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APPENDIX A

Table A-1 BOD influent and effluent of wastewater from constructed wetland systems (mg/l)

Water depth	0.15 m						0.30 m						0.45 m					
Experiments	No plant		<i>Eleocharis dulcis</i>		<i>Cyperus corymbosus</i>		No plant		<i>Eleocharis dulcis</i>		<i>Cyperus corymbosus</i>		No plant		<i>Eleocharis dulcis</i>		<i>Cyperus corymbosus</i>	
Trial	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent
1	2.10	1.09	2.23	1.64	2.61	1.92	2.30	1.07	2.53	0.78	3.35	1.60	3.25	2.09	2.17	1.26	2.87	0.78
2	8.97	2.98	3.57	1.41	9.03	2.63	3.47	2.42	3.82	2.47	5.94	3.81	2.66	1.84	2.87	1.86	3.15	2.21
3	4.86	2.81	3.62	1.20	3.58	2.03	5.22	2.28	5.14	3.17	5.20	2.23	2.85	1.84	3.58	1.47	2.65	1.25
4	5.48	2.56	2.88	2.24	3.19	2.06	2.34	1.41	2.81	1.29	2.69	1.90	3.04	2.04	2.57	1.02	4.11	1.73
5	2.93	1.39	2.19	1.64	6.83	2.73	2.77	1.64	3.55	2.07	3.32	2.55	4.03	3.02	2.86	1.47	4.37	2.01
6	3.89	2.45	2.84	1.69	5.66	3.46	4.94	3.08	5.80	4.16	4.01	2.96	2.67	2.03	3.10	1.83	9.53	3.80
7	7.60	2.71	3.23	1.75	8.81	1.95	4.17	3.17	6.11	4.40	5.33	2.11	5.79	4.51	4.58	2.24	8.13	2.73
8	6.24	2.82	4.67	1.16	7.25	1.65	7.00	3.24	8.01	2.52	6.53	2.58	12.59	8.70	7.65	3.91	13.38	3.57
9	5.69	2.42	4.16	1.88	4.13	2.16	4.44	2.14	5.94	2.89	5.12	3.52	12.51	8.86	5.16	2.89	12.08	2.07
10	5.84	2.57	5.05	1.32	5.19	2.15	6.76	3.10	7.23	2.73	8.89	3.95	8.87	6.53	5.46	2.62	7.74	2.29
11	5.01	2.60	5.68	1.29	6.09	1.95	5.06	2.12	6.51	3.31	7.61	5.80	9.25	7.98	5.30	1.55	7.32	1.76
12	7.79	3.41	7.82	2.29	8.68	1.87	3.36	2.48	8.36	5.22	5.85	4.24	7.02	6.30	6.83	1.83	7.49	1.53
13	4.38	2.41	4.23	2.24	8.72	3.71	4.68	3.06	8.44	3.73	7.36	3.56	8.51	7.30	5.13	1.83	7.86	2.30
14	5.23	3.22	5.76	2.56	5.49	3.57	6.05	3.13	9.45	7.21	6.75	3.48	9.68	8.38	9.19	1.57	10.98	3.08
15	10.69	5.18	9.15	4.44	9.44	4.77	10.48	5.03	11.04	5.80	10.68	4.07	8.86	7.51	9.53	3.03	11.51	3.06
16	9.41	4.28	10.62	2.52	10.50	4.63	10.39	5.22	12.90	6.82	15.33	5.54	8.97	6.59	10.68	1.98	10.65	3.52
17	9.28	3.21	10.41	2.71	14.70	3.76	10.59	7.20	12.77	6.34	13.88	5.71	12.31	7.24	12.94	1.55	10.68	3.28
18	7.04	3.02	6.75	2.00	8.73	1.40	7.53	4.67	8.15	2.51	8.07	1.71	9.18	6.42	8.49	1.59	10.07	2.89
Average	6.25	2.84	5.27	2.00	7.15	2.69	5.64	3.14	7.14	3.75	7.00	3.41	7.34	5.51	6.01	1.97	8.03	2.44
SD	2.35	0.91	2.68	0.78	3.02	1.03	2.69	1.53	3.10	1.87	3.45	1.34	3.54	2.65	3.13	0.72	3.39	0.86

Table A-2 Orthophosphate phosphorus influent and effluent of wastewater from constructed wetland systems (mg/l)

Water depth	0.15 m						0.30 m						0.45 m					
Experiments	No plant		Eleocharis dulcis		Cyperus corymbosus		No plant		Eleocharis dulcis		Cyperus corymbosus		No plant		Eleocharis dulcis		Cyperus corymbosus	
Trial	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent
1	0.113	0.030	0.192	0.024	0.133	0.020	0.048	0.027	0.345	0.020	0.104	0.020	0.092	0.078	0.100	0.082	0.059	0.030
2	0.096	0.010	0.084	0.012	0.264	0.008	0.042	0.003	0.240	0.025	0.370	0.004	0.060	0.040	0.140	0.052	0.156	0.013
3	0.264	0.004	0.374	0.001	0.316	0.000	0.130	0.010	0.240	0.015	0.170	0.010	0.164	0.026	0.224	0.027	0.250	0.015
4	0.126	0.014	0.120	0.042	0.190	0.000	0.100	0.002	0.180	0.018	0.180	0.001	0.120	0.027	0.136	0.035	0.154	0.018
5	0.133	0.002	0.165	0.009	0.560	0.000	0.098	0.005	0.154	0.041	0.235	0.000	0.171	0.028	0.178	0.031	0.146	0.009
6	0.184	0.011	0.156	0.001	0.324	0.020	0.106	0.011	0.354	0.026	0.290	0.023	0.092	0.038	0.142	0.056	0.182	0.012
7	0.346	0.000	0.266	0.000	0.724	0.173	0.090	0.000	0.480	0.109	0.345	0.000	0.180	0.072	0.382	0.000	0.316	0.000
8	1.000	0.004	1.100	0.004	0.600	0.000	0.222	0.004	0.565	0.025	0.800	0.000	0.480	0.200	0.576	0.054	0.400	0.004
9	0.455	0.018	0.360	0.025	1.675	0.000	0.030	0.013	0.363	0.080	0.300	0.009	0.375	0.146	0.275	0.100	0.330	0.013
10	0.375	0.030	0.175	0.034	0.750	0.008	0.105	0.017	0.540	0.116	0.275	0.010	0.125	0.038	0.260	0.081	0.370	0.019
11	0.280	0.009	0.188	0.012	0.500	0.003	0.080	0.017	0.780	0.055	0.275	0.005	0.156	0.078	0.170	0.063	0.200	0.024
12	0.225	0.007	0.335	0.026	0.760	0.005	0.150	0.012	0.200	0.074	0.175	0.009	0.200	0.116	0.180	0.048	0.165	0.010
13	0.227	0.019	0.200	0.049	0.305	0.136	0.090	0.026	0.330	0.068	0.310	0.000	0.188	0.105	0.250	0.032	0.165	0.006
14	0.920	0.001	0.645	0.011	0.750	0.000	0.750	0.014	0.813	0.099	0.890	0.000	0.235	0.126	0.500	0.035	0.513	0.000
15	1.385	0.025	1.090	0.143	1.375	0.031	1.550	0.046	1.510	0.117	1.410	0.024	0.613	0.173	1.000	0.072	0.620	0.018
16	1.790	0.031	1.855	0.128	1.770	0.043	1.630	0.087	1.550	0.405	1.650	0.042	1.313	0.316	1.268	0.099	1.260	0.014
17	1.095	0.005	1.170	0.025	1.815	0.014	0.560	0.021	2.580	0.065	1.380	0.010	0.575	0.161	1.640	0.046	1.055	0.008
18	0.175	0.018	0.325	0.057	0.490	0.013	0.570	0.026	0.525	0.078	0.560	0.014	0.123	0.072	0.355	0.054	0.365	0.010
Average	0.511	0.013	0.489	0.034	0.739	0.026	0.353	0.019	0.653	0.080	0.540	0.010	0.292	0.102	0.432	0.054	0.373	0.012
SD	0.504	0.010	0.491	0.041	0.548	0.049	0.496	0.020	0.630	0.088	0.482	0.011	0.304	0.076	0.434	0.026	0.321	0.008

