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APPENDIX

Secondary chemistry, nutrient content, water content,  
and palatability to leafcutting ants, of  
individuals of 50 tropical wood plant species.

Supplement to

Leafcutting ant diet selection:  
the role of nutrients, water, and secondary chemistry

by

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Leafcutting Ant Diet Selection:  
The Role of Nutrients, Water, and Secondary Chemistry  
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APPENDIX

Secondary chemistry, nutrient content, water content, and palatability to leafcutting ants, of individuals of 50 tropical woody plant species. Plant names follow Janzen and Liesner (1980) except as noted. Month: 6 = June, 7 = July, 8 = August. Disks harvested are the mean of measurements on 3 ant colonies,  $\pm 1$  s.d. Non-polar extracts are classified according to their deterrency in laboratory bioassays: 0 = nondeterrent; 1 = slightly deterrent, but not significantly so; 2 = significantly deterrent ( $P \leq 0.05$ ), 3 = highly deterrent ( $P \leq 0.001$ ). Alk (alkaloids): 0 = no reaction in spot tests; 1 = weak reaction; 2 = strong reaction. HT (hydrolyzable tannins): E = ellagitannins; G = gallotannins; B = both present. CT (condensed tannins): C = cyanidin; D = delphinidin; B = both present. Protein and nonstructural carbohydrate (percent dry weight) are means of 3 measurements  $\pm 1$  s.d. Nitrogen (percent dry weight) is a single measurement of total elemental nitrogen. Biomass ( $\text{mg dry weight}/\text{cm}^2$  leaf lamina) is the mean of 25 measurements,  $\pm 1$  s.d. Water content (percent wet weight) is the mean of 5 measurements,  $\pm 1$  s.d. \*: plant bore leaves only during June. #: determined by R. Liesner; synonymous with T. cuneata in Janzen and Liesner (1980).

REFERENCE

Janzen, D. H. and R. Liesner. 1980. Annotated check-list of plants of lowland Guanacaste province, Costa Rica, exclusive of grasses and non-vascular cryptogams. Brenesia 18: 15-90.

## Appendix continued.

Species	Month	Disks harvested		Non-polar			
		per hour		Extract	Alk	HT	CT
<u>Aegiphila martinicensis</u>	6	1.33	+ 2.31	1	0	-	-
(Verbenaceae)	7	1.00	+ 1.73	1	2	-	-
	8	0.33	+ 0.58	1	0	-	-
<u>Albizzia adinocephala</u>	6	4.33	+ 4.93	1	0	-	-
(Mimosaceae)	7	1.33	+ 0.58	1	2	-	-
	8	0.00	+ 0.00	1	2	-	-
<u>Ateleia herbert-smithii</u>	6	3.33	+ 3.06	3	0	-	-
(Fabaceae)	7	1.33	+ 1.53	3	1	-	-
	8	6.00	+ 7.21	3	2	-	-
<u>Banisteriopsis muricata</u>	6	3.00	+ 4.36	3	0	-	-
(Malpighiaceae)	7	1.00	+ 1.00	3	0	-	C
	8	0.33	+ 0.58	3	0	-	C
<u>Bombacopsis quinatum</u>	6	30.67	+ 11.93	0	1	-	C
(Bombacaceae)	7	31.67	+ 14.36	0	1	-	C
	8	24.33	+ 24.58	0	1	-	C
<u>Bursera simaruba</u>	6	44.33	+ 12.22	0	0	-	-
(Burseraceae)	7	24.00	+ 19.29	0	1	-	-
	8	10.33	+ 11.68	0	2	-	-
<u>Bursera tomentosa</u>	6	30.00	+ 10.15	3	0	G	C
(Burseaceae)	7	3.00	+ 2.00	3	2	-	C
	8	14.00	+ 16.52	3	0	-	C
<u>Byrsonima crassifolia</u>	6	14.67	+ 21.13	2	0	-	C
(Malpighiaceae)	7	16.33	+ 5.13	2	0	G	C
	8	2.00	+ 2.65	2	0	G	C

## Appendix continued.

Species	Month	Disks harvested	Non-polar			
		per hour	Extract	Alk	HT	CT
<u>Calycophyllum candidissimum</u>	6	19.33 $\pm$ 19.21	0	0	-	C
(Rubiaceae)	7	8.33 $\pm$ 10.97	0	0	-	C
	8	10.33 $\pm$ 10.41	0	0	-	C
<u>Cecropia peltata</u>	6	6.00 $\pm$ 2.00	1	0	-	C
(Moraceae)	7	0.00 $\pm$ 0.00	1	1	-	C
	8	3.67 $\pm$ 3.51	1	1	-	-
<u>Cedrela odorata</u>	6	20.00 $\pm$ 15.59	1	2	-	-
(Meliaceae)	7	8.67 $\pm$ 11.72	1	2	-	-
	8	3.00 $\pm$ 3.00	1	2	-	-
<u>Chlorophora tinctoria</u>	6	20.00 $\pm$ 20.88	0	0	-	-
(Moraceae)	7	8.33 $\pm$ 5.03	0	1	-	-
	8	18.00 $\pm$ 26.00	0	0	-	-
<u>Chomelia spinosa</u>	6	6.00 $\pm$ 7.94	2	0	-	-
(Rubiaceae)	7	1.00 $\pm$ 1.00	2	0	-	-
	8	9.67 $\pm$ 9.61	2	0	-	-
<u>Coccoloba venosa</u>	6	2.67 $\pm$ 3.79	3	0	G	D
(Polygonaceae)	7	0.33 $\pm$ 0.58	3	0	G	D
	8	2.00 $\pm$ 1.00	3	0	G	D
<u>Cordia alliodora</u>	6	6.33 $\pm$ 10.97	2	1	-	-
(Boraginaceae)	7	1.00 $\pm$ 1.00	2	0	-	-
	8	0.67 $\pm$ 0.58	2	0	-	-
<u>Crescentia alata</u>	6	26.00 $\pm$ 19.52	2	0	-	-
(Bignoniaceae)	7	15.67 $\pm$ 12.01	2	0	-	-
	8	6.00 $\pm$ 10.39	2	0	-	-

