



# Changes in soil fertility in a fertilised cashew plantation at Dimbulah, North Queensland

Noel J. Grundon

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CSIRO Land and Water, Atherton  
Technical Report 33/01, December 2001

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## **Abbreviations**

B	Boron
Ca	Calcium
cm	centimetre
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Cu	Copper
Fe	Iron
g	gram
ha	hectare
K	Potassium
kg	kilogram
L	litre
Mg	Magnesium
mg	milligram
mm	millimetre
Mn	Manganese
Mo	Molybdenum
N	Nitrogen
P	Phosphorus
QDNR	Queensland Department of Natural Resources
QDPI	Queensland Department of Primary Industries
S	Sulfur
t	tonne (ie 1,000 kg)
Zn	Zinc
°C	degrees Centigrade

## 1. Introduction

In tropical northern Australia there are large areas of light textured soils that are suited to the growth of cashew trees (*Anacardium occidentale* L.). To assist in the development of production systems that are economically viable and environmentally sustainable, the CSIRO Cashew Project was established jointly by CSIRO Division of Horticulture (now part of CSIRO Plant Industry) and CSIRO Division of Soils (now part of CSIRO Land and Water), as part of the CSIRO Tropical Agri-Exports Project (CSIRO 1998). The Cashew Project aimed to, amongst other things, acquire knowledge of the changes in soil fertility under fertilised cashew trees in order to provide a framework for the development of environment friendly fertiliser practices for an economically viable cashew industry in northern Australia.

This report presents the methodology and soil chemical analyses data obtained from field studies completed at a commercial cashew plantation at Dimbulah, North Queensland, from 1996 to 1998. It has the aim of putting the large data-set arising from the study into the public domain; subsequent reports will present analyses of these results and associated interpretations.

## 2. Methods

### 2.1 Field site description

The field study commenced in March 1996 and continued until the end of harvest in December 1998 on the property of Cashews Australia Pty Ltd at Dimbulah, North Queensland.

#### 2.1.1 Climate

Dimbulah is located at 17° 10' south latitude, 145° 11' east longitude, has an elevation of 407 m, and experiences a tropical, monsoonal climate with a distinct wet/dry seasonal rainfall pattern. Long term mean climatic data for Dimbulah and the mean climatic data during the period of the field studies are shown in Appendix 1.

#### 2.1.2 Soil description

A soil profile near the site of the field experiment was described by Neil Enderlin, QDNR, Mareeba (pers. comm.) in 1995 as follows:

##### Classification

Principle Profile Form : Dr4.62 (Northcote 1979),

Great Soil Group : No suitable group. Affinities with Red Earths (Stace *et al.* 1968)

New Australian Classification : Halpic Mesotrophic Red Chromosol (Isbell 1996).

Soil Land Class : Dimbulah

##### Landform

Landform element type : Fan

Landform pattern type : Undulating hills 90-300m; 1-10%

Morphological Type : Mid-slope

Slope : Gently inclined (1-3%)

##### Geology

Substrate material : Colluvium derived from granite

Vegetation: Cashew plantation

##### Microrelief

Type of microrelief : Zero or none

Surface coarse fragments : No coarse fragments

Rock outcrop : No rock outcrop

Site disturbance: Cultivation, irrigated, past or present; Erosion stabilised

Condition of surface soil when dry: Firm

Wetness class: Rapidly drained, highly permeable

Profile Morphology:

Horizon	Depth	Description
A1	0-0.1 m	Very dark brown (10YR3/2) moist; no mottles; loamy sand; few (2-10%) small pebbles (2-6 mm), subangular quartz; massive; moderately moist, moderately weak; no segregations; clear to-
A2	0.1-0.25 m	Yellowish-brown (10YR5/4) moist; no mottles; loamy sand; few (2-10%) small pebbles (2-6 mm), subangular quartz; massive; moderately moist, moderately weak; no segregations; gradual to-
A3/B1	0.25-0.5 m	Strong brown (7.5YR5/6) moist; no mottles; sandy clay loam; common (10-20%) small pebbles (2-6 mm), subangular quartz; massive; moist moderately weak; no segregations; diffuse to-
B2	0.5-1.3 m	Red (2.5YR5/8) moist; no mottle; coarse sandy light clay; abundant (50-90%) small pebbles (2-6 mm), subangular quartz, few (2-10%) medium pebbles (6-20 mm), subangular quartz; massive; moist moderately weak; no segregations; diffuse to-
B3/C	1.3-1.55 m	Reddish-yellow (7.5YR6/8) moist; few (2-10%) coarse (15-30 mm) distinct yellow mottles; clay loam, coarse sandy; common (10-20%) small pebbles (2-6 mm), subangular quartz, few (2-10%) medium pebbles (6-20 mm), subangular quartz; massive;
	1.55 m +	Decomposing granite

### ***2.1.3 Physical properties of the soil at the field site***

The physical properties of samples from a soil profile adjacent to the experimental site were measured (K Bristow, CSIRO Land and Water, Townsville, pers. comm.). The data are presented in Appendix 2.

## **2.2 Chemical analyses of soil samples**

### ***2.2.1 Location, sampling dates, and fertiliser application history***

To determine the changes in soil chemical fertility over time, soil samples were collected using a 50 mm soil auger on 4 March 1996, 3 March 1997, 12 March 1998, and 8 February 1999 from some or all of the following locations:

Location 1: From within a virgin open eucalypt forest adjacent to the cashew plantation  
Sample collection method: Ten soil cores collected from random positions and divided into depth intervals (0-15 cm, 15-30 cm, 30-50 cm, 50-100 cm and 100-150 cm). Each depth interval was kept separate, air-dried, mixed thoroughly, and a sub-sample submitted for analysis.

Fertiliser history: No fertilisers were applied before or during the study.

Location 2: From unfertilised locations within the cashew plantation  
Sample collection method: Two soil cores collected per tree from the inter-row area adjacent to the same 20 fertilised cashew trees (ie Location 3 and Location 4 below) taking care to remain outside the fertiliser placement zone of the trees. At each tree, the two soil cores were divided into depth intervals (0-15 cm, 15-30 cm, 30-50 cm, 50-100 cm and 100-150 cm), and the two samples of the same depth interval were bulked, air-died, mixed thoroughly, and a sub-sample submitted for chemical analysis.

Fertiliser history: No fertilisers were applied before or during the study.

Location 3: From within the fertiliser placement zone of 10 fertigated cashew trees  
Sample collection method: Two soil cores collected per tree from inside the fertiliser

placement zone of each tree. At each tree, the two soil cores were divided into depth intervals (0-15 cm, 15-30 cm, 30-50 cm, 50-100 cm and 100-150 cm), and the two samples of the same depth interval were bulked, air-dried, mixed thoroughly, and sub-sample submitted for chemical analysis.

**Fertiliser history:** The trees received a surface dressing of an unknown mixed fertiliser soon after establishment in the field in 1992, and had received regular amounts of fertiliser (urea and KCl) via the dripper irrigation system between May and December each year from 1992 to 1996. No records are available of the total amounts of fertilisers applied over that period. During the period of the study the trees were fertigated by Cashews Australia Pty Ltd as part of their normal management; the total amounts of N and K applied during 1996, 1997 and 1998 are listed in the section *Fertiliser rates*. To correct an apparent lack of Zn, Cashews Australia Pty Ltd applied foliar sprays of 0.25% (w/v) ZnSO<sub>4</sub>·7H<sub>2</sub>O at 100 L ha<sup>-1</sup> on 16 June 1997 and 8 October 1997.

**Location 4:** From within the fertiliser placement zone of 10 surface-dressed cashew trees

**Sample collection method:** Two soil cores collected per tree from inside the fertiliser placement zone of each tree. At each tree, the two soil cores were divided into depth intervals (0-15 cm, 15-30 cm, 30-50 cm, 50-100 cm and 100-150 cm), and the two samples of the same depth interval were bulked, air-dried, mixed thoroughly, and sub-sample submitted for chemical analysis.

**Fertiliser history:** The trees received the same amounts of fertilisers by the same delivery system at the same time as those in Location 3 prior to 1996. In February 1996, the irrigation system was changed from dripper to mini-spray system. The rates of fertilisers applied by fertigation and as surface dressings in 1996, 1997 and 1998 are listed in the section *Fertiliser rates*. To correct an apparent lack of Zn, Cashews Australia Pty Ltd applied foliar sprays of 0.25% (w/v) ZnSO<sub>4</sub>·7H<sub>2</sub>O at 100 L ha<sup>-1</sup> on 16 June 1997 and 8 October 1997.

On each collection date, the soil samples were collected before the application of fresh fertilisers.

### 2.2.2 Analyses

The following chemical analyses were completed on the soil samples by the methods listed in Rayment and Higginson (1992) for:

<u>Analysis</u>	<u>Code No. in Rayment and Higginson</u>
DTPA-extractable Cu, Fe, Mn, and Zn	12A1
Electrical conductivity (1:5 soil/water extract)	3A1
pH (1:5 soil/water suspension)	4A1
pH (1:5 soil/0.01M CaCl <sub>2</sub> )	4B2
Organic carbon (Heanes wet oxidation)	6B1
Calcium phosphate-extractable total S (ICPAES)	10B3
Exchangeable bases (Na, K, Ca, Mg) and CEC by compulsive exchange measured in an extracting solution of 0.1M BaCl <sub>2</sub> /0.1M NH <sub>4</sub> Cl	15E1
Bicarbonate-extractable P (automated colour)	9B2
<u>Total N (semi-micro Kjeldahl; automated colour)</u>	<u>7A2</u>

## 2.3 Fertiliser rates

During the period of the study as part of the normal irrigation management by Cashews Australia Pty Ltd, all fertilised trees (ie locations 3 and 4) received via the irrigation water a total of 400 g N tree<sup>-1</sup> (as urea) and 80 g K tree<sup>-1</sup> (as KCl) in 1996, 150 g N tree<sup>-1</sup> (as urea) in 1997, and 300 g

N tree<sup>-1</sup> (as urea) in 1998 between May and December of each year.

The 10 trees at location (4) received additional surface dressings of the following rates of fertilisers in 1996, 1997 and 1998:

Element	Rate of application (g element tree <sup>-1</sup> )			Commercial Product
	1996	1997	1998	
P	96	120	144	Trifos
K	400	500	600	Potassium sulfate and potassium chloride
S	22.5	72	88	Trifos and gypsum
N	600	750	900	Urea
Ca	188	226	269	Trifos, gypsum and dolomite
Mg	72	84	100	Dolomite
Fe	1	1	1	Iron sulfate
B	0.5	0.5	0.5	Borax
Mn	1	1	1	Manganese sulfate
Mo	0.1	0.1	0.1	Sodium molybdate
Zn	1	1	1	Zinc sulfate
Cu	0.5	0.5	0.5	Copper sulfate

All the P and trace elements (Fe, B, Mn, Mo, Zn and Cu) were applied in March of each year as a surface dressing broadcast around the trunk of the datum tree in a 1 m wide circular band, beginning 0.5 m from the trunk, and then raked into the top 3-4 cm of the soil. The N, K, Ca, Mg and S were applied in three split applications: 30% in March of each year; 35% in June of each year; and 35% in September of each year.

## 2.4 Plantation management

Cashews Australia Pty. Ltd completed all normal plantation management operations on the trees apart from the fertiliser management. This included pruning of trees, weed control, pest and disease management, and application of irrigation during the dry season.

### 3. Results

In the following tables, individual sample location data, location means and their associated standard errors are presented. Statistical analyses of the data and associated interpretations are presented in subsequent scientific papers.

Table 1. Soil pH at given locations on selected dates.

(Location code: V = Location 1: Inside virgin open forest; OF = Location 2: Outside fertiliser placement zone near fertigated tree; IF = Location 3: Inside fertiliser placement zone of fertigated tree; OSD = Location 2: Outside fertiliser placement zone near surface dressed tree; ISD = Location 4: Inside fertiliser placement zone of surface dressed tree.).

Location code	Rep.	pH(water)					pH(CaCl <sub>2</sub> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
<b>4 March 1996</b>											
IF	1	5.88	6.18	6.17	5.97	5.39	5.04	5.03	5.09	5.20	4.51
ISD	1	6.25	6.02	6.08	5.83	5.99	4.95	4.93	4.99	5.13	5.36
V	1	6.15	6.16	6.55	5.98	6.47	5.06	5.06	5.62	5.25	5.67
IF	2	6.03	6.06	6.37	6.46	5.68	5.04	5.03	5.19	5.40	4.63
ISD	2	6.63	6.76	6.82	6.57	5.74	5.52	5.58	5.68	5.64	4.94
V	2	6.50	6.68	6.15	6.01	6.12	5.43	5.64	5.36	5.23	5.78
IF	3	7.38	6.71	6.33	5.94	6.38	5.89	5.58	4.93	4.74	5.21
ISD	3	6.66	6.86	6.67	5.97	6.45	5.26	5.38	5.37	4.79	5.49
V	3	6.49	6.50	5.73	6.23	5.96	5.39	5.41	5.47	5.32	5.52
IF	4	5.89	6.12	6.49	6.13	6.17	5.14	5.14	5.32	5.45	5.42
ISD	4	6.45	6.40	6.41	5.91	5.59	5.26	5.09	5.33	5.24	5.24
V	4	6.39	6.44	6.53	6.32	5.89	5.28	5.28	5.55	5.47	5.64
IF	5	6.06	6.65	6.99	6.94	6.49	5.37	5.63	5.80	5.96	5.96
ISD	5	6.39	6.27	6.57	6.35	6.05	5.05	4.74	5.25	5.65	5.72
V	5	6.60	6.62	6.51	6.52	5.87	5.46	5.49	5.81	5.76	5.63
IF	6	6.22	6.85	6.83	6.62	6.47	5.56	5.67	5.75	5.70	5.79
ISD	6	6.04	6.10	5.99	5.91	5.96	5.13	5.29	5.45	5.63	5.76
V	6	6.64	6.59	6.21	6.05	6.02	5.55	5.50	5.25	5.25	5.62
IF	7	6.00	6.73	6.76	6.61	5.92	5.50	5.60	5.58	5.79	5.65
ISD	7	6.42	6.78	6.56	6.45	6.40	5.19	5.49	5.42	5.68	5.74
V	7	6.57	6.55	5.37	6.56	6.14	5.52	5.44	5.26	5.70	5.51
IF	8	5.73	6.67	6.80	6.63	6.40	5.23	5.59	5.72	5.71	5.70
ISD	8	6.46	6.51	6.65	6.27	6.14	5.24	5.24	5.43	5.42	5.57
V	8	6.34	6.25	6.73	6.83	6.32	5.25	5.13	5.18	5.45	5.96
IF	9	5.92	5.90	6.23	6.09	6.20	5.22	4.84	4.94	5.23	5.46
ISD	9	6.02	6.57	6.66	6.23	6.37	5.11	5.41	5.49	5.44	5.58
V	9	6.65	6.77	6.51	6.49	5.67	5.68	5.76	5.52	5.70	5.45
IF	10	5.95	6.12	6.15	5.97	5.76	5.08	4.92	4.91	5.45	5.56
ISD	10	6.34	6.63	6.72	6.44	6.14	5.41	5.52	5.65	5.72	5.71
V	10	6.73	6.93	5.55	5.86	6.57	5.80	5.87	5.62	5.18	5.76
Treatment means											
	IF	6.11	6.40	6.51	6.34	6.09	5.31	5.30	5.32	5.46	5.39
	ISD	6.37	6.49	6.51	6.19	6.08	5.21	5.27	5.41	5.43	5.51
	V	6.51	6.55	6.18	6.29	6.10	5.44	5.46	5.46	5.43	5.65
Standard error of the means											
	IF	0.15	0.11	0.10	0.11	0.12	0.09	0.11	0.11	0.11	0.15
	ISD	0.07	0.09	0.09	0.08	0.09	0.05	0.09	0.06	0.10	0.08
	V	0.05	0.07	0.15	0.10	0.09	0.07	0.08	0.06	0.07	0.05

Location code	Rep.	pH(water)					pH(CaCl <sub>2</sub> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
<b>3 March 1997</b>											
IF	1	6.09	6.08	6.09	5.87	5.48	4.92	5.04	5.19	5.14	5.11
ISD	1	6.21	5.95	5.73	5.52	5.03	4.81	5.18	5.38	4.92	4.28
V	1	6.19	6.27	5.97	6.26	6.01	5.39	5.33	5.01	5.24	5.25
IF	2	6.30	6.30	5.98	6.06	5.52	5.19	5.04	4.91	5.12	5.01
ISD	2	6.60	6.52	5.98	5.98	5.77	5.39	5.63	5.23	5.31	4.73
V	2	5.84	5.98	6.05	5.63	5.67	4.83	4.94	4.92	4.97	5.09
IF	3	6.60	6.20	5.61	4.90	5.78	5.16	4.74	4.39	4.30	5.06
ISD	3	6.25	6.05	5.97	5.92	5.83	5.36	5.30	5.46	5.01	4.93
V	3	5.95	5.67	5.72	5.93	6.01	5.24	5.17	5.09	5.27	5.22
IF	4	6.34	6.47	6.70	6.35	5.81	5.15	5.18	5.42	5.52	5.25
ISD	4	6.16	6.18	6.05	6.31	6.68	5.00	5.14	5.46	5.69	5.91
V	4	6.12	5.78	5.71	6.08	6.31	5.37	5.04	4.67	5.02	5.28
IF	5	6.14	6.31	6.61	6.31	6.60	4.85	4.78	5.24	5.47	5.47
ISD	5	6.49	5.46	5.80	6.50	6.08	5.57	5.11	5.30	5.74	5.56
V	5	6.19	6.31	6.45	6.62	6.77	5.46	5.45	5.44	5.52	5.60
IF	6	6.50	6.76	7.06	6.56	6.16	5.37	5.61	5.88	5.72	5.63
ISD	6	6.46	6.27	6.32	6.56	6.54	5.63	5.69	5.51	5.50	5.56
V	6	6.08	5.85	5.65	5.93	6.45	4.85	4.63	4.53	4.97	5.25
IF	7	6.52	6.91	6.59	6.41	6.75	5.36	5.62	5.22	5.55	5.55
ISD	7	6.70	6.75	6.59	6.55	6.69	5.39	5.63	5.58	5.74	5.51
V	7	6.03	5.91	5.83	6.24	6.53	4.92	4.79	4.58	5.07	5.16
IF	8	5.81	5.93	6.35	6.12	5.68	4.64	4.59	5.01	5.37	5.33
ISD	8	6.12	6.08	5.19	5.31	6.51	4.83	4.71	4.61	4.35	5.26
V	8	5.86	5.67	5.79	6.41	6.85	4.69	4.40	4.56	5.24	5.27
IF	9	6.42	6.72	6.44	6.05	5.92	5.14	5.43	5.56	5.39	5.37
ISD	9	6.17	5.83	5.57	5.88	5.92	4.84	4.80	4.87	5.01	5.38
V	9	6.16	5.93	6.12	6.38	5.86	5.05	4.76	4.93	5.29	5.07
IF	10	6.01	5.85	5.13	5.50	6.76	4.87	4.69	4.50	4.59	4.88
ISD	10	6.07	6.32	6.28	5.88	5.22	4.95	5.09	5.35	5.45	5.21
V	10	5.81	5.88	5.94	6.31	6.37	4.95	4.97	4.96	5.24	6.31
Treatment means											
	IF	6.27	6.35	6.26	6.01	6.05	5.07	5.07	5.13	5.22	5.27
	ISD	6.32	6.14	5.95	6.04	6.03	5.18	5.23	5.28	5.27	5.23
	V	6.02	5.93	5.92	6.18	6.28	5.08	4.95	4.87	5.18	5.35
Standard error of the means											
	IF	0.08	0.11	0.18	0.16	0.16	0.07	0.12	0.14	0.14	0.08
	ISD	0.07	0.11	0.13	0.14	0.19	0.10	0.11	0.10	0.14	0.15
	V	0.05	0.07	0.08	0.09	0.12	0.09	0.10	0.09	0.06	0.12
<b>12 March 1998</b>											
OF	1	5.88	6.13	6.21	6.35	5.94	4.88	4.99	5.00	5.18	4.90
IF	1	6.15	6.05	5.81	5.76	6.40	4.92	4.40	4.25	4.39	4.94
OSD	1	5.81	5.45	5.34	5.68	5.53	4.88	4.95	5.05	5.11	5.12
ISD	1	6.69	6.11	5.92	5.31	5.61	5.79	4.61	4.25	4.06	4.39
V	1	5.94	5.96	6.03	6.12	6.73	5.29	4.90	5.06	5.11	5.38
OF	2	5.86	6.07	6.32	6.10	5.93	4.91	4.99	5.06	5.08	5.06
IF	2	6.50	6.64	6.82	6.42	4.84	5.47	5.53	5.58	5.34	3.99
OSD	2	5.81	5.97	6.00	6.01	6.26	3.48	4.17	4.78	5.03	5.36
ISD	2	6.68	6.21	5.81	5.37	5.57	5.82	4.77	4.22	4.09	4.40
V	2	5.70	6.08	6.08	6.15	6.81	4.64	4.96	4.99	5.00	5.36
OF	3	5.84	5.85	6.19	6.06	6.08	4.87	4.69	4.95	5.09	5.05
IF	3	5.92	5.80	4.27	4.18	4.75	4.72	4.63	3.90	3.94	4.37
OSD	3	5.96	5.91	6.13	6.04	6.23	4.99	4.89	5.10	5.09	5.30