Table A-3 TKN influent and effluent of wastewater from constructed wetland systems (mg/l)

Water depth	0.15 m						0.30 m						0.45 m					
Experiments	No plant		Eleocharis dulcis		Cyperus corymbosus		No plant		Eleocharis dulcis		Cyperus corymbosus		No plant		Eleocharis dulcis		Cyperus corymbosus	
Trial	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent
1	4.76	2.52	5.04	2.80	4.62	1.26	3.36	2.80	3.36	2.80	4.62	2.66	3.50	2.80	3.64	2.80	3.92	1.68
2	4.20	1.68	3.64	1.12	3.36	1.40	4.48	3.36	3.36	1.68	3.92	2.24	3.92	1.96	3.36	1.40	3.92	1.68
3	2.80	1.68	2.80	1.12	3.92	1.68	2.24	1.96	3.36	1.68	2.80	1.68	2.24	1.68	3.08	2.24	3.92	2.24
4	1.68	1.12	1.68	0.56	1.96	0.56	1.12	0.84	1.68	0.96	1.12	0.56	1.12	0.56	1.12	0.68	1.12	0.56
5	1.12	0.68	1.12	0.44	1.96	0.84	1.96	1.68	1.68	1.12	1.68	0.84	1.96	0.84	1.68	0.84	2.24	0.56
6	2.24	1.40	1.68	0.84	1.12	0.56	1.50	1.12	1.68	1.12	1.12	0.84	0.84	0.28	1.96	0.56	1.96	1.12
7	1.96	1.12	1.68	1.12	1.68	0.56	1.50	0.96	1.96	0.84	1.40	0.84	1.68	0.56	1.40	0.68	1.96	1.12
8	3.36	1.12	1.12	0.56	1.68	0.56	3.92	2.24	2.80	0.56	1.12	0.56	1.68	0.56	2.24	0.56	2.24	0.56
9	1.68	0.56	1.12	0.56	10.64	0.84	1.12	0.56	1.12	0.28	1.12	0.00	2.80	0.56	3.36	0.28	2.24	0.56
10	1.12	0.28	2.24	0.56	2.24	0.84	0.96	0.56	3.36	0.56	3.36	0.00	1.12	0.56	0.56	0.28	0.56	0.00
11	1.12	0.56	2.24	0.56	3.92	1.68	0.84	0.56	1.68	0.56	1.12	0.28	1.68	0.56	1.12	0.56	2.80	1.12
12	2.80	1.68	1.68	0.84	17.36	1.12	2.24	1.68	2.24	0.56	3.92	0.56	1.12	0.56	1.12	0.42	1.12	0.56
13	1.68	0.84	2.24	0.56	6.72	1.68	1.68	0.84	2.80	0.84	2.80	0.56	1.68	1.12	1.68	0.56	1.12	0.28
14	5.60	1.68	6.16	1.12	6.72	1.12	6.72	1.96	5.32	1.12	7.28	1.12	2.80	1.12	5.04	0.28	6.72	0.56
15	10.08	3.92	3.36	0.56	10.08	2.24	12.88	5.32	12.88	2.24	11.76	1.12	13.44	2.48	6.16	0.00	12.32	1.12
16	7.84	2.66	9.52	2.80	8.96	1.68	11.76	4.76	14.56	3.92	11.76	1.12	11.20	2.24	16.80	0.56	11.76	1.12
17	8.96	6.72	8.96	0.56	12.32	2.24	7.28	4.20	13.44	5.60	12.32	1.68	4.48	2.48	9.52	0.56	6.16	1.68
18	10.08	5.04	11.76	3.92	16.80	2.80	3.36	1.96	14.56	5.04	14.56	1.12	5.04	3.36	7.84	0.56	8.35	0.56
Average	4.06	1.96	3.78	1.14	6.45	1.31	3.83	2.08	5.10	1.75	4.88	0.99	3.46	1.35	3.98	0.77	4.14	0.95
SD	3.143	1.701	3.234	0.988	5.176	0.664	3.612	1.473	4.926	1.590	4.572	0.713	3.463	0.966	4.045	0.705	3.564	0.585





Table A-4 Ammonia nitrogen influent and effluent of wastewater from constructed wetland systems ( mg/l )

Water depth	0.15 m						0.30 m						0.45 m					
Experiments	No plant		Eleocharis dulcis		Cyperus corymbosus		No plant		Eleocharis dulcis		Cyperus corymbosus		No plant		Eleocharis dulcis		Cyperus corymbosus	
Trial	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent
1	2.24	1.40	2.24	1.12	1.82	1.12	1.12	0.56	1.68	0.96	2.24	1.54	2.24	1.68	2.10	1.68	1.96	0.84
2	1.12	0.56	1.96	0.84	1.68	0.28	1.68	0.56	0.56	0.28	1.68	1.12	2.24	1.12	1.68	1.12	1.68	0.84
3	1.12	0.56	1.68	0.00	1.96	0.56	0.56	0.28	1.68	0.56	0.56	0.28	1.12	0.56	1.96	1.40	1.68	1.12
4	1.68	0.56	0.56	0.00	0.84	0.00	0.56	0.28	0.56	0.28	1.12	0.56	1.12	0.56	0.56	0.28	0.56	0.28
5	0.56	0.28	0.96	0.28	1.12	0.28	0.84	0.56	0.84	0.28	0.56	0.28	0.56	0.28	1.12	0.28	0.56	0.28
6	1.12	0.56	0.96	0.28	0.56	0.00	0.84	0.56	0.56	0.28	0.56	0.28	0.84	0.28	1.12	0.28	0.56	0.28
7	0.84	0.56	1.12	0.28	0.84	0.00	0.96	0.28	0.84	0.28	0.84	0.28	0.56	0.28	1.12	0.56	0.84	0.28
8	2.80	1.12	0.56	0.00	1.12	0.00	2.80	1.12	2.24	0.56	0.56	0.00	1.12	0.28	1.40	0.28	1.68	0.00
9	1.12	0.28	0.56	0.00	1.12	0.23	0.56	0.28	0.56	0.28	0.56	0.00	2.24	0.56	2.80	0.56	1.12	0.00
10	0.56	0.28	0.68	0.00	1.12	0.28	0.84	0.28	0.56	0.00	0.56	0.00	0.56	0.28	0.56	0.28	0.56	0.00
11	0.96	0.56	0.56	0.00	0.56	0.00	0.28	0.00	0.56	0.00	0.56	0.00	0.56	0.28	0.56	0.00	0.56	0.00
12	1.68	0.96	0.56	0.00	1.68	0.00	1.12	0.56	1.12	0.28	1.68	0.00	0.84	0.28	0.84	0.28	0.84	0.28
13	0.56	0.28	0.56	0.00	1.68	0.28	0.84	0.28	1.68	0.00	0.56	0.00	1.12	0.28	1.12	0.28	0.84	0.28
14	4.48	1.12	3.92	0.00	4.48	0.00	5.04	0.00	3.08	0.00	5.60	0.00	1.12	0.00	2.80	0.00	2.24	0.00
15	8.40	3.68	2.80	0.00	8.96	1.68	11.76	0.00	11.20	0.00	10.64	0.00	10.64	0.00	5.04	0.00	4.48	0.00
16	6.72	2.24	6.72	1.68	6.72	0.56	9.52	0.56	10.08	2.80	9.52	0.00	8.96	1.12	14.56	0.00	9.52	0.00
17	6.16	0.96	6.72	0.56	10.64	0.56	5.04	3.92	9.52	2.80	9.52	0.00	1.68	0.56	8.40	0.00	4.48	0.56
18	7.28	2.80	9.52	2.24	13.44	1.12	2.24	0.00	11.76	3.92	12.32	0.00	2.24	1.12	6.72	0.00	6.72	0.00
Average	2.74	1.04	2.37	0.40	3.35	0.39	2.59	0.56	3.28	0.75	3.31	0.24	2.21	0.53	3.03	0.40	2.27	0.28
SD	2.63	0.95	2.66	0.66	3.91	0.48	3.27	0.89	4.13	1.16	4.17	0.43	2.84	0.45	3.63	0.50	2.49	0.35



