APPENDICES

APPENDIX A

SUMMARISED ANALYSIS OF VARIANCES

FIELD NITROGEN EXPERIMENT 1

Table A1 Analysis of variance for fresh rhizome and root characteristics of wild ginger as affected by N application for Experiment 1 during 2001/02 seasons

	Mean squares [z]					
	Fresh rhizome mass (10^{-3}) (mg)	Rhizome circumference (10^{-1}) mm	Number of rhizomes (10^{-5})	Fresh enlarged root mass (10^{-2} mg)	Number of enlarged roots (10^{-2})	Enlarged root length (mm)
Nitrogen	10667**	8625**	90	2727*	1193*	2539*
Error	890	480	1002	471	236	199

[z] F values significant at 5% level of probability (*) or highly significant at 1% level of probability (**)

TUNNEL FERTIGATION EXPERIMENT 2

Table A2 Analysis of variance for plant height, number of leaves and stems of wild ginger at 56, 112, 168 and 224 DAE as affected by fertigation frequency and growing medium for Experiment 2

	Mean squares [z]											
	Plant height				Number of leaves				Number of stems			
	56	112	168	224	56	112	168	224	56	112	168	224
	(10^4mm)				(10^{-2})	(10^{-2})			(10^{-3})	(10^{-2})	(10^{-3})	(10^{-3})
Fertigation frequency (F)	913*	120*	201*	339*	1791*	767*	351*	1543*	1171*	741*	407	1568
Growing medium (M)	5371*	5370*	5768*	3088*	24642*	24640*	11039*	1161*	7320*	7321*	1429	2702
F X M	206	165	313*	183	272	180	103	330	251	159	707	195
Replication	1094	723	849	564	3665	3159	1357	940	1712	1213	651	1009
Error	112	129	89	141	372	396	350	358	347	370	387	469

[z] F values significant at 5% level of probability (*) or highly significant at 1% level of probability (**)

Table A3 Analysis of variance for fresh and dry rhizome and root characteristics, fresh and dry leaves and leaf area at 112 DAE as affected by fertigation frequency and growing medium for Experiment 2

	Mean squares [z]									
	Fresh rhizome mass (g)	Dry rhizome mass (10^5 mg)	Number of rhizomes (10^2)	Fresh root mass (10^2 mg)	Dry root mass (10^5 mg)	Number of enlarged roots (10^2)	Enlarged root length (10^3 mm)	Fresh leaf mass (10^2 mg)	Dry leaf mass (10^2 mg)	Leaf area (cm^2)
Fertigation frequency (F)	225	26422*	123	6258	2213	2555*	1091	1953*	318*	26418*
Growing medium (M)	1915	24080*	1215	3023	9475	3081*	5704	666606*	3943*	93576*
F X M	966	40468*	1298	14343	2369	5494*	4950	17490*	782	24621*
Replication	132	248*	375	980	836	1401	12240	5447	301	80499
Error	511	41061	353	8064	349	4216	2712	7301	472	133677

[z] F values significant at 5% level of probability (*) or highly significant at 1% level of probability (**)

Table A4 Analysis of variance for fresh rhizome and root characteristics, fresh and dry leaf mass and leaf area of wild ginger at 224 DAE as affected by fertigation frequency and growing medium for Experiment 2

	Mean squares[z]							
	Fresh rhizome mass (g)	Number of rhizomes	Fresh root mass (g)	Number of enlarged roots	Enlarged root length (10^{-3} mm)	Fresh leaf mass (10^{-3}g)	Dry leaf mass (10^{-2} mg)	Leaf area (cm^2)
Fertigation frequency (F)	72129*	9842	27413*	2566*	1920	3142*	3018	100796*
Growing medium (M)	8119	12142	12351	2635	5956	2731*	111	20605*
F X M	27268	10468	19795	1191	5834	1768	851	237755
Replication	42495	8333	23523	2089	4184	2614	1677	553483
Error	19067	433	12049	896	2835	1561	605	140372

[z] F values significant at 5% level of probability (*) or highly significant at 1% level of probability (**)

Table A5 Analysis of variance for the fresh rhizome and enlarged root oil yield at 224 DAE as affected by fertigation frequency and growing medium for Experiment 2

	Mean squares [z]	
	Fresh rhizome oil yield (10^{-10} %)	Fresh enlarged root oil yield (10^{-8} %)
Fertigation frequency (F)	91917	1126
Growing medium (M)	720	1008
F X M	46732	5105
Replication	61702	8396
Error	85550	1015

[z] F values significant at 5% level of probability (*) or highly significant at 1% level of probability (**)