Location code	Rep.	pH(water)					pH(CaCl <sub>2</sub> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
ISD	3	6.76	6.26	5.96	5.41	5.75	5.79	4.85	4.24	4.10	4.60
V	3	6.01	6.18	5.93	6.35	7.16	4.92	5.00	4.72	5.23	6.10
OF	4	6.41	6.04	6.40	6.11	5.91	5.38	4.98	5.20	5.16	5.15
IF	4	5.93	5.88	4.22	4.15	4.88	4.84	4.69	3.90	3.92	4.46
OSD	4	6.88	7.14	6.14	6.06	6.08	5.81	6.10	5.15	5.12	5.28
ISD	4	6.62	6.35	6.00	5.36	5.26	5.66	4.97	4.40	4.11	4.41
V	4	5.89	6.17	5.90	6.55	6.75	4.89	5.72	4.74	5.26	5.36
OF	5	6.59	6.08	6.43	6.21	6.03	5.46	4.98	5.19	5.25	5.17
IF	5	5.78	5.01	4.22	4.11	4.73	4.82	4.38	3.86	3.89	4.36
OSD	5	6.61	6.51	6.90	6.48	6.48	5.37	5.26	5.41	5.40	5.50
ISD	5	7.79	7.06	6.09	5.43	5.23	6.95	5.58	4.62	4.24	4.32
V	5	6.38	6.56	6.74	6.57	6.81	5.21	5.34	4.40	3.52	4.76
OF	6	5.93	5.90	6.33	6.18	6.16	4.96	4.92	5.44	5.51	5.54
IF	6	5.09	6.20	4.25	4.26	4.93	4.50	4.94	3.88	3.95	4.41
OSD	6	6.49	6.34	6.48	6.53	6.35	5.33	5.28	5.36	5.79	5.76
ISD	6	7.71	6.71	6.01	5.31	5.12	7.03	5.71	4.56	4.06	4.07
V	6	6.27	6.41	6.37	6.50	6.70	4.98	5.16	5.20	5.27	5.43
OF	7	5.94	5.97	6.34	6.33	6.10	5.02	5.08	5.41	5.53	5.29
IF	7	5.21	4.56	4.34	4.25	4.93	4.65	4.07	3.93	3.96	4.39
OSD	7	6.01	6.13	6.52	6.64	6.07	5.05	5.36	5.46	5.69	5.70
ISD	7	7.76	6.66	5.99	5.39	4.98	7.02	5.82	4.55	4.08	4.04
V	7	6.38	6.46	6.58	7.42	6.87	5.31	5.37	5.59	5.42	5.54
OF	8	5.94	6.21	6.14	6.15	6.36	4.89	5.23	5.22	5.32	5.49
IF	8	5.66	5.56	6.25	5.24	5.12	4.93	4.78	5.06	4.13	4.15
OSD	8	6.39	6.53	6.49	6.57	6.62	5.34	5.33	5.37	5.43	5.61
ISD	8	8.55	6.98	6.32	5.40	5.23	7.56	6.37	4.82	4.19	4.30
V	8	6.33	6.72	6.55	6.82	6.88	5.34	5.64	5.50	5.69	5.66
OF	9	6.19	6.41	6.33	5.88	6.46	5.23	5.20	5.16	4.99	5.48
IF	9	5.56	5.89	5.65	6.33	4.84	4.71	4.92	4.80	4.70	4.07
OSD	9	5.81	6.19	6.23	6.22	6.43	4.82	5.19	5.08	5.06	5.54
ISD	9	6.98	6.70	6.85	6.01	5.52	6.34	6.16	5.82	4.54	4.36
V	9	6.54	6.62	6.62	6.61	6.44	5.56	5.58	5.51	5.48	5.40
OF	10	5.87	6.20	6.42	6.27	6.16	4.89	5.11	5.33	5.52	5.63
IF	10	4.99	5.79	5.65	5.38	6.22	4.39	4.78	4.58	4.41	5.21
OSD	10	6.14	6.34	6.55	6.12	5.69	5.13	5.22	5.47	5.71	5.74
ISD	10	8.26	6.96	6.60	5.94	5.54	7.37	6.33	5.20	4.45	4.33
V	10	6.26	6.60	6.60	6.74	6.59	5.25	5.61	5.60	5.62	5.57
Treatment means											
OF		6.05	6.09	6.31	6.16	6.11	5.05	5.02	5.20	5.26	5.28
IF		5.68	5.74	5.15	5.01	5.16	4.80	4.71	4.37	4.26	4.44
OSD		6.19	6.25	6.28	6.24	6.17	5.02	5.18	5.22	5.34	5.49
ISD		7.38	6.60	6.16	5.49	5.38	6.53	5.52	4.67	4.19	4.32
V		6.17	6.38	6.34	6.58	6.77	5.14	5.33	5.13	5.16	5.46
Standard error of the means											
OF		0.08	0.05	0.03	0.04	0.06	0.07	0.05	0.05	0.06	0.08
IF		0.15	0.19	0.31	0.30	0.19	0.09	0.12	0.19	0.15	0.12
OSD		0.12	0.14	0.13	0.10	0.11	0.19	0.15	0.07	0.09	0.07
ISD		0.23	0.11	0.11	0.08	0.08	0.23	0.21	0.16	0.05	0.05
V		0.08	0.08	0.10	0.12	0.06	0.09	0.10	0.13	0.19	0.10
<b>8 February 1999</b>											
IF	1	5.98	5.32	5.48	5.96	5.94	4.64	4.37	4.45	4.86	4.88
ISD	1	7.68	5.47	5.44	5.02	5.32	6.76	4.43	4.18	4.17	4.71
V	1	6.38	6.16	5.91	6.46	6.38	5.70	5.26	5.04	5.32	5.50
IF	2	6.19	5.58	5.44	5.43	5.64	5.24	4.43	4.49	4.21	4.41

Location code	Rep.	pH(water)					pH(CaCl <sub>2</sub> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
ISD	2	6.78	5.80	5.58	5.35	5.25	6.02	4.91	4.30	4.10	4.32
V	2	6.15	5.99	6.05	5.84	5.68	5.03	5.05	4.98	4.79	4.88
IF	3	5.82	5.53	5.53	5.09	4.78	4.81	4.34	4.49	4.38	4.20
ISD	3	6.06	5.71	5.94	5.52	5.30	5.12	4.54	4.39	4.21	4.36
V	3	6.23	6.13	6.32	6.09	6.39	5.20	5.24	5.25	4.91	5.28
IF	4	5.79	5.81	5.59	4.88	5.54	4.80	4.77	4.64	4.05	4.37
ISD	4	6.83	6.13	5.53	5.18	5.77	6.21	5.25	4.35	4.14	5.20
V	4	6.19	6.07	6.07	6.22	6.48	5.36	5.19	4.95	5.09	5.43
IF	5	6.44	6.20	6.18	5.89	5.63	5.63	5.18	4.98	4.35	4.52
ISD	5	6.66	5.17	4.94	6.66	6.94	5.86	3.92	4.09	5.62	5.90
V	5	6.26	5.97	6.27	6.44	6.60	5.28	4.82	5.17	5.54	5.56
IF	6	6.41	6.09	6.04	5.13	5.20	5.65	5.23	5.08	4.20	4.21
ISD	6	7.76	6.64	6.11	5.11	4.94	6.80	5.86	4.64	4.11	4.32
V	6	6.33	6.21	6.40	6.14	6.43	5.56	5.38	5.46	5.41	5.28
IF	7	6.21	6.04	5.58	4.44	5.06	5.39	4.94	4.25	3.99	4.24
ISD	7	7.18	5.79	5.26	5.04	5.33	6.60	4.35	4.27	4.45	5.13
V	7	6.11	6.30	6.62	6.39	6.57	5.43	5.45	5.64	5.58	5.57
IF	8	6.15	6.03	5.74	4.77	4.69	5.40	4.91	4.41	4.03	4.07
ISD	8	6.92	5.35	5.32	4.85	5.78	6.30	4.10	4.07	4.01	5.06
V	8	6.21	6.17	6.42	6.35	6.61	5.43	5.19	5.27	5.29	5.44
IF	9	5.75	5.69	6.02	5.50	5.00	4.84	4.52	4.87	4.32	4.10
ISD	9	7.52	6.05	5.73	4.92	6.06	6.80	5.02	4.61	4.14	5.37
V	9	6.14	6.25	6.24	6.25	6.39	5.35	5.27	5.31	5.11	5.40
IF	10	5.86	6.06	5.34	5.58	5.82	4.71	4.48	4.61	4.88	5.20
ISD	10	8.08	6.83	6.26	4.98	5.44	7.05	6.15	5.04	4.11	4.84
V	10	6.26	6.02	6.11	6.01	6.29	5.58	5.01	5.12	5.20	5.40
Treatment means											
IF		6.06	5.84	5.69	5.27	5.33	5.11	4.72	4.63	4.33	4.42
ISD		7.15	5.89	5.61	5.26	5.61	6.35	4.85	4.39	4.31	4.92
V		6.23	6.13	6.24	6.22	6.38	5.39	5.19	5.22	5.22	5.37
Standard error of the means											
IF		0.08	0.09	0.09	0.16	0.14	0.12	0.11	0.08	0.10	0.11
ISD		0.19	0.17	0.13	0.17	0.18	0.18	0.23	0.09	0.15	0.16
V		0.03	0.04	0.07	0.06	0.08	0.06	0.06	0.07	0.08	0.06

Table 2. Electrical Conductivity (EC) and Bicarbonate-extractable P (Bicarb-P) at given locations on selected dates.

(Location code: V = Location 1: Inside virgin open forest; OF = Location 2: Outside fertiliser placement zone near fertigated tree; IF = Location 3: Inside fertiliser placement zone of fertigated tree; OSD = Location 2: Outside fertiliser placement zone near surface dressed tree; ISD = Location 4: Inside fertiliser placement zone of surface dressed tree.).

Location code	Rep.	EC (mS cm <sup>-1</sup> )					Biacrb-P (mg kg <sup>-1</sup> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
<b>4 March 1996</b>											
IF	1	0.08	0.03	0.01	0.01	0.03	7.0	7.0	5.0	5.0	3.0
ISD	1	0.01	0.01	0.01	0.02	0.01	6.0	1.0	2.0	1.0	4.0
V	1	0.01	0.01	0.01	0.01	0.02	0.5	1.0	2.0	0.5	2.0
IF	2	0.04	0.03	0.01	0.01	0.01	3.0	6.0	2.0	3.0	4.0
ISD	2	0.01	0.01	0.01	0.01	0.02	3.0	8.0	2.0	3.0	3.0
V	2	0.01	0.01	0.01	0.02	0.01	4.0	3.0	0.5	3.0	2.0
IF	3	0.11	0.04	0.01	0.01	0.02	5.0	4.0	3.0	2.0	1.0
ISD	3	0.02	0.01	0.01	0.01	0.02	6.0	7.0	6.0	2.0	2.0
V	3	0.01	0.01	0.01	0.01	0.01	2.0	3.0	0.5	3.0	0.5
IF	4	0.01	0.03	0.02	0.03	0.03	5.0	2.0	5.0	3.0	7.0
ISD	4	0.01	0.01	0.01	0.02	0.03	3.0	1.0	9.0	4.0	5.0
V	4	0.01	0.01	0.01	0.01	0.02	3.0	4.0	2.0	2.0	3.0
IF	5	0.01	0.03	0.02	0.02	0.03	5.0	5.0	2.0	3.0	3.0
ISD	5	0.03	0.02	0.02	0.02	0.05	7.0	2.0	5.0	5.0	5.0
V	5	0.01	0.01	0.01	0.01	0.01	2.0	4.0	3.0	2.0	3.0
IF	6	0.01	0.02	0.02	0.01	0.02	2.0	3.0	2.0	0.5	0.5
ISD	6	0.02	0.01	0.01	0.01	0.02	2.0	3.0	2.0	2.0	2.0
V	6	0.01	0.01	0.01	0.02	0.01	4.0	5.0	2.0	0.5	2.0
IF	7	0.02	0.04	0.02	0.02	0.02	3.0	5.0	2.0	0.5	0.5
ISD	7	0.02	0.02	0.02	0.04	0.05	6.0	1.0	2.0	0.5	1.0
V	7	0.01	0.01	0.01	0.01	0.03	3.0	2.0	3.0	0.5	0.5
IF	8	0.02	0.03	0.02	0.02	0.02	5.0	6.0	2.0	5.0	3.0
ISD	8	0.02	0.01	0.01	0.01	0.02	2.0	2.0	6.0	1.0	3.0
V	8	0.03	0.01	0.02	0.01	0.01	4.0	2.0	0.5	3.0	0.5
IF	9	0.01	0.05	0.02	0.02	0.03	2.0	6.0	0.5	2.0	4.0
ISD	9	0.04	0.02	0.01	0.01	0.01	2.0	1.0	1.0	2.0	2.0
V	9	0.03	0.01	0.02	0.02	0.01	5.0	1.0	0.5	2.0	2.0
IF	10	0.01	0.05	0.02	0.04	0.08	4.0	6.0	2.0	4.0	2.0
ISD	10	0.03	0.02	0.01	0.01	0.02	2.0	1.0	1.0	1.0	2.0
V	10	0.02	0.01	0.02	0.01	0.02	5.0	3.0	2.0	2.0	0.5
Treatment means											
IF		0.032	0.035	0.017	0.019	0.029	4.1	5.0	2.6	2.8	2.8
ISD		0.021	0.014	0.012	0.016	0.025	3.9	2.7	3.6	2.2	2.9
V		0.015	0.010	0.013	0.013	0.015	3.3	2.8	1.6	1.9	1.6
Standard error of the means											
IF		0.011	0.003	0.002	0.003	0.006	0.5	0.5	0.5	0.5	0.6
ISD		0.003	0.002	0.001	0.003	0.005	0.7	0.8	0.9	0.5	0.4
V		0.003	0.000	0.002	0.002	0.002	0.5	0.4	0.3	0.3	0.3
<b>3 March 1997</b>											
IF	1	0.02	0.03	0.03	0.03	0.06	4.0	3.0	2.0	2.0	3.0
ISD	1	0.02	0.06	0.08	0.02	0.03	8.0	8.0	10.0	2.0	2.0
V	1	0.02	0.02	0.02	0.02	0.02	3.0	2.0	0.5	2.0	0.5
IF	2	0.02	0.02	0.02	0.02	0.04	4.0	1.0	2.0	2.0	2.0
ISD	2	0.02	0.02	0.05	0.02	0.01	9.0	12.0	7.0	2.0	3.0
V	2	0.02	0.10	0.02	0.02	0.01	2.0	1.0	2.0	2.0	2.0