## Appendix continued.

Species	Month	Disks harvested		Non-polar			
		per hour		Extract	Alk	HT	CT
<u>Enterolobium cyclocarpum</u>	6	10.67	+ 15.01	1	1	-	D
(Mimosaceae)	7	0.67	+ 0.58	1	0	G	D
	8	0.00	+ 0.00	1	1	G	D
<u>Eugenia salamensis</u>	6	15.67	+ 11.37	1	2	B	-
(Myrtaceae)	7	5.33	+ 6.11	1	0	B	D
	8	5.00	+ 6.24	1	0	E	-
<u>Ficus goldmani</u>	6	36.67	+ 4.93	0	0	-	-
(Moraceae)	7	29.00	+ 17.06	0	0	-	C
	8	26.00	+ 23.43	0	0	-	-
<u>Genipa americana</u>	6	7.00	+ 11.27	3	0	-	-
(Rubiaceae)	7	5.33	+ 4.73	3	2	-	-
	8	8.33	+ 8.08	3	2	-	-
<u>Gouania polygama</u>	6	0.33	+ 0.58	2	2	-	-
(Rhamnaceae)	7	1.33	+ 1.53	2	2	-	-
	8	0.67	+ 1.15	2	0	-	-
<u>Guazuma ulmifolia</u>	6	3.33	+ 4.16	2	2	-	-
(Sterculiaceae)	7	4.67	+ 3.51	2	2	-	C
	8	1.67	+ 2.89	2	0	-	C
<u>Guettarda macrosperma</u>	6	14.33	+ 11.37	3	2	-	-
(Rubiaceae)	7	1.67	+ 2.89	3	0	-	-
	8	13.67	+ 14.01	3	1	-	-
<u>Hamelia patens</u>	6	14.33	+ 23.97	3	2	-	-
(Rubiaceae)	7	3.67	+ 1.53	3	2	-	-
	8	9.33	+ 7.37	3	2	-	-

## Appendix continued.

Species	Month	Disks harvested		Non-polar			
		per hour		Extract	Alk	HT	CT
<u>Hemiangium excelsum</u>	6	16.00	± 6.08	2	0	-	B
(Hippocrateaceae)	7	2.33	± 2.08	2	1	-	B
	8	7.33	± 7.09	2	0	-	D
<u>Hymenaea courbaril</u>	6	23.33	± 12.74	3	0	-	-
(Caesalpinaceae)	7	1.67	± 0.58	3	0	-	-
	8	7.33	± 12.70	3	0	-	B
<u>Inga vera</u>	6	11.33	± 1.53	1	0	G	D
(Mimosaceae)	7	1.00	± 1.73	1	0	G	D
	8	1.00	± 1.73	1	0	G	B
*							
<u>Jacquinia pungens</u>	6	5.00	± 4.58	1	0	-	-
(Theophrastaceae)							
<u>Iasianthea fruticosa</u>	6	11.33	± 14.47	2	2	-	-
(Compositae)	7	2.00	± 2.65	2	1	-	-
	8	4.67	± 5.03	2	2	-	-
<u>Luehea candida</u>	6	5.67	± 4.73	3	0	-	C
(Tiliaceae)	7	0.67	± 1.15	3	1	-	C
	8	5.00	± 6.92	3	2	-	-
<u>Luehea speciosa</u>	6	19.00	± 19.00	3	0	-	C
(Tiliaceae)	7	7.33	± 11.02	3	0	-	C
	8	2.33	± 4.04	3	0	-	C
<u>Malvaviscus arboreus</u>	6	3.33	± 3.51	2	0	-	-
(Malvaceae)	7	1.00	± 1.73	2	0	-	-
	8	0.67	± 1.15	2	0	-	-

## Appendix continued.

Species	Month	Disks harvested		Non-polar			
		per hour		Extract	Alk	HT	CT
<u>Melochia nodiflora</u>	6	16.33	$\pm$ 13.32	2	0	-	C
(Sterculiaceae)	7	3.00	$\pm$ 3.61	2	2	-	C
	8	0.33	$\pm$ 0.58	2	0	-	C
<u>Muntingia calabura</u>	6	11.33	$\pm$ 7.64	3	0	-	D
(Elaeocarpaceae)	7	1.67	$\pm$ 1.53	3	0	B	D
	8	1.67	$\pm$ 1.53	3	0	G	D
<u>Ocotea veraguensis</u>	6	2.00	$\pm$ 3.46	3	1	-	-
(Lauraceae)	7	0.33	$\pm$ 0.58	3	0	-	-
	8	1.00	$\pm$ 1.73	3	2	-	-
<u>Paullinia cururu</u>	6	6.67	$\pm$ 7.02	3	0	-	C
(Sapindaceae)	7	0.33	$\pm$ 0.58	3	1	-	C
	8	1.00	$\pm$ 1.00	3	0	-	C
<u>Pisonia macranthocarpa</u>	6	5.00	$\pm$ 4.36	3	0	-	-
(Nyctaginaceae)	7	7.33	$\pm$ 11.85	3	2	-	-
	8	1.33	$\pm$ 0.58	3	0	-	-
<u>Psidium guajava</u>	6	7.00	$\pm$ 9.54	3	0	-	B
(Myrtaceae)	7	11.33	$\pm$ 12.10	3	0	B	B
	8	1.67	$\pm$ 2.89	3	0	B	B
<u>Psychotria nervosa</u>	6	0.00	$\pm$ 0.00	3	0	-	-
(Rubiaceae)	7	0.33	$\pm$ 0.58	3	0	-	-
	8	0.33	$\pm$ 0.58	3	0	-	-
<u>Randia echinocarpa</u>	6	10.67	$\pm$ 9.71	1	0	-	-
(Rubiaceae)	7	1.00	$\pm$ 1.73	1	1	-	-
	8	4.33	$\pm$ 5.86	1	0	-	-