APPENDIX B

FIELD NITROGEN EXPERIMENT 1

Table B1 Details of nitrogen application used in Experiment 1

Time of application	Nitrogen ($kg \cdot ha^{-1}$)	Lime stone ammonium nitrate (LAN)	Number of rows planted	Plot size (m^2)	LAN/plot
Planting	0	0	5	23.75	0
Planting	50	178.6	4	19	339.3
Planting	100	357.1	4	19	678.5
Planting	150	535.7	4	19	1017.8
Planting	200	714.3	4	19	1357.2
Planting	250	892.9	5	23.75	2120.6

Table B2 Fertility status of the soil in Experiment 1 in the field before application of N levels during 2001/02 seasons

Soil level	pH	Resistance(ohm)	P Bray 1 ($mg \cdot kg^{-1}$)	Ca ($mg \cdot kg^{-1}$)	K ($mg \cdot kg^{-1}$)	Mg ($mg \cdot kg^{-1}$)	Na ($mg \cdot kg^{-1}$)
Topsoil	6.5	3400	24.4	369	37	103	2
Subsoil	6.6	3600	33.4	452	55	132	4

Table B3 Fertility status of the soil in Experiment 1 in the field after N application during 2001/02 seasons

Soil level	Nitrogen ($kg \cdot ha^{-1}$)	pH	Resistance (ohm)	P Bray 1 ($mg \cdot kg^{-1}$)	Ca ($mg \cdot kg^{-1}$)	K ($mg \cdot kg^{-1}$)	Mg ($mg \cdot kg^{-1}$)	Na ($mg \cdot kg^{-1}$)
Topsoil	0	7.2	3000	39.1	534	39	170	2
	50	7.0	3600	38.0	474	40	130	4
	100	7.2	3800	35.5	486	33	170	4
	150	7.0	3200	34.0	449	43	143	0.9
	200	6.7	3300	38.4	382	51	95	4
	250	6.5	2400	34.8	518	54	158	4
Subsoil	0	6.8	3400	37.7	594	47	131	6
	50	6.7	3500	41.6	418	53	110	1
	100	6.7	3600	38.9	498	44	117	2
	150	6.7	3800	33.1	491	46	133	7
	200	6.4	3500	38.9	418	51	105	9
	250	6.4	2000	36.8	489	52	128	11

Table B4 Fertility status of pine bark in Experiment 2 before planting during 2002/03 seasons

	pH	EC	Ca	Mg	K	Na	Cu	Fe	Mn	Zn	NH_4	NO_3
		mS/m	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
	5.7	161.0	50.1	48.0	252.5	27.8	0.00	0.07	0.30	0.00	45	198

Table B5 Fertility status of sand in Experiment 2 before planting during 2002/2003 seasons

	pH	Resistance (ohm)	P Bray 1 ($mg \cdot kg^{-1}$)	Ca ($mg \cdot kg^{-1}$)	K ($mg \cdot kg^{-1}$)	Mg ($mg \cdot kg^{-1}$)	Mg ($mg \cdot kg^{-1}$)
	6.9	18000	1.4	93	364	4	15

Table B6 Wild ginger fresh rhizome and enlarged root oil yield as affected by fertigation frequency and growing medium

Sample number	Fresh rhizome mass (g)	Fresh rhizome oil wet mass (g)	Fresh rhizome oil yield (%)	Fresh root mass (g)	Fresh root oil wet mass (g)	Fresh root yield (%)
1112	471.6	0.63	0.13	706.8	0.35	0.05
2111	781.6	0.49	0.10	496.8	0.17	0.04
1111	436.2	0.34	0.11	873.1	0.38	0.05
2112	408.7	0.31	0.10	632.6	0.31	0.05
1211	398.8	0.51	0.13	492.6	0.19	0.04
2211	426.6	0.16	0.04	630.7	0.26	0.04
1212	371.8	0.36	0.11	601.2	0.57	0.09
2212	606.6	0.38	0.06	698.7	0.61	0.08
2312	545.2	0.28	0.05	575.3	0.25	0.03
1312	694.4	0.29	0.04	775.9	0.41	0.05
1311	772.6	0.36	0.05	610.4	0.38	0.06
2311	476.1	0.41	0.09	322.1	0.27	0.08
2412	663.7	0.27	0.04	560.1	0.17	0.03
1412	818.7	0.39	0.05	482.3	0.27	0.06
1411	277.8	0.16	0.06	276.7	0.23	0.08
2411	856.6	0.52	0.06	767.3	0.34	0.04
2512	22.4	0.02	0.07	587.4	0.22	0.05
2511	431.1	0.23	0.05	298.7	0.20	0.07
1511	321.5	0.32	0.12	51.11	0.10	0.16
1512	474.1	0.32	0.07	435.3	0.41	0.09

First letter {eg 2311} = replication; second = fertigation frequency; third = plant part [1= rhizome and 2 = root]; fourth letter = growing media [1= pine bark and 2= sand].