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Fig. 1. Location of the study area, the Pasir K. R. Reserve.

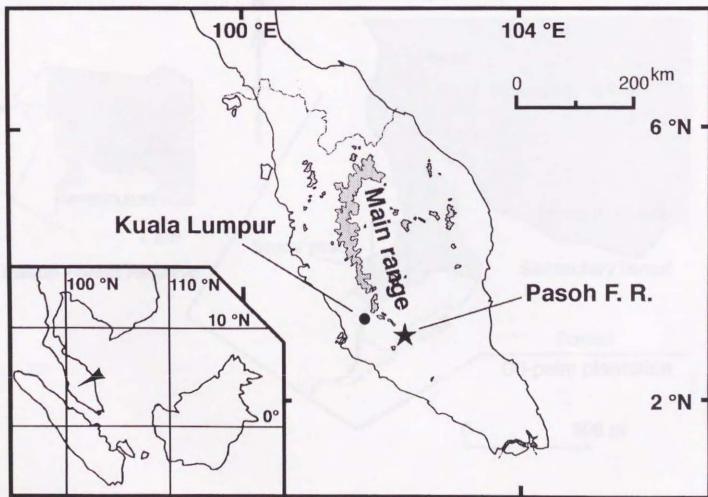


Fig. II-1. Location of the study site, the Pasoh Forest Reserve.

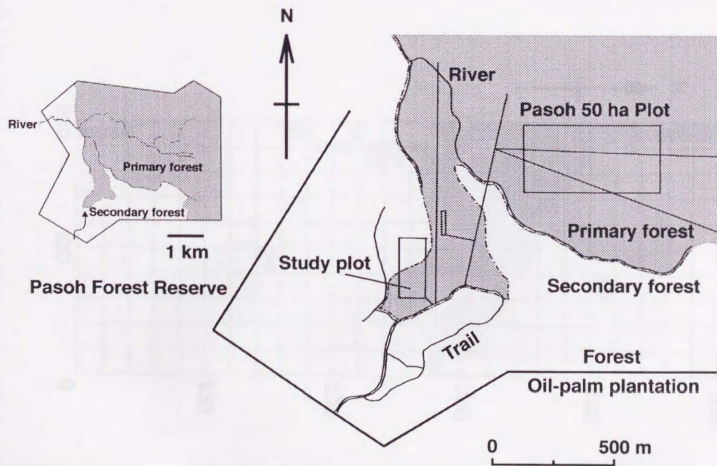


Fig. II-2. Location of the study plot in the Pasoh Forest Reserve.

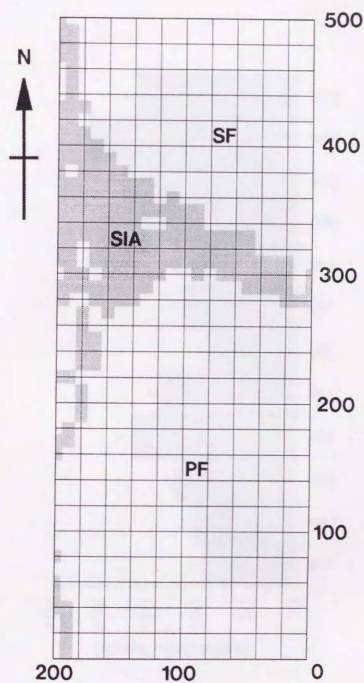


Fig. II-3. Vegetation types of the study plot. PF: primary forest; SF: secondary forest; SIA: seasonally inundated area.

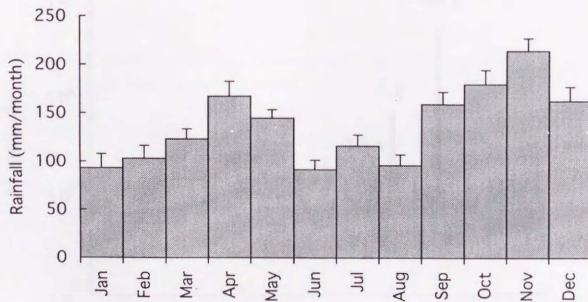


Fig. II-4. Rainfall at Kuala Klawang. Average from 1963-1992. Vertical bars represent standard deviation (SD). Data source: Malaysian Meteorological Service.

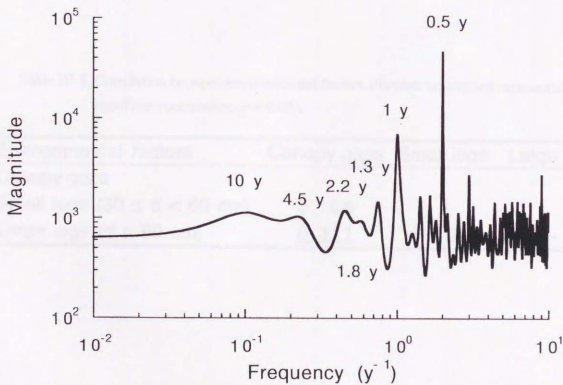


Fig. II-5. Power spectrum of rainfall at Kuala Klawang. Based on the observations in 1891-1994, including some defective periods. Data source: Malaysian Meteorological Service.

Table III-1. Correlation between environmental factors. Number underlined represents significant correlation ($p < 0.05$).

Environmental factors	Canopy gaps	Small logs	Large logs
Canopy gaps	-		
Small logs ($30 \leq d < 60$ cm)	0.109	-	
Large logs ($d \geq 60$ cm)	<u>0.311</u>	0.196	-

Table III-2. Correlation of plant phenology between forest types. a: species; b: individuals. Figures underlined represent significant correlation ($p < 0.05$).

a. Species

Pearson correlation matrix (r)

	FF	SIA	SF
FF			
SF	<u>0.816</u>		
SIA	0.618	0.428	

Matrix of Bonferroni probabilities (p)

	FF	SIA	SF
FF			
SF	<u>0.004</u>		
SIA	0.096	0.496	

b. Individuals

Pearson correlation matrix (r)

	FF	SIA	SF
FF			
SF	<u>0.706</u>		
SIA	-0.058	-0.377	

Matrix of Bonferroni probabilities (p)

	FF	SIA	SF
FF			
SF	<u>0.031</u>		
SIA	1.000	0.679	

Table III-3. List of fruiting species in the three forest types. Species underlined represent frequently fruiting species in the forest type.

Family of Plants	PF	Forest type	
		SF	SIA
Alangiaceae	<i>Alangium ebenaceum</i>		
Annonaceae	<i>Xylopia</i> spp.	<i>Xylopia</i> spp.	
Burseraceae	<i>Santiria griffithii</i>		
Burseraceae	<i>Santiria tomentosa</i>		
Burseraceae	<i>Santiria</i> spp.	<i>Santiria</i> spp.	
Combretaceae	<i>Terminalia citrina</i>		<i>Terminalia citrina</i>
Dilleniaceae	<i>Dillenia sumatrana</i>		
Dipterocarpaceae	<i>Neobalanocarpus heimii</i>	<i>Neobalanocarpus heimii</i>	
Dipterocarpaceae	<i>Shorea maxima</i>		
Ebenaceae			<i>Vatica bella</i>
Ebenaceae	<i>Diospyros singaporensis</i>	<i>Diospyros singaporensis</i>	<i>Diospyros singaporensis</i>
Ebenaceae			<i>Diospyros</i> spp.
Euphorbiaceae	<i>Antidesma coriaceum</i>		
Euphorbiaceae	<i>Bullumedendron calophyllum</i>		
Euphorbiaceae	<i>Cleistanthus sumatranus</i>		
Fagaceae			<i>Castanopsis lucida</i>
Fagaceae	<i>Castanopsis megacarpa</i>		
Fagaceae	<i>Lithocarpus rassa</i>		<i>Lithocarpus rassa</i>
Fagaceae	<i>Lithocarpus</i> spp.	<i>Lithocarpus</i> spp.	
Fagaceae			<i>Quercus gemelliflora</i>
Flacourtiaceae	<i>Ryparosa kunstleri</i>	<i>Ryparosa kunstleri</i>	
Guttiferae	<i>Garcinia hombroniana</i>		
Guttiferae			<i>Garcinia nervosa</i>
Guttiferae			<i>Garcinia nigrolineata</i>
Guttiferae	<i>Garcinia parvifolia</i>	<i>Garcinia parvifolia</i>	
Guttiferae	<i>Garcinia</i> sp.	<i>Garcinia</i> sp.	
Guttiferae	<i>Mesua ferrea</i>		
Guttiferae	<i>Irvingia malayana</i>		
Ixonanthaceae	<i>Ixonanthes icosandra</i>		<i>Ixonanthes icosandra</i>
Lauraceae	<i>Listea</i> sp.		
Leguminosae			<i>Archidendron</i> sp.
Leguminosae	<i>Ormisia venosa</i>		<i>Ormisia venosa</i>
Leguminosae	<i>Parkia speciosa</i>		
Magnoliaceae	<i>Aromadendron elegans</i>		
Meliaceae	<i>Dysoxylum acutangulum</i>		
Moraceae	<i>Ficus</i> spp.		<i>Ficus</i> spp.
Moraceae	<i>Parartocarpus bracteatus</i>	<i>Parartocarpus bracteatus</i>	
Myristicaceae	<i>Horsfieldia fulva</i>		
Myristicaceae		<i>Horsfieldia superba</i>	
Myristicaceae	<i>Knema cincta</i>	<i>Knema cineria</i>	<i>Knema cineria</i>
Myristicaceae	<i>Knema hookeriana</i>		
Myristicaceae	<i>Knema scortechnii</i>		
Myristicaceae		<i>Knema</i> spp.	<i>Knema</i> spp.
Myristicaceae	<i>Myristica cinnamomea</i>		<i>Myristica cinnamomea</i>
Myristicaceae			<i>Myristica elliptica</i>
Myristicaceae			<i>Myristica</i> spp.
Myrtaceae	<i>Eugenia cerasiformis</i>		
Myrtaceae			<i>Eugenia inophylla</i>
Myrtaceae	<i>Eugenia</i> spp.	<i>Eugenia</i> spp.	<i>Eugenia</i> spp.
Oxalidaceae	<i>Sarcotricha monopylla</i>		
Palmae	<i>rattan</i> spp.	<i>rattan</i> spp.	<i>rattan</i> spp.
Rubiaceae	<i>Diplospora malaccensis</i>	<i>Diplospora malaccensis</i>	
Rubiaceae			<i>Gardenia tubifera</i>
Rubiaceae	<i>Porterandia anisophylla</i>	<i>Porterandia anisophylla</i>	<i>Porterandia anisophylla</i>
Rubiaceae		<i>Urophyllum glabrum</i>	
Sapindaceae	<i>Xerospermum noronhianum</i>		<i>Xerospermum noronhianum</i>
Sapotaceae	<i>Payena lucida</i>		
Styracaceae	<i>Styrax benzoin</i>	<i>Styrax benzoin</i>	<i>Styrax benzoin</i>
Theaceae			<i>Pyrenaria acuminata</i>
Theaceae	<i>Ternstroemia bancana</i>		
Tiliaceae		<i>Grevia blattaeifolia</i>	
Ulmaceae	<i>Gironniera</i> spp.	<i>Gironniera</i> spp.	
Violaceae	<i>Rinorea anguifera</i>		<i>Rinorea anguifera</i>
Number of taxa	47	20	28
Number of families	29	15	16

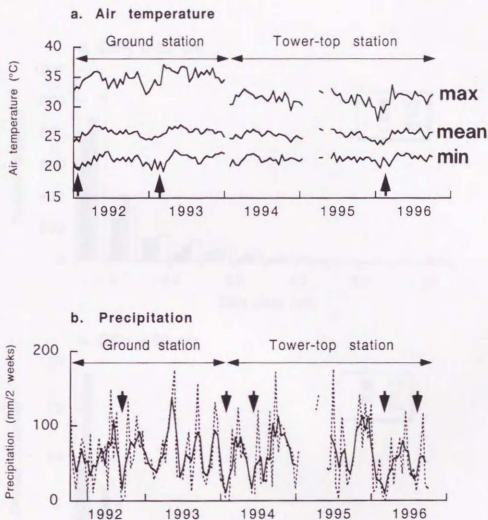


Fig. III-1. Climate of the Pasoh Forest Reserve. a: air temperature; b: precipitation.

Dotted line and solid line in figure b represent the precipitation for two weeks and its moving average for six weeks, respectively. Observations were made at a ground station in 1992-1993 and at a tower-top station in 1994-1996. Arrows represent drops of temperature or precipitation.

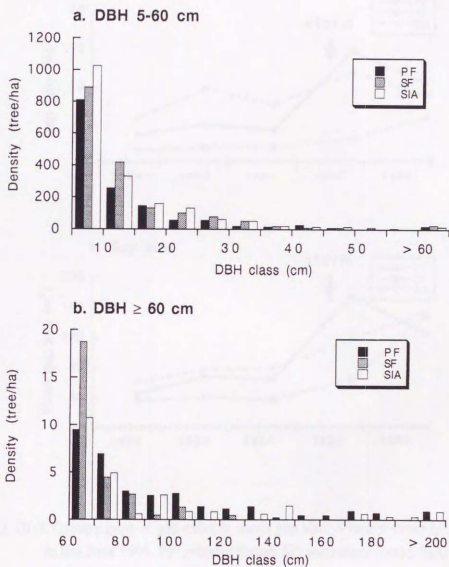


Fig. III-2. Size distribution of trees in the three forest types. a: dbh 5-60 cm; b: dbh \geq 60 cm. PF: primary forest; SF: secondary forest; SIA: seasonally inundated area.

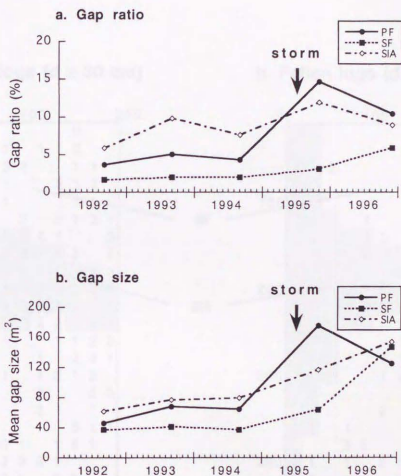
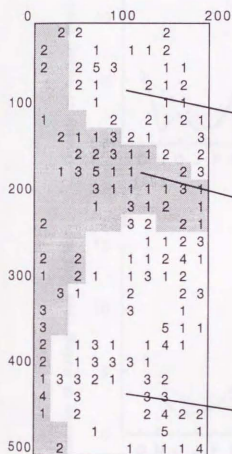


Fig. III-3. Canopy gaps: a: gap ratio; b: mean gap size. A heavy storm hit the study site in late June 1995. PF: primary forest; SF: secondary forest; SIA: seasonally inundated area.

a. Fallen logs ($d \geq 30$ cm)



b. Fallen logs ($d \geq 60$ cm)

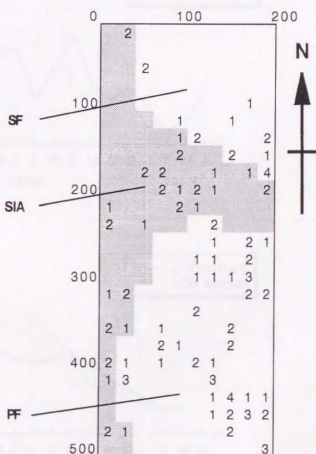


Fig. III-4. Distribution of fallen logs. a: diameter ($d \geq 30$ cm); b: $d \geq 60$ cm. Numbers represent the number of fallen logs in each 10 m x 10 m quadrate. PF: primary forest; SF: secondary forest; SIA: seasonally inundated area.

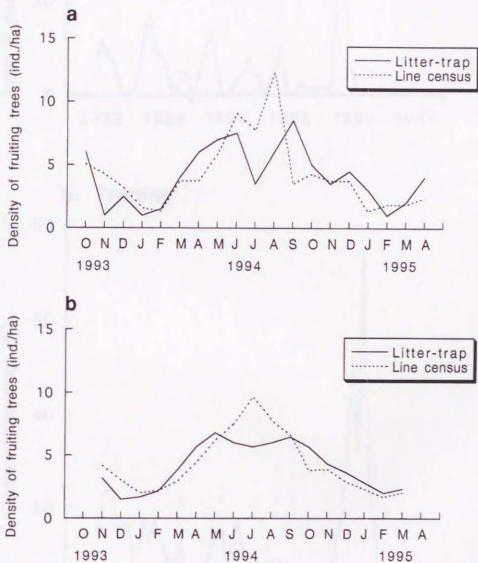


Fig. III-5. Fruiting phenology in the primary forest estimated by the two census methods. a: raw data; b: three-month moving averages.

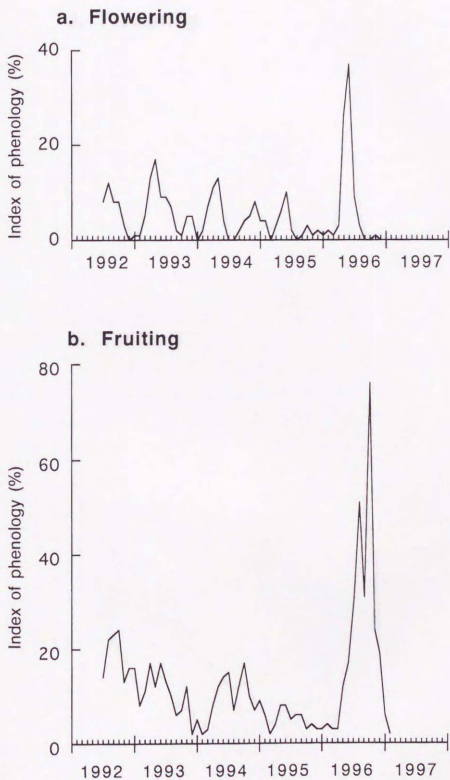


Fig. III-6. Plant reproductive phenology in the primary forest estimated by litter-trap method. a: flowering; b: fruiting. A mast fruiting event occurred in 1996.