Location code	Rep.	EC (mS cm <sup>-1</sup> )					Biacrb-P (mg kg <sup>-1</sup> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
IF	3	0.02	0.01	0.01	0.04	0.03	3.0	2.0	3.0	1.0	0.5
ISD	3	0.03	0.04	0.06	0.02	0.03	35.0	4.0	14.0	3.0	2.0
V	3	0.03	0.02	0.02	0.01	0.01	2.0	2.0	3.0	2.0	2.0
IF	4	0.02	0.02	0.02	0.03	0.03	1.0	2.0	2.0	1.0	3.0
ISD	4	0.03	0.02	0.04	0.04	0.02	12.0	13.0	11.0	2.0	2.0
V	4	0.02	0.01	0.01	0.01	0.01	2.0	3.0	2.0	2.0	3.0
IF	5	0.02	0.02	0.03	0.03	0.01	4.0	2.0	2.0	2.0	0.5
ISD	5	0.04	0.16	0.07	0.05	0.04	27.0	13.0	21.0	2.0	3.0
V	5	0.01	0.01	0.01	0.01	0.01	2.0	2.0	2.0	1.0	2.0
IF	6	0.02	0.02	0.02	0.02	0.02	4.0	2.0	2.0	2.0	3.0
ISD	6	0.04	0.10	0.07	0.02	0.02	26.0	12.0	13.0	4.0	7.0
V	6	0.01	0.01	0.01	0.01	0.01	3.0	1.0	0.5	1.0	0.5
IF	7	0.02	0.02	0.03	0.02	0.01	3.0	2.0	3.0	2.0	2.0
ISD	7	0.03	0.03	0.03	0.03	0.01	20.0	13.0	14.0	3.0	2.0
V	7	0.01	0.01	0.01	0.01	0.01	0.5	1.0	0.5	1.0	0.5
IF	8	0.01	0.01	0.02	0.03	0.03	2.0	1.0	0.5	2.0	0.5
ISD	8	0.02	0.02	0.07	0.03	0.01	7.0	12.0	5.0	2.0	2.0
V	8	0.01	0.01	0.01	0.01	0.01	2.0	3.0	2.0	2.0	2.0
IF	9	0.02	0.02	0.02	0.03	0.03	0.5	1.0	0.5	2.0	2.0
ISD	9	0.03	0.04	0.06	0.02	0.02	21.0	13.0	6.0	2.0	0.5
V	9	0.01	0.01	0.01	0.01	0.01	3.0	2.0	2.0	1.0	0.5
IF	10	0.02	0.02	0.03	0.04	0.01	2.0	1.0	0.5	2.0	2.0
ISD	10	0.03	0.03	0.06	0.05	0.10	31.0	5.0	4.0	2.0	3.0
V	10	0.01	0.02	0.02	0.01	0.01	1.0	1.0	0.5	1.0	0.5
Treatment means											
IF		0.019	0.019	0.023	0.029	0.027	2.8	1.7	1.8	1.8	1.9
ISD		0.029	0.052	0.059	0.030	0.029	19.6	10.5	10.5	2.4	2.7
V		0.015	0.022	0.014	0.012	0.011	2.1	1.8	1.5	1.5	1.4
Standard error of the means											
IF		0.001	0.002	0.002	0.002	0.005	0.4	0.2	0.3	0.1	0.3
ISD		0.002	0.014	0.005	0.004	0.008	3.2	1.1	1.7	0.2	0.5
V		0.002	0.009	0.002	0.001	0.001	0.3	0.2	0.3	0.2	0.3
<b>12 March 1998</b>											
OF	1	0.02	0.01	0.01	0.01	0.01	2.0	0.5	0.5	0.5	0.5
IF	1	0.02	0.02	0.02	0.03	0.02	0.5	1.0	0.5	0.5	0.5
OSD	1	0.02	0.02	0.02	0.01	0.02	0.5	0.5	0.5	1.0	0.5
ISD	1	0.03	0.02	0.02	0.03	0.03	21.0	17.0	21.0	3.0	2.0
V	1	0.02	0.01	0.01	0.01	0.01	2.0	1.0	2.0	0.5	0.5
OF	2	0.02	0.01	0.01	0.01	0.01	0.5	2.0	0.5	0.5	0.5
IF	2	0.02	0.02	0.02	0.02	0.04	4.0	2.0	2.0	3.0	2.0
OSD	2	0.02	0.01	0.01	0.01	0.01	1.0	1.0	1.0	0.5	0.5
ISD	2	0.02	0.02	0.02	0.03	0.03	21.0	23.0	18.0	2.0	1.0
V	2	0.02	0.01	0.01	0.01	0.01	2.0	3.0	1.0	0.5	2.0
OF	3	0.02	0.02	0.01	0.01	0.01	2.0	0.5	1.0	0.5	0.5
IF	3	0.02	0.02	0.11	0.14	0.08	2.0	1.0	1.0	0.5	0.5
OSD	3	0.02	0.01	0.01	0.01	0.01	0.5	0.5	0.5	0.5	1.0
ISD	3	0.02	0.03	0.02	0.03	0.02	20.0	16.0	19.0	5.0	1.0
V	3	0.01	0.01	0.01	0.01	0.02	2.0	1.0	0.5	0.5	0.5
OF	4	0.03	0.01	0.01	0.01	0.02	3.0	1.0	0.5	0.5	0.5
IF	4	0.02	0.02	0.12	0.14	0.08	2.0	3.0	2.0	0.5	0.5
OSD	4	0.02	0.02	0.01	0.01	0.01	1.0	1.0	0.5	0.5	0.5
ISD	4	0.02	0.03	0.02	0.02	0.03	41.0	21.0	31.0	3.0	5.0
V	4	0.02	0.02	0.01	0.01	0.01	0.5	1.0	0.5	0.5	0.5
OF	5	0.02	0.02	0.01	0.01	0.01	2.0	0.5	0.5	1.0	0.5

Location code	Rep.	EC (mS cm <sup>-1</sup> )					Biacrb-P (mg kg <sup>-1</sup> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
IF	5	0.03	0.07	0.12	0.15	0.08	4.0	2.0	0.5	0.5	2.0
OSD	5	0.02	0.01	0.01	0.01	0.01	0.5	1.0	0.5	0.5	0.5
ISD	5	0.05	0.03	0.03	0.02	0.03	19.0	29.0	42.0	6.0	4.0
V	5	0.01	0.01	0.01	0.01	0.01	2.0	1.0	0.5	0.5	0.5
OF	6	0.02	0.02	0.02	0.03	0.02	0.5	0.5	0.5	0.5	0.5
IF	6	0.11	0.05	0.11	0.10	0.05	3.0	1.0	0.5	2.0	0.5
OSD	6	0.02	0.01	0.01	0.01	0.02	0.5	0.5	0.5	1.0	0.5
ISD	6	0.09	0.04	0.02	0.02	0.03	57.0	28.0	31.0	4.0	2.0
V	6	0.01	0.01	0.01	0.01	0.01	0.5	1.0	0.5	0.5	2.0
OF	7	0.02	0.02	0.02	0.02	0.03	1.0	0.5	0.5	0.5	1.0
IF	7	0.12	0.06	0.10	0.10	0.05	6.0	1.0	0.5	0.5	0.5
OSD	7	0.02	0.01	0.01	0.02	0.02	1.0	0.5	1.0	0.5	0.5
ISD	7	0.09	0.04	0.02	0.02	0.03	47.0	23.0	33.0	3.0	2.0
V	7	0.01	0.01	0.02	0.06	0.01	0.5	1.0	0.5	2.0	0.5
OF	8	0.02	0.03	0.02	0.02	0.02	0.5	1.0	1.0	0.5	0.5
IF	8	0.08	0.07	0.05	0.05	0.06	0.5	1.0	0.5	3.0	0.5
OSD	8	0.02	0.01	0.01	0.01	0.01	0.5	1.0	0.5	0.5	0.5
ISD	8	0.13	0.06	0.02	0.03	0.05	28.0	12.0	10.0	4.0	3.0
V	8	0.02	0.01	0.01	0.01	0.01	2.0	2.0	0.5	0.5	1.0
OF	9	0.03	0.02	0.02	0.02	0.01	1.0	1.0	0.5	1.0	0.5
IF	9	0.08	0.06	0.05	0.03	0.04	2.0	1.4	3.0	5.0	2.0
OSD	9	0.02	0.01	0.01	0.01	0.01	0.5	0.5	0.5	0.5	0.5
ISD	9	0.08	0.04	0.03	0.02	0.05	54.0	34.0	10.0	7.0	5.0
V	9	0.02	0.02	0.01	0.01	0.01	2.0	1.0	0.5	0.5	0.5
OF	10	0.02	0.01	0.02	0.02	0.02	1.0	0.5	1.0	0.5	0.5
IF	10	0.08	0.03	0.03	0.04	0.03	3.0	2.0	0.5	2.0	0.5
OSD	10	0.01	0.01	0.01	0.02	0.02	1.0	0.5	1.0	0.5	0.5
ISD	10	0.13	0.05	0.02	0.02	0.04	19.0	10.0	8.0	4.0	3.0
V	10	0.01	0.01	0.01	0.01	0.01	0.5	1.0	0.5	2.0	2.0
<b>Treatment means</b>											
OF		0.022	0.017	0.015	0.016	0.016	1.4	0.8	0.7	0.6	0.6
IF		0.058	0.042	0.073	0.080	0.053	2.7	1.5	1.1	1.8	1.0
OSD		0.019	0.012	0.011	0.012	0.014	0.7	0.7	0.7	0.6	0.6
ISD		0.066	0.036	0.022	0.024	0.034	32.7	21.3	22.3	4.1	2.8
V		0.015	0.012	0.011	0.015	0.011	1.4	1.3	0.7	0.8	1.0
<b>Standard error of the means</b>											
OF		0.001	0.002	0.002	0.002	0.002	0.3	0.2	0.1	0.1	0.1
IF		0.013	0.007	0.014	0.016	0.007	0.5	0.2	0.3	0.5	0.2
OSD		0.001	0.001	0.001	0.001	0.002	0.1	0.1	0.1	0.1	0.1
ISD		0.014	0.004	0.001	0.002	0.003	4.9	2.4	3.6	0.5	0.5
V		0.002	0.001	0.001	0.005	0.001	0.2	0.2	0.2	0.2	0.2
<b>8 February 1999</b>											
IF	1	0.01	0.02	0.02	0.05	0.04	0.5	0.5	0.5	0.5	0.5
ISD	1	0.09	0.02	0.04	0.05	0.08	23.0	31.0	11.0	1.0	2.0
V	1	0.01	0.01	0.01	0.01	0.01	0.5	0.5	0.5	0.5	2.0
IF	2	0.02	0.02	0.02	0.02	0.02	9.0	2.0	3.0	0.5	2.0
ISD	2	0.04	0.02	0.02	0.02	0.04	27.0	9.0	24.0	3.0	2.0
V	2	0.01	0.01	0.01	0.01	0.01	4.0	0.5	0.5	0.5	0.5
IF	3	0.01	0.01	0.02	0.02	0.03	0.5	0.5	0.5	0.5	1.0
ISD	3	0.02	0.02	0.02	0.02	0.03	28.0	38.0	18.0	6.0	3.0
V	3	0.01	0.01	0.01	0.01	0.01	0.5	0.5	0.5	0.5	0.5
IF	4	0.02	0.02	0.03	0.04	0.03	0.5	5.0	9.0	1.0	1.0
ISD	4	0.04	0.03	0.03	0.04	0.04	31.0	20.0	27.0	7.0	4.0
V	4	0.02	0.01	0.01	0.01	0.01	0.5	1.0	0.5	0.5	0.5

Location code	Rep.	EC (mS cm <sup>-1</sup> )					Biacrb-P (mg kg <sup>-1</sup> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
IF	5	0.02	0.02	0.02	0.03	0.03	0.5	0.5	1.0	1.0	0.5
ISD	5	0.03	0.03	0.06	0.10	0.15	35.0	76.0	62.0	3.0	4.0
V	5	0.01	0.01	0.01	0.01	0.01	0.5	1.0	1.0	0.5	0.5
IF	6	0.02	0.02	0.02	0.03	0.03	0.5	5.0	7.0	1.0	0.5
ISD	6	0.06	0.02	0.02	0.04	0.04	50.0	14.0	23.0	6.0	2.0
V	6	0.01	0.01	0.01	0.01	0.01	0.5	0.5	0.5	0.5	0.5
IF	7	0.03	0.01	0.02	0.03	0.02	0.5	9.0	2.0	1.0	1.0
ISD	7	0.04	0.03	0.04	0.05	0.06	55.0	24.0	11.0	8.0	2.0
V	7	0.02	0.01	0.01	0.01	0.01	0.5	0.5	0.5	0.5	0.5
IF	8	0.02	0.02	0.02	0.03	0.04	1.0	0.5	0.5	0.5	2.0
ISD	8	0.03	0.02	0.02	0.04	0.04	18.0	13.0	13.0	1.0	3.0
V	8	0.01	0.01	0.01	0.01	0.01	1.0	1.0	0.5	1.0	2.0
IF	9	0.01	0.02	0.02	0.02	0.03	6.0	6.0	5.0	1.0	0.5
ISD	9	0.05	0.02	0.03	0.05	0.06	73.0	32.0	45.0	13.0	7.0
V	9	0.01	0.01	0.01	0.01	0.01	3.0	1.0	0.5	0.5	0.5
IF	10	0.02	0.01	0.03	0.03	0.03	1.0	1.0	0.5	0.5	0.5
ISD	10	0.05	0.02	0.02	0.04	0.04	26.0	12.0	26.0	17.0	3.0
V	10	0.01	0.02	0.01	0.01	0.01	2.0	1.0	0.5	0.5	0.5
Treatment means											
IF		0.018	0.017	0.022	0.030	0.030	2.0	3.0	2.9	0.8	1.0
ISD		0.045	0.023	0.030	0.045	0.058	36.6	26.9	26.0	6.5	3.2
V		0.012	0.011	0.010	0.010	0.010	1.3	0.8	0.6	0.6	0.8
Standard error of the means											
IF		0.002	0.002	0.001	0.003	0.002	0.9	1.0	1.0	0.1	0.2
ISD		0.006	0.002	0.004	0.007	0.011	5.5	6.3	5.1	1.6	0.5
V		0.001	0.001	0.000	0.000	0.000	0.4	0.1	0.1	0.1	0.2

Table 3. Exchangeable Na and K at given locations on selected dates.

Location code: V = Location 1: Inside virgin open forest; OF = Location 2: Outside fertiliser placement zone near fertigated tree; IF = Location 3: Inside fertiliser placement zone of fertigated tree; OSD = Location 2: Outside fertiliser placement zone near surface dressed tree; ISD = Location 4: Inside fertiliser placement zone of surface dressed tree.).

Location code	Rep.	Exchangeable Na (cmol (+) kg <sup>-1</sup> )					Exchangeable K (cmol (+) kg <sup>-1</sup> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
<b>4 March 1996</b>											
IF	1	0.03	0.04	0.03	0.02	0.03	0.14	0.12	0.06	0.08	0.22
ISD	1	0.01	0.02	0.03	0.02	0.02	0.14	0.11	0.07	0.10	0.19
V	1	0.01	0.01	0.01	0.02	0.02	0.14	0.05	0.09	0.06	0.09
IF	2	0.04	0.06	0.04	0.03	0.02	0.09	0.04	0.06	0.07	0.14
ISD	2	0.01	0.03	0.03	0.02	0.01	0.11	0.05	0.04	0.10	0.21
V	2	0.03	0.01	0.01	0.01	0.01	0.16	0.06	0.06	0.07	0.18
IF	3	0.02	0.05	0.03	0.02	0.06	0.21	0.12	0.07	0.06	0.13
ISD	3	0.04	0.05	0.05	0.03	0.04	0.23	0.22	0.10	0.07	0.13
V	3	0.02	0.01	0.01	0.01	0.03	0.16	0.06	0.05	0.09	0.12
IF	4	0.02	0.04	0.06	0.06	0.09	0.29	0.18	0.11	0.12	0.09
ISD	4	0.02	0.05	0.04	0.10	0.11	0.12	0.05	0.05	0.10	0.18
V	4	0.03	0.01	0.01	0.02	0.02	0.14	0.06	0.06	0.10	0.11
IF	5	0.02	0.04	0.09	0.08	0.12	0.16	0.10	0.20	0.17	0.12
ISD	5	0.08	0.09	0.06	0.10	0.05	0.22	0.32	0.29	0.14	0.15
V	5	0.02	0.00	0.02	0.03	0.03	0.16	0.04	0.09	0.01	0.08
IF	6	0.01	0.01	0.02	0.03	0.09	0.27	0.26	0.17	0.13	0.13
ISD	6	0.02	0.03	0.04	0.03	0.02	0.17	0.11	0.08	0.12	0.17
V	6	0.02	0.01	0.02	0.01	0.01	0.11	0.10	0.08	0.09	0.15
IF	7	0.06	0.08	0.06	0.07	0.05	0.13	0.16	0.14	0.24	0.20
ISD	7	0.03	0.03	0.04	0.04	0.05	0.22	0.18	0.17	0.19	0.18
V	7	0.03	0.02	0.03	0.02	0.02	0.17	0.11	0.06	0.08	0.14
IF	8	0.02	0.02	0.04	0.04	0.02	0.28	0.13	0.13	0.15	0.15
ISD	8	0.01	0.03	0.03	0.02	0.02	0.13	0.15	0.11	0.10	0.17
V	8	0.02	0.02	0.03	0.03	0.03	0.11	0.12	0.08	0.11	0.13
IF	9	0.03	0.06	0.05	0.06	0.13	0.16	0.32	0.30	0.16	0.25
ISD	9	0.04	0.05	0.05	0.04	0.05	0.10	0.11	0.07	0.12	0.14
V	9	0.02	0.01	0.03	0.02	0.01	0.12	0.09	0.07	0.05	0.16
IF	10	0.03	0.02	0.00	0.01	0.06	0.16	0.51	0.46	0.18	0.22
ISD	10	0.03	0.03	0.05	0.03	0.02	0.12	0.10	0.06	0.15	0.22
V	10	0.01	0.01	0.04	0.03	0.01	0.10	0.13	0.09	0.06	0.56
Treatment means											
IF		0.030	0.042	0.041	0.041	0.067	0.189	0.194	0.170	0.136	0.165
ISD		0.029	0.040	0.041	0.042	0.039	0.156	0.139	0.104	0.121	0.174
V		0.021	0.011	0.021	0.020	0.020	0.137	0.082	0.073	0.072	0.172
Standard error of the means											
IF		0.005	0.007	0.008	0.008	0.012	0.022	0.043	0.039	0.018	0.017
ISD		0.007	0.006	0.003	0.009	0.010	0.016	0.026	0.024	0.011	0.009
V		0.003	0.002	0.004	0.003	0.003	0.008	0.010	0.005	0.009	0.044
<b>3 March 1997</b>											
IF	1	0.04	0.07	0.04	0.06	0.11	0.10	0.07	0.13	0.11	0.16
ISD	1	0.03	0.07	0.07	0.03	0.04	0.30	0.22	0.07	0.11	0.21
V	1	0.04	0.03	0.04	0.04	0.04	0.10	0.10	0.13	0.10	0.10
IF	2	0.03	0.05	0.04	0.04	0.05	0.05	0.06	0.05	0.07	0.14
ISD	2	0.02	0.03	0.05	0.05	0.02	0.19	0.10	0.08	0.10	0.16
V	2	0.03	0.03	0.04	0.04	0.04	0.08	0.06	0.07	0.10	0.11
IF	3	0.01	0.01	0.02	0.04	0.03	0.20	0.11	0.08	0.11	0.08