Table A-5 TSS influent and effluent of wastewater from constructed wetland systems ( mg/l )

Water depth	0.15 m						0.30 m						0.45 m					
Experiments	No plant		<i>Eleocharis dulcis</i>		<i>Cyperus corymbosus</i>		No plant		<i>Eleocharis dulcis</i>		<i>Cyperus corymbosus</i>		No plant		<i>Eleocharis dulcis</i>		<i>Cyperus corymbosus</i>	
Trial	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent
1	80	26	58	32	62	18	8	2	28	6	64	6	16	10	10	8	34	2
2	98	20	70	2	178	4	36	8	22	10	100	24	32	28	14	6	18	4
3	56	12	32	2	116	4	22	8	22	16	22	18	14	6	8	2	26	12
4	48	6	14	6	42	2	14	2	38	18	8	8	40	12	12	2	34	6
5	22	10	10	10	104	2	48	12	28	20	30	20	14	12	18	12	22	12
6	38	6	30	6	124	2	14	4	46	18	38	36	20	13	16	12	28	8
7	46	24	8	6	96	14	16	8	58	16	38	18	26	14	8	6	54	18
8	108	66	22	20	70	16	24	12	36	12	32	12	48	28	8	6	28	14
9	46	30	48	26	106	18	34	6	136	30	16	10	22	20	12	8	24	12
10	110	77	50	36	170	70	30	25	43	40	74	60	52	52	15	12	48	15
11	50	15	70	30	82	20	30	15	92	50	57	25	85	10	35	10	50	7
12	50	15	40	5	80	20	45	10	45	10	55	25	20	12	35	5	25	15
13	65	35	75	25	60	10	25	5	30	20	30	20	40	15	25	5	20	5
14	25	25	25	10	30	5	35	10	20	15	10	5	35	6	35	5	40	5
15	100	44	55	28	90	24	145	24	90	56	55	32	48	25	50	12	95	16
16	48	20	72	20	60	36	36	24	108	16	44	16	24	12	24	4	28	4
17	108	8	20	16	144	20	24	12	48	4	240	32	32	4	28	0	8	0
18	48	16	20	0	116	4	32	16	60	4	96	32	18	4	28	12	32	0
Average	63.67	25.28	39.94	15.56	96.11	16.06	34.33	11.28	52.78	20.06	56.06	22.17	32.56	15.72	21.17	7.06	34.11	8.61
SD	29.23	19.72	22.85	11.75	40.90	16.48	29.61	7.18	32.92	14.85	52.96	13.33	17.89	11.68	12.03	3.90	19.16	5.73



Table A-6 TDS influent and effluent of wastewater from constructed wetland systems ( mg/l )

Water depth	0.15 m						0.30 m						0.45 m					
Experiments	No plant		Eleocharis dulcis		Cyperus corymbosus		No plant		Eleocharis dulcis		Cyperus corymbosus		No plant		Eleocharis dulcis		Cyperus corymbosus	
Trial	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent
1	156	132	154	152	136	134	170	168	242	178	148	174	140	178	150	180	180	196
2	182	154	162	132	182	152	188	156	176	144	116	164	148	164	162	186	180	160
3	176	176	152	156	154	140	166	206	164	196	170	160	156	176	160	200	162	200
4	172	156	166	120	166	148	162	176	146	128	142	128	152	154	146	168	154	146
5	170	178	200	182	156	178	170	208	166	114	132	180	162	142	162	112	166	145
6	196	164	200	146	194	138	202	128	188	152	196	140	182	128	184	156	196	114
7	198	222	168	144	182	222	160	198	180	180	158	182	168	164	154	172	172	164
8	226	240	214	196	242	242	230	212	226	234	248	204	256	252	244	238	252	228
9	280	166	270	198	302	156	162	178	262	182	258	160	242	192	260	216	256	174
10	245	156	225	154	210	132	225	162	265	150	205	162	200	128	235	168	275	130
11	275	155	175	135	190	130	240	140	250	140	215	110	165	120	260	145	185	125
12	225	155	160	150	190	110	165	95	145	115	105	105	130	100	140	130	155	65
13	260	235	205	170	270	205	150	195	170	225	185	200	210	200	145	215	120	90
14	245	325	240	310	230	280	230	220	240	265	265	240	220	250	175	250	270	215
15	415	460	405	440	395	508	390	340	385	412	385	348	290	320	330	340	315	252
16	424	448	412	396	408	416	456	364	512	464	476	352	556	288	420	336	420	304
17	416	368	368	324	372	276	360	324	440	368	404	316	392	248	412	304	396	212
18	324	392	336	332	336	324	260	332	328	352	316	324	276	288	320	296	280	244
Average	254.72	237.89	234.00	213.17	239.72	216.17	227.00	211.22	249.17	222.17	229.11	202.72	224.72	194.00	225.50	211.78	229.67	175.78
SD	87.46	109.94	87.61	99.76	87.19	109.41	88.47	77.83	104.90	107.29	105.73	79.92	106.09	65.40	91.66	69.06	84.69	61.27

Table A-7 DO influent and effluent of wastewater from constructed wetland systems ( mg/l )