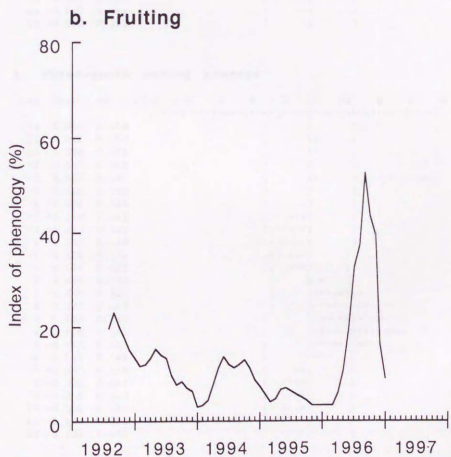
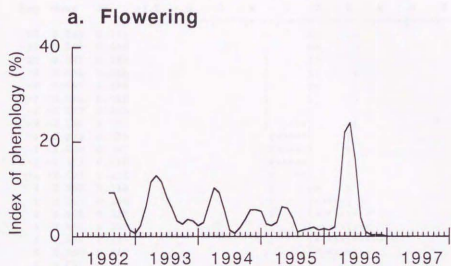


Fig. III-7. As for Fig. II-6, using three-month moving average.

a. Raw data

Lag	Corr	SE	-1.0	-.8	-.6	-.4	-.2	.0	.2	.4	.6	.8	1.0
			---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ----										
-12	0.042	0.151						(*)			
-11	0.060	0.149						(*)			
-10	0.045	0.147						(*)			
-9	0.054	0.146						(*)			
-8	0.047	0.144						(*)			
-7	0.011	0.143						()			
-6	-0.077	0.141						(*)			
-5	-0.138	0.140						(***)			
-4	-0.232	0.139						(*****)			
-3	-0.280	0.137						(*****)			
-2	-0.272	0.136						(*****)			
-1	-0.103	0.135						(**)			
0	0.062	0.134						(*)			
1	0.227	0.135						(*****)			
2	0.446	0.136						(*****)*****			
3	0.416	0.137						(*****)****			
4	0.548	0.139						(*****)*****			
5	0.367	0.140						(*****)**			
6	0.035	0.141						()			
7	-0.143	0.143						(***)			
8	-0.226	0.144						(*****)			
9	-0.201	0.146						(*****)			
10	-0.123	0.147						(***)			
11	-0.119	0.149						(**)			
12	-0.070	0.151						(*)			

b. Three-month moving average

Lag	Corr	SE	-1.0	-.8	-.6	-.4	-.2	.0	.2	.4	.6	.8	1.0
			---- ---- ---- ---- ---- ---- ---- ---- ---- ---- ----										
-12	0.019	0.154						()			
-11	0.048	0.152						(*)			
-10	0.060	0.151						(*)			
-9	0.067	0.149						(*)			
-8	0.062	0.147						(*)			
-7	0.025	0.146						()			
-6	-0.056	0.144						(*)			
-5	-0.154	0.143						(***)			
-4	-0.272	0.141						(*****)			
-3	-0.331	0.140						(*****)			
-2	-0.308	0.139						(*****)			
-1	-0.149	0.137						(***)			
0	0.093	0.136						(**)			
1	0.326	0.137						(*****)**			
2	0.533	0.139						(*****)*****			
3	0.639	0.140						(*****)*****			
4	0.618	0.141						(*****)*****			
5	0.423	0.143						(*****)***			
6	0.143	0.144						(***)			
7	-0.092	0.146						(**)			
8	-0.202	0.147						(*****)			
9	-0.216	0.149						(*****)			
10	-0.200	0.151						(*****)			
11	-0.172	0.152						(*****)			
12	-0.122	0.154						(***)			

Fig. III-8. Correlograms between flowering and fruiting phenology. a: raw data; b: three-month moving average. Parentheses represent 95% acceptable regions.

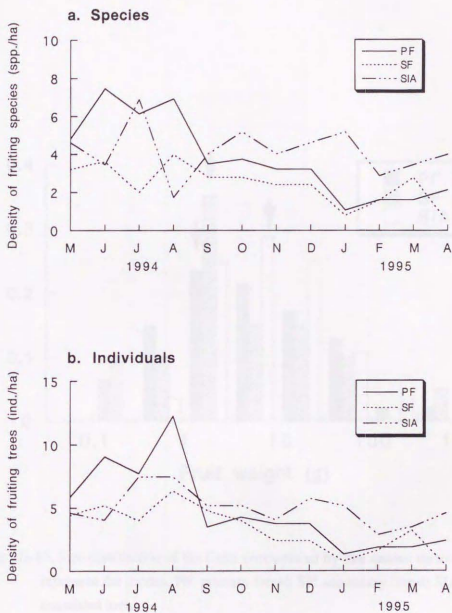


Fig. III-9. Fruiting phenology in the three forest types. a: fruiting species; b: fruiting individuals. PF: primary forest; SF: secondary forest; SIA: seasonally inundated area.

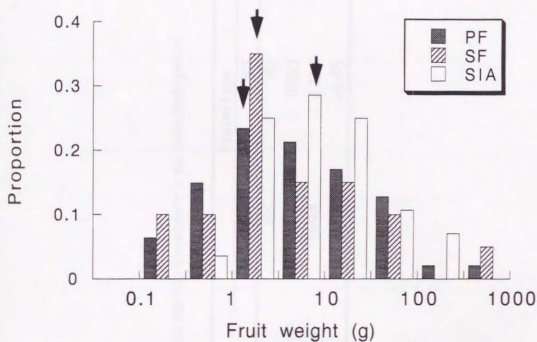


Fig. III-10. Size distribution of the fruits encountered by line census method. Arrows represent the modes. PF: primary forest; SF: secondary forest; SIA: seasonally inundated area.

Table IV-1. Trapping effort and trap disturbance in the main study period.

	Forest type		
	PF	SF	SIA
Number of traps	88	40	56
Trapping effort (trap-days)	16896	7680	10752
Number of disturbed traps	1694	1419	1705
Ratio of disturbance (%)	10.03	18.48	15.86

Table IV-2. Correlation between trap disturbance and the number of individuals (*NI*) before adjustment. Numbers underlined represent significant correlations.

FF		
	<i>r</i>	<i>p</i>
Diurnal	-0.197	0.180
Nocturnal	-0.232	0.113
Total	-0.250	0.086

SF		
	<i>r</i>	<i>p</i>
Diurnal	-0.327	<u>0.023</u>
Nocturnal	-0.377	<u>0.008</u>
Total	-0.424	<u>0.003</u>

SIA		
	<i>r</i>	<i>p</i>
Diurnal	-0.107	0.471
Nocturnal	-0.222	0.129
Total	-0.226	0.123

Table IV-3. Correlation between trap disturbance and the number of individuals (*NI*) after adjustment. Numbers underlined represent significant correlations.

<u>FF</u>		
	<u>r</u>	<u>p</u>
Diurnal	-0.087	0.557
Nocturnal	-0.078	0.600
Total	-0.094	0.525

<u>SF</u>		
	<u>r</u>	<u>p</u>
Diurnal	-0.211	0.149
Nocturnal	-0.093	0.528
Total	-0.154	0.296

<u>SIA</u>		
	<u>r</u>	<u>p</u>
Diurnal	0.067	0.652
Nocturnal	-0.045	0.761
Total	0.014	0.924

Table IV-4. Body dimensions of small mammals.

Locomotion		Activity cycle	Species	Family	Sex	Body measurements (mm)										Mass (g)	
						N	HB	sd	T	sd	HF	sd	E	sd	W	sd	
Arboreal																	
Diurnal																	
		<i>Callosciurus caniceps</i>	Sciuridae	female	1	210	na	190	na	46	na	15	na	225	na		
				male	3	198	6	203	8	47	2	15	1	232	13		
		<i>Callosciurus prevostii</i>	Sciuridae	female	1	221	na	240	na	54	na	11	na	324	na		
				male	2	255	na	263	na	57	na	18	na	438	na		
		<i>Callosciurus notatus</i>	Sciuridae	female	8	199	8	186	18	44	5	15	1	250	18		
				male	14	197	10	189	14	45	4	15	2	250	23		
		<i>Callosciurus nigrovittatus</i>	Sciuridae	female	3	192	3	169	15	41	6	14	3	222	30		
				male	4	206	3	192	21	45	4	16	4	235	16		
		<i>Sundasciurus lowii</i>	Sciuridae	female	12	136	11	108	18	33	5	12	2	85	14		
				male	7	141	8	110	9	33	6	12	2	88	12		
Nocturnal																	
		<i>Philocercus lowii</i>	Tupaiaidae	female	3	138	6	183	10	26	2	19	3	55	7		
				male	0	na	na	na	na	na	na	na	na	na	na		
		<i>Hylopetes spadicus</i>	Sciuridae	female	1	150	na	145	na	26	na	15	na	95	na		
				male	0	na	na	na	na	na	na	na	na	na	na		
Terrestrial																	
Diurnal																	
		<i>Tupaia glis</i>	Tupaiaidae	female	36	175	22	162	10	42	3	12	2	134	20		
				male	22	181	12	161	16	42	3	14	2	150	20		
		<i>Lariscus insignis</i>	Sciuridae	female	17	185	9	97	31	45	4	13	2	210	16		
				male	33	191	10	110	19	46	2	14	3	211	26		
		<i>Rhinosciurus laticaudatus</i>	Sciuridae	female	6	209	12	125	24	43	3	16	3	232	9		
				male	12	217	7	114	24	44	2	17	3	248	24		
Nocturnal																	
		<i>Echinosorex gymnaurus</i>	Echinaceidae	female	3	342	40	254	18	60	4	26	2	837	75		
				male	3	362	15	249	15	62	2	26	2	867	101		
		<i>Rattus tiomanicus</i>	Muridae	female	12	141	13	143	15	30	2	16	2	74	15		
				male	10	148	18	143	18	30	1	16	1	83	25		
		<i>Leopoldamys sabinus</i>	Muridae	female	21	226	10	358	23	45	2	25	2	331	52		
				male	50	239	19	366	32	47	2	24	2	353	67		
		<i>Maxomys rajah</i>	Muridae	female	2	178	na	177	na	37	na	20	na	145	na		
				male	6	190	23	184	14	39	3	20	2	158	17		
		<i>Maxomys surifer</i>	Muridae	female	7	167	16	169	17	38	2	19	2	141	50		
				male	13	189	19	187	15	41	1	21	3	159	35		
		<i>Maxomys whiteheadi</i>	Muridae	female	7	114	14	96	7	25	1	14	2	44	9		
				male	25	119	10	101	10	26	3	14	2	45	11		
		<i>Trichys fasciculata</i>	Hystiridae	female	2	380	na	190	na	62	na	27	na	1680	na		
				male	0	na	na	na	na	na	na	na	na	na	na		

na : not available

Table IV-5. Densities and biomass of small mammals in the three habitats.

Species	W (g)	Animal density (individuals/ha)						Biomass (g/ha)		
		PF		SF		SIA		PF	SF	SIA
		mean	sd	mean	sd	mean	sd			
Diurnal species										
<i>Tupaia glis</i>	140	1.07	0.62	0.72	0.62	1.11	0.57	149	101	155
<i>Lariscus insignis</i>	211	0.79	0.46	0.20	0.28	0.66	0.42	167	42	140
<i>Callosciurus notatus</i>	250	0.62	0.29	0.16	0.25	0.33	0.26	155	40	82
<i>Rhinosciurus laticaudatus</i>	243	0.36	0.31	0.06	0.18	0.15	0.19	87	14	36
<i>Sundasciurus lowii</i>	86	0.19	0.27	0.04	0.13	0.10	0.17	17	3	9
<i>Callosciurus nigrovittatus</i>	229	0.10	0.14	0.01	0.06	0.08	0.16	22	2	19
Subtotal		3.13	1.21	1.18	0.74	2.43	0.89	597	201	441
Nocturnal species										
<i>Leopoldamys sabanus</i>	347	2.13	0.72	2.62	0.94	1.30	0.62	739	909	450
<i>Maxomys surifer</i>	153	0.83	0.32	0.77	0.65	0.16	0.22	127	118	25
<i>Maxomys rajah</i>	155	0.44	0.32	0.23	0.26	0.05	0.11	69	36	8
<i>Maxomys whiteheadi</i>	44	0.42	0.28	0.26	0.36	0.29	0.27	18	11	13
<i>Echinosorex gymnurus</i>	852	0.21	0.21	0.26	0.35	0.31	0.27	177	219	263
<i>Rattus tiomanicus</i>	78	0.10	0.16	0.10	0.24	0.12	0.21	8	8	9
<i>Trichys fasciculata</i>	1680	0.05	0.10	0.01	0.07	0.10	0.15	83	24	161
Subtotal		4.18	1.04	4.25	1.41	2.32	0.96	1221	1324	928
Total		7.31	1.89	5.43	1.77	4.75	1.36	1819	1525	1369

Table IV-6. Species composition of small mammals in the three habitats.

Species	PF		SF		SIA	
	density(%)	biomass(%)	density(%)	biomass(%)	density(%)	biomass(%)
Diurnal species						
<i>Tupaia glis</i>	14.6	8.2	13.2	6.6	23.3	11.3
<i>Lariscus insignis</i>	10.8	9.2	3.6	2.7	13.9	10.2
<i>Callosciurus notatus</i>	8.5	8.5	2.9	2.6	6.9	6.0
<i>Rhinosciurus laticaudatus</i>	4.9	4.8	1.0	0.9	3.1	2.6
<i>Sundasciurus lowii</i>	2.6	0.9	0.7	0.2	2.1	0.6
<i>Callosciurus nigrovittatus</i>	1.3	1.2	0.2	0.1	1.8	1.4
Subtotal	42.8	32.8	21.7	13.2	51.1	32.2
Nocturnal species						
<i>Leopoldamys sabanus</i>	29.2	40.7	48.2	59.6	27.3	32.9
<i>Maxomys surifer</i>	11.3	7.0	14.2	7.7	3.4	1.8
<i>Maxomys rajah</i>	6.1	3.8	4.3	2.4	1.1	0.6
<i>Maxomys whiteheadi</i>	5.7	1.0	4.7	0.7	6.1	0.9
<i>Echinosorex gymnurus</i>	2.8	9.7	4.7	14.4	6.5	19.2
<i>Rattus tiomanicus</i>	1.4	0.4	1.9	0.5	2.5	0.7
<i>Trichys fasciculata</i>	0.7	4.6	0.3	1.5	2.0	11.7
Subtotal	57.2	67.2	78.3	86.8	48.9	67.8
Total	100.0	100.0	100.0	100.0	100.0	100.0

Table IV-7. Habitat preference of small mammals. Habitat types shown in table represent the more preferred habitat over another.

Species	Family	Habitat preference			p
		PF-SF	PF-SIA	SF-SIA	
Diurnal					
<i>Tupaia glis</i>	Tupaiaidae	PF	n.s.	SIA	< 0.001
<i>Callosciurus nigrovittatus</i>	Sciuridae	PF	n.s.	SIA	0.052
<i>Callosciurus notatus</i>	Sciuridae	PF	PF	SIA	< 0.001
<i>Lariscus insignis</i>	Sciuridae	PF	n.s.	SIA	< 0.001
<i>Rhinosciurus laticaudatus</i>	Sciuridae	PF	PF	SIA	< 0.001
<i>Sundasciurus lowii</i>	Sciuridae	PF	n.s.	n.s.	0.008
Nocturnal					
<i>Leopoldamys sabanus</i>	Muridae	SF	PF	SF	< 0.001
<i>Maxomys rajah</i>	Muridae	PF	PF	SF	< 0.001
<i>Maxomys surifer</i>	Muridae	n.s.	PF	SF	< 0.001
<i>Maxomys whiteheadi</i>	Muridae	PF	n.s.	n.s.	0.016
<i>Rattus tiomanicus</i>	Muridae	-	-	-	0.825
<i>Trichys fasciculata</i>	Hystriidae	(n.s.)	SIA	SIA)	0.090
<i>Echinosorex gymnurus</i>	Echinaceidae	n.s.	SIA	n.s.	0.023

n.s.: not significant (p > 0.05)

Table IV-8. Correlation of occurrence patterns of small mammals. Numbers underlined represent significant correlation ($p < 0.05$).

PEARSON CORRELATION MATRIX

Nocturnal													
Nocturnal													
Species	Diurnal						Nocturnal						
	TG	CNG	CN	LI	RL	SL	LS	MR	MS	MW	RT	TF	EG
TG													
CNG	0.440	-											
CN	0.513	0.110	-										
LI	0.235	0.119	0.520	-									
RL	0.306	0.095	0.536	0.563	-								
SL	0.495	0.383	0.385	0.492	0.516	-							
LS	0.242	0.125	0.509	0.142	0.287	0.281	-						
MR	0.230	0.404	0.581	0.258	0.501	0.343	0.452	-					
MS	0.233	0.342	0.454	0.171	0.407	0.409	0.748	0.757	-				
MW	-0.071	0.434	-0.041	0.228	0.217	0.092	-0.241	-0.349	-0.253	-			
RT	-0.035	0.364	-0.179	-0.113	-0.227	0.063	-0.095	-0.110	-0.001	-0.184	-		
TF	0.035	-0.142	0.330	0.235	-0.068	0.097	0.424	0.358	-0.403	0.311	0.073	-	
EG	0.093	0.008	0.292	0.229	-0.179	0.119	0.444	0.500	0.437	0.382	0.186	0.524	-

MATRIX OF BONFERRONI PROBABILITIES

Dietary Habits of Various Species													
Species	Diurnal						Nocturnal						
	Treeshrubs	Squirrels					Rats				Porcupines	Moonrats	
	TG	CNG	CN	LI	RL	SL	LS	MR	MS	MW	RT	TF	EG
TG	-												
CNG	0.000	-											
CN	0.000	1.000	-										
LI	0.000	1.000	0.000	-									
RL	0.039	1.000	0.000	0.000	-								
SL	0.000	0.001	0.001	0.000	0.000	-							
LS	0.002	1.000	0.000	1.000	0.089	0.112	-						
MR	0.746	0.000	0.000	0.273	0.000	0.002	0.000	-					
MS	0.682	0.005	0.000	1.000	0.000	0.000	0.000	0.000	-				
MW	1.000	0.000	1.000	0.798	1.000	1.000	0.518	0.005	0.331	-			
RT	1.000	0.002	1.000	0.813	1.000	1.000	1.000	1.000	1.000	1.000	-		
TF	1.000	1.000	0.013	0.626	1.000	1.000	0.000	0.002	0.000	0.030	1.000	-	
EG	1.000	1.000	0.071	0.772	1.000	1.000	0.000	0.000	0.000	0.001	1.000	0.000	-

TG: *Tapia glis*; CNG: *Callosciurus nigrovittatus*; CN: *C. notatus*; LI: *Lariscus insignis*; RL: *Rhinosciurus laticaudatus*; SL: *Sundasciurus lewii*; LS: *Leopoldamys sabanus*; MR: *Macomys rajah*; MS: *M. surifer*; MW: *M. Whiteheadi*; RT: *Rattus tomanicus*; TF: *Trichys fasciculata*; EG: *Echinostorex gymnaurus*.

Table IV-9. Correlation between occurrence patterns of small mammals and environmental factors. Numbers underlined represent significant correlation ($p < 0.05$).