Location code	Rep.	Exchangeable Na (cmol (+) kg <sup>-1</sup> )					Exchangeable K (cmol (+) kg <sup>-1</sup> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
ISD	3	0.02	0.02	0.02	0.03	0.05	0.18	0.16	0.11	0.11	0.12
V	3	0.02	0.04	0.04	0.04	0.04	0.07	0.08	0.08	0.08	0.09
IF	4	0.02	0.05	0.05	0.07	0.11	0.08	0.07	0.11	0.14	0.16
ISD	4	0.03	0.02	0.03	0.05	0.09	0.25	0.15	0.09	0.24	0.14
V	4	0.01	0.03	0.04	0.04	0.04	0.07	0.08	0.09	0.09	0.13
IF	5	0.05	0.11	0.09	0.09	0.04	0.15	0.21	0.39	0.14	0.12
ISD	5	0.02	0.07	0.10	0.14	0.08	0.29	0.25	0.24	0.30	0.20
V	5	0.02	0.02	0.02	0.03	0.03	0.06	0.05	0.06	0.09	0.16
IF	6	0.03	0.03	0.05	0.04	0.03	0.13	0.11	0.10	0.12	0.15
ISD	6	0.02	0.04	0.05	0.03	0.07	0.22	0.32	0.43	0.18	0.18
V	6	0.01	0.01	0.02	0.02	0.10	0.09	0.08	0.07	0.10	0.15
IF	7	0.06	0.07	0.05	0.07	0.04	0.12	0.12	0.18	0.21	0.16
ISD	7	0.02	0.03	0.05	0.09	0.03	0.30	0.22	0.16	0.23	0.09
V	7	0.01	0.02	0.02	0.03	0.10	0.06	0.07	0.06	0.11	0.14
IF	8	0.02	0.02	0.04	0.07	0.05	0.09	0.11	0.25	0.13	0.14
ISD	8	0.03	0.05	0.07	0.04	0.04	0.10	0.15	0.18	0.17	0.12
V	8	0.02	0.02	0.01	0.04	0.12	0.07	0.07	0.07	0.11	0.14
IF	9	0.03	0.03	0.02	0.11	0.11	0.18	0.23	0.06	0.12	0.16
ISD	9	0.02	0.04	0.04	0.02	0.03	0.20	0.20	0.22	0.16	0.16
V	9	0.02	0.02	0.02	0.02	0.02	0.08	0.06	0.06	0.08	0.07
IF	10	0.02	0.04	0.09	0.08	0.04	0.07	0.07	0.09	0.15	0.14
ISD	10	0.02	0.04	0.04	0.05	0.13	0.21	0.26	0.39	0.31	0.16
V	10	0.02	0.02	0.04	0.03	0.03	0.06	0.07	0.10	0.08	0.08
Treatment means											
IF		0.031	0.048	0.049	0.067	0.061	0.117	0.116	0.144	0.130	0.141
ISD		0.023	0.041	0.052	0.053	0.058	0.224	0.203	0.197	0.191	0.154
V		0.020	0.024	0.029	0.033	0.056	0.074	0.072	0.079	0.094	0.117
Standard error of the means											
IF		0.005	0.009	0.008	0.007	0.011	0.015	0.019	0.033	0.011	0.008
ISD		0.002	0.006	0.007	0.011	0.011	0.020	0.020	0.040	0.024	0.012
V		0.003	0.003	0.004	0.003	0.011	0.004	0.004	0.007	0.004	0.010
<b>12 March 1998</b>											
OF	1	0.06	0.04	0.05	0.08	0.07	0.10	0.09	0.08	0.10	0.15
IF	1	0.06	0.08	0.08	0.06	0.07	0.08	0.09	0.09	0.21	0.25
OSD	1	0.07	0.05	0.05	0.06	0.05	0.11	0.08	0.08	0.09	0.11
ISD	1	0.08	0.16	0.15	0.13	0.20	0.09	0.35	0.35	0.44	0.56
V	1	0.08	0.11	0.08	0.07	0.15	0.05	0.07	0.13	0.08	0.14
OF	2	0.06	0.06	0.07	0.08	0.07	0.09	0.09	0.08	0.11	0.14
IF	2	0.05	0.09	0.08	0.06	0.06	0.07	0.06	0.06	0.10	0.11
OSD	2	0.05	0.04	0.04	0.05	0.09	0.10	0.11	0.08	0.07	0.08
ISD	2	0.11	0.10	0.10	0.11	0.15	0.10	0.34	0.35	0.41	0.51
V	2	0.11	0.09	0.10	0.05	0.12	0.08	0.07	0.07	0.08	0.16
OF	3	0.05	0.04	0.08	0.09	0.09	0.08	0.09	0.08	0.11	0.13
IF	3	0.06	0.08	0.09	0.06	0.08	0.08	0.09	0.14	0.25	0.43
OSD	3	0.06	0.06	0.06	0.05	0.07	0.09	0.08	0.08	0.07	0.10
ISD	3	0.07	0.18	0.25	0.14	0.18	0.09	0.30	0.43	0.45	0.28
V	3	0.07	0.04	0.03	0.10	0.10	0.04	0.04	0.07	0.07	0.14
OF	4	0.11	0.06	0.10	0.08	0.10	0.07	0.09	0.08	0.08	0.15
IF	4	0.06	0.07	0.09	0.08	0.05	0.10	0.08	0.14	0.20	0.44
OSD	4	0.08	0.09	0.06	0.06	0.08	0.16	0.10	0.07	0.06	0.10
ISD	4	0.10	0.12	0.15	0.17	0.18	0.07	0.32	0.39	0.32	0.40
V	4	0.07	0.05	0.05	0.09	0.10	0.08	0.07	0.06	0.10	0.15
OF	5	0.10	0.06	0.12	0.11	0.10	0.16	0.13	0.09	0.12	0.15
IF	5	0.06	0.10	0.08	0.04	0.03	0.11	0.14	0.12	0.19	0.41

Location code	Rep.	Exchangeable Na (cmol (+) kg <sup>-1</sup> )					Exchangeable K (cmol (+) kg <sup>-1</sup> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
OSD	5	0.10	0.06	0.10	0.07	0.09	0.12	0.08	0.10	0.07	0.13
ISD	5	0.06	0.08	0.18	0.21	0.13	0.20	0.81	1.06	0.39	0.41
V	5	0.04	0.05	0.05	0.07	0.07	0.06	0.09	0.06	0.11	0.15
OF	6	0.05	0.06	0.06	0.09	0.12	0.11	0.08	0.08	0.11	0.17
IF	6	0.03	0.06	0.06	0.05	0.02	0.09	0.15	0.07	0.19	0.39
OSD	6	0.06	0.04	0.06	0.07	0.08	0.14	0.08	0.08	0.14	0.18
ISD	6	0.11	0.11	0.10	0.12	0.10	0.10	0.31	0.45	0.55	0.55
V	6	0.04	0.06	0.05	0.10	0.09	0.05	0.06	0.06	0.12	0.18
OF	7	0.06	0.05	0.05	0.08	0.18	0.07	0.08	0.10	0.12	0.23
IF	7	0.03	0.04	0.05	0.02	0.02	0.11	0.06	0.06	0.22	0.41
OSD	7	0.03	0.03	0.06	0.09	0.07	0.11	0.10	0.10	0.14	0.31
ISD	7	0.08	0.06	0.09	0.13	0.11	0.11	0.34	0.43	0.48	0.56
V	7	0.05	0.06	0.05	0.08	0.08	0.06	0.07	0.07	0.11	0.17
OF	8	0.08	0.08	0.06	0.11	0.14	0.08	0.05	0.07	0.11	0.13
IF	8	0.15	0.07	0.07	0.05	0.03	0.06	0.07	0.09	0.06	0.16
OSD	8	0.05	0.07	0.06	0.10	0.10	0.11	0.08	0.17	0.12	0.14
ISD	8	0.06	0.10	0.11	0.12	0.12	0.10	0.18	0.53	0.46	0.59
V	8	0.03	0.04	0.06	0.06	0.07	0.09	0.09	0.08	0.09	0.13
OF	9	0.10	0.08	0.11	0.12	0.16	0.09	0.14	0.11	0.12	0.16
IF	9	0.05	0.09	0.07	0.10	0.11	0.07	0.08	0.07	0.07	0.14
OSD	9	0.03	0.05	0.06	0.09	0.10	0.10	0.09	0.11	0.12	0.15
ISD	9	0.10	0.10	0.06	0.16	0.13	0.11	0.12	0.20	0.62	0.97
V	9	0.04	0.05	0.07	0.06	0.07	0.06	0.08	0.09	0.10	0.13
OF	10	0.07	0.08	0.08	0.06	0.10	0.08	0.05	0.08	0.10	0.17
IF	10	0.06	0.11	0.12	0.09	0.10	0.07	0.08	0.05	0.12	0.23
OSD	10	0.06	0.05	0.07	0.10	0.10	0.10	0.10	0.12	0.19	0.16
ISD	10	0.07	0.15	0.14	0.17	0.17	0.10	0.19	0.39	0.64	0.90
V	10	0.04	0.05	0.04	0.06	0.06	0.05	0.07	0.08	0.09	0.14
Treatment means											
OF		0.074	0.061	0.078	0.090	0.113	0.093	0.089	0.085	0.108	0.158
IF		0.061	0.079	0.079	0.061	0.057	0.084	0.090	0.089	0.161	0.297
OSD		0.059	0.054	0.062	0.074	0.083	0.114	0.090	0.099	0.107	0.146
ISD		0.084	0.116	0.133	0.146	0.147	0.107	0.326	0.458	0.476	0.573
V		0.057	0.060	0.058	0.074	0.091	0.062	0.071	0.077	0.095	0.149
Standard error of the means											
OF		0.007	0.005	0.008	0.006	0.012	0.008	0.009	0.004	0.004	0.009
IF		0.011	0.006	0.006	0.008	0.010	0.006	0.010	0.011	0.021	0.042
OSD		0.007	0.005	0.005	0.006	0.005	0.007	0.004	0.009	0.013	0.021
ISD		0.006	0.012	0.017	0.010	0.011	0.011	0.059	0.072	0.032	0.068
V		0.008	0.007	0.006	0.006	0.009	0.005	0.005	0.007	0.005	0.005
<b>8 February 1999</b>											
IF	1	0.03	0.08	0.06	0.05	0.07	0.09	0.04	0.06	0.16	0.23
ISD	1	0.02	0.06	0.04	0.20	0.21	0.11	0.11	0.20	0.50	0.66
V	1	0.02	0.01	0.01	0.01	0.01	0.05	0.06	0.06	0.08	0.12
IF	2	0.04	0.07	0.07	0.04	0.04	0.09	0.04	0.05	0.12	0.29
ISD	2	0.01	0.02	0.04	0.05	0.04	0.13	0.11	0.12	0.23	0.38
V	2	0.01	0.00	0.01	0.01	0.01	0.06	0.05	0.06	0.07	0.09
IF	3	0.02	0.06	0.04	0.05	0.05	0.06	0.04	0.04	0.04	0.08
ISD	3	0.05	0.07	0.08	0.07	0.06	0.11	0.19	0.24	0.27	0.29
V	3	0.01	0.01	0.01	0.01	0.04	0.05	0.06	0.06	0.08	0.14
IF	4	0.06	0.05	0.07	0.09	0.04	0.05	0.03	0.05	0.04	0.14
ISD	4	0.02	0.05	0.09	0.09	0.18	0.09	0.09	0.13	0.37	0.27
V	4	0.01	0.01	0.01	0.01	0.04	0.06	0.07	0.08	0.09	0.14
IF	5	0.02	0.02	0.07	0.11	0.21	0.11	0.10	0.06	0.17	0.26

Location code	Rep.	Exchangeable Na (cmol (+) kg <sup>-1</sup> )					Exchangeable K (cmol (+) kg <sup>-1</sup> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
ISD	5	0.03	0.07	0.04	0.24	0.20	0.12	0.22	0.40	0.90	0.21
V	5	0.02	0.07	0.03	0.05	0.03	0.05	0.05	0.07	0.12	0.10
IF	6	0.02	0.01	0.03	0.08	0.03	0.09	0.07	0.07	0.06	0.09
ISD	6	0.02	0.03	0.10	0.07	0.14	0.11	0.07	0.24	0.35	0.49
V	6	0.01	0.02	0.02	0.05	0.05	0.06	0.06	0.07	0.12	0.10
IF	7	0.02	0.02	0.07	0.08	0.05	0.09	0.09	0.06	0.07	0.20
ISD	7	0.02	0.15	0.11	0.08	0.09	0.09	0.21	0.37	0.59	0.47
V	7	0.01	0.02	0.01	0.02	0.02	0.08	0.07	0.07	0.06	0.08
IF	8	0.01	0.03	0.09	0.07	0.06	0.06	0.07	0.06	0.05	0.07
ISD	8	0.01	0.10	0.06	0.06	0.06	0.11	0.16	0.17	0.27	0.58
V	8	0.01	0.01	0.01	0.04	0.01	0.07	0.10	0.08	0.08	0.12
IF	9	0.02	0.05	0.06	0.07	0.05	0.05	0.05	0.04	0.05	0.07
ISD	9	0.02	0.03	0.06	0.09	0.10	0.07	0.10	0.26	0.43	0.62
V	9	0.01	0.01	0.01	0.02	0.01	0.05	0.05	0.06	0.09	0.06
IF	10	0.08	0.06	0.07	0.09	0.04	0.07	0.05	0.05	0.14	0.19
ISD	10	0.01	0.02	0.07	0.12	0.14	0.07	0.05	0.23	0.48	0.55
V	10	0.03	0.02	0.01	0.01	0.02	0.09	0.09	0.07	0.08	0.12
Treatment means											
	IF	0.032	0.045	0.063	0.073	0.064	0.076	0.058	0.054	0.090	0.162
	ISD	0.021	0.060	0.069	0.107	0.122	0.101	0.131	0.236	0.439	0.452
	V	0.014	0.018	0.013	0.023	0.024	0.062	0.066	0.068	0.087	0.107
Standard error of the means											
	IF	0.007	0.007	0.005	0.007	0.017	0.007	0.007	0.003	0.016	0.026
	ISD	0.004	0.013	0.008	0.020	0.019	0.006	0.019	0.029	0.063	0.050
	V	0.002	0.006	0.002	0.005	0.005	0.004	0.005	0.002	0.006	0.008

Table 4. Exchangeable Ca and Mg at given locations on selected dates.

(Location code: V = Location 1: Inside virgin open forest; OF = Location 2: Outside fertiliser placement zone near fertigated tree; IF = Location 3: Inside fertiliser placement zone of fertigated tree; OSD = Location 2: Outside fertiliser placement zone near surface dressed tree; ISD = Location 4: Inside fertiliser placement zone of surface dressed tree.).

Location Code	Rep.	Exchangeable Ca (cmol (+) kg <sup>-1</sup> )					Exchangeable Mg (cmol (+) kg <sup>-1</sup> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
<b>4 March 1996</b>											
IF	1	0.80	0.68	0.60	0.64	0.28	0.26	0.28	0.31	0.93	1.32
ISD	1	0.53	0.48	0.56	0.72	0.89	0.21	0.32	0.38	0.92	1.60
V	1	0.51	0.39	0.71	0.44	0.40	0.14	0.14	0.33	0.33	0.35
IF	2	1.65	0.80	0.61	0.53	0.93	0.30	0.17	0.36	0.79	1.34
ISD	2	1.35	0.72	0.54	0.58	0.50	0.35	0.29	0.41	0.78	1.92
V	2	1.16	0.89	0.70	0.87	0.97	0.27	0.25	0.36	0.23	1.17
IF	3	1.62	0.91	0.43	0.33	0.75	0.39	0.32	0.27	0.26	0.52
ISD	3	0.93	0.62	0.40	0.34	0.51	0.29	0.18	0.26	0.24	0.47
V	3	1.09	0.91	0.52	0.38	0.64	0.30	0.32	0.27	0.32	0.59
IF	4	0.94	0.81	0.58	0.80	0.68	0.41	0.33	0.41	0.87	1.33
ISD	4	0.80	0.51	0.66	0.85	0.80	0.29	0.28	0.47	0.93	1.16
V	4	0.88	0.88	0.70	0.56	0.51	0.32	0.30	0.36	0.56	1.07
IF	5	1.20	0.90	1.02	1.33	1.49	0.91	0.51	0.72	1.13	1.53
ISD	5	1.08	0.53	1.04	1.51	1.50	0.37	0.20	0.57	0.95	1.30
V	5	1.70	1.53	0.85	0.45	0.42	0.62	0.55	0.32	0.62	0.95
IF	6	1.72	1.15	0.71	1.10	1.17	0.74	0.34	0.40	0.92	1.36
ISD	6	1.08	0.79	0.62	0.96	1.32	0.27	0.29	0.58	1.02	1.56
V	6	1.03	0.78	0.67	0.78	0.46	0.32	0.33	0.31	0.47	0.32
IF	7	2.11	2.08	2.17	1.71	1.96	0.69	0.50	0.98	1.50	1.54
ISD	7	1.94	0.89	0.92	1.99	1.92	0.73	0.35	0.64	1.94	1.45
V	7	1.06	0.88	0.76	0.38	0.68	0.33	0.35	0.26	0.72	0.23
IF	8	1.43	0.78	0.68	0.97	1.02	0.50	0.27	0.41	0.95	1.07
ISD	8	0.82	0.66	0.45	0.75	1.27	0.29	0.15	0.38	0.78	1.39
V	8	1.11	0.85	0.87	0.42	0.68	0.34	0.34	0.27	0.27	0.42
IF	9	0.79	0.51	0.48	0.84	1.28	0.23	0.21	0.22	0.79	1.31
ISD	9	1.50	1.09	0.60	1.04	1.21	0.37	0.47	0.44	1.03	0.99
V	9	0.88	0.88	0.75	0.52	0.52	0.24	0.31	0.25	0.74	0.98
IF	10	0.85	0.41	0.35	0.93	1.41	0.26	0.14	0.17	0.96	1.61
ISD	10	1.33	0.64	0.76	1.31	1.63	0.57	0.28	0.40	1.00	1.66
V	10	0.88	1.01	0.76	0.45	0.86	0.41	0.42	0.31	0.26	1.21
Treatment means											
IF		1.31	0.90	0.76	0.92	1.10	0.47	0.31	0.43	0.91	1.29
ISD		1.14	0.69	0.66	1.00	1.16	0.37	0.28	0.45	0.96	1.35
V		1.03	0.90	0.73	0.53	0.61	0.33	0.33	0.31	0.45	0.73
Standard error of the means											
IF		0.15	0.15	0.17	0.13	0.15	0.07	0.04	0.08	0.10	0.10
ISD		0.13	0.06	0.06	0.15	0.15	0.05	0.03	0.04	0.13	0.13
V		0.10	0.09	0.03	0.05	0.06	0.04	0.03	0.01	0.06	0.12
<b>3 March 1997</b>											
IF	1	0.43	0.45	0.63	0.83	0.87	0.19	0.18	0.33	0.91	1.28
ISD	1	0.39	0.56	0.60	0.37	0.12	0.11	0.16	0.38	0.86	0.73
V	1	1.01	0.89	0.85	0.86	0.77	0.37	0.41	0.47	0.51	0.39
IF	2	0.76	0.51	0.37	0.50	0.63	0.26	0.15	0.17	0.43	1.13
ISD	2	1.10	0.81	0.76	0.58	0.66	0.26	0.22	0.46	0.80	0.90
V	2	0.99	0.73	0.66	0.73	0.61	0.34	0.38	0.41	0.47	0.43
IF	3	0.47	0.25	0.13	0.30	0.48	0.19	0.10	0.08	0.17	0.43