## Appendix continued.

Species	Month	Disks harvested		Non-polar			
		per hour		Extract	Alk	HT	CT
<u>Sapium thelocarpum</u>	6	28.33	+ 20.01	0	2	E	-
(Euphorbiaceae)	7	36.67	+ 22.14	0	2	E	-
	8	11.67	+ 14.57	0	2	B	-
<u>Sapranthus palanga</u>	6	6.33	+ 9.29	3	2	-	-
(Annonaceae)	7	2.33	+ 1.15	3	1	-	-
	8	0.00	+ 0.00	3	2	-	-
<u>Schoepfia schreiberi</u>	6	6.33	+ 5.51	1	0	B	-
(Olacaceae)	7	0.67	+ 0.58	1	2	B	-
	8	1.33	+ 1.52	1	2	E	-
<u>Spondias mombin</u>	6	65.33	+ 22.12	0	1	B	-
(Anacardiaceae)	7	60.33	+ 21.50	0	0	B	-
	8	34.33	+ 26.76	0	0	B	D
<u>Spondias purpurea</u>	6	32.33	+ 28.57	0	0	B	-
(Anacardiaceae)	7	27.33	+ 6.51	0	0	B	-
	8	36.00	+ 19.47	0	0	B	-
<u>Stachytarpheta jamaicensis</u>	6	2.67	+ 2.51	1	2	-	-
(Verbenaceae)	7	1.00	+ 1.00	1	1	-	-
	8	0.67	+ 0.58	1	0	-	-
<u>Stemmadenia obovata</u>	6	10.00	+ 4.00	3	2	-	-
(Apocynaceae)	7	1.33	+ 1.15	3	2	-	-
	8	2.67	+ 2.08	3	2	-	-
<u>Trichilia martiana</u> #	6	8.33	+ 11.93	1	0	-	D
(Meliaceae)	7	1.67	+ 1.53	1	1	-	D
	8	1.33	+ 2.31	1	0	-	D



Appendix continued.

Species	Month	Disks harvested		Non-polar			
		per hour		Extract	Alk	HT	CT
<u>Verbesina gigantea</u>	6	4.00	$\pm$ 6.93	3	2	-	-
(Compositae)	7	0.00	$\pm$ 0.00	3	2	-	-
	8	0.00	$\pm$ 0.00	3	0	-	-
<u>Zanthoxylum setulosum</u>	6	12.33	$\pm$ 14.74	2	2	-	-
(Rutaceae)	7	0.33	$\pm$ 0.58	2	2	-	-
	8	5.33	$\pm$ 7.57	2	2	-	-

Appendix continued.

Species	Month	Protein	Nitrogen	Nonstructural carbohydrate
<u>Aegiphila martinicensis</u>	6	2.47 $\pm$ 0.29	4.24	35.05 $\pm$ 3.13
	7	1.75 $\pm$ 0.20	4.32	25.04 $\pm$ 1.53
	8	1.44 $\pm$ 0.15	3.34	19.03 $\pm$ 0.48
<u>Albizzia adinocephala</u>	6	7.86 $\pm$ 0.39	6.37	19.53 $\pm$ 1.24
	7	4.88 $\pm$ 0.22	3.88	20.40 $\pm$ 0.99
	8	11.30 $\pm$ 0.42	3.80	14.55 $\pm$ 0.82
<u>Ateleia herbert-smithii</u>	6	8.48 $\pm$ 0.44	5.07	31.85 $\pm$ 1.71
	7	6.45 $\pm$ 0.84	3.98	23.51 $\pm$ 0.58
	8	4.72 $\pm$ 0.17	3.33	17.21 $\pm$ 1.92
<u>Banasteriopsis muricata</u>	6	6.96 $\pm$ 0.20	5.42	12.32 $\pm$ 0.35
	7	3.76 $\pm$ 0.23	2.78	13.08 $\pm$ 1.64
	8	2.45 $\pm$ 0.24	2.16	12.17 $\pm$ 0.49
<u>Bombacopsis guinatum</u>	6	6.90 $\pm$ 0.23	3.49	12.52 $\pm$ 2.95
	7	4.42 $\pm$ 0.47	2.11	22.16 $\pm$ 1.07
	8	6.47 $\pm$ 0.37	2.48	12.58 $\pm$ 0.69
<u>Bursera simaruba</u>	6	2.40 $\pm$ 0.18	2.82	13.43 $\pm$ 1.44
	7	1.82 $\pm$ 0.20	2.86	13.38 $\pm$ 0.60
	8	1.32 $\pm$ 0.26	2.42	10.58 $\pm$ 0.69
<u>Bursera tomentosa</u>	6	2.36 $\pm$ 0.02	2.19	17.88 $\pm$ 1.37
	7	1.64 $\pm$ 0.25	1.96	20.94 $\pm$ 0.30
	8	1.23 $\pm$ 0.06	1.75	13.33 $\pm$ 0.36
<u>Byrsonima crassifolia</u>	6	2.54 $\pm$ 0.19	1.96	18.00 $\pm$ 1.17
	7	2.59 $\pm$ 0.14	2.44	17.00 $\pm$ 0.67
	8	2.18 $\pm$ 0.22	2.26	13.20 $\pm$ 1.13

Appendix continued.