Species	Environmental factors		
	Canopy gaps	Small logs	Large logs
Diurnal			
<i>Tupaia glis</i>	0.039	-0.164	-0.039
<i>Callosciurus nigrovittatus</i>	-0.015	-0.164	-0.202
<i>Callosciurus notatus</i>	0.015	0.028	0.074
<i>Lariscus insignis</i>	0.221	-0.030	<u>0.294</u>
<i>Rhinosciurus laticaudatus</i>	0.114	-0.058	<u>0.379</u>
<i>Sundasciurus lowii</i>	0.075	-0.049	<u>0.268</u>
Nocturnal			
<i>Leopoldamys sabanus</i>	<u>-0.291</u>	-0.031	-0.224
<i>Maxomys rajah</i>	-0.040	-0.175	-0.026
<i>Maxomys surifer</i>	-0.208	-0.031	-0.059
<i>Maxomys whiteheadi</i>	0.200	0.081	<u>0.295</u>
<i>Ratus tiomanicus</i>	0.116	0.056	0.085
<i>Trichys fasciculata</i>	0.034	-0.088	0.187
<i>Echinosorex gymnurus</i>	0.187	0.116	0.096

Table IV-10. Summary of the habitat preference of small mammals and some other related factors.

Species group Species	Family	Locomotion*	Activity cycle*	Density	Habitat preference	Correlation with		Food habit*
						Canopy gaps	Fallen logs	
Primary forest species group								
<i>Tupaia glis</i>	Tupaiaidae	Terrestrial	Diurnal	high	PF = SIA > SF			insect, fruits
<i>Callosciurus nigrovittatus</i>	Sciuridae	Arboreal	Diurnal	low	PF = SIA > SF			insect, fruits
<i>Callosciurus notatus</i>	Sciuridae	Arboreal	Diurnal	medium	PF > SIA > SF			insect, fruits
<i>Lariscus insignis</i>	Sciuridae	Terrestrial	Diurnal	high	PF = SIA > SF		Positive	insect, fruits
<i>Rhinosciurus laticaudatus</i>	Sciuridae	Terrestrial	Diurnal	low	PF > SIA > SF		Positive	insect
<i>Sundasciurus lowii</i>	Sciuridae	Arboreal	Diurnal	low	PF > SF		Positive	insect, fruits
<i>Maxomys rajah</i>	Muridae	Terrestrial	Nocturnal	medium	PF > SF > SIA			insect, fruits
<i>Maxomys whiteheadi</i>	Muridae	Terrestrial	Nocturnal	medium	PF > SF		Positive	insect, fruits
Secondary forest species group								
<i>Leopoldamys sabanus</i>	Muridae	Terrestrial	Nocturnal	high	SF > PF > SIA	Negative		insect, fruits
<i>Maxomys surifer</i>	Muridae	Terrestrial	Nocturnal	high	SF = PF > SIA			insect, fruits
Water associated species group								
<i>Echinosorex gymnurus</i>	Echinaceidae	Terrestrial	Nocturnal	medium	SIA > PF = SF			insect, fruits, aquatic animals
<i>Trichys fasciculata</i>	Hystriidae	Terrestrial	Nocturnal	low	SIA > PF = SF			insect, fruits
Ubiquitous species group								
<i>Rattus tiomanicus</i>	Muridae	Terrestrial	Nocturnal	low	PF = SF = SIA			insect, fruits

* cited from Medway (1978).

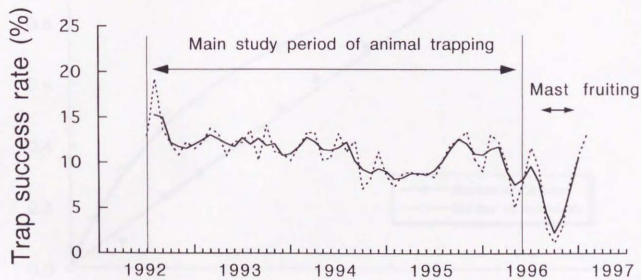


Fig. IV-1. Trap success rate during the trapping period using oil-palm fruit as baits.

Broken line: monthly value; solid line: three-month moving average. The rate was low in the mast fruiting event in 1996.

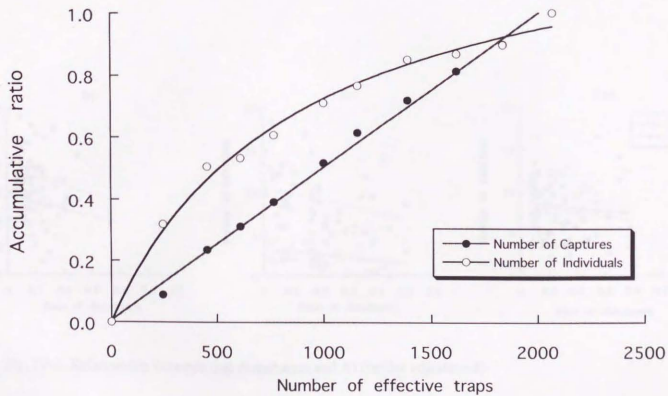


Fig. IV-2. Relationship between the number of effective traps and NC or NI .

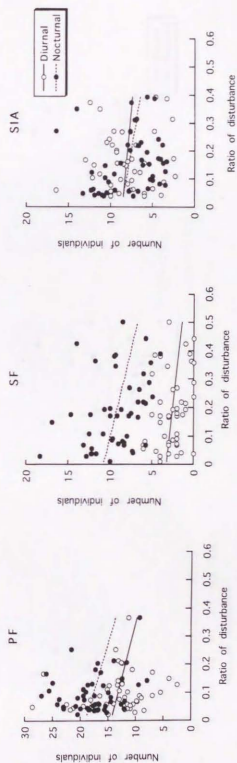


Fig. IV-3. Relationship between trap disturbance and N_i (before adjustment).

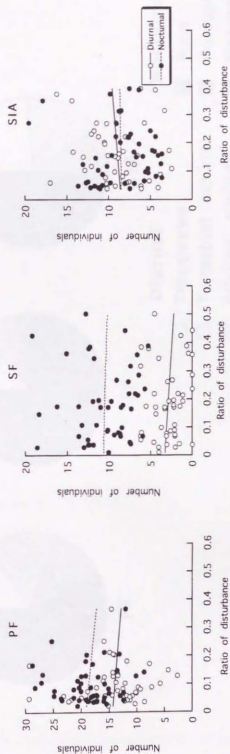


Fig. IV-4. Relationship between trap disturbance and *MI* (after adjustment).

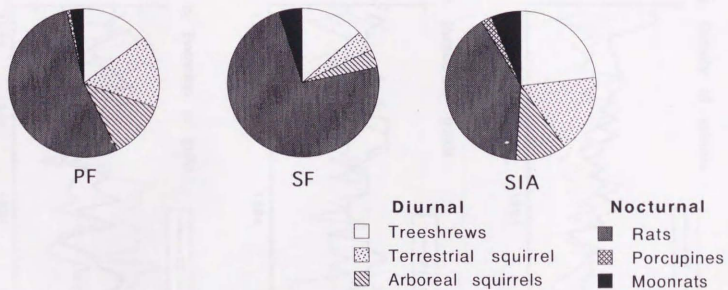


Fig. IV-5. Composition of guilds of small mammals in the three habitats in density of animals.

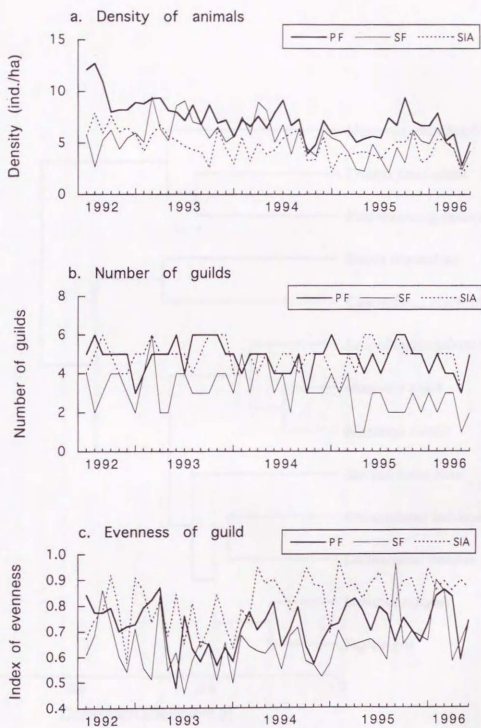


Fig. IV-6. Temporal changes of some ecological indices in the three habitats. a: density of animals; b: number of guilds; c: evenness of guild.

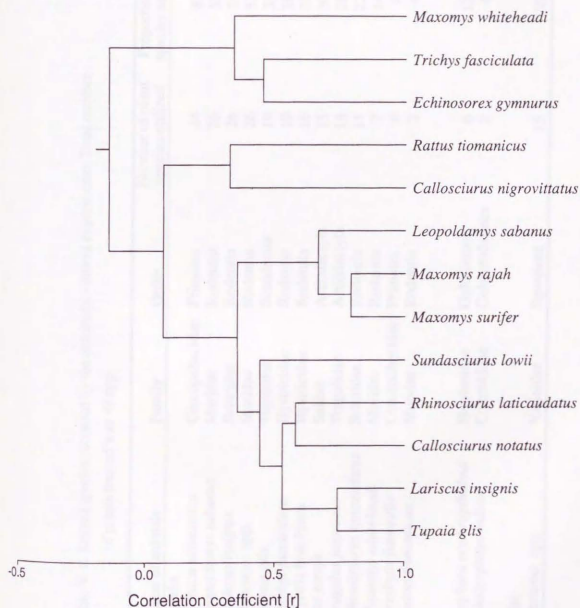


Fig. IV-7. Dendrogram of species occurrence patterns in the study plot (see text).

Table V-1. Animal species recorded by the automatic camera experiments. Total number of plants treated was 49 spp.

Name of animals	Family	Order	Number of plant species utilized	Proportion of plant species utilized (%)
Mammalia				
<i>Macaca nemestrina</i>	Cercopithecidae	Primates	44	89.8
<i>Leopoldamys sabanus</i>	Muridae	Rodentia	26	53.1
<i>Lariscus insignis</i>	Sciuridae	Rodentia	26	53.1
<i>Maxomys</i> spp.	Muridae	Rodentia	26	53.1
<i>Tupaia glis</i>	Tupaiaidae	Scandentia	19	38.8
<i>Trichys fasciculata</i>	Hystriidae	Rodentia	19	38.8
<i>Hystrix brachyura</i>	Hystriidae	Rodentia	16	32.7
<i>Sus scrofa</i>	Suidae	Artiodactyla	15	30.6
<i>Tragulus javanicus</i>	Tragulidae	Artiodactyla	14	28.6
<i>Rhinosciurus laticaudatus</i>	Sciuridae	Rodentia	11	22.4
<i>Maxomys whiteheadi</i>	Muridae	Rodentia	7	14.3
<i>Presbytis femoralis</i>	Cercopithecidae	Primates	4	8.2
<i>Rattus tiomanicus</i>	Muridae	Rodentia	2	4.1
Aves				
<i>Lophura erythrophthalma</i>	Phasianidae	Galliformes	6	12.2
<i>Chalcophaps indica</i>	Columbidae	Columbiformes	2	4.1
Reptilia				
<i>Varanus</i> spp.	Varinidae	Squamata	15	30.6

Table V-2. Number of photos taken in each experiment. Experiments for which total number of photos ≥ 10 are shown.

Individual number	Plant species	Mammals															Birds				Totals
		Tropic. Frigate	Mutton	Leprosy	Rhinoceros	Borneo	Mammals sp.	M. whiteheadi	Leopoldina	Tyrone	Harris	Ser.	Tagalog	Chalcophaps	Leprosy						
1	<i>Aluqueria rhomboides</i>	3	1	14			5			37					1	61					
2	<i>Archidamia hubbardi</i>			6	1		7			7	55	34				123					
3	<i>Archidamia hubbardi</i>						9				28	34	1			72					
4	<i>Anticarsus nictus</i> (griffithi)			28												28					
5	<i>Baccarus parvifolia</i>			51		2										53					
6	<i>Baccarus parvifolia</i>			2	11					6			2			21					
7	<i>Baccarus reticulatus</i>			24	1											25					
8	<i>Bolitochloa medusa</i>			1				2	1	50						53					
9	Black bear (unknown sp.)									22						22					
10	<i>Brown quail</i>			49			1				9	1				60					
11	<i>Cassianus littoralis</i> (sp.)			24											7	31					
12	<i>Cassianus littoralis</i> (sp.)			17	37		8	1	51				11			97					
13	<i>Cassianus littoralis</i> (sp.)															18					
14	<i>Cassianus littoralis</i>															18					
15	<i>Dillenia sumatrana</i>					4				22	24					50					
16	<i>Diogenes caudatus</i>			21												21					
17	<i>Diogenes caudatus</i>			7	1	1	17			17	2	3				40					
18	<i>Diogenes caudatus</i>			22						10	1	5				38					
19	<i>Dipodomys deserti</i>			8			7			21						36					
20	<i>Dipodomys deserti</i>			23			8			9	7					47					
21	<i>Dipodomys deserti</i>			23						1	373	8			4	410					
22	<i>Dipodomys deserti</i>			60						4		2				66					
23	<i>Eulipomys melanurus</i>	20					1			13						35					
24	<i>Eumeces</i> sp.			2		1				2	7	3	5			20					
25	<i>Garcinia nervosa</i>			16						2	64					84					
26	<i>Garcinia nervosa</i>			30	26		1	4	1							82					
27	<i>Garcinia nervosa</i>	2		10	1											14					
28	<i>Haplophragma</i>		38	37								2				40					
29	<i>Haplophragma</i>														2	39					
30	<i>Kenna kenna</i>			10	1		24			2	22	1				65					
31	<i>Kenna kenna</i>			11		1						7	2			24					
32	<i>Lophoceros</i> curvii			13												13					
33	<i>Lophoceros</i> curvii			2	1		2	1				5				11					
34	<i>Lophoceros</i> curvii			17			5					19				36					
35	<i>Lophoceros</i> sp.															12					
36	<i>Myrmica cinerea</i>	10		3	1		1				13	2			2	32					
37	<i>Myrmica cinerea</i>			3		1	1	2		1	42					52					
38	<i>Myrmica cinerea</i>										21	1				22					
39	<i>Myrmica mangrove</i>			9	42					1	11					63					
40	<i>Myrmica mangrove</i>			1	35		7				7	1				44					
41	<i>Myrmica mangrove</i>			1	65					46			1			113					
42	<i>Paracercopithecus</i>			78												78					
43	<i>Paracercopithecus</i>			14						4		2	2		2	24					
44	<i>Paracercopithecus</i>			12			1									16					
45	<i>Perotis perotis</i>			5	2							13	2			21					
46	<i>Perotis perotis</i>															20					
47	<i>Perotis perotis</i>	11		7	1											20					
48	<i>Perotis perotis</i>			5												10					
49	<i>Perotis perotis</i>			38		1	1					2	3			47					
50	<i>Perotis perotis</i>			13												13					
51	<i>Perotis perotis</i>			24	1		2			6		1	8			39					
52	<i>Perotis perotis</i>			2	4	1				3						27					
53	<i>Perotis perotis</i>									11			1			12					
54	<i>Perotis perotis</i>			11			2			4	2					16					
55	Red fox (unknown sp.)			13	8							3				28					
56	<i>Riphaea</i> (unknown)														6	6					
57	<i>Riphaea</i> (unknown)	6	1	4			3			19	2	2				37					
58	<i>Sarcophaga</i> (unknown)			3			8									16					
59	<i>Sarcophaga</i> (unknown)	4		7	11	1								72		96					
60	<i>Sarcophaga</i> (unknown)			16	5	31								3		51					
61	<i>Sarcophaga</i> (unknown)			7	5	6										37					
62	<i>Sarcophaga</i> (unknown)			15						7	1				13	38					
63	<i>Sarcophaga</i> (unknown)			3		1			3						7	15					
64	<i>Sarcophaga</i> (unknown)			3	25	1				4	1				13	49					
65	<i>Sarcophaga</i> (unknown)			2	13	6	1								8	23					
66	<i>Sarcophaga</i> (unknown)															23					
67	<i>Temnodactylus</i> (sp.)			26												26					
68	<i>Temnodactylus</i> (sp.)			7	1											8					
69	<i>Temnodactylus</i> (sp.)									50		2				52					
70	<i>Temnodactylus</i> (sp.)													1	4	5					
71	<i>Temnodactylus</i> (sp.)															17					
72	<i>Temnodactylus</i> (sp.)															33					
73	<i>Temnodactylus</i> (sp.)	15		1	2					31						43					
74	<i>Temnodactylus</i> (sp.)									2						2					
75	<i>Temnodactylus</i> (sp.)									4						4					
76	<i>Temnodactylus</i> (sp.)									5						5					
77	<i>Temnodactylus</i> (sp.)									22						22					
78	<i>Temnodactylus</i> (sp.)			56								2				58					
Totals		120	121	961	288	12	21	147	34	428	714	144	48	72	75	70	34	3369			
Proportion (%)		3.6	3.7	29.2	8.8	0.4	0.6	4.5	1.0	13.0	21.7	4.4	1.5	2.2	2.3	2.1	1.0	100.0			

Table V-3. Clusters of plant individuals recognized using Morisita's similarity index.
Numbers in table represent the percentage of the animal species in number
of photos (see text).

Int. no.	Plant species	Mammals													Birds		Reptiles	
		Tupia	Prionomys	Macrus	Lariscus	Abomyscus	Reuter	Mosimus	sp.	M. chinensis	Leopoldina	Trichys	Hystrix	Des	Tragulus	Chalcophaps	Lophura	Varanus
Cluster Macaca																		
Subcluster Macaca																		
13	Casuarina littoralis (Indo)																	5.6
39	Myrica integrata	14.3										1.6	17.5					
16	Diopatra caudata												8.7					
7	Baccharis reticulata					4.0												
51	Intax																	
4	Acorus calamus (Indo)											11.1						
10	Bacca opuntifolia						1.5					13.6	1.5	5.9			10.6	
67	Ternstroemia chinensis (Indo)																	
29	Equisetum arvense																	
48	Pteris caudata						2.1	2.1				15.9	2.3	4.3	6.4		4.3	
40	Onoclea sensibilis																	
41	Onoclea sensibilis	0.9		2.3	79.5											0.9		
5	Baccharis reticulata							3.8										
11	Casuarina littoralis (Indo)																	
73	Equisetum arvense									27.5					2.5	30.6	2.8	
68	Equisetum arvense									40.0								
68	Equisetum arvense	20.0																
34	Lophoceros lucidus																	
26	Equisetum arvense																	
45	Pteris caudata																	
63	Equisetum arvense																	
30	Equisetum arvense																	
62	Equisetum arvense																	
30	Equisetum arvense																	
30	Equisetum arvense																	
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30	Equisetum arvense																	
30	Equisetum arvense																	

Table V-4. Clusters of plant species recognized using Morisita's similarity index.