Location Code	Rep.	Exchangeable Ca (cmol (+) kg <sup>-1</sup> )					Exchangeable Mg (cmol (+) kg <sup>-1</sup> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
ISD	3	1.03	0.73	0.90	0.59	0.42	0.34	0.17	0.13	0.25	0.30
V	3	0.77	0.62	0.62	0.53	0.61	0.34	0.35	0.37	0.40	0.42
IF	4	0.61	0.43	0.43	0.83	0.82	0.22	0.21	0.31	0.85	1.16
ISD	4	0.45	0.35	0.46	0.78	0.72	0.21	0.17	0.28	0.80	1.36
V	4	0.96	0.64	0.39	0.41	0.84	0.26	0.26	0.23	0.34	0.63
IF	5	0.79	0.56	0.85	1.23	0.85	0.29	0.22	0.47	1.00	0.55
ISD	5	0.75	0.54	1.02	1.52	1.30	0.55	0.34	0.61	1.14	1.13
V	5	1.00	0.71	0.57	0.59	1.03	0.28	0.30	0.25	0.06	0.16
IF	6	1.02	0.80	0.90	0.83	1.12	0.36	0.31	0.50	0.74	1.20
ISD	6	2.19	0.79	0.97	1.13	1.05	0.73	0.89	0.56	0.70	1.00
V	6	0.53	0.27	0.13	0.06	0.04	0.17	0.12	0.10	0.17	0.26
IF	7	1.72	0.89	0.94	1.55	0.97	0.39	0.27	0.54	1.20	0.74
ISD	7	1.59	0.81	0.81	2.01	0.65	0.49	0.42	0.67	1.21	0.34
V	7	0.63	0.20	0.06	0.04	0.03	0.23	0.18	0.11	0.17	0.21
IF	8	0.57	0.31	0.47	1.08	1.31	0.19	0.09	0.22	0.72	1.16
ISD	8	0.60	0.37	0.48	0.67	0.95	0.33	0.18	0.18	0.44	0.56
V	8	0.39	0.11	0.05	0.03	0.02	0.14	0.11	0.16	0.28	0.45
IF	9	0.69	0.61	0.44	0.91	0.97	0.23	0.27	0.29	1.08	1.06
ISD	9	0.67	0.50	0.33	1.04	1.30	0.30	0.14	0.30	0.82	0.18
V	9	0.88	0.35	0.15	0.13	0.12	0.28	0.21	0.14	0.15	0.17
IF	10	1.45	0.78	0.46	0.61	0.86	0.44	0.21	0.20	0.38	0.66
ISD	10	0.73	0.52	0.47	1.01	1.34	0.33	0.18	0.46	0.72	1.22
V	10	0.81	0.74	0.59	0.41	0.52	0.32	0.49	0.33	0.25	0.27
Treatment means											
IF		0.85	0.56	0.56	0.87	0.89	0.28	0.20	0.31	0.75	0.94
ISD		0.95	0.60	0.68	0.97	0.85	0.37	0.29	0.40	0.77	0.77
V		0.80	0.53	0.41	0.38	0.46	0.27	0.28	0.26	0.28	0.34
Standard error of the means											
IF		0.13	0.07	0.08	0.11	0.07	0.03	0.02	0.05	0.10	0.10
ISD		0.18	0.06	0.08	0.16	0.13	0.06	0.07	0.06	0.09	0.13
V		0.07	0.09	0.09	0.10	0.12	0.02	0.04	0.04	0.05	0.05
<b>12 March 1998</b>											
OF	1	0.83	0.53	0.51	0.57	0.57	0.20	0.19	0.28	0.47	0.67
IF	1	0.65	0.33	0.08	0.12	0.56	0.49	0.19	0.05	0.13	0.23
OSD	1	0.66	0.45	0.49	0.45	0.35	0.19	0.19	0.30	0.47	0.77
ISD	1	0.92	0.15	0.30	0.62	0.91	0.38	0.22	0.20	0.55	0.90
V	1	0.82	0.43	0.19	0.24	0.92	0.27	0.21	0.11	0.14	0.52
OF	2	0.77	0.54	0.54	0.68	0.63	0.24	0.20	0.28	0.49	0.66
IF	2	1.10	0.67	0.07	0.11	0.55	0.40	0.21	0.05	0.13	0.23
OSD	2	0.67	0.49	0.49	0.47	0.55	0.23	0.17	0.24	0.33	0.54
ISD	2	0.81	0.18	0.50	0.51	0.38	0.47	0.38	0.38	0.58	0.25
V	2	0.53	0.31	0.22	0.23	1.25	0.17	0.17	0.12	0.15	0.70
OF	3	0.75	0.54	0.49	0.66	0.63	0.24	0.19	0.27	0.48	0.65
IF	3	0.73	0.45	0.08	0.11	0.50	0.42	0.27	0.05	0.33	0.40
OSD	3	0.72	0.45	0.47	0.52	0.61	0.24	0.16	0.25	0.37	0.57
ISD	3	0.88	0.24	0.27	0.72	1.02	0.27	0.30	0.13	0.37	0.72
V	3	0.48	0.14	0.21	0.23	1.08	0.19	0.11	0.09	0.13	0.60
OF	4	0.78	0.53	0.52	0.49	0.76	0.26	0.19	0.27	0.37	0.74
IF	4	0.96	0.49	0.13	0.27	0.75	0.37	0.22	0.05	0.28	0.33
OSD	4	1.46	1.41	0.43	0.44	0.58	0.41	0.37	0.24	0.28	0.49
ISD	4	0.99	0.32	0.31	0.59	1.02	0.35	0.32	0.19	0.28	0.80
V	4	0.75	0.39	0.16	0.55	1.05	0.24	0.22	0.11	0.44	0.67
OF	5	1.34	0.54	0.53	0.66	0.76	0.37	0.20	0.28	0.55	0.75
IF	5	0.98	0.36	0.26	0.38	0.64	0.35	0.20	0.06	0.13	0.23

Location Code	Rep.	Exchangeable Ca (cmol (+) kg <sup>-1</sup> )					Exchangeable Mg (cmol (+) kg <sup>-1</sup> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
OSD	5	0.96	0.48	0.43	0.65	1.09	0.23	0.16	0.23	0.41	0.80
ISD	5	1.62	0.42	0.27	0.59	1.00	0.46	0.45	0.14	0.31	0.81
V	5	0.95	0.66	0.76	0.58	1.05	0.33	0.37	0.35	0.45	0.62
OF	6	1.26	0.63	0.76	0.88	1.31	0.25	0.18	0.36	0.42	0.77
IF	6	1.31	0.72	0.24	0.19	0.27	0.53	0.20	0.10	0.24	0.06
OSD	6	1.30	0.75	0.52	1.13	1.39	0.25	0.21	0.22	0.63	0.76
ISD	6	2.36	0.72	0.34	0.91	1.52	0.62	0.34	0.16	0.29	0.86
V	6	0.87	0.74	0.64	0.65	1.44	0.35	0.37	0.47	0.49	0.76
OF	7	0.98	0.72	0.80	1.00	1.32	0.25	0.30	0.37	0.49	0.53
IF	7	1.13	0.36	0.24	0.18	0.29	0.59	0.22	0.11	0.30	0.05
OSD	7	1.12	0.96	0.69	0.84	1.36	0.19	0.24	0.25	0.39	0.79
ISD	7	2.44	0.71	0.33	1.11	1.71	0.53	0.20	0.15	0.30	0.89
V	7	1.11	0.85	1.13	0.56	1.48	0.31	0.37	0.34	0.43	0.74
OF	8	0.80	0.50	0.42	0.92	1.06	0.20	0.16	0.22	0.58	0.85
IF	8	0.68	0.34	0.22	0.27	0.65	0.47	0.21	0.04	0.06	0.13
OSD	8	0.91	0.61	0.46	0.84	1.03	0.30	0.15	0.23	0.54	0.84
ISD	8	2.52	1.11	0.31	0.22	0.56	0.29	0.32	0.25	0.09	0.30
V	8	1.60	0.12	0.59	0.75	1.19	0.39	0.33	0.35	0.40	0.80
OF	9	1.12	0.52	0.52	0.81	1.38	0.48	0.24	0.26	0.33	0.80
IF	9	1.07	0.78	0.52	0.25	0.49	0.44	0.36	0.35	0.12	0.20
OSD	9	0.83	0.82	0.43	0.75	1.22	0.17	0.19	0.22	0.31	0.80
ISD	9	1.79	0.99	0.45	0.25	0.53	0.41	0.42	0.42	0.12	0.42
V	9	1.03	0.68	0.58	0.73	1.19	0.29	0.37	0.36	0.44	0.87
OF	10	0.85	0.64	0.64	0.80	1.39	0.18	0.17	0.26	0.39	0.78
IF	10	0.85	0.53	0.37	0.25	0.47	0.47	0.21	0.20	0.22	0.18
OSD	10	0.84	0.71	0.67	1.49	1.33	0.24	0.22	0.21	0.96	0.81
ISD	10	2.44	1.12	0.61	0.76	1.37	0.28	0.25	0.26	0.34	0.80
V	10	0.89	0.71	0.63	0.68	1.23	0.25	0.26	0.24	0.42	0.90
Treatment means											
OF		0.95	0.57	0.57	0.75	0.98	0.27	0.20	0.29	0.46	0.72
IF		0.95	0.50	0.22	0.21	0.52	0.45	0.23	0.11	0.19	0.20
OSD		0.95	0.71	0.51	0.76	0.95	0.25	0.21	0.24	0.47	0.72
ISD		1.68	0.60	0.37	0.63	1.00	0.41	0.32	0.23	0.32	0.68
V		0.90	0.50	0.51	0.52	1.19	0.28	0.28	0.25	0.35	0.72
Standard error of the means											
OF		0.07	0.02	0.04	0.05	0.11	0.03	0.01	0.01	0.02	0.03
IF		0.07	0.05	0.05	0.03	0.05	0.02	0.02	0.03	0.03	0.03
OSD		0.09	0.10	0.03	0.11	0.12	0.02	0.02	0.01	0.06	0.04
ISD		0.23	0.12	0.04	0.09	0.14	0.04	0.03	0.03	0.05	0.08
V		0.10	0.08	0.10	0.07	0.06	0.02	0.03	0.04	0.05	0.04
<b>8 February 1999</b>											
IF	1	0.67	0.42	0.44	0.64	0.70	0.27	0.15	0.19	0.08	0.58
ISD	1	1.20	0.40	0.42	0.14	0.51	0.49	0.18	0.11	0.05	0.35
V	1	0.99	0.55	0.12	0.39	0.66	0.26	0.28	0.25	0.25	0.66
IF	2	0.79	0.40	0.31	0.16	0.35	0.34	0.23	0.26	0.07	0.12
ISD	2	1.30	0.57	0.16	0.07	0.61	0.45	0.30	0.26	0.04	0.64
V	2	0.67	0.25	0.12	0.10	0.09	0.18	0.09	0.11	0.08	0.11
IF	3	0.51	0.30	0.21	0.19	0.20	0.23	0.12	0.20	0.07	0.14
ISD	3	1.60	0.52	0.15	0.09	0.41	0.50	0.18	0.28	0.05	0.30
V	3	0.59	0.35	0.27	0.19	0.48	0.27	0.18	0.20	0.12	0.56
IF	4	0.73	0.57	0.39	0.17	0.74	0.24	0.25	0.23	0.13	0.42
ISD	4	1.50	0.64	0.30	0.24	1.00	0.53	0.37	0.26	0.20	0.98
V	4	1.30	0.55	0.29	0.19	0.43	0.44	0.28	0.21	0.17	0.46
IF	5	1.60	0.75	0.56	0.77	1.30	0.62	0.45	0.16	0.48	0.78

Location Code	Rep.	Exchangeable Ca (cmol (+) kg <sup>-1</sup> )					Exchangeable Mg (cmol (+) kg <sup>-1</sup> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
ISD	5	1.20	0.24	0.81	1.00	1.90	0.51	0.08	0.14	0.47	1.60
V	5	0.88	0.79	0.56	0.66	0.71	0.39	0.40	0.52	0.24	0.57
IF	6	1.30	0.67	0.60	0.40	0.56	0.63	0.43	0.37	0.23	0.35
ISD	6	2.10	0.97	0.72	0.25	0.78	0.85	0.41	0.23	0.10	0.50
V	6	1.10	0.76	0.36	0.58	0.70	0.34	0.32	0.32	0.37	0.64
IF	7	2.30	0.67	0.42	0.50	1.10	1.10	0.41	0.27	0.29	0.63
ISD	7	3.10	0.92	0.89	1.60	1.90	0.64	0.27	0.29	0.62	1.30
V	7	1.70	0.83	0.69	0.67	0.78	0.31	0.25	0.17	0.20	0.47
IF	8	0.96	0.53	0.23	0.21	0.40	0.41	0.42	0.16	0.20	0.31
ISD	8	1.60	0.61	0.30	0.26	1.10	0.57	0.37	0.11	0.26	0.67
V	8	0.97	0.74	0.36	0.38	0.65	0.31	0.33	0.22	0.26	0.77
IF	9	0.71	0.51	0.37	0.27	0.42	0.20	0.16	0.20	0.15	0.18
ISD	9	1.60	0.66	0.30	0.31	1.20	0.48	0.19	0.17	0.10	0.71
V	9	0.89	0.40	0.17	0.19	0.18	0.27	0.25	0.14	0.13	0.15
IF	10	0.76	0.40	0.66	1.20	1.60	0.23	0.23	0.19	0.16	1.00
ISD	10	2.00	1.00	0.55	0.37	1.20	0.58	0.37	0.24	0.16	0.76
V	10	0.80	0.38	0.24	0.26	0.53	0.29	0.23	0.13	0.13	0.58
Treatment means											
IF		1.03	0.52	0.42	0.45	0.74	0.43	0.29	0.22	0.19	0.45
ISD		1.72	0.65	0.46	0.43	1.06	0.56	0.27	0.21	0.21	0.78
V		0.99	0.56	0.32	0.36	0.52	0.31	0.26	0.23	0.20	0.50
Standard error of the means											
IF		1.03	0.52	0.42	0.45	0.74	0.09	0.04	0.02	0.04	0.09
ISD		1.72	0.65	0.46	0.43	1.06	0.04	0.03	0.02	0.06	0.13
V		0.99	0.56	0.32	0.36	0.52	0.02	0.03	0.04	0.03	0.07

Table 5. Effective Cation Exchangeable Capacity (ECEC) and Total N at given locations on selected dates (na = Data not available).

(Location code: V = Location 1: Inside virgin open forest; OF = Location 2: Outside fertiliser placement zone near fertigated tree; IF = Location 3: Inside fertiliser placement zone of fertigated tree; OSD = Location 2: Outside fertiliser placement zone near surface dressed tree; ISD = Location 4: Inside fertiliser placement zone of surface dressed tree.).

Location code	Rep.	ECEC (cmol (+) kg <sup>-1</sup> )					Total N (%)				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
<b>4 March 1996</b>											
IF	1	1.24	1.12	1.00	1.67	1.85	0.012	na	na	na	na
ISD	1	0.89	0.94	1.04	1.76	2.69	0.027	na	na	na	na
V	1	0.80	0.59	1.15	0.85	0.86	0.022	na	na	na	na
IF	2	2.08	1.07	1.07	1.41	2.43	0.015	na	na	na	na
ISD	2	1.82	1.10	1.02	1.48	2.64	0.031	na	na	na	na
V	2	1.62	1.22	1.13	1.18	2.33	0.004	na	na	na	na
IF	3	2.24	1.40	0.81	0.67	1.47	0.022	na	na	na	na
ISD	3	1.48	1.07	0.81	0.68	1.15	0.009	na	na	na	na
V	3	1.57	1.30	0.85	0.80	1.38	0.004	na	na	na	na
IF	4	1.66	1.37	1.16	1.85	2.19	0.015	na	na	na	na
ISD	4	1.23	0.89	1.22	1.97	2.25	0.019	na	na	na	na
V	4	1.37	1.24	1.13	1.24	1.71	0.010	na	na	na	na
IF	5	2.29	1.56	2.03	2.71	3.27	0.027	na	na	na	na
ISD	5	1.75	1.14	1.97	2.69	3.00	0.016	na	na	na	na
V	5	2.50	2.12	1.28	1.11	1.48	0.012	na	na	na	na
IF	6	2.74	1.77	1.30	2.18	2.76	0.029	na	na	na	na
ISD	6	1.54	1.21	1.31	2.14	3.07	0.033	na	na	na	na
V	6	1.48	1.22	1.08	1.35	0.94	0.023	na	na	na	na
IF	7	2.99	2.82	3.35	3.52	3.76	0.029	na	na	na	na
ISD	7	2.92	1.45	1.76	4.17	3.60	0.037	na	na	na	na
V	7	1.59	1.36	1.11	1.20	1.07	0.009	na	na	na	na
IF	8	2.22	1.20	1.25	2.11	2.26	0.020	na	na	na	na
ISD	8	1.25	0.99	0.98	1.66	2.86	0.023	na	na	na	na
V	8	1.58	1.33	1.25	0.83	1.26	0.017	na	na	na	na
IF	9	1.21	1.09	1.05	1.85	2.98	0.021	na	na	na	na
ISD	9	2.01	1.71	1.17	2.23	2.39	0.032	na	na	na	na
V	9	1.26	1.29	1.10	1.33	1.67	0.011	na	na	na	na
IF	10	1.30	1.08	0.98	2.07	3.29	0.026	na	na	na	na
ISD	10	2.05	1.04	1.26	2.49	3.53	0.032	na	na	na	na
V	10	1.40	1.58	1.20	0.80	2.64	0.012	na	na	na	na
Treatment means											
	IF	2.00	1.45	1.40	2.01	2.62	0.022	na	na	na	na
	ISD	1.69	1.15	1.25	2.13	2.72	0.026	na	na	na	na
	V	1.52	1.32	1.13	1.07	1.53	0.012	na	na	na	na
Standard error of the means											
	IF	0.20	0.17	0.24	0.24	0.23	0.002	na	na	na	na
	ISD	0.18	0.08	0.11	0.29	0.22	0.003	na	na	na	na
	V	0.13	0.12	0.04	0.07	0.18	0.002	na	na	na	na
<b>3 March 1997</b>											
IF	1	0.76	0.77	1.13	1.91	2.42	0.018	na	na	na	na
ISD	1	0.83	1.01	1.12	1.37	1.10	0.017	na	na	na	na
V	1	1.52	1.43	1.49	1.51	1.30	0.012	na	na	na	na
IF	2	1.10	0.77	0.63	1.04	1.95	0.018	na	na	na	na
ISD	2	1.57	1.16	1.35	1.53	1.74	0.019	na	na	na	na
V	2	1.44	1.20	1.18	1.34	1.19	0.011	na	na	na	na

