MS	P	MS	P	MS	P
Replication	3	0.913	0.061	0.070	0.795	0.805	0.056
Boron (A)	3	33.874	0.006	394.67	0.0000	90.679	0.006
Time (B)	4	74.069	0.004	64.269	0.006	8.583	0.014
A*B	12	2.011	0.002	3.898	0.01	3.793	0.030
Error	57	0.1747		0.204		0.215	
CV%			11.8		24.1		16.6

Appendix C-3 ANOVA for B concentration in retained and dropped fruit

Source of variance	DF	pea-size		June drop		pre-harvest	
		MS	P	MS	P	MS	P
Replication	3	0.227	0.051	0.042	0.225	0.127	0.227
Boron (A)	3	6.559	0.005	22.88	0.05	45.56	0.019
Tape (B)	1	46.66	0.001	108.45	0.003	74.45	0.009
A*B	3	0.359	0.000	5.181	0.004	2.92	0.024
Error	21	0.051		0.027		0.081	
CV%			16.1		25.0		24.3

Appendix - D Characteristics of 60 Apple Leaf and Fruit Samples Collected at Harvest from Surveyed Orchard, Yunnan 1996

No	Location	Leaf [B] (mg kg ⁻¹)	Fruit [B] (mg kg ⁻¹)	Length (cm)	Diameter (cm)	weight (g)	Soluble Solids (%)	Firmness (kg cm ⁻²)	Seed No.
1	1	13.56	7.79	5.36	5.71	140	14.9	13.9	7.4
2	1	18.46	12.45	5.7	6.17	159	13.2	12.5	7.1
3	1	11.98	6.55	5.29	5.86	144.9	14.9	14.4	5.2
4	1	16.49	8.46	5.64	6.21	151	14.9	13.1	5.3
5	1	15.26	5.23	5.62	6.19	147	15.5	14.5	7.6
6	1	14.43	8.04	5.66	6.23	133.8	14.6	13.4	5.2
7	1	23.19	14.44	5.94	6.51	169	13.6	11.8	10.1
8	1	16.23	9.28	5.77	6.34	144.5	14.3	13.2	4.4
9	1	17.00	10.77	5.79	6.36	152.9	15.4	12.2	5.3
10	1	18.26	12.74	5.78	6.35	159	13	12	8.1
11	1	21.08	10.95	6	6.57	109	13.3	12.4	6.3
12	1	23.13	14.11	6.08	6.65	167	13.9	12.1	10.4
13	1	16.64	12.43	6.1	6.67	162.7	13.9	12.4	7.2
14	1	16.87	9.73	5.8	6.37	155	13.8	12.8	6.7
15	1	19.42	13.76	6.33	6.9	180.2	13.1	11.5	8.2
16	1	19.33	13.16	6.37	6.94	169.7	13	11.6	10.1
17	1	18.49	12.45	5.38	5.71	144	16.3	12.4	7.4
18	1	20.05	14.47	6.5	7.07	186.21	12.6	11.1	11.1
19	1	21.46	14.11	6.61	7.18	179.8	12.5	11.09	11.9
20	1	19.34	10.93	6.11	6.68	165	13.3	12.3	8.3
21	2	24.59	16.15	6.79	7.36	199.6	11.4	11	12.1
22	2	21.39	18.39	6.88	7.45	155	12.7	11.2	13.2
23	2	15.32	9.33	6.33	6.9	177	14.8	12.7	6.1
24	2	22.15	16.15	5.81	6.38	153	12.1	11.8	11.2
25	2	27.37	18.29	6.49	7.06	189.8	11.9	11	13.7
26	2	21.66	16.13	6.5	7.05	180.5	13.4	11.9	10.8
27	2	15.23	7.78	5.6	6.17	149	15.5	13.8	5.6
28	2	19.45	11.82	6.2	6.77	165	13.8	12.5	7.1
29	2	14.46	6.14	5.3	5.87	110	15.2	13.2	5.7
30	2	18.23	12.33	5.9	6.47	160	13.6	12.5	7.4
31	2	20.13	12.97	6.1	6.67	170	12.8	12.8	8.1
32	2	17.00	9.53	5.67	6.24	140.9	13.8	12.5	6
33	2	16.23	9.19	5.84	6.41	145.3	13.8	12.6	6.3
34	2	16.43	12.32	5.61	6.18	160.5	14.7	13	6.1
35	2	25.04	16.17	6.73	7.11	189.6	12.3	11.6	13.1
36	2	19.34	10.93	5.74	6.31	162.1	13.3	12.9	5.8
37	2	20.08	12.97	6.41	6.98	185.9	12.8	12.1	8.4
38	2	21.45	14.16	6.44	7.01	183	13	10	10.1
39	2	17.23	8.66	5.2	5.77	137.4	13.1	14.6	5.3
40	2	15.39	6.09	5.19	5.76	118.5	14.7	15.2	4.2
41	3	15.32	8.67	5.77	6.34	141.6	16.2	14.2	5.3
42	3	15.26	7.42	5.34	5.91	137.8	14.5	14.5	4.1
43	3	15.77	10.55	5.36	5.93	105.1	15.4	13.3	5.4
43	3	23.45	16.83	6.75	7.22	199.4	11.9	12.9	13.5
45	3	19.24	13.37	6.25	6.82	165.1	13.8	13.3	7.8
46	3	19.44	12.72	6.07	6.64	150.7	14.9	13.8	7.2
47	3	21.03	14.77	6.69	7.06	193.8	12.5	12.9	10
48	3	16.46	10.45	5.92	6.49	144.1	17.8	13.2	6.2
49	3	22.56	14.71	5.46	6.03	179.5	12.4	13	11.2
50	3	19.37	13.75	6.53	6.74	173.7	13.1	13.1	9.4
51	3	14.55	8.88	5.99	6.56	145.6	14.9	14.6	4.2
52	3	19.22	11.92	6.07	6.64	163.4	13.3	13.7	7.3
53	3	20.45	14.22	6.43	7	206	12.6	12.9	11.4
54	3	18.4	10.4	5.44	6.01	130.4	13.7	13.8	4.1
55	3	16.24	8.93	5.89	6.46	156.7	13.9	14	6.3
56	3	17.45	11.23	6.22	6.79	157.9	13.8	13.7	7.1
57	3	16.52	9.88	6.01	6.33	149	14	13.8	5.1
58	3	14.66	7.66	5.65	6.22	123.6	14.1	14.5	6.2
59	3	18.01	9.92	5.78	6.35	131.15	14.2	13.8	5.4
60	3	18.46	12.35	6.3	6.67	161.19	13.2	12.2	7.9