Water depth	0.15 m						0.30 m						0.45 m					
Experiments	No plant		<i>Eleocharis dulcis</i>		<i>Cyperus corymbosus</i>		No plant		<i>Eleocharis dulcis</i>		<i>Cyperus corymbosus</i>		No plant		<i>Eleocharis dulcis</i>		<i>Cyperus corymbosus</i>	
Trial	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent
1	5.20	6.20	3.00	4.80	6.00	2.60	5.00	6.40	2.40	2.60	0.80	0.20	3.00	1.80	1.80	1.00	2.20	2.60
2	2.40	11.60	2.60	11.00	1.30	9.60	2.10	10.70	1.00	2.20	0.20	1.20	5.00	4.80	0.80	2.60	1.00	5.50
3	9.20	10.70	5.20	7.40	4.00	15.00	7.20	9.40	4.70	4.80	3.10	5.40	4.60	6.20	1.60	2.60	7.40	5.20
4	13.00	6.30	7.40	5.60	4.20	6.20	10.40	6.10	4.40	1.00	1.20	3.50	7.00	7.80	1.60	1.80	2.20	4.00
5	5.40	9.40	5.20	9.40	1.60	9.50	10.60	9.80	1.80	4.20	1.40	0.50	7.00	10.50	2.60	2.40	2.70	6.00
6	11.70	8.40	6.80	8.40	0.90	8.50	15.00	7.10	3.20	2.50	4.60	0.50	12.40	8.20	3.00	2.00	8.80	1.00
7	12.20	1.30	8.90	1.20	2.00	1.00	15.00	1.00	0.90	0.80	4.60	1.70	13.60	1.70	3.50	2.80	6.00	1.20
8	1.00	3.60	3.40	3.90	1.80	2.10	6.20	4.20	0.80	0.50	4.40	2.80	1.40	4.50	1.60	0.70	1.40	2.30
9	7.00	3.20	3.10	3.10	1.40	3.00	6.50	3.80	0.80	3.30	0.90	3.20	5.00	1.00	0.90	0.60	2.20	0.70
10	3.40	2.20	4.40	5.50	2.00	4.00	3.30	6.40	0.70	1.90	1.90	1.20	2.00	6.90	1.20	1.40	1.40	5.60
11	2.80	1.60	2.90	2.80	1.70	1.40	2.60	1.90	0.70	0.60	1.90	1.80	8.10	1.30	1.00	1.10	2.10	1.30
12	1.90	2.40	3.50	1.70	1.60	2.70	1.80	1.00	1.00	1.90	0.50	0.90	1.20	8.00	1.70	0.80	1.60	1.30
13	4.10	1.40	6.10	1.65	1.40	1.30	4.00	2.20	0.90	2.40	3.20	0.80	9.40	5.80	3.50	2.30	1.50	0.90
14	5.10	1.00	7.80	1.40	3.00	1.40	7.40	1.05	1.70	1.45	1.80	1.30	5.80	2.40	3.10	2.10	5.40	1.60
15	1.50	2.20	2.90	2.40	1.20	0.50	0.90	0.80	1.30	0.50	1.10	0.50	1.80	1.30	1.40	0.70	1.38	1.00
16	0.30	14.40	5.38	10.18	0.20	2.50	1.30	3.00	0.00	0.80	0.60	0.60	0.80	4.80	0.00	1.50	0.20	7.00
17	13.00	10.10	7.10	9.90	1.40	3.00	5.20	3.60	1.20	0.40	0.70	2.30	12.00	5.60	1.10	2.10	1.00	2.20
18	12.30	9.30	7.60	7.60	1.80	6.90	7.10	2.90	1.70	4.00	1.80	3.40	15.00	3.60	0.90	3.00	1.10	2.60
Average	6.19	5.85	5.18	5.44	2.08	4.51	6.20	4.52	1.62	1.99	1.93	1.77	6.39	4.79	1.74	1.75	2.75	2.89
SD	4.53	4.28	2.05	3.37	1.39	3.95	4.28	3.21	1.29	1.38	1.45	1.40	4.53	2.83	1.00	0.80	2.44	2.08



Table A-8 pH influent and effluent of wastewater from constructed wetland systems

Water depth	0.15 m						0.30 m						0.45 m					
Experiments	No plant		<i>Eleocharis dulcis</i>		<i>Cyperus corymbosus</i>		No plant		<i>Eleocharis dulcis</i>		<i>Cyperus corymbosus</i>		No plant		<i>Eleocharis dulcis</i>		<i>Cyperus corymbosus</i>	
Trial	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent
1	7.90	8.50	7.80	7.50	7.70	7.30	7.90	7.80	7.30	6.90	7.00	6.50	8.20	7.20	7.10	6.80	7.70	6.70
2	8.40	10.10	7.80	9.20	7.20	10.00	8.30	9.49	7.10	9.10	6.90	8.90	9.20	10.10	6.90	8.00	7.10	8.00
3	9.90	10.00	8.40	9.20	7.80	9.90	10.10	9.70	8.20	8.00	7.70	7.70	10.30	9.70	7.50	7.80	9.50	8.30
4	9.80	9.90	8.50	8.90	8.40	9.60	10.10	8.60	7.90	7.90	7.40	7.60	10.10	9.40	7.70	7.70	8.80	8.30
5	9.30	9.90	8.10	9.10	7.50	9.60	10.40	9.20	7.70	7.40	7.60	7.40	10.00	9.20	7.90	7.40	9.40	7.80
6	8.90	9.90	7.90	9.00	7.60	9.80	9.80	9.60	7.60	7.40	8.50	7.70	8.30	10.00	7.70	7.60	9.10	8.60
7	9.30	9.40	8.10	8.30	7.60	9.00	10.10	8.90	7.60	7.20	8.90	7.30	9.50	9.70	7.70	7.70	10.10	7.80
8	7.50	10.00	8.10	8.70	7.50	9.20	8.60	9.70	7.50	7.90	7.70	7.90	9.00	9.70	7.30	7.90	7.70	8.50
9	8.90	9.50	8.40	8.00	7.30	9.00	10.00	9.31	7.50	7.20	7.60	7.50	9.90	9.20	7.70	7.40	8.30	8.00
10	9.00	8.90	8.20	9.30	7.40	9.50	10.00	9.40	7.20	9.20	7.80	9.30	10.20	10.20	7.40	9.70	7.90	10.10
11	8.50	9.70	9.50	8.10	9.00	8.40	8.10	9.50	8.50	7.60	8.10	8.10	9.20	10.60	8.40	7.80	8.30	8.70
12	9.00	10.10	9.20	8.20	8.30	8.50	9.90	10.10	8.20	7.60	7.70	8.10	10.90	10.70	8.50	7.80	8.70	8.50
13	9.80	10.00	9.40	8.30	8.50	8.10	10.80	9.20	8.30	7.60	7.90	7.80	10.90	10.70	8.40	8.10	10.20	8.70
14	9.50	9.70	9.30	8.30	8.40	8.50	9.60	9.70	8.10	7.60	7.90	8.10	10.60	10.90	8.20	7.90	9.10	8.70
15	8.80	8.40	9.20	7.60	8.10	7.00	8.90	6.90	8.10	6.40	7.80	6.30	10.50	9.50	7.90	6.50	7.60	6.50
16	6.70	9.10	7.80	8.20	7.90	8.10	7.80	7.80	6.70	7.40	6.50	7.20	9.30	9.10	6.50	7.70	6.40	7.90
17	8.60	8.60	8.20	8.30	7.80	7.70	7.80	7.70	7.80	7.30	7.40	7.40	10.20	8.00	7.40	7.50	7.40	7.50
18	8.10	8.30	8.20	8.10	7.80	7.80	7.80	8.10	7.60	7.20	7.60	7.40	9.50	9.70	7.50	7.60	7.40	7.80
Average	8.77	9.44	8.45	8.46	7.88	8.72	9.22	8.93	7.72	7.61	7.67	7.68	9.77	9.64	7.65	7.72	8.37	8.13
SD	0.84	0.64	0.59	0.55	0.48	0.93	1.05	0.90	0.47	0.68	0.55	0.71	0.80	0.93	0.53	0.63	1.06	0.80