Location code	Rep.	ECEC (cmol (+) kg <sup>-1</sup> )					Total N (%)				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
IF	3	0.87	0.47	0.31	0.62	1.02	0.023	na	na	na	na
ISD	3	1.57	1.08	1.16	0.98	0.89	0.028	na	na	na	na
V	3	1.20	1.09	1.11	1.05	1.16	0.010	na	na	na	na
IF	4	0.93	0.76	0.90	1.89	2.25	0.018	na	na	na	na
ISD	4	0.94	0.69	0.86	1.87	2.31	0.022	na	na	na	na
V	4	1.30	1.01	0.75	0.88	1.64	0.007	na	na	na	na
IF	5	1.28	1.10	1.80	2.46	1.56	0.026	na	na	na	na
ISD	5	1.61	1.20	1.97	3.10	2.71	0.023	na	na	na	na
V	5	1.36	1.08	0.90	0.77	1.38	0.007	na	na	na	na
IF	6	1.54	1.25	1.55	1.73	2.50	0.022	na	na	na	na
ISD	6	3.16	2.04	2.01	2.04	2.30	0.044	na	na	na	na
V	6	0.80	0.48	0.32	0.35	0.55	0.002	na	na	na	na
IF	7	2.29	1.35	1.71	3.03	1.91	0.026	na	na	na	na
ISD	7	2.40	1.48	1.69	3.54	1.11	0.032	na	na	na	na
V	7	0.93	0.47	0.25	0.35	0.48	0.008	na	na	na	na
IF	8	0.87	0.53	0.98	2.00	2.66	0.018	na	na	na	na
ISD	8	1.06	0.75	0.91	1.32	1.67	0.029	na	na	na	na
V	8	0.62	0.31	0.29	0.46	0.73	0.012	na	na	na	na
IF	9	1.13	1.14	0.81	2.22	2.30	0.001	na	na	na	na
ISD	9	1.19	0.88	0.89	2.04	1.67	0.031	na	na	na	na
V	9	1.26	0.64	0.37	0.38	0.38	0.015	na	na	na	na
IF	10	1.98	1.10	0.84	1.22	1.70	0.030	na	na	na	na
ISD	10	1.29	1.00	1.36	2.09	2.85	0.023	na	na	na	na
V	10	1.21	1.32	1.06	0.77	0.90	0.006	na	na	na	na
<b>Treatment means</b>											
IF		1.28	0.92	1.07	1.81	2.03	0.020	na	na	na	na
ISD		1.56	1.13	1.33	1.99	1.84	0.027	na	na	na	na
V		1.16	0.90	0.77	0.79	0.97	0.009	na	na	na	na
<b>Standard error of the means</b>											
IF		0.16	0.10	0.15	0.22	0.16	0.002	na	na	na	na
ISD		0.23	0.12	0.14	0.25	0.22	0.002	na	na	na	na
V		0.09	0.12	0.14	0.13	0.13	0.001	na	na	na	na
<b>12 March 1998</b>											
OF	1	1.19	0.85	0.92	1.22	1.46	0.013	0.005	na	na	na
IF	1	1.28	0.69	0.30	0.52	1.11	0.025	0.019	na	na	na
OSD	1	1.03	0.77	0.92	1.07	1.28	0.010	0.003	na	na	na
ISD	1	1.47	0.88	1.00	1.74	2.57	0.021	0.001	na	na	na
V	1	1.22	0.82	0.51	0.53	1.73	0.004	0.001	na	na	na
OF	2	1.16	0.89	0.97	1.36	1.50	0.018	0.005	na	na	na
IF	2	1.62	1.03	0.26	0.40	0.95	0.026	0.016	na	na	na
OSD	2	1.05	0.81	0.85	0.92	1.26	0.006	0.001	na	na	na
ISD	2	1.49	1.00	1.33	1.61	1.29	0.015	0.011	na	na	na
V	2	0.89	0.64	0.51	0.51	2.23	0.003	0.001	na	na	na
OF	3	1.12	0.86	0.92	1.34	1.50	0.011	0.002	na	na	na
IF	3	1.29	0.89	0.36	0.75	1.41	0.033	0.018	na	na	na
OSD	3	1.11	0.75	0.86	1.01	1.35	0.003	0.001	na	na	na
ISD	3	1.31	1.02	1.08	1.68	2.20	0.025	0.016	na	na	na
V	3	0.78	0.33	0.40	0.53	1.92	0.001	0.001	na	na	na
OF	4	1.22	0.87	0.97	1.02	1.75	0.008	0.004	na	na	na
IF	4	1.49	0.86	0.41	0.83	1.57	0.028	0.001	na	na	na
OSD	4	2.11	1.97	0.80	0.84	1.25	0.006	0.003	na	na	na
ISD	4	1.51	1.08	1.04	1.36	2.40	0.028	0.019	na	na	na
V	4	1.14	0.73	0.38	1.18	1.97	0.010	0.001	na	na	na
OF	5	1.97	0.93	1.02	1.44	1.76	0.015	0.004	na	na	na

Location code	Rep.	ECEC (cmol (+) kg <sup>-1</sup> )					Total N (%)				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
IF	5	1.50	0.80	0.52	0.74	1.31	0.035	0.001	na	na	na
OSD	5	1.41	0.78	0.86	1.20	2.11	0.001	0.002	na	na	na
ISD	5	2.34	1.76	1.65	1.50	2.35	0.045	0.019	na	na	na
V	5	1.38	1.17	1.22	1.21	1.89	0.002	0.004	na	na	na
OF	6	1.67	0.95	1.26	1.50	2.37	0.017	0.002	na	na	na
IF	6	1.96	1.13	0.47	0.67	0.74	0.041	0.034	na	na	na
OSD	6	1.75	1.08	0.88	1.97	2.41	0.019	0.007	na	na	na
ISD	6	3.19	1.48	1.05	1.87	3.03	0.040	0.019	na	na	na
V	6	1.31	1.23	1.22	1.36	2.47	0.006	0.001	na	na	na
OF	7	1.36	1.15	1.32	1.69	2.26	0.007	0.004	na	na	na
IF	7	1.86	0.68	0.46	0.72	0.77	0.040	0.021	na	na	na
OSD	7	1.45	1.33	1.10	1.46	2.53	0.009	0.005	na	na	na
ISD	7	3.16	1.31	1.00	2.02	3.27	0.039	0.017	na	na	na
V	7	1.53	1.35	1.59	1.18	2.47	0.006	0.002	na	na	na
OF	8	1.16	0.79	0.77	1.72	2.18	0.010	0.008	na	na	na
IF	8	1.36	0.69	0.42	0.44	0.97	0.023	0.019	na	na	na
OSD	8	1.37	0.91	0.92	1.60	2.11	0.002	0.001	na	na	na
ISD	8	2.97	1.71	1.20	0.89	1.57	0.037	0.029	na	na	na
V	8	2.11	0.58	1.08	1.30	2.19	0.016	0.002	na	na	na
OF	9	1.79	0.98	1.00	1.38	2.50	0.025	0.005	na	na	na
IF	9	1.63	1.31	1.01	0.54	0.94	0.028	0.021	na	na	na
OSD	9	1.13	1.15	0.82	1.27	2.27	0.011	0.001	na	na	na
ISD	9	2.41	1.63	1.13	1.15	2.05	0.042	0.025	na	na	na
V	9	1.42	1.18	1.10	1.33	2.26	0.015	0.007	na	na	na
OF	10	1.18	0.94	1.06	1.35	2.44	0.008	0.001	na	na	na
IF	10	1.45	0.93	0.74	0.68	0.98	0.027	0.015	na	na	na
OSD	10	1.24	1.08	1.07	2.74	2.40	0.007	0.001	na	na	na
ISD	10	2.89	1.71	1.40	1.91	3.24	0.033	0.022	na	na	na
V	10	1.23	1.09	0.99	1.25	2.33	0.010	0.005	na	na	na
<b>Treatment means</b>											
OF		1.38	0.92	1.02	1.40	1.97	0.013	0.004	na	na	na
IF		1.54	0.90	0.50	0.63	1.08	0.031	0.017	na	na	na
OSD		1.37	1.06	0.91	1.41	1.90	0.007	0.003	na	na	na
ISD		2.27	1.36	1.19	1.57	2.40	0.033	0.018	na	na	na
V		1.30	0.91	0.90	1.04	2.15	0.007	0.003	na	na	na
<b>Standard error of the means</b>											
OF		0.10	0.03	0.05	0.07	0.13	0.002	0.001	na	na	na
IF		0.07	0.07	0.07	0.05	0.09	0.002	0.003	na	na	na
OSD		0.11	0.12	0.03	0.18	0.17	0.002	0.001	na	na	na
ISD		0.24	0.11	0.07	0.11	0.21	0.003	0.002	na	na	na
V		0.12	0.11	0.13	0.11	0.08	0.002	0.001	na	na	na
<b>8 February 1999</b>											
IF	1	1.06	0.69	0.75	0.93	1.58	na	na	na	na	na
ISD	1	1.82	0.75	0.77	0.89	1.73	na	na	na	na	na
V	1	1.32	0.90	0.44	0.73	1.45	na	na	na	na	na
IF	2	1.26	0.74	0.69	0.39	0.80	na	na	na	na	na
ISD	2	1.89	1.00	0.58	0.39	1.67	na	na	na	na	na
V	2	0.92	0.39	0.30	0.26	0.30	na	na	na	na	na
IF	3	0.82	0.52	0.49	0.35	0.47	na	na	na	na	na
ISD	3	2.26	0.96	0.75	0.48	1.06	na	na	na	na	na
V	3	0.92	0.60	0.54	0.40	1.22	na	na	na	na	na
IF	4	1.08	0.90	0.74	0.43	1.34	na	na	na	na	na
ISD	4	2.14	1.15	0.78	0.90	2.43	na	na	na	na	na
V	4	1.81	0.91	0.59	0.46	1.07	na	na	na	na	na

Location code	Rep.	ECEC (cmol (+) kg <sup>-1</sup> )					Total N (%)				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
IF	5	2.35	1.32	0.85	1.53	2.55	na	na	na	na	na
ISD	5	1.86	0.61	1.39	2.61	3.91	na	na	na	na	na
V	5	1.34	1.31	1.18	1.07	1.41	na	na	na	na	na
IF	6	2.04	1.18	1.07	0.77	1.03	na	na	na	na	na
ISD	6	3.08	1.48	1.29	0.77	1.91	na	na	na	na	na
V	6	1.51	1.16	0.77	1.12	1.49	na	na	na	na	na
IF	7	3.51	1.19	0.82	0.94	1.98	na	na	na	na	na
ISD	7	3.85	1.55	1.66	2.89	3.76	na	na	na	na	na
V	7	2.10	1.17	0.94	0.95	1.35	na	na	na	na	na
IF	8	1.44	1.05	0.54	0.53	0.84	na	na	na	na	na
ISD	8	2.29	1.24	0.64	0.85	2.41	na	na	na	na	na
V	8	1.36	1.18	0.67	0.76	1.55	na	na	na	na	na
IF	9	0.98	0.77	0.67	0.54	0.72	na	na	na	na	na
ISD	9	2.17	0.98	0.79	0.93	2.63	na	na	na	na	na
V	9	1.22	0.71	0.38	0.43	0.40	na	na	na	na	na
IF	10	1.14	0.74	0.97	1.59	2.83	na	na	na	na	na
ISD	10	2.66	1.44	1.09	1.13	2.65	na	na	na	na	na
V	10	1.21	0.72	0.45	0.48	1.25	na	na	na	na	na
Treatment means											
IF		1.57	0.91	0.76	0.80	1.41	na	na	na	na	na
ISD		2.40	1.12	0.97	1.18	2.42	na	na	na	na	na
V		1.37	0.91	0.63	0.67	1.15	na	na	na	na	na
Standard error of the means											
IF		0.26	0.08	0.06	0.14	0.26	na	na	na	na	na
ISD		0.20	0.10	0.11	0.27	0.28	na	na	na	na	na
V		0.12	0.09	0.09	0.10	0.14	na	na	na	na	na

Table 6. DTPA-extractable Cu and Zn at given locations on selected dates.

(Location code: V = Location 1: Inside virgin open forest; OF = Location 2: Outside fertiliser placement zone near fertigated tree; IF = Location 3: Inside fertiliser placement zone of fertigated tree; OSD = Location 2: Outside fertiliser placement zone near surface dressed tree; ISD = Location 4: Inside fertiliser placement zone of surface dressed tree.).

Location code	Rep.	DTPA-Cu (mg kg <sup>-1</sup> )					DTPA-Zn (mg kg <sup>-1</sup> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
<b>4 March 1996</b>											
IF	1	0.07	0.02	0.02	0.02	0.02	0.45	0.19	0.30	0.44	1.67
ISD	1	0.05	0.07	0.02	0.02	0.02	0.29	0.33	0.26	0.50	1.37
V	1	0.02	0.06	0.05	0.05	0.02	0.58	0.17	0.23	0.20	1.21
IF	2	0.05	0.02	0.02	0.02	0.02	0.39	0.21	0.17	0.25	0.97
ISD	2	0.07	0.02	0.02	0.02	0.02	0.22	0.29	0.17	0.37	0.75
V	2	0.05	0.02	0.05	0.02	0.02	0.20	0.18	0.18	1.20	0.90
IF	3	0.02	0.02	0.02	0.02	0.02	0.23	0.13	0.09	0.38	1.18
ISD	3	0.06	0.02	0.02	0.02	0.02	0.60	0.33	0.20	0.66	0.91
V	3	0.05	0.02	0.07	0.05	0.03	0.50	0.17	0.37	0.30	1.12
IF	4	0.06	0.02	0.02	0.02	0.02	0.61	0.26	0.40	0.54	0.91
ISD	4	0.05	0.02	0.09	0.02	0.02	0.30	0.17	0.56	0.67	1.28
V	4	0.05	0.03	0.07	0.03	0.01	0.39	0.33	0.23	0.20	1.32
IF	5	0.10	0.05	0.06	0.05	0.02	0.54	0.35	0.34	2.56	3.18
ISD	5	0.10	0.02	0.05	0.02	0.02	0.27	0.28	0.42	0.87	1.06
V	5	0.04	0.03	0.05	0.04	0.02	0.32	0.39	0.37	1.20	1.60
IF	6	0.08	0.06	0.05	0.02	0.02	0.30	0.20	0.50	0.79	1.26
ISD	6	0.06	0.07	0.02	0.02	0.02	0.29	0.19	0.25	0.55	1.68
V	6	0.05	0.02	0.07	0.05	0.02	0.21	0.14	0.18	0.30	1.12
IF	7	0.11	0.09	0.10	0.07	0.02	0.53	0.26	1.21	1.68	2.18
ISD	7	0.08	0.02	0.11	0.02	0.05	0.35	0.30	0.32	0.73	1.72
V	7	0.05	0.02	0.05	0.02	0.03	0.27	0.14	0.37	0.20	1.82
IF	8	0.07	0.05	0.02	0.07	0.02	0.49	0.22	0.26	0.54	1.27
ISD	8	0.07	0.06	0.02	0.02	0.02	0.33	0.14	0.17	0.35	0.64
V	8	0.04	0.03	0.07	0.03	0.05	0.39	0.19	0.23	0.30	1.23
IF	9	0.07	0.02	0.02	0.02	0.02	0.38	0.19	0.27	0.63	1.19
ISD	9	0.08	0.07	0.02	0.05	0.02	0.19	0.49	0.25	0.67	0.98
V	9	0.05	0.03	0.02	0.04	0.03	0.21	0.15	0.37	0.32	3.20
IF	10	0.11	0.07	0.02	0.02	0.02	0.46	0.34	0.42	1.44	1.27
ISD	10	0.09	0.07	0.06	0.07	0.02	0.34	0.23	0.42	0.55	1.42
V	10	0.05	0.03	0.02	0.06	0.02	0.16	0.25	0.18	0.26	1.16
Treatment means											
IF		0.074	0.041	0.036	0.034	0.020	0.438	0.235	0.395	0.924	1.509
ISD		0.071	0.043	0.043	0.028	0.023	0.318	0.274	0.302	0.592	1.179
V		0.045	0.029	0.052	0.039	0.025	0.322	0.211	0.269	0.448	1.468
Standard error of the means											
IF		0.009	0.008	0.009	0.007	0.000	0.037	0.021	0.098	0.233	0.219
ISD		0.005	0.008	0.011	0.005	0.003	0.035	0.032	0.041	0.051	0.118
V		0.003	0.003	0.006	0.004	0.003	0.044	0.028	0.029	0.126	0.209
<b>12 March 1998</b>											
OF	1	0.19	0.29	0.27	0.05	0.45	0.89	0.11	0.09	0.20	0.16
IF	1	0.29	0.05	0.05	0.05	0.05	1.66	0.22	0.36	0.34	0.88
OSD	1	0.44	0.42	0.47	0.38	0.49	0.49	0.16	0.11	0.17	0.20
ISD	1	0.76	0.18	0.05	0.05	0.21	2.17	0.83	0.64	0.43	1.39
V	1	0.17	0.06	0.17	0.05	0.16	0.16	0.10	0.31	0.25	5.16
OF	2	0.14	0.34	0.09	0.21	0.10	0.65	0.15	0.09	0.34	0.14
IF	2	0.16	0.12	0.05	0.05	0.17	2.13	0.24	0.22	0.33	0.79