Numbers in table represent the percentage of the animal species as number of photos (see text).

Sp. no.	Plant species	Mammals										Birds		Reptiles				
		Tapira	Proechimys	Marmosa	Laricium	Rhinoceros	Rattus	Mastomys	sp.	M. whiteheadi	Leopoldina	Trochus	Hemion	Ser	Togolus	Chalcophaps	Lophura	Varanus
Cluster Marmosa																		
27	<i>Lichocarpus curatii</i>			100.0														
39	<i>reus</i>			52.7	4.5	0.9		3.6		20.0	1.8		2.7	10.9				2.7
5	<i>Baccharis reticulata</i>			99.0	4.0													
3	<i>Anacardium nitidum griffithii</i>			100.0														
13	<i>Diogenes cauliflora</i>			91.3							8.7							
22	<i>Garcinia parvifolia</i>	14.3		71.4	7.1					7.1								
24	<i>Horsfieldia superba</i>			94.9														5.1
47	<i>Styax terreus</i>			58.5	26.1	4.3								13.0				1.6
48	<i>Terminalia cinerea</i>			71.7									6.5	8.7				
9	<i>Cassipourea litorea</i> (ndls)			75.9										20.4				1.6
43	<i>Sesuvium robustum?</i>	20.0		40.0				40.0										1.6
53	<i>Mimosa marginata</i>	14.3		66.7						1.6	17.5							
8	<i>Bacca oppositifolia</i>			72.7				1.5		13.9	1.5					10.6		
4	<i>Baccharis parvifolia</i>			71.6	14.9	2.7				8.1			2.7					
38	<i>Passerina avicularis</i>			85.0		1.7		1.7					3.3	5.0				3.3
51	<i>Clusia malayana</i>			70.0				27.5						2.5				
26	<i>Kenna acuminata</i>	12.5		45.8		4.2							29.2					
40	<i>red tree</i> (<i>Likiep</i> sp.)			46.4	28.6					14.3			10.7					
34	<i>Garcinia cinerea</i>	0.6	0.6	63.7						33.8	0.6			0.6				
35	<i>Passerina avicularis</i>			83.9				0.8		4.0			4.8	1.6	3.2			1.6
29	<i>Lichocarpus lanceolatus</i>			47.2									52.8					
37	<i>Passerina avicularis</i>	53.3		40.0	3.3									3.3				
21	<i>Garcinia neglecta</i>			48.4	41.9			1.6	6.5		1.6			61.9				
15	<i>Portia speciosa</i>			23.8	9.5			4.8										
14	<i>Diogenes cauliflora</i>			34.5	1.2		1.2	20.2					32.1	1.2	3.6	61.9	6.0	
12	<i>Dillenia sumatrana</i>			91.3		12.8		7.5	2.6		41.5		45.3					
18	<i>Endersbya malaccensis?</i>	51.3		44.1		2.9	20.5		26.5				33.3					
50	<i>Scaphium corallifolium</i>	44.1		2.9	20.5		26.5		29.5				5.9					
44	<i>Spina fasciata</i>	4.2		7.3	11.5		1.0	1.0								75.0		
Average		7.4	0.0	57.3	9.4	0.6	1.0	3.8	1.7	7.1	1.6	3.3	3.4	2.6		2.6	0.4	1.0
Cluster Laricium																		
17	<i>Lichocarpus stipulatus</i>			99.5									6.1					
45	<i>Scaphium corallifolium</i>	19.3		6.7	31.8	0.8		0.8	2.5		9.2	0.6	4.2			2.5	17.6	3.4
46	<i>Shorea malayana</i>	6.8		2.7	51.4	1.4		2.7			5.4			28.4				1.4
Average		8.7		3.1	58.1	0.7		1.2	0.8		4.9	2.3	1.4	10.5		0.8	5.9	1.6
Cluster Leopoldina																		
1	<i>Alseodaphne rhomboides</i>	4.9		1.6	23.0					8.2			60.7					1.6
10	<i>Cassipourea litorea</i> (<i>corallifolia</i>)			38.1					8.2	1.0			52.6					
49	<i>Terminalia cinerea</i> (<i>corallifolia</i>)			3.6									96.4					
15	<i>Diogenes cauliflora</i>			13.1					24.6				49.2	11.5				1.9
42	<i>Passerina fasciata</i>	16.2	2.7	19.8					9.1				51.4		5.4	5.4		
Average		4.2	0.5	5.1	12.9				9.8	0.2		82.0	2.3	1.1	1.1		0.3	0.3
Cluster Proechimys																		
11	<i>Cassipourea neglecta</i>			59.1	1.5	2.9				8.8			16.1		11.7			
23	<i>Horsfieldia superba</i>			95.0										5.0				
28	<i>Lichocarpus curatii</i>			16.2	9.1					16.2				45.6				
Average		51.4	6.5	4.0					9.0	3.0		5.4	20.7					
Cluster Trochus																		
7	<i>black tree</i> (<i>Likiep</i> sp.)													95.7				4.3
20	<i>Garcinia cinerea</i>			19.0										76.2		2.4		
6	<i>Archidendron indum</i>			1.8						3.6	1.8			80.9			1.8	
2	<i>Archidendron indum</i>			3.0	0.5					8.1				31.0	34.5	0.5		
32	<i>Mimosa effigata</i>			4.1			1.4	1.4	2.7	1.4	85.1	1.4					17.3	1.5
18	<i>Passerina</i>			10.0			5.0						10.0	35.0	15.0		25.0	
41	<i>Passerina acuminata</i>			20.0										20.0				60.9
31	<i>Mimosa cinerea</i>	31.3		9.4	3.1					3.1				40.6	5.3			6.3
10	<i>Lichocarpus</i> sp.			41.7						58.3								
25	<i>Kenna acuminata</i>			23.1	1.5					39.9				3.1	33.8	1.5		
16	<i>Diogenes cauliflora</i>			5.6										2.2	91.2	2.2		
Average		2.8		8.7	4.3	0.6		10.1	0.4	1.6	52.7	7.0	0.6	2.4		7.0	1.4	
Average (total)		5.7	3.1	35.5	9.5	0.5	0.5	5.9	1.3	11.1	12.6	4.8	2.2	2.6	1.5	2.1	1.0	

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[illegible]

Table V-6. Groups of plant individuals recognized using TWINSpan. Numbers in table represent the percentage of the animal species as number of photos (see text).

ju. no.	Plant species	Animal species													
		Tapac	Phaeodytes	Maeae	Laticus	Rhinoceros	Rellus	Macropygia	Macropygia	Macropygia	Macropygia	Macropygia	Macropygia	Macropygia	Macropygia
Group A															
15	<i>Dillenia sumatrana</i>					7.5		41.5	45.3		5.7				
53	<i>ratian</i>								91.7				8.3		
62	<i>Sarcotoclea monophylla</i>	24.1		3.4					24.1					44.8	3.4
66	<i>Temnala olina</i> (collydon)			2.0					98.0						
70	<i>Temnala olina</i> (collydon)			5.1					93.9						
23	<i>Endopentemum malacense?</i>	51.3		12.9		2.5			33.2						
71	<i>Xerocarpum nonchianum</i>	62.5		4.2	8.3				16.7						
1	<i>Alangium ebenaceum</i>	4.9		1.6	23.0				8.2						1.6
6	<i>Baccharis peruviana</i>			9.5	52.4				25.6			9.5			
12	<i>Canarium littorale</i> (collydon)				38.1				1.0	52.6					
35	<i>Lithocarpus</i> sp.				41.7				58.3						
72	<i>Xerocarpum nonchianum</i>				50.0				50.0						
22	<i>Elaeocarpus stipulata</i>				90.9								3.0		
84	<i>Shorea macrocarpa</i>	6.1		4.1	51.0	2.0			2.0		8.2		26.5		
65	<i>Shorea macrocarpa</i>	8.0			52.0				4.0				32.0		4.0
26	<i>Garcinia nigrotheca</i>			48.4	41.9			1.6	6.5		1.6				
59	<i>Sapum bicoloratum</i>	4.2		7.3	11.5	1.0			1.0					75.0	
55	<i>Sarcotoclea monophylla</i>			7.8	81.6				2.8					7.8	
Average		9.0	0.0	4.6	31.5	0.2	0.4	8.6	2.7	30.3	0.4	0.0	5.8	3.9	4.6
Group B															
45	<i>Palcia speciosa</i>			23.8	9.5			4.8					61.9		
52	<i>ratian</i>			12.5	25.0	6.3				12.5			18.8		12.5
55	<i>red fruit (unknown sp.)</i>			46.4	28.6					14.3			10.7		
66	<i>Oryza sativa</i>			56.5	26.1	4.3							13.0		
20	<i>Horsfieldia superba</i>			94.9											5.1
43	<i>Paracarpus bracteatus</i>			58.3						16.7			8.3	8.3	
67	<i>Temnala olina</i> (pulp)			89.7									6.9		0.4
11	<i>Canarium littorale</i> (pulp)			86.7									30.6		2.8
19	<i>Temnala olina</i> (pulp)			41.2									5.9	23.5	29.4
18	<i>Disopygia angustata</i>			57.9						26.3	2.6			13.2	
44	<i>Paracarpus bracteatus</i>			75.0				6.3		6.3			2.6	12.5	
50	<i>ratian</i>			53.8	2.6			5.1		15.4				20.5	
17	<i>Disopygia angustata</i>			15.2	2.2	2.2	37.0			37.0			6.3		
57	<i>Ryanea kusnetii</i>	16.2	2.7	10.8				8.1		51.4		5.4	5.4		
31	<i>Ryanea kusnetii</i>	12.5		40.8			4.2					29.2	8.3		
46	<i>Portulaca anaphylla</i>	55.0		35.0	5.0								5.0		
81	<i>Sarcotoclea monophylla</i>	43.2		13.5	16.2					10.8		13.5			2.7
27	<i>Garcinia peruviana</i>	14.3		71.4	7.1					7.1					
39	<i>Myrica maritima</i>	14.3		65.7						1.8	17.5				
41	<i>Osmia venosa</i>	0.9		57.5						40.7			0.9		
47	<i>Portulaca anaphylla</i>	50.0		50.0											
4	<i>Ardisia rubra</i>			100.0											
5	<i>Baccharis peruviana</i>			96.2		3.8									
13	<i>Canarium littorale</i> (pulp)			96.0	4.0									5.6	
32	<i>Lithocarpus curtisii</i>			100.0											
49	<i>Pyrenaria acuminata</i>			100.0				18.9		56.8				2.7	
18	<i>Disopygia angustata</i>			21.6						15.9	2.3				
40	<i>Osmia venosa</i>			2.3	79.5					11.1					
31	<i>ratian</i>			85.9											
58	<i>Sarcia calyculata?</i>	26.0		40.0				40.0							
73	<i>Yulopis malayana</i>			70.0				27.5					2.5		
Average		7.1	0.2	60.3	3.9	0.6	1.2	3.5	0.0	10.1	0.7	1.7	3.6	4.8	0.0
Group C															
Subgroup C1															
3	<i>Archidendron buibum</i>							12.5			38.9	47.2	1.4		
23	<i>Oryza sativa</i>							33.3		37.5	29.2				
24	<i>Eugenia</i> sp.			10.0		5.0				10.0	35.0	15.0		25.0	
30	<i>Ryanea kusnetii</i>			23.1	1.5			36.9		3.1	33.8		1.5		
9	<i>Belconia malayana</i>			1.8				3.8	1.8				1.8		
9	<i>black bean (unknown sp.)</i>														4.3
37	<i>Myrica elliptica</i>			5.8		1.9		1.9	3.8	1.9	80.6				3.8
28	<i>Myrica elliptica</i>										85.5	4.5			
21	<i>Diospyros angustata</i>			5.6						0.2	91.2	2.0		1.0	
25	<i>Garcinia nervosa</i>			19.0						2.4	76.2	2.4			
38	<i>Myrica elliptica</i>	31.3		3.4	3.1			3.1		43.5	6.3				8.3
Average		2.8	0.0	6.8	0.4	0.6	0.0	8.3	0.5	50.4	64.3	6.6	0.7	2.4	0.0
Subgroup C2															
42	<i>Paracarpus bracteatus</i>			92.9				2.1				7.1			
48	<i>Pyrenaria acuminata</i>			80.9		2.1						4.3	6.4		4.3
10	<i>Ryanea kusnetii</i>			72.7				1.5			13.6	1.5		10.6	
24	<i>Eugenia</i> sp.			91.3							8.7				
14	<i>ratian</i>			68.9				12.5			12.5				
2	<i>Archidendron buibum</i>			4.8	0.8			5.6		5.6	28.4	27.2		27.2	2.4
33	<i>Lithocarpus</i> sp.			18.2	9.1			18.2	9.1			43.5			
43	<i>Lithocarpus laudus</i>			47.2								52.8			
16	<i>Pyrenaria acuminata</i>			20.0								20.0			60.0
63	<i>Sarcotoclea monophylla</i>					6.7			20.0		6.7			46.7	20.0
Average		0.0	0.0	49.7	1.0	0.8	0.0	4.0	2.9	0.6	68.8	15.6	0.6	0.0	14.4
Group D															
14	<i>Castanopsis megacarpa</i>			59.1	1.5	2.9		8.8		16.1		11.7			
28	<i>Horsfieldia superba</i>			55.0								5.0			
Average		0.0	0.0	77.1	0.7	1.5	0.0	0.0	4.4	0.0	9.0	0.0	8.3	0.0	0.0

Table V-7. Two-way table of TWINSPAN based on the species data. Numbers in table represent the relative abundance of the animal species as number of photos (see text).

[illegible]

Table V-8. Groups of plant species recognized using TWINSpan. Numbers in table represent the percentage of the animal species as number of photos (see text).

In cl. Plant species	Animal species												
	Tapes	Proctos	Meleas	Larvae	Phlebotomus	Redus	Macropod	Macropod	Macropod	Macropod	Macropod	Macropod	Macropod
Group A													
44. <i>Euphorbia</i>	4.2	7.3	11.5	1.0		1.0						75.5	
4. <i>Baccharis</i>		71.6	14.9	2.7					8.1		2.7		
47. <i>Silene</i>	3.2	45.2	19.4	3.2							3.2	16.1	8.7
21. <i>Gentiana</i>		48.4	41.3			1.6	6.5		1.6				
36. <i>Phlox</i>		23.9	9.5			4.8					61.9		
42. red fl. <i>Lupinus</i> sp.)		45.4	24.6						14.2		10.7		
22. <i>Gentiana</i>	14.3	71.4	7.1						2.1				
37. <i>Phlox</i>	53.3	45.0	3.3									3.3	
43. <i>Gentiana</i>	20.0	45.0				40.0							
18. <i>Erigeron</i>	91.3	12.8				2.5			33.3				
30. <i>Scrophularia</i>	44.1	5.9	20.6			20.5			5.9				
17. <i>Flavocyprip</i>		90.9							6.1		3.0		
45. <i>Scrophularia</i>	16.9	8.9	31.1	0.8		3.0	2.5	8.0	0.8	4.1		2.5	17.2
46. <i>Shorea</i>	6.8	2.7	31.4	1.4		2.7		5.4			38.4		1.4
1. <i>Alnus</i>	4.9	1.8	23.0			8.2		60.7					1.8
19. <i>Conium</i>		37.5				6.7	1.0	52.8					
32. <i>Lithospermum</i>		41.7				59.3							
Average	13.0	0.0	24.0	26.2	0.3	0.0	9.3	0.6	11.6	0.5	0.2	4.6	0.0
Group B													
14. <i>Diapentha</i>		34.5	1.2	1.2	20.2			32.1	1.2	3.6	0.0		
34. <i>Ononis</i>	0.6	0.6	63.7					33.8	0.6		0.6		
39. <i>Salix</i>		52.7	4.5	0.9		3.6		20.0	1.8	2.7	10.9		2.7
49. <i>Ternstroemia</i>			3.6					96.4					
42. <i>Rapanea</i>	18.2	2.7	10.8			8.1		51.4	5.4	5.4			
15. <i>Ononis</i>		7.8						44.6	2.1				
Average	2.8	0.6	27.0	1.8	0.3	4.6	2.0	5.5	46.4	0.8	1.5	2.9	0.0
Group C													
Subgroup C1													
26. <i>Krassia</i>	12.5	45.8	9.1	4.2		18.2	8.1			29.2	8.3		
29. <i>Lithospermum</i>		16.2								45.5			
29. <i>Lithospermum</i>		47.0								52.8			
41. <i>Rapanea</i>		20.0								20.0		60.0	
35. <i>Pycnanthus</i>		88.9				0.8		4.0		4.8	3.2		1.8
38. <i>Pycnanthus</i>		85.0		1.7		1.7				3.3	0.0		3.3
51. <i>Yucca</i>		70.0				27.0				2.5			
9. <i>Canarium</i>	1.8	75.0								19.6		1.8	1.8
24. <i>Myrsine</i>		82.2	2.2			6.7		4.4					4.4
48. <i>Ternstroemia</i>		71.7								6.5	6.7		13.0
3. <i>Antidesma</i>		100.0											
5. <i>Baccharis</i>		99.0	4.0										
13. <i>Diapentha</i>		91.3							8.7				
27. <i>Lithospermum</i>		100.0											
8. <i>Shorea</i>		72.7				1.3		13.8	1.8			10.8	
Average	1.0	0.0	70.8	1.0	0.4	0.0	3.9	0.6	0.6	1.3	10.5	1.0	2.7
Subgroup C2													
31. <i>Myrsine</i>	26.3	23.7	2.6			2.6			34.2	5.3			5.3
33. <i>Myrsine</i>	12.8	66.2						1.8	18.9				
2. <i>Antidesma</i>		3.0	0.5			8.1		3.6	31.0	34.5	0.5	1.5	
15. <i>Diapentha</i>		12.1				24.6		49.2	11.5			17.3	1.5
16. <i>Shorea</i>		10.0		5.0				10.0	35.0	15.0	25.0		
23. <i>Krassia</i>		23.1	1.5			26.9		3.1	33.8	1.8			
6. <i>Baccharis</i>		1.8				3.8	1.8		92.9		1.8		
32. <i>Myrsine</i>		4.1		1.4		1.4	2.7	1.4	85.1	1.4		2.7	
7. <i>Shorea</i>		5.8				0.2	91.2		2.0			4.3	
14. <i>Diapentha</i>		18.0				2.4	78.2		2.4			1.0	
20. <i>Shorea</i>						6.5	84.7		5.1	6.5	2.8	0.0	1.7
Average	3.7	0.0	15.4	0.4	0.6	0.0	7.0	0.4	6.5	84.7	5.1	6.5	2.8
Group D													
11. <i>Canarium</i>	59.1	1.5	2.9			8.8			16.1	11.7			
23. <i>Myrsine</i>										5.0			
Average	0.0	77.1	9.7	1.5	0.0	0.0	4.4	0.0	8.0	0.0	8.3	0.0	0.0

Table V-9. Comparison of the results between the two classification methods (plant individuals). TG: *Tupaia glis*; MN: *Macaca nemestrina*; PF: *Presbytis femoralis*; LI: *Lariscus insignis*; LS: *Leopoldamys sabanus*; HB: *Hystrix brachyura*; TF: *Trichys fasciculata*.