Table A-9 Temperature of influent and effluent wastewater from constructed wetland systems ( °C )

Water depth	0.15 m						0.30 m						0.45 m					
Experiments	No plant		<i>Eleocharis dulcis</i>		<i>Cyperus corymbosus</i>		No plant		<i>Eleocharis dulcis</i>		<i>Cyperus corymbosus</i>		No plant		<i>Eleocharis dulcis</i>		<i>Cyperus corymbosus</i>	
Trial	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent	Influent	Effluent
1	26.0	28.0	26.0	27.0	26.0	27.5	27.0	28.5	27.0	28.5	27.0	28.5	27.0	28.0	27.0	28.5	27.2	28.5
2	27.5	31.5	26.8	28.5	27.0	31.0	28.0	31.0	28.0	30.0	28.0	30.0	28.0	30.0	28.2	30.0	28.0	31.0
3	30.0	32.5	29.0	29.0	29.0	32.0	30.5	31.0	30.0	30.0	29.5	32.5	29.5	30.5	30.0	31.0	30.0	30.0
4	32.0	29.0	29.0	27.0	30.0	28.0	32.0	28.0	31.0	27.5	30.0	28.0	30.0	28.5	32.0	27.5	30.0	28.0
5	28.5	31.5	27.0	28.5	28.0	30.5	28.0	29.5	27.0	29.0	27.5	29.0	28.5	30.5	27.5	29.0	27.5	30.5
6	30.0	36.0	28.5	30.0	29.0	35.0	30.0	32.5	29.0	32.5	29.0	29.5	30.5	33.0	29.0	31.0	30.5	30.5
7	34.5	31.0	31.0	28.5	32.0	31.0	33.0	31.0	30.0	29.5	33.0	29.5	34.0	30.5	32.0	30.0	34.0	30.0
8	30.0	36.0	29.0	31.0	29.0	33.5	31.0	33.0	29.5	32.5	30.0	33.0	29.0	34.0	29.5	30.0	30.0	32.0
9	34.0	30.5	32.0	28.0	32.5	30.0	33.5	29.5	31.5	29.5	31.0	29.5	32.5	28.5	32.5	28.5	31.5	28.0
10	29.5	32.5	28.5	29.5	28.5	31.5	29.0	31.0	28.0	29.5	28.0	30.5	29.5	33.0	29.0	30.5	29.0	31.5
11	31.0	30.0	30.0	28.0	30.0	29.0	33.0	29.5	29.5	29.0	31.0	29.5	32.5	30.0	30.0	28.5	31.5	29.5
12	28.0	34.8	28.0	31.5	28.0	32.5	29.0	33.0	28.5	30.2	29.0	31.0	29.5	32.5	28.5	30.0	28.5	30.0
13	33.0	32.9	32.5	30.1	33.5	31.9	32.0	29.5	30.0	29.6	32.0	29.0	34.0	32.0	32.0	29.2	30.0	28.5
14	32.0	32.9	31.0	30.8	30.2	31.2	30.1	30.0	30.5	29.0	32.0	28.9	33.5	32.3	30.2	29.0	30.5	29.0
15	30.0	33.2	31.2	32.0	30.8	31.0	30.8	30.0	29.0	29.5	28.8	28.1	32.2	30.1	29.7	29.5	31.0	30.1
16	33.5	31.2	32.5	29.2	33.0	31.1	29.0	29.9	29.6	28.9	30.0	30.1	30.0	31.8	30.0	28.2	31.8	29.8
17	29.0	30.9	30.0	29.2	28.9	29.9	29.2	28.2	28.8	27.0	29.1	29.0	31.2	31.1	28.8	27.0	29.9	27.0
18	28.8	31.9	29.1	31.0	28.0	31.8	27.8	30.0	27.0	28.8	27.9	29.2	31.1	30.1	26.8	28.2	28.8	28.5
Average	30.4	32.0	29.5	29.4	29.6	31.0	30.2	30.3	29.1	29.5	29.6	29.7	30.7	30.9	29.6	29.2	30.0	29.6
SD	2.4	2.1	1.9	1.5	2.1	1.8	2.0	1.5	1.3	1.4	1.7	1.3	2.1	1.7	1.7	1.1	1.7	1.3

APPENDIX B

Table B-1 Climate change and cummulative rainfall at Sakol Nakorn Fisheries Station on sampling days

Date	Temperature ( <sup>o</sup> C)	Cummulative rainfall (mm.)	Climate of sampling time
18/07/95	25-27	94.3	Rainy
23/07/95	28-29	16.5	Partly-cloudy sky
28/07/95	29-30	4.2	No sunshine with cloudy sky
02/08/95	32	105.5	Partly cloudy sky
07/08/95	27-29	79.1	Gloomy
12/08/95	30	21.1	Shower
17/08/95	31.5-33	9	Sunny and cloudy sky
22/08/95	28-28.5	9.5	Cloudy
27/08/95	34	21.6	Sunny and clear sky
01/09/95	30-31.5	185.9	Sunny
06/09/95	31.5-32	50.6	Partly-cloudy sky
11/09/95	27	7.5	Gloomy
16/09/95	29-32	14.6	Hot and sunshine
21/09/95	32	0	Hot
26/09/95	29-33	0	Sunny and clear sky
01/10/95	34	0	Lightly cloudy
06/10/95	30-31	2.2	Gloomy
11/10/95	28-29	2.6	Partly-cloudy sky
16/10/95	32	0	Hot





Table B-2 Some characteristics of soil separates

Separate	Diameter mm	Number of particles per gram	Surface area in 1 gram, cm <sup>2</sup>
Very coarse sand	-	90	11
Coarse sand	2.00-0.20	720	23
Medium sand	-	5,700	45
Fine sand	0.20-0.02	46,00	91
Very fine sand	-	722,00	227
Silt	0.02-0.002	5,776,000	454
Clay	Below 0.002	90,260,853,000	8,000,000

Source : Based on Foth, 1984

APPENDIX C

\*\*\* ANALYSIS OF VARIANCE \*\*\*

EFFIBOD  
by DEPTH  
PLANT

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig of F
Main Effects	11281.783	4	2820.446	16.637	.000
DEPTH	3006.322	2	1503.161	8.867	.000
PLANT	8356.667	2	4178.334	24.647	.000
2-Way Interactions	10245.239	4	2561.310	15.109	.000
DEPTH PLANT	10245.239	4	2561.310	15.109	.000
Explained	22322.816	8	2790.352	16.460	.000
Residual	24411.743	144	169.526		
Total	46734.559	152	307.464		

ONEWAY

Variable EFFIBOD  
By Variable SYSTEM

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	8	22322.8159	2790.3520	16.4597	.0000
Within Groups	144	24411.7431	169.5260		
Total	152	46734.5590			

ONEWAY

Variable EFFIBOD  
By Variable SYSTEM

Multiple Range Tests: Scheffe test with significance level .05

(\*) Indicates significant differences which are shown in the lower triangle

G G G G G G G G  
r r r r r r r r  
p p p p p p p p  
7 4 6 5 1 3 2 8 9

Mean SYSTEM

25.3956	Grp 7	
45.6638	Grp 4	*
47.0261	Grp 6	*
49.0406	Grp 5	*
54.5931	Grp 1	*
59.5576	Grp 3	*
60.3313	Grp 2	*
60.6722	Grp 8	*
68.8159	Grp 9	* * * *