Location code	Rep.	DTPA-Cu (mg kg <sup>-1</sup> )					DTPA-Zn (mg kg <sup>-1</sup> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
OSD	2	0.35	0.31	0.25	0.13	0.19	0.73	0.20	0.07	0.11	0.17
ISD	2	0.43	0.36	0.11	0.21	0.15	2.11	0.52	0.19	0.27	0.91
V	2	0.08	0.05	0.05	0.09	0.16	0.18	0.13	0.21	0.31	4.44
OF	3	0.07	0.19	0.15	0.27	0.18	0.54	0.22	0.09	0.18	0.17
IF	3	0.42	0.16	0.15	0.13	0.05	2.25	0.46	0.39	0.44	0.56
OSD	3	0.24	0.15	0.25	0.05	0.13	0.69	0.15	0.11	0.08	0.16
ISD	3	2.68	0.33	0.15	0.17	0.22	8.61	0.40	0.22	0.42	0.19
V	3	0.09	0.07	0.07	0.09	0.16	0.30	0.27	0.18	0.28	4.86
OF	4	0.18	0.11	0.11	0.18	0.06	0.38	0.16	0.18	0.11	0.13
IF	4	1.02	0.38	0.12	0.15	0.05	3.35	0.66	0.49	0.77	3.18
OSD	4	0.11	0.12	0.05	0.13	0.06	0.26	0.24	0.10	0.09	0.11
ISD	4	2.53	0.50	0.31	0.36	0.21	7.25	0.57	0.42	0.36	0.36
V	4	0.07	0.05	0.12	0.21	0.20	0.15	0.05	0.05	2.22	4.89
OF	5	0.35	0.15	0.17	0.19	0.05	0.22	0.15	0.11	0.16	0.13
IF	5	0.05	0.16	0.14	0.15	0.08	2.97	0.35	0.40	2.50	2.75
OSD	5	0.17	0.13	0.09	0.19	0.24	0.66	0.21	0.13	0.15	0.14
ISD	5	0.56	0.29	0.18	0.22	0.18	2.30	0.29	0.23	0.36	0.20
V	5	0.16	0.26	0.30	0.24	0.63	0.13	0.19	0.25	2.06	10.65
OF	6	0.08	0.12	0.09	0.11	0.05	0.15	0.06	0.08	0.16	0.65
IF	6	0.18	0.20	0.11	0.18	0.05	1.95	0.41	0.14	0.18	0.36
OSD	6	0.32	0.34	0.26	0.26	0.24	0.69	0.16	0.12	0.98	0.68
ISD	6	0.42	0.06	0.09	0.14	0.10	1.24	1.02	4.43	0.23	0.23
V	6	0.20	0.09	0.08	0.06	0.40	0.14	0.13	0.14	2.23	4.19
OF	7	0.12	0.05	0.09	0.12	0.16	0.42	0.12	0.12	0.13	0.63
IF	7	0.41	0.12	0.14	0.09	0.08	2.19	0.48	0.13	0.18	0.31
OSD	7	0.16	0.14	0.10	0.10	0.09	0.22	0.07	0.15	0.12	0.69
ISD	7	0.23	0.14	0.21	0.20	0.07	1.01	0.11	0.16	0.21	0.23
V	7	0.24	0.05	0.18	0.12	0.07	0.22	0.13	0.27	2.25	7.27
OF	8	0.08	0.10	0.17	0.10	0.11	0.74	0.12	0.11	0.16	0.16
IF	8	0.14	0.05	0.05	0.23	0.12	1.92	0.44	0.31	1.22	1.08
OSD	8	0.18	0.13	0.15	0.11	0.12	0.47	0.16	0.15	0.09	0.14
ISD	8	0.35	0.10	0.25	0.14	0.26	1.55	0.28	0.60	0.36	1.23
V	8	0.16	0.15	0.23	0.14	0.16	0.27	0.22	0.36	1.16	1.99
OF	9	0.14	0.18	0.10	0.08	0.10	0.74	0.20	0.10	0.10	0.37
IF	9	0.40	0.17	0.15	0.05	0.05	2.76	0.66	0.22	0.73	0.98
OSD	9	0.09	0.15	0.10	0.07	0.10	0.31	0.07	0.23	0.31	0.34
ISD	9	0.26	0.17	0.13	0.09	0.06	0.41	0.33	1.09	0.48	1.75
V	9	0.19	0.18	0.19	0.16	0.08	0.11	0.07	0.28	1.24	1.76
OF	10	0.25	0.16	0.07	0.05	0.42	0.43	0.10	0.12	0.12	0.89
IF	10	0.05	0.16	0.05	0.05	0.05	1.94	0.40	0.25	0.60	0.05
OSD	10	0.17	0.10	0.12	0.05	0.10	0.25	0.10	0.08	1.23	0.71
ISD	10	0.54	0.17	0.12	0.15	0.08	2.03	0.35	0.23	0.46	0.60
V	10	0.11	0.05	0.07	0.09	0.34	0.27	0.27	0.24	1.16	1.66
Treatment means											
	OF	0.160	0.169	0.131	0.136	0.168	0.516	0.139	0.109	0.166	0.343
	IF	0.312	0.157	0.101	0.113	0.075	2.312	0.432	0.291	0.729	1.094
	OSD	0.223	0.199	0.184	0.147	0.176	0.477	0.152	0.125	0.333	0.334
	ISD	0.876	0.230	0.160	0.173	0.154	2.868	0.470	0.821	0.358	0.709
	V	0.147	0.101	0.146	0.125	0.236	0.193	0.156	0.229	1.316	4.687

Location code	Rep.	DTPA-Cu (mg kg <sup>-1</sup> )					DTPA-Zn (mg kg <sup>-1</sup> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
Standard error of the means											
OF		0.028	0.028	0.019	0.023	0.047	0.076	0.015	0.009	0.022	0.089
IF		0.091	0.029	0.014	0.020	0.013	0.170	0.047	0.038	0.221	0.330
OSD		0.036	0.036	0.040	0.033	0.040	0.065	0.018	0.014	0.132	0.081
ISD		0.292	0.043	0.025	0.027	0.023	0.870	0.087	0.411	0.030	0.182
V		0.018	0.023	0.026	0.020	0.055	0.021	0.025	0.028	0.266	0.868

Table 7. DTPA-extractable Fe and Mn at given locations on selected dates.

(Location code: V = Location 1: Inside virgin open forest; OF = Location 2: Outside fertiliser placement zone near fertigated tree; IF = Location 3: Inside fertiliser placement zone of fertigated tree; OSD = Location 2: Outside fertiliser placement zone near surface dressed tree; ISD = Location 4: Inside fertiliser placement zone of surface dressed tree.).

Location code	Rep.	DTPA-Fe (mg kg <sup>-1</sup> )					DTPA-Mn (mg kg <sup>-1</sup> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
<b>4 March 1996</b>											
IF	1	10.56	6.60	3.24	1.79	1.25	34.54	21.06	10.46	4.27	3.59
ISD	1	7.53	5.86	3.07	1.06	0.83	22.43	19.34	11.53	4.44	2.18
V	1	9.74	13.66	8.43	5.00	2.60	26.85	3.02	5.14	3.20	0.40
IF	2	8.93	6.33	3.49	1.36	2.83	24.55	18.61	8.36	2.22	4.28
ISD	2	6.26	5.02	2.32	1.30	1.43	14.50	16.69	6.92	3.11	3.13
V	2	6.66	7.19	3.53	1.80	4.20	21.62	15.88	10.04	4.00	2.30
IF	3	3.83	5.95	3.99	2.23	2.81	6.46	10.54	6.17	3.58	4.34
ISD	3	7.95	4.32	2.13	1.81	1.29	20.40	9.84	4.02	3.58	2.56
V	3	9.13	11.73	2.69	1.60	1.20	14.96	5.68	4.00	1.90	1.80
IF	4	10.90	8.33	4.17	1.84	1.30	33.27	20.84	9.42	4.95	1.73
ISD	4	9.78	7.26	4.50	1.86	1.19	23.71	20.63	12.45	4.94	1.55
V	4	9.10	12.22	3.53	0.02	2.10	34.93	4.32	10.04	4.00	1.50
IF	5	10.83	7.64	4.60	2.56	0.95	35.24	30.89	13.56	3.67	1.62
ISD	5	18.60	15.32	6.30	2.10	1.14	57.10	38.04	19.84	3.52	2.08
V	5	8.56	8.79	3.53	0.05	2.30	28.82	6.63	4.00	1.80	2.10
IF	6	9.05	6.78	4.99	1.58	1.10	21.02	19.60	14.42	3.25	1.79
ISD	6	13.11	9.40	5.21	1.45	1.10	29.36	32.87	17.09	3.75	1.86
V	6	9.50	12.89	2.69	5.00	3.20	43.14	3.45	10.04	4.00	0.15
IF	7	13.25	10.16	7.85	1.53	0.98	28.58	14.63	10.29	2.16	3.37
ISD	7	12.26	6.70	4.18	1.19	1.11	21.40	16.80	12.17	3.57	3.90
V	7	7.65	10.06	3.53	1.80	2.80	31.95	19.56	5.65	1.90	0.12
IF	8	9.95	5.25	3.60	1.41	1.12	22.31	11.84	7.22	2.20	1.33
ISD	8	8.85	8.13	4.66	2.01	1.09	15.60	16.51	9.75	4.19	1.95
V	8	9.27	15.25	2.69	1.60	3.80	36.53	17.79	4.00	3.20	0.50
IF	9	12.00	13.10	6.22	2.79	1.29	38.57	37.12	22.23	10.07	3.21
ISD	9	8.44	5.17	3.49	1.78	1.02	18.02	14.27	8.40	4.02	1.36
V	9	5.57	5.98	4.35	1.90	4.20	37.33	11.01	4.00	3.20	0.21
IF	10	26.84	10.04	5.96	1.72	1.48	39.46	27.49	31.14	4.99	3.33
ISD	10	10.10	6.56	3.67	1.27	1.36	23.77	24.25	12.17	2.26	1.36
V	10	6.49	5.53	2.69	3.20	1.60	12.08	13.73	6.45	2.10	0.12
Treatment means											
IF		11.61	8.02	4.81	1.88	1.51	28.40	21.26	13.33	4.14	2.86
ISD		10.29	7.37	3.95	1.58	1.15	24.63	20.92	11.43	3.74	2.19
V		8.17	10.33	3.76	2.20	2.80	28.82	10.11	6.34	2.93	0.92
Standard error of the means											
IF		1.87	0.77	0.46	0.15	0.22	3.20	2.67	2.46	0.74	0.36
ISD		1.14	1.00	0.41	0.12	0.05	3.86	2.73	1.46	0.23	0.26
V		0.47	1.06	0.55	0.55	0.33	3.18	1.99	0.85	0.29	0.28
<b>12 March 1998</b>											
OF	1	11.27	6.15	4.22	2.12	1.99	19.45	17.64	8.58	4.51	2.37
IF	1	9.50	18.83	14.69	4.61	3.77	19.22	32.15	31.18	37.50	22.55
OSD	1	9.46	4.89	3.04	1.73	1.07	16.23	14.28	8.57	5.49	2.63
ISD	1	11.17	14.67	10.52	10.72	4.34	40.22	53.84	50.79	28.29	9.69
V	1	15.77	8.88	5.44	3.82	2.56	9.64	2.68	0.80	0.50	4.07
OF	2	8.95	7.42	4.52	2.63	1.54	19.93	20.53	11.43	5.02	1.75
IF	2	10.10	14.83	14.30	4.51	4.24	19.12	31.69	32.22	31.52	21.06

Location code	Rep.	DTPA-Fe (mg kg <sup>-1</sup> )					DTPA-Mn (mg kg <sup>-1</sup> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
OSD	2	9.93	6.24	3.32	1.44	0.76	16.38	19.33	11.22	3.44	1.41
ISD	2	11.55	6.17	3.96	3.29	6.24	25.42	23.81	15.68	9.96	14.42
V	2	16.01	5.33	5.09	4.09	2.30	10.58	3.32	0.58	0.55	3.08
OF	3	9.13	7.66	4.25	2.23	1.61	16.19	19.33	9.37	3.45	1.44
IF	3	8.72	16.21	23.35	5.22	3.10	19.33	30.48	39.58	31.73	10.64
OSD	3	8.85	6.04	3.43	0.95	1.29	15.63	17.81	10.22	3.49	1.42
ISD	3	18.89	13.01	7.47	2.95	4.52	22.60	15.27	60.84	17.93	4.87
V	3	10.33	5.49	4.48	4.36	2.77	5.87	0.69	0.70	0.55	3.98
OF	4	8.42	7.42	3.06	2.08	1.41	15.58	19.31	7.50	3.19	0.86
IF	4	11.75	16.16	16.78	7.96	6.62	17.22	30.44	37.13	28.09	9.98
OSD	4	8.71	5.24	3.76	1.23	1.16	9.10	10.58	9.94	3.99	1.67
ISD	4	15.43	14.11	7.28	2.61	1.99	21.50	16.91	64.50	17.43	4.41
V	4	13.92	5.19	5.64	1.87	2.16	8.83	2.65	0.57	5.20	3.42
OF	5	14.72	8.90	3.60	2.01	1.78	10.14	17.22	8.60	2.51	1.34
IF	5	9.74	12.45	31.91	9.90	10.41	17.82	54.93	45.12	25.23	15.42
OSD	5	9.25	6.89	4.13	2.82	1.78	19.13	22.92	12.01	8.48	3.14
ISD	5	16.89	9.66	6.37	3.33	1.37	32.64	37.25	54.08	22.47	4.94
V	5	4.25	5.77	2.70	2.06	2.26	11.02	20.73	14.82	4.98	4.13
OF	6	17.90	10.14	5.48	2.81	3.54	24.92	25.95	15.79	5.50	1.53
IF	6	10.55	15.37	24.32	11.70	7.71	13.51	27.51	66.62	39.73	19.44
OSD	6	15.24	11.75	6.35	2.76	2.39	26.57	30.92	20.48	3.31	2.07
ISD	6	22.86	12.04	10.14	4.30	1.62	40.58	36.21	59.37	27.79	6.25
V	6	6.17	3.97	3.04	2.44	2.69	17.26	18.51	12.07	3.68	2.89
OF	7	20.62	11.45	7.31	3.01	4.87	20.44	16.00	20.62	6.01	2.28
IF	7	8.46	11.69	26.00	8.95	7.71	13.75	27.26	60.03	40.29	14.56
OSD	7	14.05	10.10	6.72	2.92	1.38	28.63	29.23	22.54	7.39	1.66
ISD	7	20.45	15.73	10.06	3.94	1.70	43.65	50.81	50.03	24.76	6.49
V	7	5.38	3.95	3.86	3.26	2.30	16.93	19.99	17.65	5.07	3.27
OF	8	13.55	8.76	4.98	2.89	4.03	16.07	17.63	11.33	5.77	2.31
IF	8	6.34	9.56	19.57	12.43	9.56	12.01	17.77	38.79	26.02	31.01
OSD	8	9.67	10.29	5.27	2.25	1.37	14.11	23.43	14.19	5.47	1.45
ISD	8	11.07	11.52	18.46	7.43	18.10	27.66	51.26	57.78	42.07	91.59
V	8	8.57	5.59	2.51	1.51	1.63	21.59	15.29	9.41	3.98	2.49
OF	9	22.37	10.15	6.41	4.09	3.43	24.75	20.74	13.23	6.31	1.62
IF	9	19.27	15.69	6.60	11.77	9.56	22.10	28.78	15.35	19.11	27.23
OSD	9	18.91	12.68	4.91	3.01	1.69	29.24	36.09	10.57	6.83	1.68
ISD	9	13.03	12.74	8.04	6.00	6.29	34.18	29.98	34.72	41.17	34.14
V	9	5.84	4.17	2.77	1.84	1.76	16.54	14.51	8.29	3.97	2.71
OF	10	40.43	14.21	7.36	4.82	4.21	30.39	36.12	20.50	7.28	1.91
IF	10	6.72	8.92	10.79	12.59	0.20	9.91	21.05	28.52	19.21	0.20
OSD	10	12.38	9.66	6.32	2.09	2.58	26.62	31.14	19.87	1.28	1.63
ISD	10	20.00	11.65	8.47	6.66	2.24	62.63	68.61	47.04	20.62	1.55
V	10	8.38	4.38	2.11	1.54	1.38	17.02	15.04	13.39	4.49	2.82
Treatment means											
OF		16.74	9.23	5.12	2.87	2.84	19.79	21.05	12.70	4.96	1.74
IF		10.12	13.97	18.83	8.96	6.29	16.40	30.21	39.45	29.84	17.21
OSD		11.65	8.38	4.73	2.12	1.55	20.16	23.57	13.96	4.92	1.88
ISD		16.13	12.13	9.08	5.12	4.84	35.11	38.40	49.48	25.25	17.84
V		9.46	5.27	3.76	2.68	2.18	13.53	11.34	7.83	3.30	3.29

Location code	Rep.	DTPA-Fe (mg kg <sup>-1</sup> )					DTPA-Mn (mg kg <sup>-1</sup> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
Standard error of the means											
OF		3.06	0.75	0.47	0.29	0.41	1.83	1.89	1.52	0.48	0.15
IF		1.14	1.01	2.43	1.03	1.06	1.23	3.12	4.74	2.45	2.86
OSD		1.08	0.90	0.44	0.24	0.18	2.23	2.60	1.61	0.70	0.18
ISD		1.37	0.86	1.22	0.81	1.59	3.92	5.53	4.61	3.21	8.71
V		1.39	0.46	0.42	0.35	0.15	1.57	2.54	2.11	0.62	0.19

Table 8. Organic carbon (Org-C) and Calcium phosphate-extractable sulfate (Extr.-SO<sub>4</sub>) at given locations on selected dates (na = Data not available).

(Location code: V = Location 1: Inside virgin open forest; OF = Location 2: Outside fertiliser placement zone near fertigated tree; IF = Location 3: Inside fertiliser placement zone of fertigated tree; OSD = Location 2: Outside fertiliser placement zone near surface dressed tree; ISD = Location 4: Inside fertiliser placement zone of surface dressed tree.).