Species	Month	Protein	Nitrogen	Nonstructural carbohydrate
<u>Calycophyllum candidissimum</u>	6	3.37 $\pm$ 0.17	4.23	21.10 $\pm$ 1.74
	7	2.80 $\pm$ 0.21	2.19	21.12 $\pm$ 0.42
	8	1.86 $\pm$ 0.07	1.58	14.29 $\pm$ 0.51
<u>Cecropia peltata</u>	6	2.68 $\pm$ 0.21	2.57	17.11 $\pm$ 1.03
	7	2.56 $\pm$ 0.17	2.80	16.67 $\pm$ 2.79
	8	1.31 $\pm$ 0.16	2.48	12.46 $\pm$ 1.58
<u>Cedrela odorata</u>	6	2.75 $\pm$ 0.23	4.29	18.58 $\pm$ 0.86
	7	2.38 $\pm$ 0.19	4.49	18.61 $\pm$ 0.21
	8	4.21 $\pm$ 0.27	4.05	11.34 $\pm$ 2.12
<u>Chlorophora tinctoria</u>	6	1.43 $\pm$ 0.19	4.22	14.30 $\pm$ 2.32
	7	1.24 $\pm$ 0.12	3.06	17.19 $\pm$ 1.07
	8	2.53 $\pm$ 0.09	2.90	13.92 $\pm$ 1.10
<u>Chomelia spinosa</u>	6	2.92 $\pm$ 0.28	3.21	16.57 $\pm$ 1.61
	7	2.19 $\pm$ 0.07	2.65	14.73 $\pm$ 0.56
	8	1.53 $\pm$ 0.05	2.03	16.27 $\pm$ 0.55
<u>Coccoloba venosa</u>	6	1.75 $\pm$ 0.17	3.23	19.91 $\pm$ 1.44
	7	2.20 $\pm$ 0.15	1.47	24.13 $\pm$ 0.88
	8	1.25 $\pm$ 0.04	0.79	15.16 $\pm$ 0.39
<u>Cordia alliodora</u>	6	2.25 $\pm$ 0.16	5.97	8.35 $\pm$ 1.19
	7	2.73 $\pm$ 0.16	3.64	10.13 $\pm$ 0.18
	8	1.89 $\pm$ 0.13	2.99	7.79 $\pm$ 0.33
<u>Crescentia alata</u>	6	1.27 $\pm$ 0.18	5.09	8.73 $\pm$ 1.32
	7	0.67 $\pm$ 0.06	1.69	10.39 $\pm$ 1.48
	8	0.43 $\pm$ 0.23	1.53	9.54 $\pm$ 0.36

Appendix continued.

Species	Month	Protein	Nitrogen	Nonstructural carbohydrate
<u>Enterolobium cyclocarpum</u>	6	1.27 $\pm$ 0.19	3.10	13.30 $\pm$ 1.58
	7	2.87 $\pm$ 0.07	3.28	14.08 $\pm$ 0.76
	8	3.39 $\pm$ 0.31	2.86	10.91 $\pm$ 2.46
<u>Eugenia salamensis</u>	6	2.56 $\pm$ 0.16	5.02	11.50 $\pm$ 1.26
	7	3.47 $\pm$ 0.18	3.72	12.56 $\pm$ 0.24
	8	1.41 $\pm$ 0.04	6.37	6.69 $\pm$ 0.50
<u>Ficus goldmani</u>	6	0.53 $\pm$ 0.14	1.66	12.38 $\pm$ 2.11
	7	2.56 $\pm$ 0.17	2.21	28.09 $\pm$ 0.39
	8	2.32 $\pm$ 0.23	5.39	15.38 $\pm$ 0.40
<u>Genipa americana</u>	6	2.11 $\pm$ 0.25	4.98	27.22 $\pm$ 1.66
	7	1.10 $\pm$ 0.18	1.94	37.18 $\pm$ 1.30
	8	0.89 $\pm$ 0.10	1.18	26.61 $\pm$ 1.26
<u>Gouania polygama</u>	6	2.90 $\pm$ 0.19	5.07	15.71 $\pm$ 0.88
	7	3.05 $\pm$ 0.26	2.34	16.85 $\pm$ 1.20
	8	1.27 $\pm$ 0.33	2.67	10.42 $\pm$ 0.27
<u>Guazuma ulmifolia</u>	6	2.34 $\pm$ 0.15	5.06	12.33 $\pm$ 0.96
	7	3.92 $\pm$ 0.35	2.11	16.65 $\pm$ 0.19
	8	2.46 $\pm$ 0.28	1.82	11.57 $\pm$ 0.83
<u>Guettarda macrosperma</u>	6	2.91 $\pm$ 0.15	3.20	18.26 $\pm$ 0.86
	7	1.42 $\pm$ 0.11	2.00	15.66 $\pm$ 1.11
	8	1.55 $\pm$ 0.13	1.66	13.24 $\pm$ 0.20
<u>Hamelia patens</u>	6	5.64 $\pm$ 0.31	4.28	10.76 $\pm$ 1.28
	7	3.41 $\pm$ 0.13	3.11	20.24 $\pm$ 0.47
	8	4.06 $\pm$ 0.07	1.22	19.63 $\pm$ 2.18