DATA ANALYSIS OF SELECTED PLANT AT EACH DEPTH

Variable EFFIBOD (0.15m)  
By Variable PLANT

O N E W A Y

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	518.3671	259.1836	1.6429	.2048
Within Groups	45	7099.3851	157.7641		
Total	47	7617.7523			

Variable EFFIBOD (0.30m)  
By Variable PLANT

O N E W A Y

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	95.6460	47.8230	.2563	.7750
Within Groups	48	8957.0925	186.6061		
Total	50	9052.7385			

Variable EFFIBOD3 (0.45m)  
By Variable PLANT

O N E W A Y

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	18875.5219	9437.7609	67.1056	.0000
Within Groups	50	7032.0266	140.6405		
Total	52	25907.5484			

Variable EFFIBOD3  
By Variable PLANT

O N E W A Y

Multiple Range Tests: Scheffe test with significance level .05

(\*) Indicates significant differences which are shown in the lower triangle

Mean	PLANT	
25.3956	Grp 1	
60.6722	Grp 2	*
68.8159	Grp 3	*

G G G  
r r r  
p p p  
1 2 3

DATA ANALYSIS FOR BOD REMOVAL AT VARIOUS DEPTHS  
O N E W A Y -

Variable EFFIBOD (noplant)  
By Variable DEPTH

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	7684.8319	3842.4159	53.4077	.0000
Within Groups	47	3381.4146	71.9450		
Total	49	11066.2464			

O N E W A Y

Variable EFFIBOD  
By Variable DEPTH

Multiple Range Tests: Scheffe test with significance level .05

(\*) Indicates significant differences which are shown in the lower triangle

Mean	DEPTH	
25.3956	Grp 3	
45.6638	Grp 2	*
54.5931	Grp 1	**

G G G  
r r r  
P P P  
3 2 1

O N E W A Y

Variable EFFIBOD (eleocharis)  
By Variable DEPTH

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	1798.4371	899.2185	4.4144	.0175
Within Groups	47	9574.0465	203.7031		
Total	49	11372.4836			

ONEWAY

Variable EFFIBOD (eleocharis)  
By Variable DEPTH

Multiple Range Tests: Scheffe test with significance level .05

(\*) Indicates significant differences which are shown in the lower triangle

		G G G
		r r r
		p p p
		2 3 1
Mean	DEPTH	
49.0406	Grp 2	
60.6722	Grp 3	
62.6793	Grp 1	*

ONEWAY

Variable EFFIBOD (cyperus)  
By Variable DEPTH

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	4194.4744	2097.2372	10.1415	.0002
Within Groups	49	10133.0431	206.7968		
Total	51	14327.5176			

ONEWAY

Variable EFFIBOD  
By Variable DEPTH

Multiple Range Tests: Scheffe test with significance level .05

(\*) Indicates significant differences which are shown in the lower triangle

		G G G
		r r r
		p p p
		2 1 3
Mean	DEPTH	
47.0261	Grp 2	
59.5576	Grp 1	*
68.8159	Grp 3	*



\*\*\* ANALYSIS OF VARIANCE \*\*\*

EFFIPO4  
by DEPTH  
PLANT

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig of F
Main Effects	12263.296	4	3065.824	30.658	.000
DEPTH	6080.894	2	3040.447	30.404	.000
PLANT	6238.674	2	3119.337	31.193	.000
2-Way Interactions	5833.999	4	1458.500	14.585	.000
DEPTH PLANT	5833.999	4	1458.500	14.585	.000
Explained	18026.500	8	2253.313	22.533	.000
Residual	14800.356	148	100.002		
Total	32826.856	156	210.429		

ONEWAY

Variable EFFIPO4  
By Variable SYSTEM

Source	D.F.	Analysis of Variance			
		Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	8	18026.5001	2253.3125	22.5326	.0000
Within Groups	148	14800.3558	100.0024		
Total	156	32826.8559			

Multiple Range Tests: Scheffe test with significance level .05  
 (\*) Indicates significant differences which are shown in the lower triangle

		G G G G G G G G
		r r r r r r r r
		P P P P P P P P
		7 8 5 4 2 1 9 3 6
Mean	SYSTEM	
60.5888	Grp 7	
80.8694	Grp 8	*
85.2678	Grp 5	*
89.9847	Grp 4	*
90.2817	Grp 2	*
93.2594	Grp 1	*
95.4082	Grp 9	* *
96.5547	Grp 3	* *
96.9028	Grp 6	* *

Variable EFFIPO1 (0.15m)  
By Variable PLANT

## O N E W A Y

## Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	344.0972	172.0486	2.3392	.1069
Within Groups	50	3677.5384	73.5508		
Total	52	4021.6355			

Variable EFFIPO2 (0.30 m)  
By Variable PLANT

## O N E W A Y

## Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	1232.3456	616.1728	7.5940	.0013
Within Groups	50	4056.9569	81.1391		
Total	52	5289.3025			

Variable EFFIPO2  
By Variable PLANT

## O N E W A Y

Multiple Range Tests: Scheffe test with significance level .05

(\*) Indicates significant differences which are shown in the lower triangle

Mean	PLANT	
85.2678	Grp 2	
89.9847	Grp 1	
96.9028	Grp 3	*

G G G  
r r r  
p p p  
2 1 3

Variable EFFIPO3 (0.45 m)  
By Variable PLANT

## O N E W A Y

## Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	12438.8509	6219.4255	33.8243	.0000
Within Groups	49	9009.8390	183.8743		
Total	51	21448.6899			

## ONEWAY

Variable EFFIPO3

By Variable PLANT

Multiple Range Tests: Scheffe test with significance level .05

(\*) Indicates significant differences which are shown in the lower triangle

Mean	PLANT	
58.0683	Grp 1	
80.8694	Grp 2	*
95.4082	Grp 3	* *

G G G  
 r r r  
 p p p  
 1 2 3



ONEWAY

Variable EFFIPO41 (no plant)  
By Variable DEPTH

		Analysis of Variance			
Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	11146.6663	5573.3332	36.2190	.0000
Within Groups	49	7540.0587	153.8787		
Total	51	18686.7250			
33.3300	100.0000				

ONEWAY

Variable EFFIPO41 (no plant)  
By Variable DEPTH

Multiple Range Tests: Scheffe test with significance level .05

(\*) Indicates significant differences which are shown in the lower triangle

Mean	DEPTH	
60.5888	Grp 3	
89.9847	Grp 2	*
93.2594	Grp 1	*

G G G  
 r r r  
 p p p  
 3 2 1

ONEWAY

Variable EFFIPO42 (eleocharis)  
By Variable DEPTH

		Analysis of Variance			
Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	776.8590	388.4295	3.2299	.0479
Within Groups	50	6013.0695	120.2614		
Total	52	6789.			