Location code	Rep.	Org-C (%)					Extr.-SO <sub>4</sub> (mg kg <sup>-1</sup> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
<b>4 March 1996</b>											
IF	1	0.53	0.29	0.26	0.36	0.39	na	na	na	na	na
ISD	1	0.35	0.32	0.16	0.20	0.25	na	na	na	na	na
V	1	0.25	0.24	0.05	0.03	0.05	na	na	na	na	na
IF	2	0.55	0.34	0.27	0.22	0.19	na	na	na	na	na
ISD	2	0.38	0.24	0.18	0.16	0.13	na	na	na	na	na
V	2	0.29	0.24	0.09	0.06	0.11	na	na	na	na	na
IF	3	0.32	0.30	0.23	0.17	0.16	na	na	na	na	na
ISD	3	0.38	0.24	0.20	0.18	0.15	na	na	na	na	na
V	3	0.34	0.37	0.11	0.05	0.10	na	na	na	na	na
IF	4	0.39	0.26	0.16	0.21	0.28	na	na	na	na	na
ISD	4	0.40	0.36	0.37	0.43	0.25	na	na	na	na	na
V	4	0.40	0.38	0.15	0.03	0.08	na	na	na	na	na
IF	5	0.47	0.27	0.27	0.31	0.23	na	na	na	na	na
ISD	5	0.47	0.42	0.37	0.32	0.29	na	na	na	na	na
V	5	0.44	0.43	0.12	0.06	0.09	na	na	na	na	na
IF	6	0.63	0.34	0.28	0.33	0.39	na	na	na	na	na
ISD	6	0.44	0.24	0.14	0.09	0.12	na	na	na	na	na
V	6	0.39	0.36	0.09	0.04	0.07	na	na	na	na	na
IF	7	0.59	0.67	0.53	0.35	0.34	na	na	na	na	na
ISD	7	0.63	0.29	0.27	0.20	0.20	na	na	na	na	na
V	7	0.32	0.29	0.13	0.05	0.06	na	na	na	na	na
IF	8	0.34	0.31	0.27	0.30	0.29	na	na	na	na	na
ISD	8	0.37	0.24	0.16	0.13	0.16	na	na	na	na	na
V	8	0.48	0.39	0.16	0.03	0.07	na	na	na	na	na
IF	9	0.52	0.43	0.30	0.29	0.25	na	na	na	na	na
ISD	9	0.42	0.26	0.15	0.14	0.14	na	na	na	na	na
V	9	0.36	0.25	0.15	0.07	0.10	na	na	na	na	na
IF	10	0.53	0.33	0.28	0.37	0.35	na	na	na	na	na
ISD	10	0.44	0.29	0.24	0.33	0.34	na	na	na	na	na
V	10	0.31	0.28	0.08	0.07	0.09	na	na	na	na	na
Treatment means											
	IF	0.49	0.35	0.28	0.29	0.29	na	na	na	na	na
	ISD	0.43	0.29	0.22	0.22	0.20	na	na	na	na	na
	V	0.36	0.32	0.11	0.05	0.08	na	na	na	na	na
Standard error of the means											
	IF	0.03	0.04	0.03	0.02	0.02	na	na	na	na	na
	ISD	0.03	0.02	0.03	0.03	0.02	na	na	na	na	na
	V	0.02	0.02	0.01	0.01	0.01	na	na	na	na	na
<b>12 March 1998</b>											
OF	1	0.34	0.20	na	na	na	1.46	1.48	1.50	1.52	1.53
IF	1	0.42	0.34	na	na	na	4.30	3.80	4.18	6.63	6.30
OSD	1	0.35	0.27	na	na	na	2.35	2.37	2.39	2.41	2.42
ISD	1	0.29	0.25	na	na	na	5.70	5.90	6.08	6.30	6.40
V	1	0.39	0.27	na	na	na	2.20	0.80	1.30	1.10	0.81
OF	2	0.34	0.25	na	na	na	1.55	1.57	1.59	1.60	1.62

Location code	Rep.	Org-C (%)					Extr.-SO <sub>4</sub> (mg kg <sup>-1</sup> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
IF	2	0.36	0.25	na	na	na	3.70	3.60	3.50	3.80	7.30
OSD	2	0.36	0.23	na	na	na	2.44	2.46	2.48	2.49	2.51
ISD	2	0.24	0.21	na	na	na	6.60	6.80	6.97	7.10	9.40
V	2	0.32	0.17	na	na	na	1.33	1.20	1.60	0.60	0.99
OF	3	0.34	0.30	na	na	na	1.64	1.66	1.68	1.69	1.71
IF	3	0.58	0.32	na	na	na	3.96	3.40	4.70	9.10	8.20
OSD	3	0.29	0.17	na	na	na	2.53	2.55	2.57	2.58	2.60
ISD	3	0.35	0.23	na	na	na	7.50	7.70	7.86	8.00	16.00
V	3	0.26	0.12	na	na	na	1.50	1.29	1.30	0.50	1.10
OF	4	0.29	0.23	na	na	na	1.73	1.75	1.77	1.78	1.80
IF	4	0.45	0.33	na	na	na	3.70	3.50	4.70	8.20	9.10
OSD	4	0.34	0.27	na	na	na	2.62	2.64	2.66	2.67	2.69
ISD	4	0.35	0.28	na	na	na	8.40	8.60	8.75	8.90	14.40
V	4	0.35	0.20	na	na	na	1.30	1.34	1.10	0.90	0.90
OF	5	0.40	0.24	na	na	na	1.82	1.84	1.85	1.87	1.89
IF	5	0.43	0.23	na	na	na	4.20	4.00	5.00	7.30	10.00
OSD	5	0.37	0.20	na	na	na	2.71	2.73	2.74	2.76	2.78
ISD	5	0.52	0.27	na	na	na	9.30	9.50	9.64	9.80	17.31
V	5	0.29	0.21	na	na	na	1.10	1.80	4.50	3.90	3.80
OF	6	0.56	0.34	na	na	na	1.91	1.93	1.94	1.96	1.98
IF	6	0.60	0.41	na	na	na	3.90	3.87	7.60	10.70	10.90
OSD	6	0.50	0.29	na	na	na	2.80	2.82	2.83	2.85	2.87
ISD	6	0.51	0.35	na	na	na	10.20	10.40	10.53	15.40	26.20
V	6	0.33	0.24	na	na	na	4.50	4.30	4.10	3.20	3.90
OF	7	0.46	0.32	na	na	na	2.00	2.01	2.03	2.05	2.07
IF	7	0.51	0.29	na	na	na	3.80	4.30	6.20	11.60	11.80
OSD	7	0.47	0.32	na	na	na	2.89	2.90	2.92	2.94	2.96
ISD	7	0.52	0.33	na	na	na	11.10	11.20	11.42	14.00	24.80
V	7	0.34	0.29	na	na	na	3.80	4.03	3.90	3.50	4.40
OF	8	0.38	0.21	na	na	na	2.09	2.10	2.12	2.14	2.16
IF	8	0.28	0.26	na	na	na	3.30	4.30	3.90	6.50	9.41
OSD	8	0.37	0.27	na	na	na	2.98	2.99	3.01	3.03	3.05
ISD	8	0.52	0.33	na	na	na	12.00	12.10	12.31	12.50	12.70
V	8	0.55	0.28	na	na	na	4.40	4.24	3.80	3.70	4.10
OF	9	0.55	0.29	na	na	na	2.17	2.19	2.21	2.23	2.25
IF	9	0.37	0.32	na	na	na	3.90	4.10	4.30	4.50	4.70
OSD	9	0.45	0.29	na	na	na	3.06	3.08	3.10	3.12	3.14
ISD	9	0.62	0.49	na	na	na	12.80	13.00	13.20	13.40	13.60
V	9	0.33	0.24	na	na	na	5.10	4.45	3.79	3.70	4.40
OF	10	0.43	0.25	na	na	na	2.26	2.28	2.30	2.32	2.33
IF	10	0.43	0.32	na	na	na	4.80	5.00	5.19	5.40	5.50
OSD	10	0.36	0.29	na	na	na	3.15	3.17	3.19	3.21	3.22
ISD	10	0.43	0.33	na	na	na	13.70	13.90	14.09	14.30	14.40
V	10	0.31	0.19	na	na	na	4.52	4.60	3.70	3.70	4.00
Treatment means											
	OF	0.41	0.26	na	na	na	1.86	1.88	1.90	1.92	1.93
	IF	0.44	0.31	na	na	na	3.96	3.99	4.93	7.37	8.32
	OSD	0.39	0.26	na	na	na	2.75	2.77	2.79	2.81	2.82
	ISD	0.44	0.31	na	na	na	9.73	9.91	10.09	10.97	15.52
	V	0.35	0.22	na	na	na	2.97	2.80	2.91	2.48	2.84

Location code	Rep.	Org-C (%)					Extr.-SO <sub>4</sub> (mg kg <sup>-1</sup> )				
		0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm	0-15 cm	15-30 cm	30-50 cm	50-100 cm	100-150 cm
Standard error of the means											
OF		0.03	0.01	na	na	na	0.09	0.08	0.09	0.09	0.09
IF		0.03	0.02	na	na	na	0.13	0.15	0.38	0.81	0.74
OSD		0.02	0.01	na	na	na	0.09	0.08	0.08	0.09	0.09
ISD		0.04	0.03	na	na	na	0.85	0.85	0.85	1.05	1.94
V		0.03	0.02	na	na	na	0.51	0.51	0.44	0.47	0.52

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## Appendix 1. Climatic data for Dimbulah and the field site.

Table A1.1. Mean climatic data for Dimbulah, North Queensland (Adapted from Bureau of Meteorology weather data; Commenced 1931; last record 1996).

Month												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean daily maximum temperature (°C)												
34.0	32.9	32.5	31.6	29.5	27.8	27.4	28.8	30.9	33.3	34.2	35.0	31.5
Mean daily minimum temperature (°C)												
21.7	21.4	19.9	18.0	14.5	12.6	11.1	10.5	13.3	16.7	19.8	20.9	16.6
Mean rainfall (mm)												
185.0	210.2	138.9	29.2	14.6	14.0	5.5	5.3	6.1	17.5	54.4	99.7	780.4
Mean number of raindays												
12.8	14.5	10.0	4.4	2.3	2.3	1.4	1.0	1.0	2.0	4.8	8.3	64.9
Highest monthly rainfall (mm)												
791.2	512.0	656.7	120.5	85.2	85.3	53.3	81.3	87.2	182.2	212.3	233.1	791.2
Lowest monthly rainfall (mm)												
27.2	12.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Highest recorded daily rain (mm)												
174.2	105.7	176.4	98.0	62.8	56.4	27.2	58.7	77.2	98.2	101.6	175.0	176.4

Table A1.2. Climatic data at the field site during the period of the field studies (Kindly provided by P. O'Farrell, QDPI, Mareeba.)

1996 - Month												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean daily maximum temperature (°C)												
na*	na	30.2	31.3	27.8	29.1	26.4	27.7	30.8	30.0	34.6	34.0	na
Highest daily maximum temperature (°C)												
na	na	34.0	34.6	31.8	31.1	30.4	32.0	37.3	35.7	38.1	39.7	na
Mean daily minimum temperature (°C)												
na	na	18.6	17.7	15.0	12.4	10.3	12.8	12.9	17.7	18.6	30.7	na
Lowest daily minimum temperature (°C)												
na	na	14.4	13.1	9.3	9.3	5.4	5.8	8.0	14.4	16.4	16.8	na
Mean temperature at 9.00 am (°C)												
na	na	24.8	25.1	21.7	19.0	16.8	19.4	21.5	24.4	26.0	27.3	na
Mean temperature at 3.00 pm (°C)												
na	na	28.5	29.6	26	28.5	25.4	26.7	29.9	28.7	32.5	31.9	na
Mean relative humidity at maximum temperature (%)												
na	na	69	62	64	70	81	79	65	77	66	89	na
Mean relative humidity at minimum temperature (%)												
na	na	98	99	95	99	99	100	99	100	100	100	na
Mean daily solar radiation (w m <sup>2</sup> )												
na	na	4797	5085	39.8	4884	4794	5115	6504	6293	6663	5984	na
Highest daily solar radiation (w m <sup>2</sup> )												
na	na	7065	6806	5601	5040	5587	6158	7113	8001	8112	7924	na
Lowest daily solar radiation (w m <sup>2</sup> )												
na	na	614	1804	1699	4770	643	2208	4867	993	4732	4156	na
Total rainfall (mm)												
na	na	114.5	158.5	10.0	0	16.3	0.8	2.0	43.5	21.5	52.5	na
Highest recorded daily rain (mm)												
na	na	52.8	63.3	3.3	0	15.3	0.3	0.8	33.0	11.3	26.5	na
Number of raindays												
na	na	10	13	10	0	4	3	4	7	7	12	na
Total 'A' class pan evaporation (mm)												
na	na	117.8	101.9	89.9	161.3	117.8	166.7	234.6	223.3	237.4	219.5	na
Mean daily 'A' class pan evaporation (mm)												
Na	na	3.8	3.4	2.9	5.4	3.8	5.4	7.8	7.2	7.9	7.1	na

1996 - Month												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	sep	Oct	Nov	Dec	Year
Highest daily 'A' class pan evaporation (mm)												
Na	na	7.5	8.8	5.1	7.6	7.5	8.7	14.3	11.0	14.6	12.0	na
Lowest daily 'A' class pan evaporation (mm)												
Na	na	0.1	0	0.3	3.7	0.1	1.1	3.8	0.3	0.9	0.1	0
1997 - Month												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	sep	Oct	Nov	Dec	Year
Mean daily maximum temperature (°C)												
31.6	31.8	30.0	27.6	27.0	24.8	25.6	26.8	30.9	31.5	34.0	32.7	29.5
Highest daily maximum temperature (°C)												
36.4	34.8	33.1	31.1	30.4	27.1	28.5	28.7	35.5	35.9	36.4	37.3	27.3
Mean daily minimum temperature (°C)												
20.4	20.6	19.9	14.7	13.5	12.4	12.4	11.4	14.6	16.1	18.6	20.6	16.3
Lowest daily minimum temperature (°C)												
18.3	17.9	15.3	11.3	7.6	4.7	8.9	6.2	10.6	14.4	14.8	18.8	4.7
Mean temperature at 9.00 am (°C)												
25.7	25.7	22.9	22.2	19.8	18.3	18.4	18.5	22.6	23.7	26.2	26.2	22.5
Mean temperature at 3.00 pm (°C)												
29.7	29.4	28.4	26.1	25.8	23.5	24.2	25.3	30.1	29.2	31.8	30.7	27.8
Mean relative humidity at maximum temperature (%)												
na	na	na	56	57	59	60	69	97	99	91	87	na
Mean relative humidity at minimum temperature (%)												
na	na	na	95	97	93	96	94	99	99	98	99	na
Mean daily solar radiation (w m <sup>2</sup> )												
5621	5529	4692	5080	4584	3778	3932	4786	6157	6809	6506	5308	5232
Highest daily solar radiation (w m <sup>2</sup> )												
7627	7584	7531	6820	5625	4972	1915	6264	7147	8030	7819	6289	8030
Lowest daily solar radiation (w m <sup>2</sup> )												
3681	2616	931	3259	1176	1377	2294	1948	3532	4444	4012	2585	931
Total rainfall (mm)												
31.0	131.8	211.3	6.5	38.3	2.0	0.5	8.5	1.3	6.0	7.0	300.5	744.7
Highest recorded daily rain (mm)												
17.5	43.0	87.5	2.3	33.0	1.5	0.5	7.5	0.5	4.3	2.8	70.8	87.5
Number of raindays												
7	15	12	7	3	2	1	3	3	3	6	13	75
Total 'A' class pan evaporation (mm)												
132.0	97.4	109.7	147.2	125.6	104.7	113.9	156.6	217.8	258.8	254.2	55.4	1773.3
Mean daily 'A' class pan evaporation (mm)												
4.3	3.5	3.5	4.9	4.1	3.5	3.7	5.1	7.3	8.4	8.5	1.8	4.9
Highest daily 'A' class pan evaporation (mm)												
11.1	8.2	8.4	10.2	7.7	7.6	5.4	10.4	12.6	13.3	11.2	7.6	13.3
Lowest daily 'A' class pan evaporation (mm)												
0	0	0	1.8	0.1	0.1	1.7	0.9	0.1	3.6	2.6	0	0
1998 - Month												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	sep	Oct	Nov	Dec	Year
Mean daily maximum temperature (°C)												
31.6	32.3	30.7	31.4	28.7	29.0	27.5	29.3	31.1	34.0	32.3	33.1	30.9
Highest daily maximum temperature (°C)												
35.7	34.8	35.5	34.4	31.5	31.1	30.9	32.9	35.9	37.7	36.6	37.0	37.7
Mean daily minimum temperature (°C)												
21.2	21.1	18.5	19.0	16.4	12.7	14.5	13.6	17.3	20.1	19.5	19.6	17.8
Lowest daily minimum temperature (°C)												
19.9	20.1	15.3	13.5	9.8	7.1	5.6	5.1	14.4	16.4	15.5	12.6	5.1
Mean temperature at 9.00 am (°C)												
26.0	26.6	24.7	25.1	22.5	19.7	19.9	20.7	24.0	26.7	25.5	22.4	23.6
Mean temperature at 3.00 pm (°C)												
29.0	30.3	29.6	29.7	26.8	27.6	26.9	28.3	29.3	31.9	29.9	30.2	29.1
Mean relative humidity at maximum temperature (%)												
60	56	54	53	84	97	83	37	40	48	75	97	65
Mean relative humidity at minimum temperature (%)												
98	97	96	96	99	99	98	92	92	94	97	100	97

1998 - Month												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	sep	Oct	Nov	Dec	Year
Mean daily solar radiation (w m <sup>2</sup> )												
4916	5769	5292	4977	3992	4437	3867	5206	5672	6061	5784	6368	5195
Highest daily solar radiation (w m <sup>2</sup> )												
7790	7958	8358	6254	5529	4934	5256	5913	7027	7473	7646	9948	9948
Lowest daily solar radiation (w m <sup>2</sup> )												
2390	2035	1651	3734	1876	2865	2284	3806	3067	3062	2568	2990	1651
Total rainfall (mm)												
274.0	40.5	34.8	17.8	22.0	0	1.3	0	4.8	77.3	146.8	180.3	799.6
Highest recorded daily rain (mm)												
56.5	12.5	13.3	11.0	11.0	0	0.5	0	3.3	28.8	43.0	46.8	56.5
Number of raindays												
23	10	10	3	10	0	4	0	3	10	13	13	99
Total 'A' class pan evaporation (mm)												
53.5	148.2	148.9	150.0	77.5	138.0	124.6	188.6	189.1	na	na	na	na
Mean daily 'A' class pan evaporation (mm)												
1.7	5.3	4.8	5.0	2.5	4.6	4.0	6.1	6.3	na	na	na	na
Highest daily 'A' class pan evaporation (mm)												
7.7	9.9	10.7	9.9	9.7	6.0	7.1	10.1	9.0	na	na	na	na
Lowest daily 'A' class pan evaporation (mm)												
0	0.1	0	0.5	0	3.0	1.7	3.7	3.4	na	na	na	0

\*na = not available or not applicable

## Appendix 2. Physical properties of soil at the field site.

Table A2.1. Physical properties of a soil profile adjacent to the experimental site.

(a) Particle size and bulk density						
Depth (cm)	Fraction of sample gravel (%)	Fraction of < 2 mm component (%)				Bulk density (g cm <sup>-3</sup> )
		Coarse sand	Fine sand	Silt	Clay	
0	3.50	84.89	8.55	2.68	3.88	1.599
25	3.31	83.25	10.41	2.71	3.62	1.636
50	3.85	86.84	6.88	2.59	3.69	1.605
100	5.34	75.71	15.11	3.09	6.08	1.545
150	7.73	76.22	15.80	2.89	5.09	1.559
(b) Volumetric soil moisture contents (m <sup>3</sup> m <sup>-3</sup> ) at various suctions						
Depth (cm)	0 cm	10 cm	30 cm	50 cm	100 cm	
0	0.299	0.277	0.205	0.146	0.106	
25	0.309	0.293	0.203	0.150	0.104	
50	0.300	0.291	0.198	0.151	0.100	
100	0.293	0.283	0.182	0.138	0.104	
150	0.302	0.272	0.184	0.149	0.109	
	0.3 bar	1 bar	3 bar	15 bar	Available water (mm)	
0	0.079	0.053	0.033	0.028	78	
25	0.055	0.044	0.034	0.023	81	
50	0.053	0.041	0.032	0.022	78	
100	0.080	0.058	0.043	0.029	75	
150	0.086	0.048	0.039	0.023	86	