## Appendix continued.

Species	Month	Protein	Nitrogen	Nonstructural carbohydrate
<u>Hemiangium excelsum</u>	6	2.01 $\pm$ 0.08	1.30	32.37 $\pm$ 0.40
	7	1.98 $\pm$ 0.01	1.80	28.95 $\pm$ 2.38
	8	2.07 $\pm$ 0.24	1.79	25.23 $\pm$ 0.41
<u>Hymenaea courbaril</u>	6	1.80 $\pm$ 0.16	1.95	16.03 $\pm$ 1.72
	7	2.19 $\pm$ 0.13	2.66	16.06 $\pm$ 0.51
	8	2.53 $\pm$ 0.23	2.17	20.98 $\pm$ 1.55
<u>Inga vera</u>	6	2.40 $\pm$ 0.21	2.67	14.12 $\pm$ 0.88
	7	2.61 $\pm$ 0.26	2.93	14.62 $\pm$ 1.25
	8	2.15 $\pm$ 0.38	2.89	10.58 $\pm$ 0.14
<u>Jacquinia pungens</u>	6	3.51 $\pm$ 0.27	2.01	27.12 $\pm$ 1.03
<u>Lasianthea fruticosa</u>	6	4.24 $\pm$ 0.02	4.37	9.17 $\pm$ 0.41
	7	2.31 $\pm$ 0.08	3.62	8.73 $\pm$ 1.38
	8	1.68 $\pm$ 0.05	3.06	7.05 $\pm$ 0.34
<u>Luehea candida</u>	6	1.72 $\pm$ 0.09	1.85	8.59 $\pm$ 1.07
	7	1.26 $\pm$ 0.17	2.63	16.18 $\pm$ 0.79
	8	0.80 $\pm$ 0.21	3.16	11.24 $\pm$ 0.39
<u>Luehea speciosa</u>	6	1.78 $\pm$ 0.20	4.02	19.11 $\pm$ 0.36
	7	1.37 $\pm$ 0.19	1.83	24.52 $\pm$ 1.03
	8	1.10 $\pm$ 0.03	1.60	15.59 $\pm$ 0.42
<u>Malvaviscus arboreus</u>	6	2.18 $\pm$ 0.24	2.71	9.56 $\pm$ 1.74
	7	0.88 $\pm$ 0.27	2.29	9.15 $\pm$ 1.48
	8	2.63 $\pm$ 0.09	2.16	8.20 $\pm$ 0.66

## Appendix continued.

Species	Month	Protein	Nitrogen	Nonstructural carbohydrate
<u>Melochia nodiflora</u>	6	2.70 $\pm$ 0.17	1.90	20.62 $\pm$ 2.22
	7	3.17 $\pm$ 0.28	3.08	22.17 $\pm$ 1.90
	8	3.65 $\pm$ 0.27	3.28	18.97 $\pm$ 0.65
<u>Muntingia calabura</u>	6	1.58 $\pm$ 0.16	3.88	24.64 $\pm$ 1.53
	7	1.96 $\pm$ 0.06	2.38	32.22 $\pm$ 1.81
	8	1.22 $\pm$ 0.30	2.24	19.18 $\pm$ 1.12
<u>Ocotea veraguensis</u>	6	1.81 $\pm$ 0.10	1.38	17.46 $\pm$ 0.33
	7	1.57 $\pm$ 0.04	2.05	11.94 $\pm$ 0.51
	8	1.46 $\pm$ 0.34	1.92	10.12 $\pm$ 1.22
<u>Paullinia cururu</u>	6	1.72 $\pm$ 0.21	3.13	15.01 $\pm$ 0.47
	7	2.32 $\pm$ 0.14	3.02	10.11 $\pm$ 0.91
	8	3.40 $\pm$ 0.26	1.57	6.81 $\pm$ 0.20
<u>Pisonia macranthocarpa</u>	6	2.23 $\pm$ 0.24	2.74	12.27 $\pm$ 1.18
	7	1.50 $\pm$ 0.07	2.79	11.72 $\pm$ 0.37
	8	3.07 $\pm$ 0.36	3.18	9.58 $\pm$ 0.43
<u>Psidium guajava</u>	6	1.81 $\pm$ 0.06	3.86	15.51 $\pm$ 0.47
	7	1.53 $\pm$ 0.10	0.93	19.55 $\pm$ 0.89
	8	1.48 $\pm$ 0.07	2.43	13.77 $\pm$ 0.91
<u>Psychotria nervosa</u>	6	1.64 $\pm$ 0.11	1.84	14.35 $\pm$ 0.15
	7	2.45 $\pm$ 0.23	2.29	17.02 $\pm$ 1.53
	8	2.57 $\pm$ 0.07	1.30	11.78 $\pm$ 0.41
<u>Randia echinocarpa</u>	6	1.67 $\pm$ 0.05	2.87	11.04 $\pm$ 1.65
	7	2.44 $\pm$ 0.17	2.74	12.09 $\pm$ 0.67
	8	2.39 $\pm$ 0.13	1.82	11.36 $\pm$ 0.50