Ind. No.	Plant species	Morisita's index		TWINSPAN		Difference between methods
		Cluster	Subcluster	Group	Indicator spp.	
13	Canarium littorale (pulp)	MN	MN	B	MN	
39	Myristica mangayi	MN	MN	B	MN	
16	Diospyros caudata	MN	MN	C2	MN+LS	
7	Baccaurea reticulata	MN	MN	B	MN	
51	rattan	MN	MN	B	MN	
4	Artocarpus nitidus	MN	MN	B	MN	
10	Bouea oppositifolia	MN	MN	C2	MN+LS	
67	Terminalia citrina (pulp)	MN	MN	B	MN	
29	Horsfieldia superba	MN	MN	B	MN	
48	Pyrenaria acuminata	MN	MN	C2	MN+LS	
40	Omosia venosa	MN	MN	B	MN	
41	Omosia venosa	MN	MN	B	MN	
5	Baccaurea parvifolia	MN	MN	B	MN	
11	Canarium littorale (pulp)	MN	MN	B	MN	
73	Xylofia malayana	MN	MN	B	MN	
56	Santiria rubiginosa?	MN	MN	B	MN	
42	Paratocarpus bracteatus	MN	MN	C2	MN+LS	
34	Lithocarpus lucidus	MN	MN	C2	MN+LS	
26	Garcinia nigrolineata	MN	MN	A	LI+LS+TG	*
45	Parkia speciosa	MN	MN	B	MN	
63	Sarcotheca monophylla	MN	MN	C2	MN+LS	
30	Knema hookeriana	MN	MN	C1	TF	*
62	Sarcotheca monophylla	MN	MN	A	LI+LS+TG	*
32	Lithocarpus curtisi	MN	LS	B	MN	
50	rattan	MN	LS	B	MN	
49	Pyrenaria acuminata	MN	LS	B	MN	
44	Paratocarpus bracteatus	MN	LS	B	MN	
27	Garcinia parvifolia	MN	LS	B	MN	
54	rattan	MN	LS	C2	MN+LS	
43	Paratocarpus bracteatus	MN	LS	B	MN	
18	Diospyros singaporensis	MN	LS	B	MN	
66	Styrax benzoin	MN	LS	B	MN	
55	red fruit (unknown sp.)	MN	LS	B	MN	
69	Terminalia citrina (pulp)	MN	LS	B	MN	
31	Knema scortechnii	MN	LS	B	MN	
52	rattan	MN	LS	B	MN	
17	Diospyros singaporensis	MN	LS	B	MN	
47	Porterandia anisophylla	MN	TG	B	MN	
61	Sarcotheca monophylla	MN	TG	B	MN	
46	Porterandia anisophylla	MN	TG	B	MN	
71	Xerospermum noronhianum	MN	TG	A	LI+LS+TG	
23	Endospermum malaccense?	MN	TG	A	LI+LS+TG	
59	Sapium baccatum	MN	OTHER	A	LI+LS+TG	*
64	Shorea maxima	U		A	LI+LS+TG	
65	Shorea maxima	U		A	LI+LS+TG	
6	Baccaurea parvifolia	U		A	LI+LS+TG	
35	Lithocarpus sp.	U		A	LI+LS+TG	
72	Xerospermum noronhianum	U		A	LI+LS+TG	
22	Elaeocarpus stipularis	U		A	LI+LS+TG	
60	Sarcotheca monophylla	U		A	LI+LS+TG	
1	Alangium ebenaceum	LS		A	LI+LS+TG	
70	Terminalia citrina (cotyledon)	LS		A	LI+LS+TG	
12	Canarium littorale (cotyledon)	LS		A	LI+LS+TG	
68	Terminalia citrina (cotyledon)	LS		A	LI+LS+TG	
53	rattan	LS		A	LI+LS+TG	
57	Ryparosa kunsteri	LS		B	MN	*
19	Dipterocarpus crinitus	LS		B	MN	*
20	Dipterocarpus crinitus	LS		C1	TF	*
15	Dillenia sumatrana	LS		A	LI+LS+TG	
14	Castanopsis megacarpa	PF+HB		D	PF	
28	Horsfieldia sucosa	PF+HB		D	PF	
33	Lithocarpus ewyckii	PF+HB		C2	MN+LS	*
25	Garcinia nervosa	TF		C1	TF	
38	Myristica elliptica	TF		C1	TF	
9	black bean (unknown sp.)	TF		C1	TF	
37	Myristica elliptica	TF		C1	TF	
8	Belischedia madang	TF		C1	TF	
24	Eugenia sp.	TF		C1	TF	
2	Archidendron bubaliun	TF		C2	MN+LS	*
56	Ryparosa acuminata	TF		C2	MN+LS	*
36	Myristica cinnamomea	TF		C1	TF	
3	Archidendron bubaliun	TF		C1	TF	
21	Dysoxylum acutangulum	TF		C1	TF	

Table V-10. Comparison of the results between the two classification methods (plant species). TG: *Tupaia glis*; MN: *Macaca nemestrina*; PF: *Presbytis femoralis*; LI: *Lariscus insignis*; LS: *Leopoldamys sabanus*; HB: *Hystrix brachyura*; TF: *Trichys fasciculata*.

Sp. no.	Plant species	Monist's index	TWINSPAN		Difference between methods
		Cluster	Group	Indicator sp.	
27	<i>Lithocarpus curtisii</i>	MN	C1	MN	
39	rattan	MN	B	LS	(*)
5	<i>Baccaurea reticulata</i>	MN	C1	MN	
3	<i>Artocarpus nilidus griffithii</i>	MN	C1	MN	
13	<i>Diospyros caulliflora</i>	MN	C1	MN	
22	<i>Garcinia parvifolia</i>	MN	A	LI	(*)
24	<i>Horsfieldia superba</i>	MN	C1	MN	
47	<i>Styrax benzoin</i>	MN	A	LI	(*)
48	<i>Terminalia citrina</i> (pulp)	MN	C1	MN	
9	<i>Canarium littorale</i> (pulp)	MN	C1	MN	
43	<i>Santiria rubiginosa?</i>	MN	A	LI	(*)
33	<i>Myristica mainpayi</i>	MN	C2	TF	*
8	<i>Bouea opositifolia</i>	MN	C1	MN	
4	<i>Baccaurea parvifolia</i>	MN	A	LI	(*)
38	<i>Pyrenaria acuminata</i>	MN	C1	MN	
51	<i>Xyloplea malayana</i>	MN	C1	MN	
26	<i>Knema scortechinii</i>	MN	C1	MN	
40	red fruit (unknown sp.)	MN	A	LI	(*)
34	<i>Osmia venosa</i>	MN	B	LS	(*)
35	<i>Paratocarpus bracteatus</i>	MN	C1	MN	
29	<i>Lithocarpus lucidus</i>	MN	C1	MN	
37	<i>Porterandia anisophylla</i>	MN	A	LI	(*)
21	<i>Garcinia nigrolineata</i>	MN	A	LI	(*)
36	<i>Parkia speciosa</i>	MN	A	LI	*
14	<i>Diospyros singaporensis</i>	MN	B	LS	(*)
12	<i>Dillenia sumatrana</i>	MN	B	LS	*
18	<i>Endospermum malaccense?</i>	MN	A	LI	*
50	<i>Xerospermum noronhianum</i>	MN	A	LI	*
44	<i>Sapum baccatum</i>	MN	A	LI	*
17	<i>Elaeocarpus stipularis</i>	LI	A	LI	
45	<i>Sarcotheca monophylla</i>	LI	A	LI	
46	<i>Shorea maxima</i>	LI	A	LI	
1	<i>Alangium ebenaceum</i>	LS	A	LI	*
10	<i>Canarium littorale</i> (cotyledon)	LS	A	LI	*
49	<i>Terminalia citrina</i> (cotyledon)	LS	B	LS	
15	<i>Dipterocarpus crinitus</i>	LS	C2	TF	*
42	<i>Ryparosa kunsteri</i>	LS	B	LS	
11	<i>Castanopsis megacarpa</i>	PF-HB	D	PF	
23	<i>Horsfieldia succosa</i>	PF-HB	D	PF	
28	<i>Lithocarpus ewyckii</i>	PF-HB	C1	MN	*
7	black bean (unknown sp.)	TF	C2	TF	
20	<i>Garcinia nervosa</i>	TF	C2	TF	
6	<i>Belisohmedia madang</i>	TF	C2	TF	
2	<i>Archidendron bubalum</i>	TF	C2	TF	
32	<i>Myristica elliptica</i>	TF	C2	TF	
19	<i>Eugenia</i> sp.	TF	C2	TF	
41	<i>Ryparosa acuminata</i>	TF	C1	MN	*
31	<i>Myristica cinamomea</i>	TF	C2	TF	
30	<i>Lithocarpus</i> sp.	TF	A	LI	*
25	<i>Knema hookeriana</i>	TF	C2	TF	
16	<i>Dysoxylum acutangulum</i>	TF	C2	TF	

(*) indicates the plant species of which fruit is dominantly utilized by *Macaca pamestina* in number of photos.

Table V-11. Nutrient contents of the fruits analyzed.

Plant species	Family	Edible part	Nutrient contents (% fresh matter)					Energy (cal/g)	Nutrient contents (% dry matter)					Energy (cal/g)	
			Moisture (%)	Protein	Lipid	(CH ₂ O) _n	Fiber		Ash	Protein	Lipid	(CH ₂ O) _n	Fiber		Ash
<i>Archidendron bubalum</i>	LEGU	seed	56.4	7.0	0.2	34.8	1.1	0.6	1985	16.1	0.4	79.8	2.4	1.4	4553
<i>Bouea oppositifolia</i>	ANAC	pulp	90.1	0.2	0.0	6.2	3.2	0.3	449	1.6	0.4	62.5	32.6	2.8	4534
<i>Bouea oppositifolia</i>	ANAC	seed	46.1	2.1	0.4	49.9	1.1	0.3	2398	3.9	0.7	92.7	2.0	0.6	4449
<i>Canarium littorale</i>	BURS	pulp	77.7	0.7	1.4	14.7	4.4	1.1	1045	3.1	6.4	65.7	19.9	4.9	4685
<i>Canarium littorale</i>	BURS	seed	8.8	13.6	52.3	6.8	14.8	3.8	6858	14.9	57.3	7.4	16.2	4.1	7520
<i>Castanopsis megacarpa</i>	FAGA	seed	52.5	2.6	0.1	43.2	1.0	0.6	2096	5.4	0.3	90.9	2.1	1.4	4413
<i>Diospyros singaporensis</i>	EBEN	seed	49.4	5.3	0.1	23.5	21.3	0.5	2411	10.4	0.2	46.4	42.1	1.0	4765
<i>Eugenia inophylla</i>	MYRT	pulp	80.8	1.4	0.1	14.1	3.1	0.5	861	7.3	0.6	73.3	16.1	2.8	4484
<i>Garcinia nervosa</i>	GUTT	seed	55.5	1.8	6.7	28.7	2.4	4.9	2129	4.2	15.1	64.4	5.3	11.1	4783
<i>Irvingia malayana</i>	IRVI	pulp	80.5	0.8	2.1	13.0	3.3	0.3	982	4.0	10.9	66.8	16.7	1.6	5035
<i>Knema hookeriana</i>	MYRI	seed	37.2	3.8	28.4	24.4	5.9	0.4	4320	6.0	45.2	38.8	9.5	0.6	6879
<i>Myristica cinnamomea</i>	MYRI	seed	46.0	1.4	8.5	37.2	6.2	0.7	2839	2.7	15.7	68.9	11.4	1.3	5258
<i>Myristica elliptica</i>	MYRI	seed	29.8	5.0	55.0	0.8	8.8	0.6	6073	7.1	78.3	1.2	12.6	0.8	8650
<i>Myristica elliptica</i>	MYRI	seed coat	64.1	2.5	15.8	12.7	4.3	0.7	2438	6.9	43.9	35.3	12.0	1.9	6792
<i>Neobalanocarpus heimii</i>	DIPT	seed	32.1	2.1	0.3	63.8	1.3	0.4	3005	3.0	0.4	94.0	1.9	0.6	4425
<i>Ormosia venosa</i>	LEGU	seed	33.8	2.8	1.0	51.8	9.6	1.0	3008	4.2	1.5	78.2	14.5	1.5	4544
<i>Parkia speciosa</i>	LEGU	seed	80.7	6.5	1.5	8.1	2.2	1.0	978	33.7	7.8	42.2	11.3	5.0	5065
<i>Pyrenaria acuminata</i>	THEA	pulp	86.4	0.5	0.1	11.4	1.1	0.4	591	3.8	0.4	84.1	8.5	3.3	4347
<i>Quercus gemelliflora</i>	FAGA	seed	59.9	0.7	0.3	37.7	0.7	0.7	1756	1.7	0.8	93.9	1.8	1.8	4380
<i>Sarcotheca monophylla</i>	OXAL	pulp	90.5	0.6	0.0	5.2	3.2	0.4	430	6.8	0.4	54.8	33.9	4.2	4527
<i>Shorea maxima</i>	DIPT	seed	44.0	1.8	0.2	52.0	1.5	0.6	2471	3.1	0.4	92.9	2.6	1.0	4412
<i>Styrax benzoin</i>	STYR	pulp	70.7	1.4	0.0	19.6	7.7	0.6	1327	4.7	0.1	66.9	26.4	2.0	4529
<i>Terminalia citrina</i>	COMB	pulp	70.9	2.8	0.2	24.2	0.6	1.4	1267	9.5	0.8	83.1	2.0	4.7	4354
<i>Xerospermum noronhianum</i>	SAPI	seed coat	73.4	1.1	0.1	20.4	4.6	0.4	1198	4.0	0.4	76.7	17.5	1.5	4503
Average			59.1	2.8	7.3	25.2	4.7	0.9	2205	7.0	12.0	65.0	13.4	2.6	5079
SD			21.8	3.0	15.7	17.5	4.9	1.1	1627	6.8	21.5	25.7	11.2	2.3	1155

Table V-12. List of porcine-favored fruits.

Plant species	Family	No. of animal species recorded	Trichys fasciculata		Other animals		Total no. of photos
			No. of photos	(%)	No. of photos	(%)	
unknown sp. (Leguminosae)	LEGU	2	22	95.7	1	4.3	23
<i>Dysoxylum acutangulum</i>	MELI	5	373	91.2	36	8.8	409
<i>Beilschmiedia madang</i>	LAUR	5	50	90.9	5	9.1	55
<i>Myristica elliptica</i>	MYRI	7	42	80.8	10	19.2	52
<i>Garcinia nervosa</i>	GUTT	5	64	75.3	21	24.7	85
<i>Knema hookeriana</i>	MYRI	7	22	33.3	44	66.7	66
<i>Myristica cinnamomea</i>	MYRI	8	13	33.3	26	66.7	39
<i>Archidendron bubalum</i>	LEGU	9	33	26.2	93	73.8	126

Table V-13. Nutrient contents of porcupine-favored fruits and some other fruits.

Plant species	Family	Edible part	Moisture (%)	Nutrient contents (% fresh matter)					Energy (cal/g)
				Protein	Lipid	(CH ₂ O) _n	Fiber	Ash	
Plants preferred by <i>Trichys fasciculata</i>									
<i>Archidendron bubalum</i>	LEGU	seed	56.4	7.0	0.2	34.8	1.1	0.6	1985
<i>Garcinia nervosa</i>	GUTT	seed	55.5	1.8	6.7	28.7	2.4	4.9	2129
<i>Kiowa kookeriana</i>	MYRI	seed	37.2	3.8	28.4	24.4	5.9	0.4	4320
<i>Myristica cinnamomea</i>	MYRI	seed	46.0	1.4	8.5	37.2	6.2	0.7	2839
<i>Myristica elliptica</i>	MYRI	seed	29.8	5.0	55.0	0.8	8.8	0.6	6073
<i>Myristica elliptica</i>	MYRI	seed coat	64.1	2.5	15.8	12.7	4.3	0.7	2438
Average			48.2	3.6	19.1	23.1	4.8	1.3	3297
SD			5.3	0.9	8.2	5.7	1.1	0.7	653
Plants consumed by other animals									
<i>Bouea oppositifolia</i>	ANAC	pulp	90.1	0.2	0.0	6.2	3.2	0.3	449
<i>Bouea oppositifolia</i>	ANAC	seed	46.1	2.1	0.4	49.9	1.1	0.3	2398
<i>Canarium littorale</i>	BURS	pulp	77.7	0.7	1.4	14.7	4.4	1.1	1045
<i>Canarium littorale</i>	BURS	seed	8.8	13.6	52.3	6.8	14.8	3.8	6858
<i>Castanopsis megacarpa</i>	FAGA	seed	52.5	2.6	0.1	43.2	1.0	0.6	2096
<i>Diospyros singaporensis</i>	EBEN	seed	49.4	5.3	0.1	23.5	21.3	0.5	2411
<i>Eugenia inophylla</i>	MYRT	pulp	80.8	1.4	0.1	14.1	3.1	0.5	861
<i>Iringia malayana</i>	RFM	pulp	80.5	0.8	2.1	13.0	3.3	0.3	982
<i>Neobalanocarpus heimii</i>	DIPT	seed	32.1	2.1	0.3	63.8	1.3	0.4	3005
<i>Ormosia venosa</i>	LEGU	seed	33.8	2.8	1.0	51.8	9.6	1.0	3008
<i>Parkia speciosa</i>	LEGU	seed	80.7	6.5	1.5	8.1	2.2	1.0	978
<i>Pyrenaria acuminata</i>	THEA	pulp	86.4	0.5	0.1	11.4	1.1	0.4	591
<i>Quercus gemelliflora</i>	FAGA	seed	59.9	0.7	0.3	37.7	0.7	0.7	1756
<i>Sarcothecka monophylla</i>	OXAL	pulp	90.5	0.6	0.0	5.2	3.2	0.4	430
<i>Shorea maxima</i>	DIPT	seed	44.0	1.8	0.2	52.0	1.5	0.6	2471
<i>Soya benzoin</i>	STYR	pulp	70.7	1.4	0.0	19.6	7.7	0.6	1327
<i>Terminalia citrina</i>	COMB	pulp	70.9	2.8	0.2	24.2	0.6	1.4	1267
<i>Xerospermum noronhanum</i>	SAPI	seed coat	73.4	1.1	0.1	20.4	4.6	0.4	1198
Average			62.7	2.6	3.4	25.9	4.7	0.8	1841
SD			5.5	0.8	2.9	4.4	1.3	0.2	355

Table V-14. Morisita's similarity indices between replications.