Note: Location 1, 2, 3 stand for Zhaotong, Kunming, Lijiang, Respectively.

Appendix-E Procedures of Tissue Boron Concentration Analysis

Great care must be taken in the sampling (see chapter 3), preparation and analysis because contamination can easily ruin good experiments and obscure micronutrient deficiencies. In order to avoid contamination, only plastic containers should be used.

1. Sample preparation

Leaf, shoot and fruit samples are oven dry at 80, 80, 65 °C for 2, 4, 7-10 days, respectively and ground, then sieved through 1 mm mesh. However it is not necessary to grind plant sample if its weight is lower than 2 g.

2. Extraction

Dry- ashing technique is used to extract B from plant samples:

Weight approximately 300 mg of oven-dried ground material into tall crucible. Sample of standard references material and blanks are included with each batch of samples. Ash the samples at 500 °C for 8 hours and cool.

Remove crucibles from the furnace and place in electric frying pans. Rinse the crucible walls down with 2 ml HCl (1:1 concentrated HCl to deionized (D.I) water). Adjust frying pan temperature to 50 °C and heat for 30 minutes.

Cool and transfer the solution from crucible to a 10 ml graduated polystyrene vial with small washes of D.I. water cap the vial and shake well.

allow the precipitate to settle by standing overnight or centrifuge at 2500-3000 rpm for 4 minutes.

2. Boron determination

2.1 Reagent preparation:

a. Buffer- masking reagent

Dissolved 140 g ammonium acetate, 10 g potassium acetate, 10 g tetra sodium salt of DETA, 4 g nitrilotracetic acid in 200 ml of D.I. water. After contents are completely

dissolved, slowly add 62.5 ml conc. acetic acid. Dilute solution to 1 l and stand overnight at room temperature. Filter through a #1 filter paper.

b. Azomethine-H reagent (prepare 24 hours before being used)

Dissolve 1.6 g of fresh azomethine-H (Merk) and 4 g ascorbic acid in 120 ml D.I. water. Dilute solution to 200 ml. Store in polypropylene bottle wrapped in aluminum foil and place in a refrigerator. (This reagent must be used within 14 days).

c. N Hydrochloric acid

Dilute 97 ml of conc. HCl (A.R. grade) to 1 l D.I. water.

d. Boron solution (100 ppm)

Dissolve 0.5716 g boric acid in 1 l D.I. water. This solution is used to prepare a series of B standard in N HCl (0, 1, 2, 3, 4, and 5, ppm. Standard solution: diluting 0, 1, 2, 3, 4 and 5 ml of 100 ppm B standard, respectively to 100 ml)

e Mixed reagent

Mix two parts (by volume) of buffer masking reagent with one part of azomethine-H reagent. This reagent must be used within 4 hours)

2.2 PROCEDURE

Pipette 1 l of extracted solution in to vial. Add 3 ml of mixed reagent in a strong jet with a Eppendor to mix well with sample. Stand for 1 hour before the content is determined colorimetrically at 420 nm.

Sample readings are compared with a series of B standards (0, 1, 2, 3, 4, and 5 ppm) prepared at same time and treated in the same way as sample solution.

2.3 Cleaning

All plastic container are cleaned with D.I. water left in 20% concentrated HCl overnight. Rinsed with D.I. water and air dried (Basson, *et al.*, 1969).

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