## Appendix continued.

Species	Month	Protein	Nitrogen	Nonstructural carbohydrate
<u>Sapium thelocarpum</u>	6	5.53 $\pm$ 0.48	2.47	21.48 $\pm$ 1.41
	7	3.78 $\pm$ 0.29	3.02	18.40 $\pm$ 1.77
	8	3.64 $\pm$ 0.11	2.78	14.31 $\pm$ 0.76
<u>Sapranthus palanga</u>	6	4.94 $\pm$ 0.33	4.99	8.56 $\pm$ 0.87
	7	2.17 $\pm$ 0.08	1.30	10.48 $\pm$ 0.48
	8	2.86 $\pm$ 0.35	4.41	6.29 $\pm$ 0.25
<u>Schoepfia schreiberi</u>	6	2.27 $\pm$ 0.12	2.90	18.64 $\pm$ 1.64
	7	2.55 $\pm$ 0.15	2.83	15.78 $\pm$ 1.40
	8	2.25 $\pm$ 0.22	3.47	12.32 $\pm$ 0.76
<u>Spondias mombin</u>	6	2.21 $\pm$ 0.22	2.16	11.45 $\pm$ 0.81
	7	2.43 $\pm$ 0.08	2.19	16.37 $\pm$ 1.00
	8	1.82 $\pm$ 0.31	4.10	12.29 $\pm$ 0.34
<u>Spondias purpurea</u>	6	4.71 $\pm$ 0.10	2.64	17.61 $\pm$ 0.27
	7	4.12 $\pm$ 0.20	2.21	16.00 $\pm$ 0.42
	8	4.97 $\pm$ 0.28	1.85	16.58 $\pm$ 0.98
<u>Stachytarpheta jamaicensis</u>	6	2.11 $\pm$ 0.13	4.20	22.37 $\pm$ 0.61
	7	1.19 $\pm$ 0.14	2.47	28.12 $\pm$ 1.32
	8	0.97 $\pm$ 0.12	1.37	20.30 $\pm$ 3.41
<u>Stemmadenia obovata</u>	6	2.72 $\pm$ 0.13	3.72	20.76 $\pm$ 1.29
	7	1.43 $\pm$ 0.38	4.29	19.36 $\pm$ 2.35
	8	2.27 $\pm$ 0.36	4.13	20.67 $\pm$ 2.12
<u>Trichilia martiana</u>	6	1.78 $\pm$ 0.02	1.81	18.66 $\pm$ 0.80
	7	2.30 $\pm$ 0.13	2.40	18.06 $\pm$ 1.55
	8	2.31 $\pm$ 0.20	1.25	17.21 $\pm$ 0.90

Appendix continued.

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Species	Month	Protein	Nitrogen	Nonstructural carbohydrate
<u>Verbesina gigantea</u>	6	3.00 $\pm$ 0.29	5.37	10.70 $\pm$ 0.31
	7	1.45 $\pm$ 0.29	4.00	9.13 $\pm$ 0.32
	8	0.67 $\pm$ 0.05	2.45	4.61 $\pm$ 0.52
<u>Zanthoxylum setulosum</u>	6	5.24 $\pm$ 0.08	5.50	16.21 $\pm$ 0.56
	7	4.35 $\pm$ 0.31	3.52	19.93 $\pm$ 0.25
	8	3.27 $\pm$ 0.47	2.76	12.93 $\pm$ 2.36



Appendix continued.

Species	Month	Biomass	Water
<u>Aegiphila martinicensis</u>	6	9.40 $\pm$ 2.47	83.85 $\pm$ 1.21
	7	2.67 $\pm$ 0.15	88.22 $\pm$ 0.83
	8	2.41 $\pm$ 0.18	84.79 $\pm$ 0.23
<u>Albizzia adinocephala</u>	6	8.96 $\pm$ 0.69	81.40 $\pm$ 3.30
	7	8.02 $\pm$ 0.55	51.89 $\pm$ 2.11
	8	9.65 $\pm$ 0.75	56.02 $\pm$ 3.94
<u>Ateleia herbert-smithii</u>	6	8.28 $\pm$ 0.68	70.15 $\pm$ 0.63
	7	3.19 $\pm$ 0.48	76.38 $\pm$ 0.43
	8	5.61 $\pm$ 0.42	66.23 $\pm$ 0.62
<u>Banasteriopsis muricata</u>	6	4.69 $\pm$ 0.78	75.08 $\pm$ 4.00
	7	2.69 $\pm$ 0.16	76.76 $\pm$ 0.29
	8	5.48 $\pm$ 0.42	63.22 $\pm$ 0.73
<u>Bombacopsis quinatum</u>	6	3.00 $\pm$ 0.78	91.57 $\pm$ 0.92
	7	3.13 $\pm$ 0.29	87.35 $\pm$ 0.58
	8	3.39 $\pm$ 0.44	82.80 $\pm$ 0.98
<u>Bursera simaruba</u>	6	2.54 $\pm$ 0.15	84.93 $\pm$ 1.18
	7	5.74 $\pm$ 0.64	71.65 $\pm$ 0.73
	8	5.67 $\pm$ 0.55	68.75 $\pm$ 1.05
<u>Bursera tomentosa</u>	6	5.05 $\pm$ 0.23	76.17 $\pm$ 4.32
	7	5.05 $\pm$ 0.19	70.07 $\pm$ 5.98
	8	5.22 $\pm$ 0.92	66.19 $\pm$ 2.73
<u>Byrsonima crassifolia</u>	6	10.43 $\pm$ 0.83	58.14 $\pm$ 1.37
	7	6.52 $\pm$ 2.44	70.48 $\pm$ 4.68
	8	5.48 $\pm$ 0.71	70.61 $\pm$ 1.78

Appendix continued.