Ind. no.	Plant species	Vegetation	Replication no.	Replication no.				Species group	
				1	2	3	4	Cluster	Subcluster
Different period/Same site									
2	<i>Archidendron bubalum</i>	Primary	1					<i>Trichys</i>	
3	<i>Archidendron bubalum</i>	Primary	2	0.914				<i>Trichys</i>	
67	<i>Terminalia citrina</i> (pulp)	SIA	1					<i>Macaca</i>	<i>Leopoldamys</i>
69	<i>Terminalia citrina</i> (pulp)	SIA	2	0.572				<i>Macaca</i>	<i>Leopoldamys</i>
68	<i>Terminalia citrina</i> (cotyledon)	SIA	1					<i>Leopoldamys</i>	
70	<i>Terminalia citrina</i> (cotyledon)	SIA	2	0.983				<i>Leopoldamys</i>	
37	<i>Myristica elliptica</i>	SIA	1					<i>Trichys</i>	
38	<i>Myristica elliptica</i>	SIA	2	1.116				<i>Trichys</i>	
40	<i>Ormosia venosa</i>	Primary	1					<i>Macaca</i>	<i>Macaca</i>
41	<i>Ormosia venosa</i>	Primary	2	1.018				<i>Macaca</i>	<i>Macaca</i>
Different site/Same vegetation									
5	<i>Baccaurea parvifolia</i>	Primary	1					<i>Macaca</i>	<i>Macaca</i>
6	<i>Baccaurea parvifolia</i>	Primary	2	0.108				<i>Lariscus</i>	
17	<i>Diospyros singaporensis</i>	Secondary	1					<i>Macaca</i>	<i>Leopoldamys</i>
18	<i>Diospyros singaporensis</i>	Secondary	2	0.554				<i>Macaca</i>	<i>Leopoldamys</i>
19	<i>Dipterocarpus crinitus</i>	Primary	1					<i>Leopoldamys</i>	
20	<i>Dipterocarpus crinitus</i>	Primary	2	0.756				<i>Leopoldamys</i>	
42	<i>Paratocarpus bracteatus</i>	Secondary	1					<i>Macaca</i>	<i>Macaca</i>
43	<i>Paratocarpus bracteatus</i>	Secondary	2	0.654				<i>Macaca</i>	<i>Leopoldamys</i>
44	<i>Paratocarpus bracteatus</i>	Secondary	3	0.814	1.087			<i>Macaca</i>	<i>Leopoldamys</i>
60	<i>Sarcotheca monophylla</i> (*1)	Primary	1					<i>Lariscus</i>	
61	<i>Sarcotheca monophylla</i> (*1)	Primary	2	0.310				<i>Macaca</i>	<i>Tupaia</i>
62	<i>Sarcotheca monophylla</i> (*2)	Primary	3	0.053	0.565			<i>Macaca</i>	<i>Macaca</i>
63	<i>Sarcotheca monophylla</i> (*2)	Primary	4	0.000	0.052	0.751		<i>Macaca</i>	<i>Macaca</i>
64	<i>Shorea maxima</i>	Primary	1					<i>Lariscus</i>	
65	<i>Shorea maxima</i>	Primary	2	1.061				<i>Lariscus</i>	
Different vegetation									
11	<i>Canarium littorale</i> (pulp)	Secondary	1					<i>Macaca</i>	<i>Macaca</i>
13	<i>Canarium littorale</i> (pulp)	Primary	2	1.056				<i>Macaca</i>	<i>Macaca</i>
46	<i>Porterandia anisophylla</i>	Primary	1					<i>Macaca</i>	<i>Tupaia</i>
47	<i>Porterandia anisophylla</i>	Secondary	2	1.102				<i>Macaca</i>	<i>Tupaia</i>
48	<i>Pyrenaria acuminata</i>	Secondary	1					<i>Macaca</i>	<i>Macaca</i>
49	<i>Pyrenaria acuminata</i>	SIA	2	1.192				<i>Macaca</i>	<i>Leopoldamys</i>
50	rattan	Primary	1					<i>Macaca</i>	<i>Leopoldamys</i>
51	rattan	Secondary	2	1.016				<i>Macaca</i>	<i>Macaca</i>
52	rattan	Primary	3	0.434	0.202			<i>Macaca</i>	<i>Leopoldamys</i>
53	rattan	Secondary	4	0.413	0.127	0.356		<i>Leopoldamys</i>	
54	rattan	Primary	5	1.043	0.857	0.321	0.000	<i>Macaca</i>	<i>Leopoldamys</i>
71	<i>Xerospermum noronhianum</i>	Primary	1					<i>Macaca</i>	<i>Tupaia</i>
72	<i>Xerospermum noronhianum</i>	Secondary	2	0.302				<i>Lariscus</i>	

(*1) and (*2) represent the same individuals studied at different times.

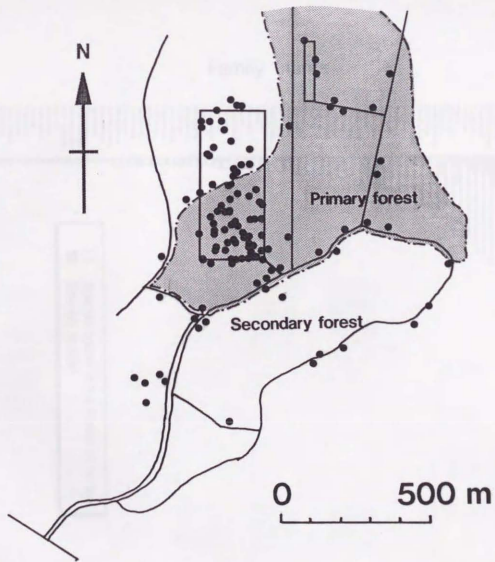


Fig. V-1. Location of the fruiting trees studied. Closed circles represent individual plants.

a. Diurnal

Macaca nemestrina



Lariscus insignis

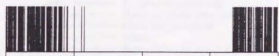


Tupaia glis

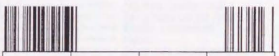


b. Nocturnal

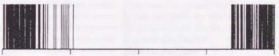
Leopoldamys sabanus



Maxomys spp.

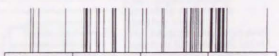


Trichys fasciculata



c. Non-circadian

Sus scrofa



Tragulus javanicus

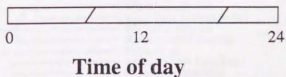
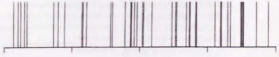


Fig. V-3. Activity cycles of mammals. a: diurnal species; b: nocturnal species; c: non-circadian. Vertical lines represent the time photos were taken.

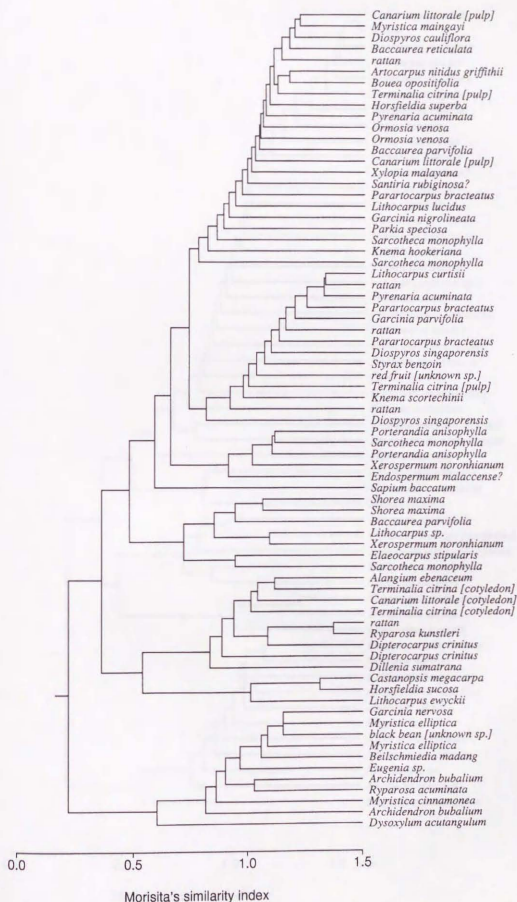


Fig. V-4. Similarity of fruit consumption by terrestrial vertebrates based on individual data.

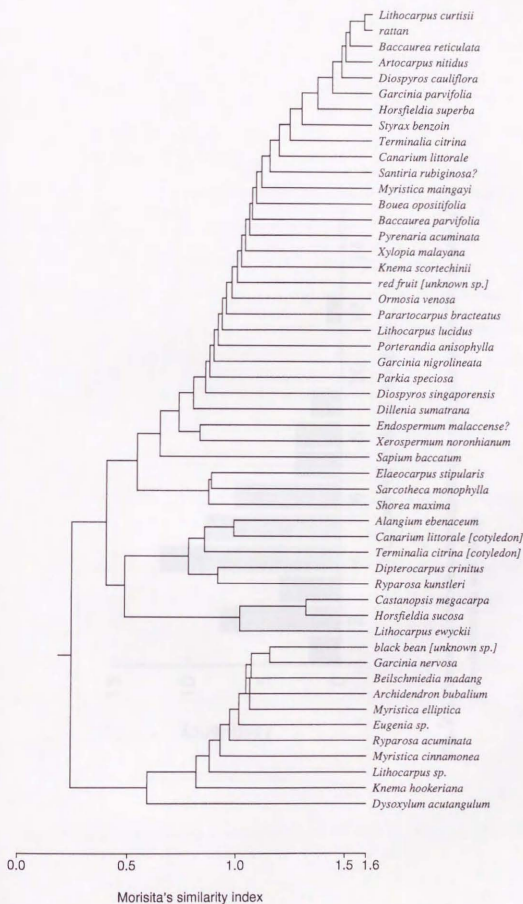


Fig. V-5. Similarity of fruit consumption by terrestrial vertebrates based on species data.

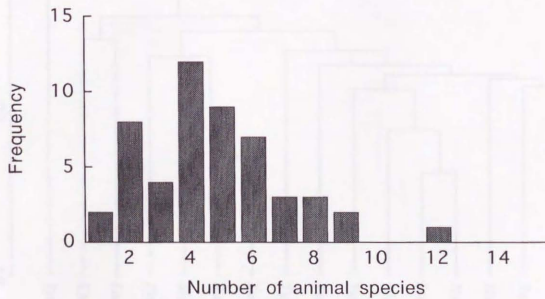


Fig. V-6. Number of fruit consumers appearing on each plant species. Total number of animals recorded was 16 spp.

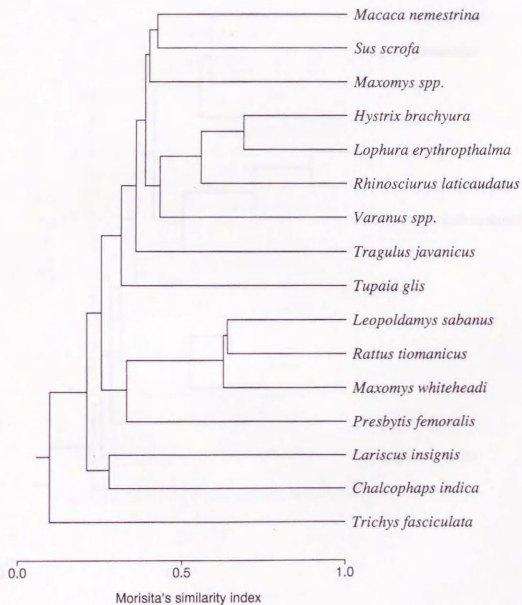


Fig. V-7. Similarity of fruit utilization of terrestrial vertebrates based on individual data.

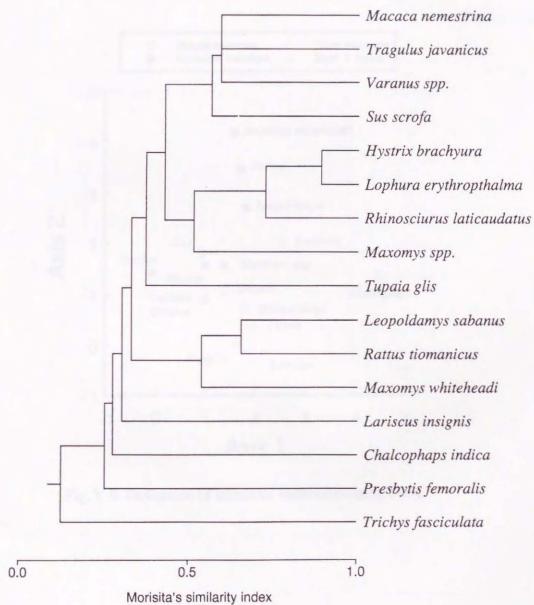


Fig. V-8. Similarity of fruit utilization of terrestrial vertebrates based on species data.

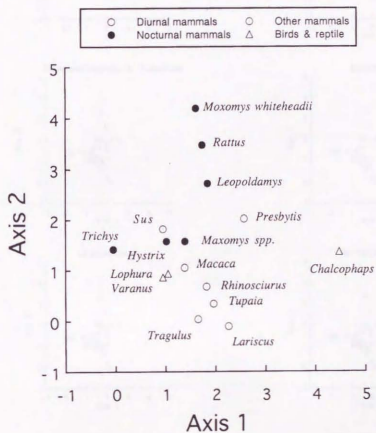


Fig. V-9. Ordination of terrestrial vertebrates using DCA.

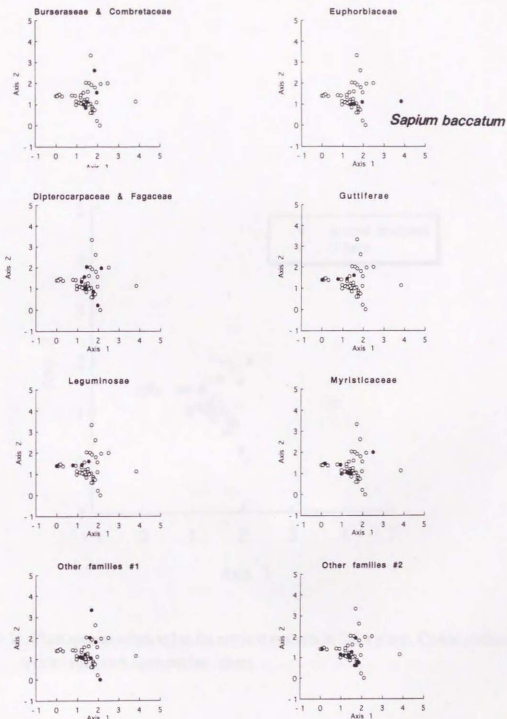


Fig. V-10. DCA plot for plant species. Families of which fruits are similar in morphology are shown in the same figures, except for other families #1 and #2. Closed circles: species belonging to the family; open circles: species belonging in other families.

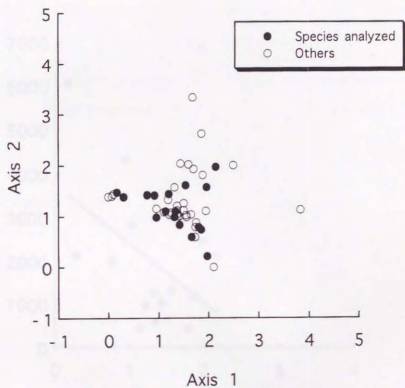


Fig. V-11. Plant species subjected to the nutrient analysis in DCA plane. Closed circles: species analyzed; open circles: others.

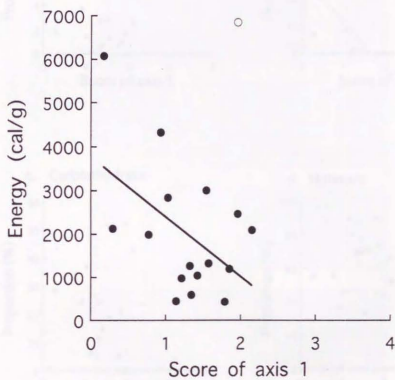


Fig. V-12. Relationship between the scores of axis 1 in DCA plot and energy content of fruits. Open circles: cotyledon of *Canarium littorale*; closed circles: others.

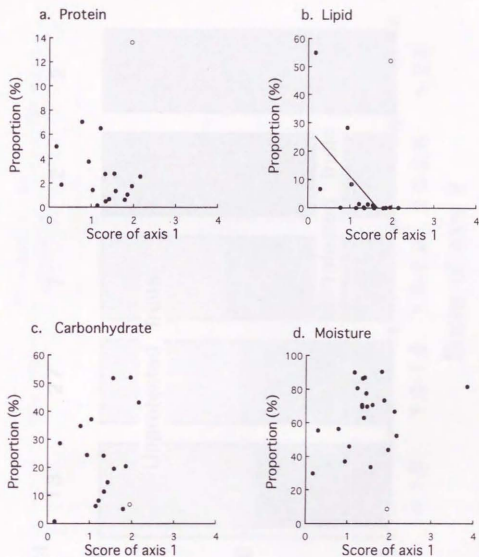


Fig. V-13. Relationship between the scores of axis 1 in DCA plot and nutrients of fruits. Open circles: cotyledon of *Canarium littorale*; closed circles: others.

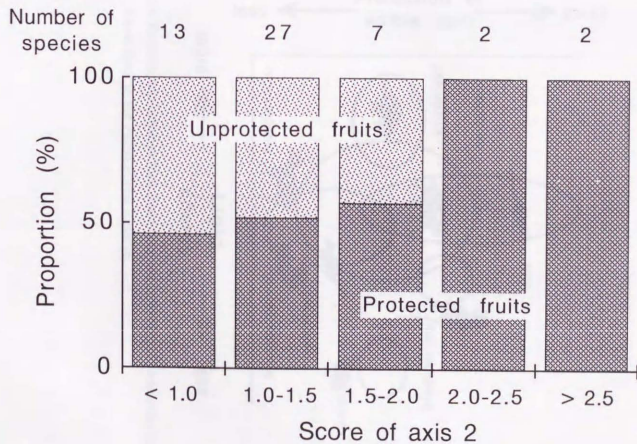


Fig. V-14. Relationship between the scores of axis 2 in DCA plot and fruit protection.