## O N E W A Y

Variable EFFIPO42 (eleocharis)  
By Variable DEPTH

Multiple Range Tests: Scheffe test with significance level .05

(\*) Indicates significant differences which are shown in the lower triangle

		G	G	G
		r	r	r
		p	p	p
		3	2	1
Mean	DEPTH			
80.8694	Grp 3			
85.2678	Grp 2			
90.2817	Grp 1		*	

## O N E W A Y

Variable EFFIPO43 (cyperus)  
By Variable DEPTH

## Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	21.1622	10.5811	.4157	.6622
Within Groups	49	1247.2276	25.4536		
Total	51	1268.3898			

\*\*\* ANALYSIS OF VARIANCE \*\*\*

EFFINH3 by DEPTH PLANT					
Source of Variation	Sum of Squares	DF	Mean Square	F	Sig of F
Main Effects	11933.626	4	2983.406	9.141	.000
DEPTH	422.292	2	211.146	.647	.525
PLANT	11476.627	2	5738.313	17.581	.000
2-Way Interactions	4496.197	4	1124.049	3.444	.010
DEPTH PLANT	4496.197	4	1124.049	3.444	.010
Explained	16519.529	8	2064.941	6.327	.000
Residual	45041.422	138	326.387		
Total	61560.951	146	421.650		

ONEWAY

Variable EFFINH3  
By Variable SYSTEM

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	8	16519.5291	2064.9411	6.3267	.0000
Within Groups	138	45041.4222	326.3871		
Total	146	61560.9513			

ONEWAY

Variable EFFINH3  
By Variable SYSTEM

Multiple Range Tests: Scheffe test with significance level .05

(\*) Indicates significant differences which are shown in the lower triangle

Mean	SYSTEM	
58.1263	Grp 1	
65.4418	Grp 7	
71.6640	Grp 4	
72.3528	Grp 5	
80.1113	Grp 8	
82.0382	Grp 9	
85.4169	Grp 6	*
89.8271	Grp 3	*
91.2375	Grp 2	* *

G G G G G G G G G  
r r r r r r r r r  
P P P P P P P P P  
1 7 4 5 8 9 6 3 2



## O N E W A Y

Variable EFFINH1 (0.15M)  
By Variable PLANT

## Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	11317.3873	5658.6937	40.2482	.0000
Within Groups	46	6467.3722	140.5950		
Total	48	17784.7595			

## O N E W A Y

Variable EFFINH1  
By Variable PLANT

Multiple Range Tests: Scheffe test with significance level .05

(\*) Indicates significant differences which are shown in the lower triangle

Mean	PLANT	
58.1263	Grp 1	
89.8271	Grp 3	*
91.2375	Grp 2	*

G G G  
r r r  
p p p  
1 3 2



## O N E W A Y

Variable EFFINH2 (0.30M)  
By Variable PLANT

## Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	1932.1472	966.0736	2.1346	.1299
Within Groups	46	20818.9765	452.5864		
Total	48	22751.1237			

## O N E W A Y

Variable EFFINH3 (0.45M)  
By Variable PLANT

## Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	2763.7719	1381.8860	3.5802	.0359
Within Groups	46	17755.0735	385.9799		
Total	48	20518.8454			

## O N E W A Y

Variable EFFINH3 (NO PLANT)  
By Variable DEPTH

## Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	1425.2949	712.6474	2.3474	.1072
Within Groups	45	13661.2910	303.5842		
Total	47	15086.5858			

## O N E W A Y

Variable EFFINH3 (ELEOCHARIS)  
By Variable DEPTH

## Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	3034.1410	1517.0705	4.8011	.0128
Within Groups	46	14535.3996	315.9869		
Total	48	17569.5406			

## O N E W A Y

Variable EFFINH32  
By Variable DEPTH  
Multiple Range Tests: Scheffe test with significance level .05

(\*) Indicates significant differences which are shown in the lower triangle

		G G G
		r r r
		p p p
		2 3 1
Mean	DEPTH	
72.3528	Grp 2	
80.1113	Grp 3	
91.2375	Grp 1	*

## O N E W A Y

Variable EFFINH33 (CYPERUS)  
By Variable DEPTH

## Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	518.5534	259.2767	.7234	.4904
Within Groups	47	16844.7315	358.3985		
Total	49	17363.2849			

\*\*\* ANALYSIS OF VARIANCE \*\*\*

EFFITKN  
by DEPTH  
PLANT

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig of F
Main Effects	16070.388	4	4017.597	14.192	.000
DEPTH	2589.263	2	1294.631	4.573	.012
PLANT	13313.593	2	6656.797	23.515	.000
2-Way Interactions	3102.671	4	775.668	2.740	.031
DEPTH PLANT	3102.671	4	775.668	2.740	.031
Explained	19147.345	8	2393.418	8.455	.000
Residual	40481.523	143	283.088		
Total	59628.869	151	394.893		

----- O N E W A Y -----

Variable EFFITKN  
By Variable SYSTEM

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	8	19147.3454	2393.4182	8.4547	.0000
Within Groups	143	40481.5232	283.0876		
Total	151	59628.8686			

----- O N E W A Y -----

Variable EFFITKN  
By Variable SYSTEM

Multiple Range Tests: Scheffe test with significance level .05

(\*) Indicates significant differences which are shown in the lower triangle

G G G G G G G G  
r r r r r r r r r  
P P P P P P P P P  
4 1 7 5 2 9 6 8

Mean SYSTEM

35.2853	Grp 4	
52.6606	Grp 1	
58.5419	Grp 7	
63.2359	Grp 5	*
64.2788	Grp 2	*
68.9967	Grp 9	*
70.6024	Grp 6	*
71.5256	Grp 8	*
71.5511	Grp 3	*

O N E W A Y

Variable EFFITKN1 (0.15m)  
By Variable PLANT

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	3159.6708	1579.8354	9.5739	.0003
Within Groups	48	7920.6902	165.0144		
Total	50	11080.3610			

O N E W A Y

Variable EFFITKN1  
By Variable PLANT

(\*) Indicates significant differences which are shown in the lower triangle

Mean	PLANT	
52.6606	Grp 1	
64.2788	Grp 2	*
71.5511	Grp 3	*

G G G  
r r r  
P P P  
1 2 3

O N E W A Y

Variable EFFITKN2 (0.30m)  
By Variable PLANT

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	11802.5045	5901.2523	17.3529	.0000
Within Groups	48	16323.4771	340.0724		
Total	50	28125.9817			

O N E W A Y

Variable EFFITKN2  
By Variable PLANT

Multiple Range Tests: Scheffe test with significance level .05

(\*) Indicates significant differences which are shown in the lower triangle

Mean	PLANT	
35.2853	Grp 1	
63.2359	Grp 2	*
70.6024	Grp 3	*

G G G  
r r r  
P P P  
1 2 3

Variable EFFITKN3 (0.45m)		O N E W A Y			
By Variable PLANT		Analysis of Variance			
Source	D.F	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	1529.5404	764.7702	2.2137	.1206
Within Groups	47	16237.3558	345.4757		
Total	49	17766.8962			

O N E W A Y

Variable EFFITKN1 (no plant)  
By Variable DEPTH

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	4875.4789	2437.7394	11.7863	.0001
Within Groups	47	9720.8918	206.8275		
Total	49	14596.3707			

O N E W A Y

Variable EFFITKN1  
By Variable DEPTH

(\*) Indicates significant differences which are shown in the lower triangle

Mean	DEPTH	
35.2853	Grp 2	
52.6606	Grp 1	*
58.5419	Grp 3	*

G G G  
r r r  
p p p  
2 1 3

O N E W A Y

Variable EFFITKN2 (eleocharis)  
By Variable DEPTH

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	661.8779	330.9389	1.1573	.3233
Within Groups	46	13153.6844	285.9497		
Total	48	13815.5623			

O N E W A Y

Variable EFFITKN3 (cyperus)  
By Variable DEPTH

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	59.9725	29.9862	.0852	.9185
Within Groups	50	17606.9471	352.1389		
Total	52	17666.9196			