Species	Month	Biomass	Water
<u>Calycophyllum candidissimum</u>	6	7.63 $\pm$ 1.61	77.14 $\pm$ 7.40
	7	4.95 $\pm$ 0.15	74.39 $\pm$ 1.13
	8	4.11 $\pm$ 0.49	72.16 $\pm$ 0.96
<u>Cecropia peltata</u>	6	4.43 $\pm$ 0.55	82.23 $\pm$ 4.21
	7	6.19 $\pm$ 0.86	77.21 $\pm$ 2.69
	8	6.45 $\pm$ 0.81	71.60 $\pm$ 2.50
<u>Cedrela odorata</u>	6	3.65 $\pm$ 0.96	84.12 $\pm$ 3.63
	7	5.48 $\pm$ 0.27	71.61 $\pm$ 0.20
	8	6.19 $\pm$ 1.66	68.45 $\pm$ 0.25
<u>Chlorophora tinctoria</u>	6	3.99 $\pm$ 0.67	76.50 $\pm$ 3.14
	7	3.65 $\pm$ 0.54	78.71 $\pm$ 0.57
	8	4.56 $\pm$ 0.80	69.01 $\pm$ 2.80
<u>Chomelia spinosa</u>	6	4.32 $\pm$ 0.81	72.93 $\pm$ 9.37
	7	3.26 $\pm$ 0.33	76.21 $\pm$ 2.47
	8	4.24 $\pm$ 0.92	71.29 $\pm$ 2.28
<u>Coccoloba venosa</u>	6	9.06 $\pm$ 1.09	68.00 $\pm$ 2.22
	7	9.52 $\pm$ 0.81	65.52 $\pm$ 4.87
	8	7.99 $\pm$ 2.87	68.99 $\pm$ 4.86
<u>Cordia alliodora</u>	6	6.65 $\pm$ 1.27	73.26 $\pm$ 1.55
	7	8.15 $\pm$ 1.03	63.06 $\pm$ 1.98
	8	9.97 $\pm$ 1.82	55.27 $\pm$ 2.61
<u>Crescentia alata</u>	6	6.32 $\pm$ 0.85	84.43 $\pm$ 1.16
	7	9.00 $\pm$ 1.02	69.47 $\pm$ 0.69
	8	10.30 $\pm$ 1.64	72.59 $\pm$ 1.28

Appendix continued.

Species	Month	Biomass	Water
<u>Enterolobium cyclocarpum</u>	6	6.20 $\pm$ 0.49	58.15 $\pm$ 0.56
	7	6.99 $\pm$ 0.59	60.05 $\pm$ 0.88
	8	6.69 $\pm$ 0.68	64.91 $\pm$ 2.21
<u>Eugenia salamensis</u>	6	4.11 $\pm$ 1.02	83.42 $\pm$ 1.47
	7	4.82 $\pm$ 0.81	76.57 $\pm$ 1.58
	8	4.76 $\pm$ 0.64	72.78 $\pm$ 2.17
<u>Ficus goldmani</u>	6	13.75 $\pm$ 1.07	73.94 $\pm$ 4.37
	7	7.63 $\pm$ 2.63	81.87 $\pm$ 9.60
	8	9.84 $\pm$ 2.20	71.37 $\pm$ 4.38
<u>Genipa americana</u>	6	6.39 $\pm$ 2.69	82.32 $\pm$ 1.53
	7	4.43 $\pm$ 0.29	73.62 $\pm$ 2.01
	8	4.37 $\pm$ 0.18	72.47 $\pm$ 1.08
<u>Gouania polygama</u>	6	2.87 $\pm$ 0.81	80.72 $\pm$ 2.27
	7	2.28 $\pm$ 0.92	82.21 $\pm$ 2.50
	8	2.15 $\pm$ 0.18	76.61 $\pm$ 1.15
<u>Guazuma ulmifolia</u>	6	8.67 $\pm$ 3.04	63.11 $\pm$ 4.37
	7	4.17 $\pm$ 0.27	74.75 $\pm$ 0.62
	8	5.35 $\pm$ 0.75	67.62 $\pm$ 0.69
<u>Guettarda macrosperma</u>	6	4.69 $\pm$ 1.49	79.87 $\pm$ 1.31
	7	3.06 $\pm$ 0.44	76.16 $\pm$ 1.34
	8	4.37 $\pm$ 0.37	69.81 $\pm$ 0.94
<u>Hamelia patens</u>	6	4.78 $\pm$ 0.19	80.43 $\pm$ 2.96
	7	3.46 $\pm$ 0.18	82.49 $\pm$ 1.57
	8	5.08 $\pm$ 0.37	75.83 $\pm$ 0.73

Appendix continued.

Species	Month	Biomass	Water
<u>Hemiangium excelsum</u>	6	8.21 $\pm$ 0.58	64.99 $\pm$ 1.70
	7	9.32 $\pm$ 0.37	66.52 $\pm$ 0.68
	8	8.15 $\pm$ 0.89	67.55 $\pm$ 4.46
<u>Hymenaea courbaril</u>	6	7.17 $\pm$ 1.13	51.32 $\pm$ 1.66
	7	6.58 $\pm$ 0.27	60.26 $\pm$ 0.68
	8	7.95 $\pm$ 0.49	57.61 $\pm$ 0.42
<u>Inga vera</u>	6	5.22 $\pm$ 0.33	59.92 $\pm$ 1.82
	7	7.37 $\pm$ 0.88	55.92 $\pm$ 1.51
	8	6.32 $\pm$ 0.59	51.75 $\pm$ 6.16
<u>Jacquinia pungens</u>	6	9.45 $\pm$ 0.92	58.46 $\pm$ 2.94
<u>Lasianthea fruticosa</u>	6	3.19 $\pm$ 0.99	79.48 $\pm$ 1.54
	7	3.00 $\pm$ 0.36	73.09 $\pm$ 4.94
	8	3.00 $\pm$ 0.36	70.44 $\pm$ 2.69
<u>Luehea candida</u>	6	4.17 $\pm$ 0.71	72.30 $\pm$ 2.79
	7	3.78 $\pm$ 0.37	72.48 $\pm$ 0.73
	8	4.95 $\pm$ 1.29	62.78 $\pm$ 2.66
<u>Luehea speciosa</u>	6	8.28 $\pm$ 0.59	53.36 $\pm$ 1.45
	7	3.65 $\pm$ 0.42	68.62 $\pm$ 2.30
	8	7.50 $\pm$ 0.76	57.11 $\pm$ 1.62
<u>Malvaviscus arboreus</u>	6	3.19 $\pm$ 1.45	86.12 $\pm$ 2.87
	7	2.61 $\pm$ 0.23	83.93 $\pm$ 1.23
	8	3.26 $\pm$ 0.23	79.01 $\pm$ 1.28

Appendix continued.