Hatched bars: protected fruits; shaded bars: unprotected fruits.

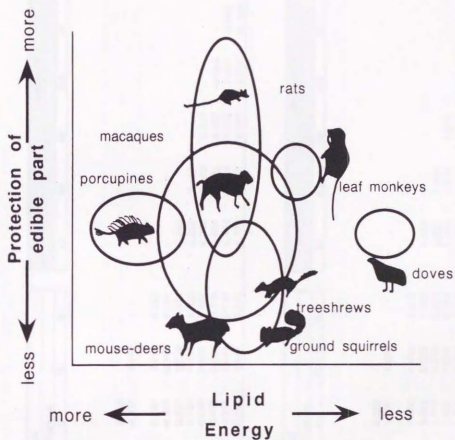


Fig. V-15. Relationship between fruit characters and frugivorous vertebrates on the forest floor in the Pasoh Forest Reserve.

Table VI-1. Correlation of population dynamics between small mammal species.

Numbers underlined represent significant correlations ($p < 0.05$).

Pearson correlation matrix (r)

Species	Diurnal						Nocturnal						
	Tree shrews		Squirrels				Rats				Porcupines	Moonrats	
	TG	CNIG	CN	LI	RL	SL	LS	MR	MS	MW	RT	TF	EG
TG	-												
CNIG	-0.057	-											
CN	0.325	0.047	-										
LI	0.249	-0.431	0.018	-									
RL	0.247	-0.252	-0.320	<u>0.540</u>	-								
SL	0.273	0.333	0.137	-0.037	0.108	-							
EG	-0.075	-0.087	-0.393	0.102	0.459	-0.049							
LS	0.483	0.316	0.277	-0.038	-0.188	0.191	-						
MR	0.050	-0.330	-0.345	<u>0.655</u>	<u>0.738</u>	0.078	-0.262	-					
MS	<u>0.513</u>	0.209	0.008	0.255	0.412	<u>0.572</u>	<u>0.567</u>	0.163	-				
MW	-0.238	0.417	-0.441	-0.358	0.063	0.388	0.205	-0.172	0.470	-			
RT	0.177	-0.073	<u>0.622</u>	-0.070	-0.386	-0.176	0.096	-0.504	-0.247	-0.364	-		
TF	0.219	0.071	-0.052	-0.156	0.045	-0.140	0.464	-0.012	0.308	0.181	-0.043	-	
EG	-0.075	-0.087	-0.393	0.102	0.459	-0.049	-0.462	0.387	-0.050	0.001	-0.198	0.139	-

Matrix of Bonferroni probabilities (p)

Species	Diurnal						Nocturnal						
	Tree shrews		Squirrels				Rats				Porcupines	Moonrats	
	TG	CNIG	CN	LI	RL	SL	LS	MR	MS	MW	RT	TF	EG
TG	1.000												
CNIG	1.000	-											
CN	1.000	1.000	-										
LI	1.000	0.218	1.000	-									
RL	1.000	1.000	1.000	<u>0.008</u>	-								
SL	1.000	1.000	1.000	1.000	1.000	-							
LS	0.052	1.000	1.000	1.000	1.000	1.000	-						
MR	1.000	1.000	1.000	<u>0.000</u>	<u>0.000</u>	1.000	1.000	-					
MS	<u>0.021</u>	1.000	1.000	1.000	0.349	<u>0.002</u>	<u>0.003</u>	1.000	-				
MW	1.000	0.306	0.166	1.000	1.000	0.604	1.000	1.000	0.077	-			
RT	1.000	1.000	<u>0.000</u>	1.000	0.635	1.000	1.000	<u>0.028</u>	1.000	1.000	-		
TF	1.000	1.000	1.000	1.000	1.000	1.000	0.092	1.000	1.000	1.000	1.000	-	
EG	1.000	1.000	<u>0.542</u>	1.000	0.104	1.000	0.095	0.617	1.000	1.000	1.000	1.000	-

TG: *Tupaia glis*; CNIG: *Callosciurus nigrovittatus*; CN: *C. notatus*; LI: *Lariscus insignis*; RL: *Rhinosciurus laticaudatus*; SL: *Sundasciurus lowii*; LS: *Leopoldamys sabanus*; MR: *Maxomys rajah*; MS: *M. surifer*; MW: *M. whiteheadi*; RT: *Rattus tiomanicus*; TF: *Trichys fasciculata*; EG: *Echinosorex gymnaeus*.

Table VI-2. Correlation of population dynamics among the three dominant small mammals. Numbers underlined represent significant correlations ($p < 0.05$).

Pearson correlation matrix (r)

Animal species	sex	<i>Leopoldamys sabanus</i>		<i>Tupaia glis</i>		<i>Lariscus insignis</i>	
		Female	Male	Female	Male	Female	Male
<i>Leopoldamys sabanus</i>	Female	-					
<i>Leopoldamys sabanus</i>	Male	0.025	-				
<i>Tupaia glis</i>	Female	-0.007	<u>0.558</u>	-			
<i>Tupaia glis</i>	Male	0.214	0.334	<u>0.562</u>	-		
<i>Lariscus insignis</i>	Female	<u>-0.521</u>	0.217	0.299	-0.146	-	
<i>Lariscus insignis</i>	Male	-0.344	0.356	<u>0.442</u>	0.388	0.428	-

Matrix of Bonferroni probabilities (p)

Animal species	sex	<i>Leopoldamys sabanus</i>		<i>Tupaia glis</i>		<i>Lariscus insignis</i>	
		Female	Male	Female	Male	Female	Male
<i>Leopoldamys sabanus</i>	Female	-					
<i>Leopoldamys sabanus</i>	Male	1.000	-				
<i>Tupaia glis</i>	Female	1.000	<u>0.001</u>	-			
<i>Tupaia glis</i>	Male	1.000	0.348	<u>0.001</u>	-		
<i>Lariscus insignis</i>	Female	<u>0.003</u>	1.000	0.648	1.000	-	
<i>Lariscus insignis</i>	Male	0.289	0.228	<u>0.032</u>	0.115	0.045	-

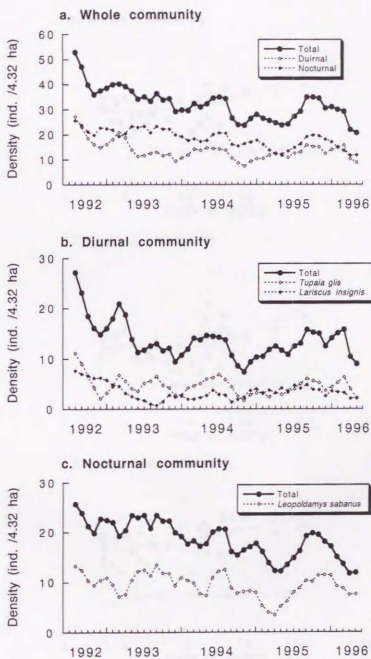


Fig. VI-1. Density of animals in the primary forest habitat during the main trapping period, June 1992-May 1996. Three-month moving averages are shown.

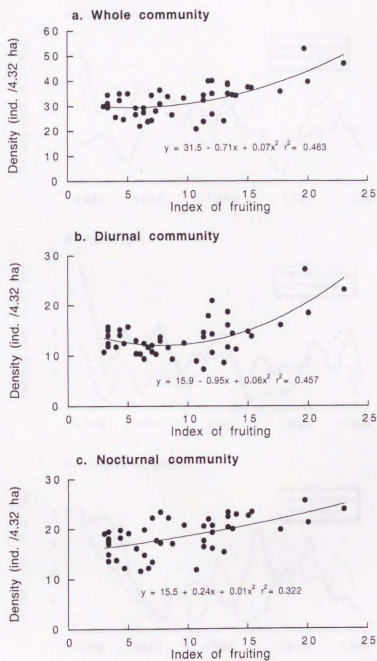


Fig. VI-2. Fruit availability and density of animals. Three-month moving averages are shown.

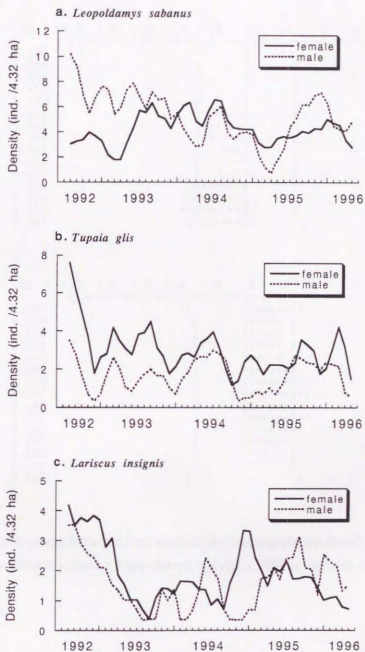


Fig. VI-3. Population dynamics of the three dominant small mammals.

a. Female

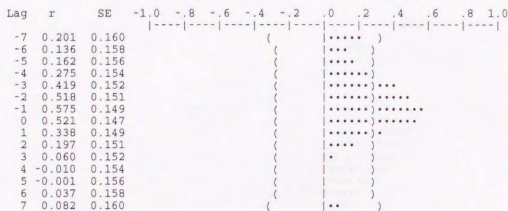
Lag	r	SE	-1.0	-.8	-.6	-.4	-.2	.0	.2	.4	.6	.8	1.0
-7	0.035	0.160	----- ----- ----- ----- ----- ----- ----- -----										
-6	-0.019	0.158					()				
-5	-0.046	0.156					(.)			
-4	-0.066	0.154					(.)			
-3	-0.110	0.152					(***)			
-2	-0.187	0.151					(***)			
-1	-0.247	0.149					(*****)			
0	-0.233	0.147					(*****)			
1	-0.128	0.149					(***)			
2	-0.084	0.151					(**)			
3	-0.142	0.152					(***)			
4	-0.267	0.154					(*****)			
5	-0.373	0.156				**	(*****)			
6	-0.367	0.158				**	(*****)			
7	-0.239	0.160					(*****)			

b. Male

Lag	r	SE	-1.0	-.8	-.6	-.4	-.2	.0	.2	.4	.6	.8	1.0
-7	0.261	0.160	----- ----- ----- ----- ----- ----- ----- -----										
-6	0.223	0.158					(*****)			
-5	0.216	0.156					(*****)			
-4	0.201	0.154					(*****)			
-3	0.219	0.152					(*****)			
-2	0.281	0.151					(*****)			
-1	0.412	0.149					(*****)	***		
0	0.504	0.147					(*****)	*****		
1	0.464	0.149					(*****)	*****		
2	0.396	0.151					(*****)	**		
3	0.337	0.152					(*****)	*		
4	0.277	0.154					(*****)			
5	0.181	0.156					(***)			
6	0.105	0.158					(**)			
7	0.063	0.160					(*)			

Fig. VI-4. Correlograms between fruit availability and population density of *Leopoldamys sabanus*. Parentheses represent 95% acceptable regions.

a. Female



b. Male

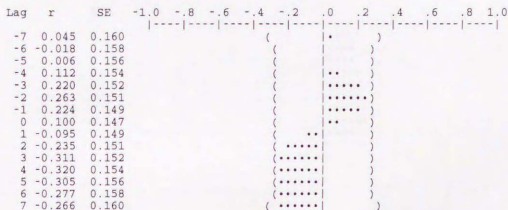


Fig. VI-5. Correlograms between fruit availability and population density of *Tupaia glis*. Parentheses represent 95% acceptable regions.

a. Female

Lag	r	SE	-1.0	-.8	-.6	-.4	-.2	.0	.2	.4	.6	.8	1.0
-7	0.227	0.160					(*****)				
-6	0.269	0.158					(*****)				
-5	0.285	0.156					(*****)				
-4	0.280	0.154					(*****)				
-3	0.283	0.152					(*****)				
-2	0.330	0.151					(*****	*)				
-1	0.414	0.149					(*****	****				
0	0.492	0.147					(*****	*****				
1	0.480	0.149					(*****	*****				
2	0.476	0.151					(*****	*****				
3	0.431	0.152					(*****	****				
4	0.386	0.154					(*****	***				
5	0.311	0.156					(*****	*)				
6	0.233	0.158					(*****	*)				
7	0.121	0.160					(***)				

b. Male

Lag	r	SE	-1.0	-.8	-.6	-.4	-.2	.0	.2	.4	.6	.8	1.0
-7	0.142	0.160					(***)				
-6	0.161	0.158					(****)				
-5	0.194	0.156					(****)				
-4	0.223	0.154					(*****)				
-3	0.232	0.152					(*****)				
-2	0.231	0.151					(*****)				
-1	0.275	0.149					(*****)				
0	0.284	0.147					(*****)				
1	0.175	0.149					(****)				
2	0.011	0.151					(*))				
3	-0.129	0.152					(****)				
4	-0.228	0.154					(*****)				
5	-0.274	0.156					(*****)				
6	-0.262	0.158					(*****)				
7	-0.256	0.160					(*****)				

Fig. VI-6. Correlograms between fruit availability and population density of *Lariscus insignis*. Parentheses represent 95% acceptable regions.

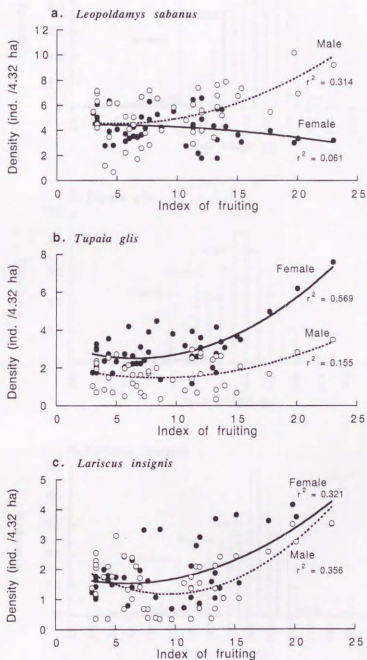


Fig. VI-7. Fruit availability and densities of the three small mammals.

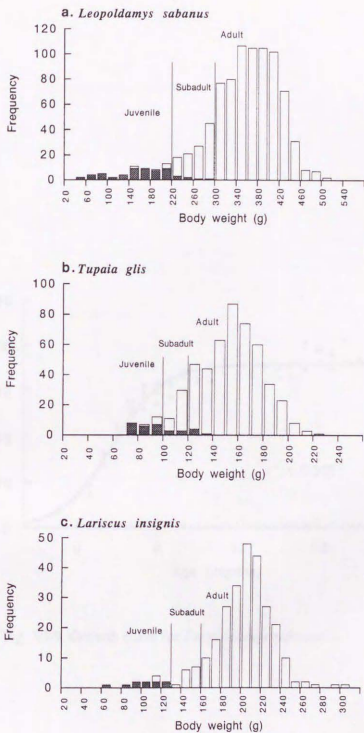


Fig. VI-8. Developmental stages of the three dominant small mammals. Open bars: adults; Shaded bars: juveniles, distinguished by their appearance.

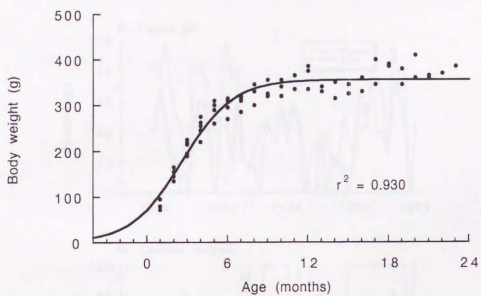


Fig. VI-9. Growth curve for *Leopoldamys sabanus*.

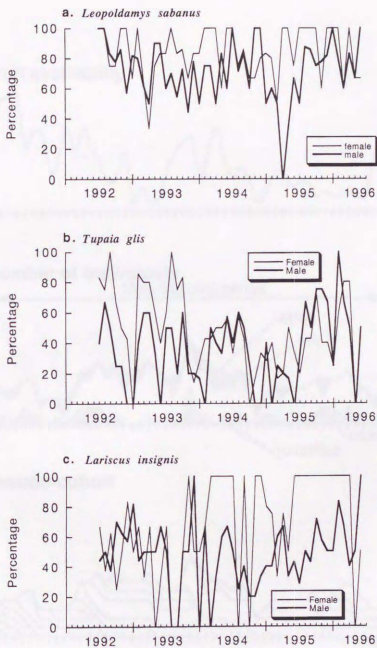


Fig. VI-10. Exposed ratio of individuals (NA/MNA) for the three dominant small mammals.

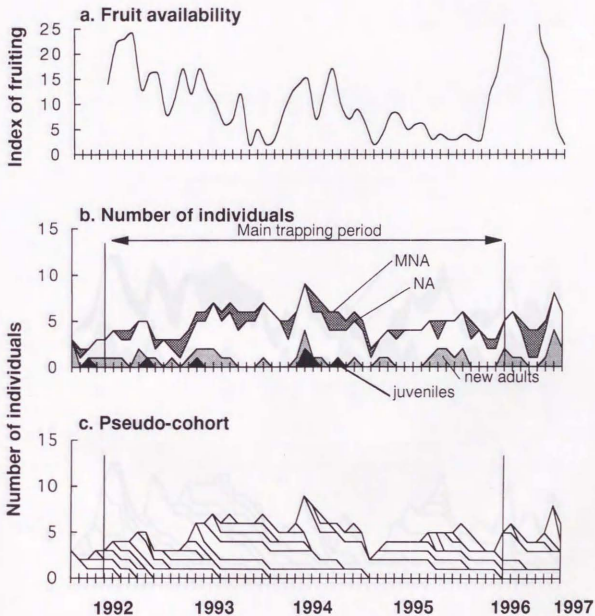


Fig. VI-11. Population dynamics of females of *Leopoldamys sabanus*. a: fruit availability; b: MNA, NA, and emergence of new individuals; c: pseudo-cohort.

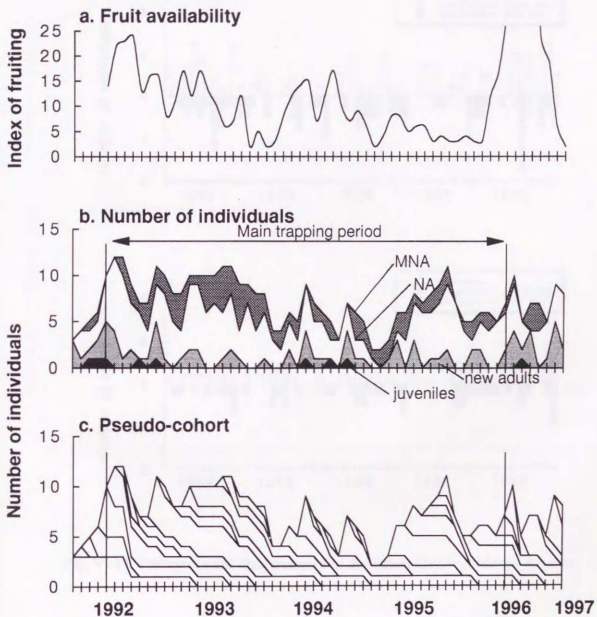


Fig. VI-12. Population dynamics of males of *Leopoldamys sabanus*. a: fruit availability; b: MNA, NA, and emergence of new individuals; c: pseudo-cohort.