\*\*\* ANALYSIS OF VARIANCE \*\*\*

EFFITSS  
by DEPTH  
PLANT

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig of F
Main Effects	5627.403	4	1406.851	3.203	.015
DEPTH	2132.811	2	1066.406	2.428	.092
PLANT	3332.022	2	1666.011	3.793	.025
2-Way Interactions	6084.223	4	1521.056	3.463	.010
DEPTH PLANT	6084.223	4	1521.056	3.463	.010
Explained	11994.715	8	1499.339	3.413	.001
Residual	60175.799	137	439.239		
Total	72170.514	145	497.728		

----- ONEWAY -----

Variable EFFITSS  
By Variable SYSTEM

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	8	11994.7148	1499.3394	3.4135	.0013
Within Groups	137	60175.7993	439.2394		
Total	145	72170.5142			

----- ONEWAY -----

Variable EFFITSS  
By Variable SYSTEM

Multiple Range Tests: Scheffe test with significance level .05

(\*) Indicates significant differences which are shown in the lower triangle

G G G G G G G G  
r r r r r r r r  
P P P P P P P P  
6 8 7 5 2 1 4 9 3

Mean SYSTEM

54.0447 Grp 6  
57.5806 Grp 8  
58.8757 Grp 7  
59.3653 Grp 5  
60.2694 Grp 2  
64.5860 Grp 1  
68.3481 Grp 4  
73.2094 Grp 9  
84.3906 Grp 3

\*





## O N E W A Y

Variable EFFITSS1 (0.15m)  
By Variable PLANT

## Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	5094.8890	2547.4445	7.3141	.0018
Within Groups	45	15673.0991	348.2911		
Total	47	20767.9882			

## O N E W A Y

Variable EFFITSS1  
By Variable PLANT

Multiple Range Tests: Scheffe test with significance level .05

(\*) Indicates significant differences which are shown in the lower triangle

Mean	PLANT	
61.5194	Grp 2	
64.5860	Grp 1	
84.3906	Grp 3	* *

G G G  
r r r  
P P P  
2 1 3

## O N E W A Y

Variable EFFITSS2 (0.30m)  
By Variable PLANT

## Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	1041.8913	520.9457	1.4419	.2474
Within Groups	44	15897.1310	361.2984		
Total	46	16939.0223			

## O N E W A Y

Variable EFFITSS3 (0.45m)  
By Variable PLANT

## Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	2626.7705	1313.3852	2.5699	.0873
Within Groups	47	24019.8545	511.0607		
Total	49	26646.6250			

O N E W A Y

Variable EFFITSS1 (no plant)  
By Variable DEPTH

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	776.2265	388.1133	1.2981	.2833
Within Groups	44	13155.6802	298.9927		
Total	46	13931.9067			

O N E W A Y

Variable EFFITSS2 (eleocharis)  
By Variable DEPTH

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	168.8892	84.4446	.1290	.8793
Within Groups	47	30772.7508	654.7394		
Total	49	30941.6400			

O N E W A Y

Variable EFFITSS3 (cyperus)  
By Variable DEPTH

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	5549.7575	2774.8788	10.2159	.0002
Within Groups	46	12494.7189	271.6243		
Total	48	18044.4764			

O N E W A Y

Variable EFFITSS3  
By Variable DEPTH

Multiple Range Tests: Scheffe test with significance level .05  
(\* ) Indicates significant differences which are shown in the lower triangle

		G G G
		r r r
		P P P
		2 3 1
Mean	DEPTH	
57.5293	Grp 2	
73.2094	Grp 3	*
84.3906	Grp 1	*

## \*\*\* ANALYSIS OF VARIANCE \*\*\*

EFFITDS by DEPTH PLANT					
Source of Variation	Sum of Squares	DF	Mean Square	F	Sig of F
Main Effects	2704.931	4	676.233	1.941	.107
DEPTH	1166.961	2	583.481	1.675	.191
PLANT	1508.545	2	754.272	2.165	.119
2-Way Interactions	2822.987	4	705.747	2.026	.094
DEPTH PLANT	2822.987	4	705.747	2.026	.094
Explained	5353.303	8	669.163	1.921	.062
Residual	47029.996	135	348.370		
Total	52383.298	143	366.317		

## ----- O N E W A Y -----

Variable EFFITDS  
By Variable SYSTEM

## Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	8	5353.3027	669.1628	1.9208	.0617
Within Groups	135	47029.9958	348.3703		
Total	143	52383.2985			

## ----- O N E W A Y -----

Variable EFFITDS  
By Variable SYSTEM

Multiple Range Tests: Scheffe test with significance level .05  
- No two groups are significantly different at the .050 level

Variable EFFITDS1 (0.15 m)  
By Variable PLANT

## O N E W A Y

## Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	59.0668	29.5334	.0712	.9313
Within Groups	49	20316.1289	414.6149		
Total	51	20375.1957			

Variable EFFITDS2 (0.30m)  
By Variable PLANT

## O N E W A Y

## Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	1023.6124	511.8062	1.5772	.2183
Within Groups	43	13953.9750	324.5110		
Total	45	14977.5874			

Variable EFFITDS3 (0.45m)  
By Variable PLANT

## O N E W A Y

## Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	3067.0932	1533.5466	5.1680	.0097
Within Groups	43	12759.8919	296.7417		
Total	45	15826.9851			

Variable EFFITDS3 (0.45m)  
By Variable PLANT

## O N E W A Y

Multiple Range Tests: Scheffe test with significance level .05

(\*) Indicates significant differences which are shown in the lower triangle

			G G G
			r r r
			P P P
			2 1 3
Mean	PLANT		
4.3480	Grp 2		
8.8237	Grp 1		
23.6307	Grp 3	*	

O N E W A Y

Variable EFFITDS1 (no plant)  
By Variable DEPTH

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	1747.7288	873.8644	1.8723	.1651
Within Groups	47	21936.8146	466.7407		
Total	49	23684.5434			

O N E W A Y

Variable EFFITDS2 (eleocharis)  
By Variable DEPTH

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	560.7458	280.3729	1.1564	.3240
Within Groups	44	10668.0075	242.4547		
Total	46	11228.7533			

O N E W A Y

Variable EFFITDS3 (cyperus)  
By Variable DEPTH

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	1877.6051	938.8026	2.6596	.0810
Within Groups	45	15884.4575	352.9879		
Total	47	17762.0627			

Variable GROWTH (Cyperus)  
By Variable DEPTH

ONEWAY

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	2073.6752	1036.8376	.5532	.5815
Within Groups	27	50602.0832	1874.1512		
Total	29	52675.7584			

Variable GROWTH  
By Variable DEPTH

ONEWAY

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	8818.2022	4409.1011	13.5847	.0001
Within Groups	27	8763.2063	324.5632		
Total	29	17581.4084			

Variable GROWTH  
By Variable DEPTH

ONEWAY

Multiple Range Tests: Scheffe test with significance level .05

(\*) Indicates significant differences which are shown in the lower triangle

Mean	DEPTH	
82.3400	Grp 3	
87.2000	Grp 2	
120.8950	Grp 1	**





## BIOGRAPHY

Sasidhorn Buddhawong was born on October 2, 1971 in Suphan-Buri Province. She received a Bachelor Degree of Science in 1992 from Department of Environmental Science, Faculty of Science, Silpakorn University. She continued her further study at Inter-Department of Environmental Science, Chulalongkorn University.