Species	Month	Biomass	Water
<u>Melochia nodiflora</u>	6	7.93 $\pm$ 0.38	61.06 $\pm$ 6.69
	7	5.80 $\pm$ 0.42	59.20 $\pm$ 3.08
	8	4.04 $\pm$ 0.29	63.38 $\pm$ 1.25
<u>Muntingia calabura</u>	6	5.54 $\pm$ 1.06	66.35 $\pm$ 2.60
	7	4.63 $\pm$ 0.42	70.94 $\pm$ 2.77
	8	7.24 $\pm$ 0.71	57.81 $\pm$ 2.61
<u>Ocotea veraguensis</u>	6	7.89 $\pm$ 0.42	46.64 $\pm$ 1.22
	7	6.58 $\pm$ 0.63	56.31 $\pm$ 2.77
	8	6.78 $\pm$ 0.36	55.30 $\pm$ 4.14
<u>Paullinia cururu</u>	6	4.95 $\pm$ 0.36	63.79 $\pm$ 1.12
	7	2.87 $\pm$ 0.15	72.82 $\pm$ 0.88
	8	3.00 $\pm$ 0.15	63.31 $\pm$ 7.26
<u>Pisonia macranthocarpa</u>	6	7.76 $\pm$ 0.71	70.50 $\pm$ 2.10
	7	6.00 $\pm$ 0.29	72.63 $\pm$ 2.30
	8	8.54 $\pm$ 1.33	70.61 $\pm$ 1.03
<u>Psidium guajava</u>	6	10.69 $\pm$ 1.76	67.96 $\pm$ 4.89
	7	7.11 $\pm$ 0.42	75.55 $\pm$ 0.80
	8	8.41 $\pm$ 1.88	67.29 $\pm$ 7.07
<u>Psychotria nervosa</u>	6	4.30 $\pm$ 0.42	74.22 $\pm$ 1.54
	7	3.72 $\pm$ 0.94	78.18 $\pm$ 5.90
	8	2.87 $\pm$ 0.27	80.59 $\pm$ 0.87
<u>Randia echinocarpa</u>	6	3.19 $\pm$ 0.27	76.58 $\pm$ 3.34
	7	3.39 $\pm$ 0.44	65.01 $\pm$ 8.24
	8	4.56 $\pm$ 0.40	66.14 $\pm$ 0.91

Appendix continued.

Species	Month	Biomass	Water
<u>Sapium thelocarpum</u>	6	3.00 $\pm$ 0.36	88.28 $\pm$ 0.70
	7	3.85 $\pm$ 0.15	83.58 $\pm$ 1.25
	8	6.00 $\pm$ 0.37	75.14 $\pm$ 1.79
<u>Sapranthus palanga</u>	6	2.54 $\pm$ 0.84	81.50 $\pm$ 3.01
	7	2.41 $\pm$ 0.37	76.29 $\pm$ 0.66
	8	2.93 $\pm$ 0.52	71.66 $\pm$ 1.88
<u>Schoepfia schreiberi</u>	6	7.11 $\pm$ 0.42	71.22 $\pm$ 3.40
	7	8.02 $\pm$ 0.49	71.20 $\pm$ 1.01
	8	6.84 $\pm$ 1.06	67.83 $\pm$ 2.45
<u>Spondias mombin</u>	6	7.63 $\pm$ 0.82	71.97 $\pm$ 2.24
	7	6.39 $\pm$ 0.49	75.34 $\pm$ 1.32
	8	11.08 $\pm$ 1.00	62.44 $\pm$ 1.15
<u>Spondias purpurea</u>	6	3.50 $\pm$ 0.67	83.27 $\pm$ 1.40
	7	3.00 $\pm$ 0.15	79.11 $\pm$ 0.61
	8	4.56 $\pm$ 0.23	70.38 $\pm$ 1.93
<u>Stachytarpheta jamaicensis</u>	6	4.50 $\pm$ 1.11	83.25 $\pm$ 4.46
	7	7.04 $\pm$ 1.50	71.79 $\pm$ 4.91
	8	5.67 $\pm$ 0.18	75.17 $\pm$ 1.64
<u>Stemmadenia obovata</u>	6	4.11 $\pm$ 1.17	86.42 $\pm$ 2.33
	7	2.74 $\pm$ 0.29	82.26 $\pm$ 2.24
	8	3.19 $\pm$ 0.48	81.46 $\pm$ 0.74
<u>Trichilia martiana</u>	6	4.63 $\pm$ 0.99	68.91 $\pm$ 0.75
	7	2.87 $\pm$ 0.15	78.58 $\pm$ 0.29
	8	4.04 $\pm$ 0.44	70.88 $\pm$ 1.39

Appendix continued.

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Species	Month	Biomass	Water
<u>Verbesina gigantea</u>	6	3.00 $\pm$ 0.27	89.97 $\pm$ 1.32
	7	3.26 $\pm$ 0.76	87.01 $\pm$ 1.03
	8	3.46 $\pm$ 0.88	81.29 $\pm$ 1.74
<u>Zanthoxylum setulosum</u>	6	4.89 $\pm$ 0.95	79.13 $\pm$ 1.84
	7	5.74 $\pm$ 0.49	69.20 $\pm$ 0.94
	8	6.52 $\pm$ 0.23	59.40 $\pm$ 3.02