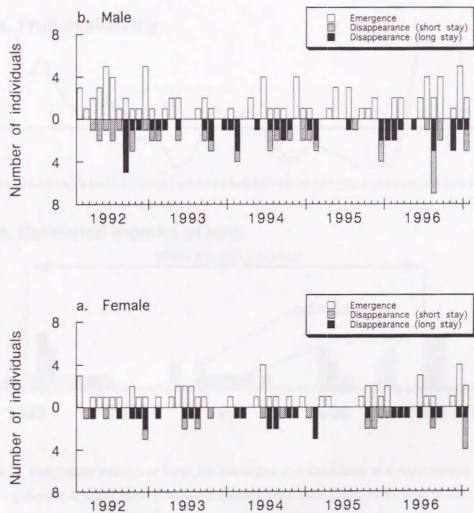


Fig. VI-13. Emergence and disappearance of individuals in *Leopoldamys sabanus*.

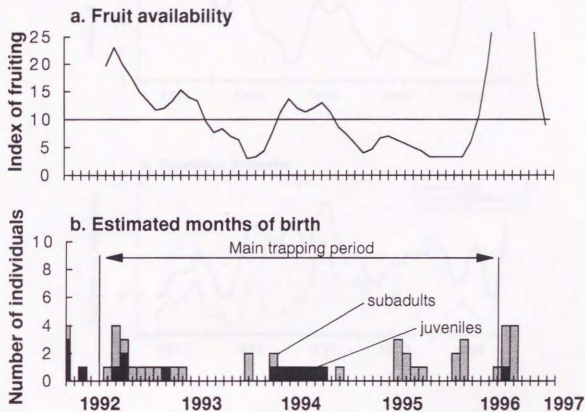


Fig. VI-14. Estimated months of birth for juveniles and subadults of *Leopoldamys sabanus*. Closed bars: juveniles; shaded bars: subadults, according to the thresholds in Fig. VI-8a. Three-month moving average is shown for fruit availability.

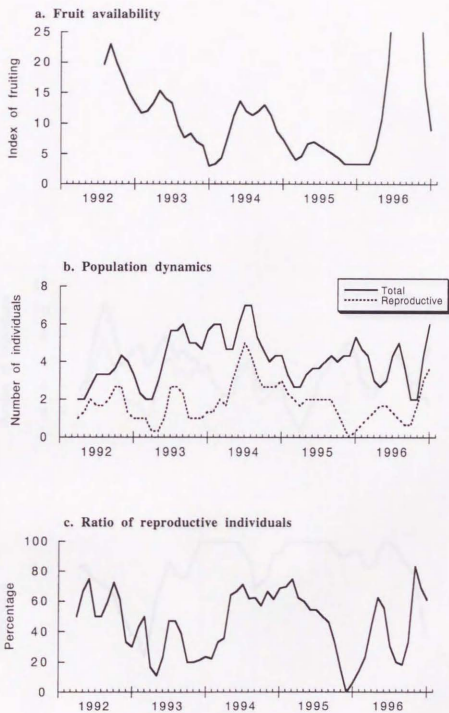


Fig. VI-15. Reproductive activity of females of *Leopoldamys sabanus*. Three-month moving averages are shown.

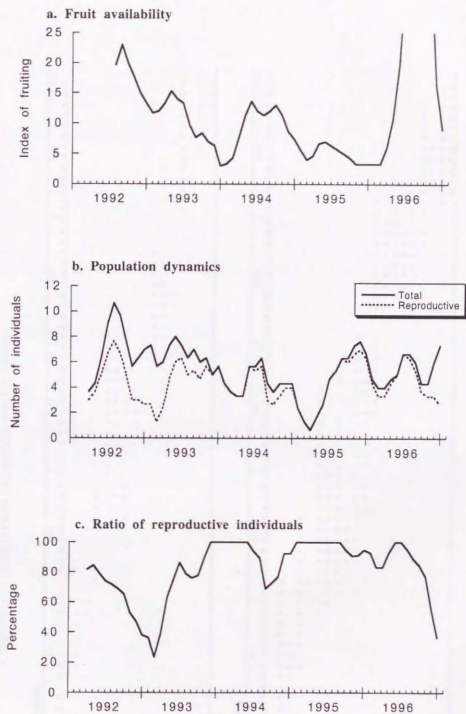


Fig. VI-16. Reproductive activity of males of *Leopoldamys sabanus*. Three-month moving averages are shown.

Fig. VI-17. Reproductive conditions of individuals of *Leopoldamys sabanus*.

Individuals which stayed in the study plot for six months or more are shown.

-: normal; X: reproductive; ?: unknown because of uncaptured; for both sexes.

+: transitional from normal to reproductive for males.

a. Female

Ind. No.	1992	1993	1994	1995	1996	1997
	F M X M J J X S O N D	F M X M J J X S O N D	F M X M J J X S O N D	F M X M J J X S O N D	F M X M J J X S O N D	F M X M J J X S O N D
24	- - - -					
39	X X X X X X					
87	- - - X X X - - - X X					
103	- - - ? ? - ? ? X ? ? ? ? X					
124	- - - - - - - - - X X			X X X X X X X X X X X X		
132	- - - ? - - - - - X X X X X X					
143	X X X ? X X ? - - ? - X X					
148	- - - - - - - X - X X					
219	- - - - - - -					
247						
313				X X X X X X X X X X X X		
343				- ? ? ? ? ? ? ? X X X X X X ? - - - ? - X X		
347				- - ? - - - - ? - - -		
433				- - - - - - - - - X X X X X X X ? ? ? ? ? X X		
L13				- - - - - - - - - - - - - - - - - X		
L14				- - - ? X X X X		
				- - - ? ? X X X		

b. Male

Ind. No.	1992	1993	1994	1995	1996	1997
	F M X M J J X S O N D	F M X M J J X S O N D	F M X M J J X S O N D	F M X M J J X S O N D	F M X M J J X S O N D	F M X M J J X S O N D
1	X X X X X X X X X ? X X X X X					
13	- X X X X X X					
8	X X X X X X X X X ? X X X X X					
89	- - - - - + + + +					
93	- - - ? - - - + X X + X X X X X X X X X X X X X X					
19	X ? ? ? X X X X X X X X X					
123	- + ? X X X X X X X X X X					
111	- - - + + X X X ? -					
127	- - - - - ? - + X ? X ? X X ? ? ? X X X X ? X X X X					
210		X ? X ? X X X X X X X X X				
243						
348			X X ? X X X X X X ? ? ? X X X X X X X X X X			
411				X ? X X X X X X X		
412				X ? X X X X X X X		
414				X X X X X X X X		
432				X X X ? X X X		
442				+ X X X ? X X X X X ? X ? X		
449				+ + X X X X		
18				X X X X X X X ? ? X X X X		
				X X X X X X ? X X X X		

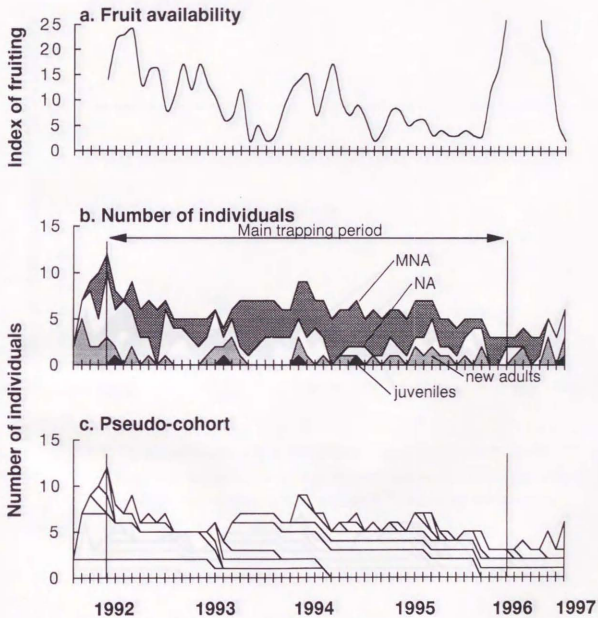


Fig. VI-18. Population dynamics of females of *Tupaia glis*. a: fruit availability; b: MNA, NA, and emergence of new individuals; c: pseudo-cohort.

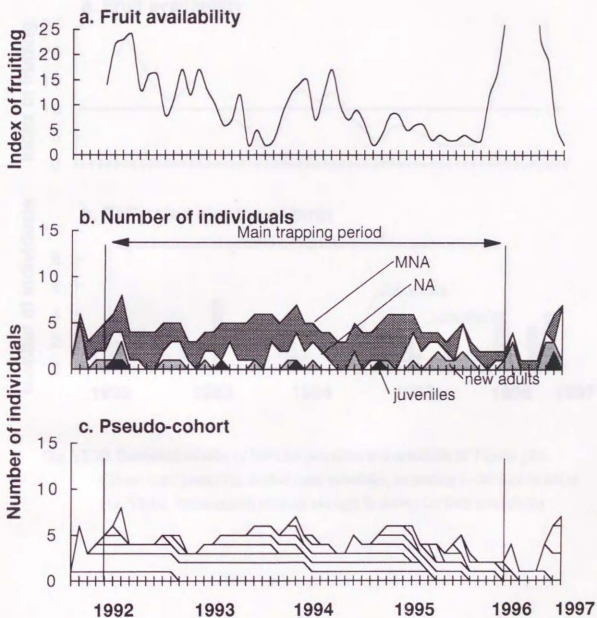


Fig. VI-19. Population dynamics of males of *Tupaia glis*. a: fruit availability; b: MNA, NA, and emergence of new individuals; c: pseudo-cohort.

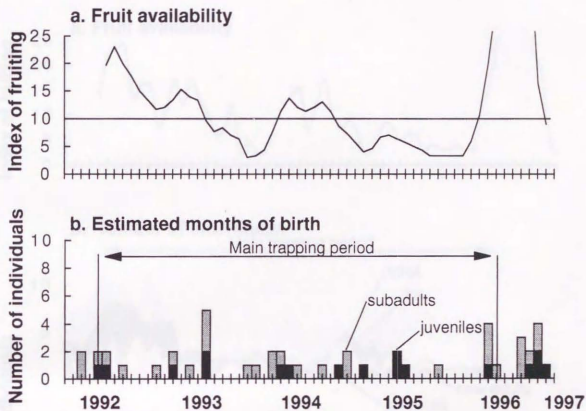


Fig. VI-20. Estimated months of birth for juveniles and subadults of *Tupaia glis*.

Closed bars: juveniles; shaded bars: subadults, according to the thresholds in

Fig. VI-8b. Three-month moving average is shown for fruit availability.

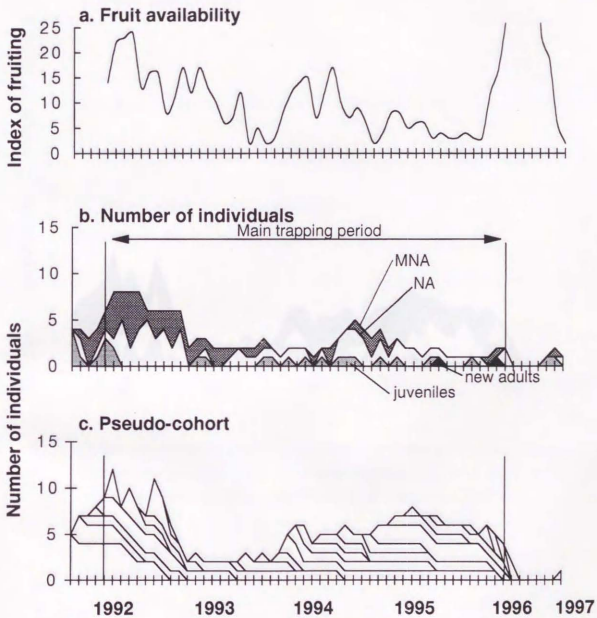


Fig. VI-21. Population dynamics of females of *Lariscus insignis*. a: fruit availability; b: MNA, NA, and emergence of new individuals; c: pseudo-cohort.

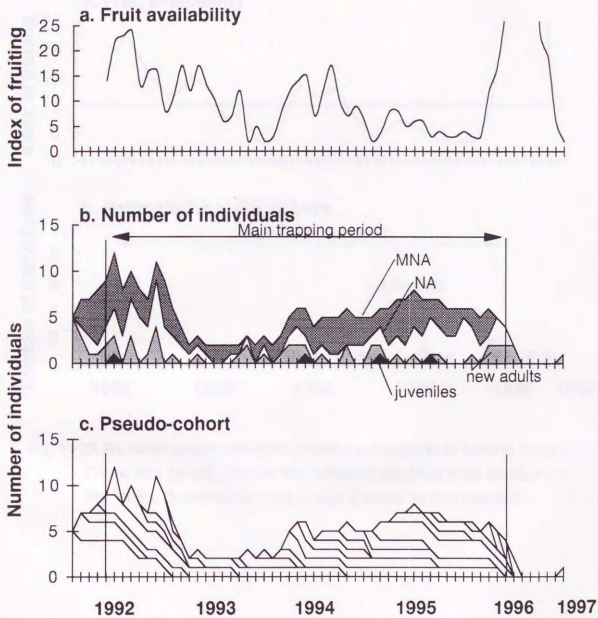


Fig. VI-22. Population dynamics of males of *Lariscus insignis*. a: fruit availability; b: MNA, NA, and emergence of new individuals; c: pseudo-cohort.

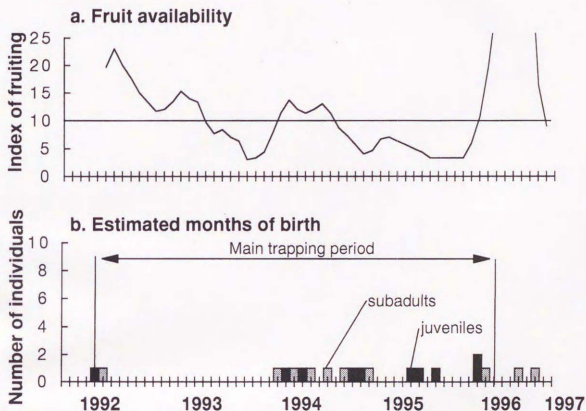
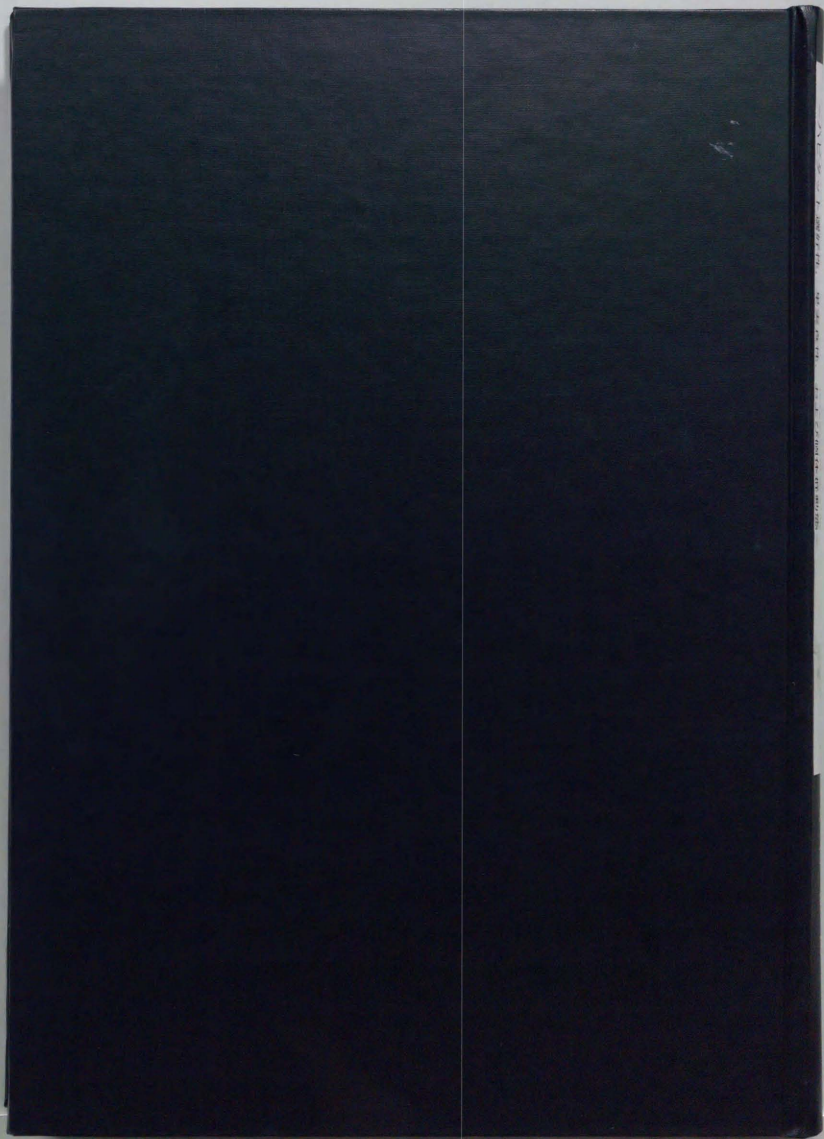
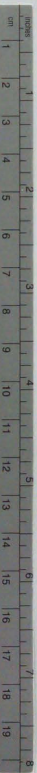


Fig. VI-23. Estimated months of birth for juveniles and subadults of *Lariscus insignis*.

Closed bars: juveniles; shaded bars: subadults, according to the thresholds in

Fig. VI-8c. Three-month moving average is shown for fruit availability.

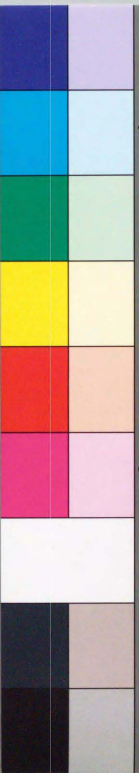




Kodak Color Control Patches

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Blue Cyan Green Yellow Red Magenta White 3/Color Black



Kodak Gray Scale



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A 1 2 3 4 5 6 M 8 9 10 11 12 13 14 15 B 17 18 19

