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## **APPENDIX**

## APPENDIX

**Table 4.1** Thirty-two characters, with their methods of scoring used in the study of *Cassia* s.l.

No.	Abbreviation	Characters
1.	PET	Petiole length in mm
2.	PED	Petiole diameter in mm
3.	RCL	Rachis length in mm
4.	RCD	Rachis diameter in mm (between 2-3 leaflet pair)
5.	DBLP	Distance between first and second leaflet pair
6.	NOL	Number of leaflet
7.	TLL	Terminal leaflet length in mm
8.	TLW	Terminal leaflet width in mm
9.	BTWP	Distance from base to the widest point of leaflet
10.	LWR	Terminal leaflet length to width ratio
11.	LS	Terminal leaflet shape (calculated by BTW/TLL)
12.	LMW	Lamina width in mm
13.	POLL	Petiolule length in mm
14.	FLD	Flower diameter in mm
15.	BTL	Bracteole length in mm
16.	BTW	Bracteole width in mm
17.	PCL	Pedicel length in mm
18.	SPL	Largest sepal length in mm
19.	SPW	Largest sepal width in mm
20.	PTL	Largest petal length in mm
21.	PLW	Largest petal width in mm
22.	PSL	Petals stalk length in mm (largest petal)
23.	FML	Filament length in mm (largest fertile stamen)
24.	FMD	Filament diameter in mm (largest fertile stamen)

**Table 4.1 (continued)**

No.	Abbreviation	Characters
25.	ATL	Anther length in mm (largest fertile stamen)
26.	ATD	Anther diameter in mm (largest fertile stamen)
27.	OSL	Ovary stalk length in mm
28.	OVL	Ovary length in mm
29.	OVD	Ovary diameter in mm
30.	STL	Style length in mm
31.	STD	Style diameter in mm
32.	FTL	Fruit length in mm



Table 5.1 List of taxa used for the study of *Cassia* s.l.

Taxon number	Taxa in Larsen et al., (1984)	Genus in Irwin and Barneby (1981)	Habit
1	<i>C. javanica</i> subsp. <i>javanica</i>	<i>Cassia</i> L.	tree
2	<i>C. grandis</i>	<i>Cassia</i> L.	tree
3	<i>C. bakeriana</i>	<i>Cassia</i> L.	tree
4	<i>C. fistula</i>	<i>Cassia</i> L.	tree
5	<i>C. pumila</i>	<i>Chamaecrista</i> Moench	smallshrub
6	<i>C. leschenaultiana</i>	<i>Chamaecrista</i> Moench	smallshrub
7	<i>C. obtusifolia</i>	<i>Senna</i> Miller	undershrub
8	<i>C. alata</i>	<i>Senna</i> Miller	shrub
9	<i>C. hirsuta</i>	<i>Senna</i> Miller	undershrub
10	<i>C. sophera</i>	<i>Senna</i> Miller	shrub
11	<i>C. surattensis</i> subsp. <i>surattensis</i>	<i>Senna</i> Miller	shrub
12	<i>C. surattensis</i> subsp. <i>gluaca</i>	<i>Senna</i> Miller	shrub
13	<i>C. occidentalis</i>	<i>Senna</i> Miller	undershrub
14	<i>C. tora</i>	<i>Senna</i> Miller	undershrub
15	<i>C. timoriensis</i>	<i>Senna</i> Miller	tree
16	<i>C. garrettiana</i>	<i>Senna</i> Miller	tree
17	<i>C. spectabilis</i>	<i>Senna</i> Miller	tree
18	<i>C. siamea</i>	<i>Senna</i> Miller	tree

**Table 5.2 Initial eigenvalues of all characters.**

<b>Factor</b>	<b>Total</b>	<b>% of Variance</b>	<b>Cumulative %</b>
1	12.892	40.287	40.287
2	5.317	16.615	56.902
3	3.391	10.597	67.500
4	2.325	7.267	74.767
5	1.457	4.552	79.319
6	1.257	3.927	83.246
7	1.090	3.405	86.651
8	.705	2.203	88.854
9	.617	1.928	90.782
10	.464	1.450	92.232
11	.356	1.113	93.345
12	.336	1.049	94.394
13	.241	.753	95.147
14	.217	.678	95.825
15	.188	.588	96.413
16	.160	.499	96.912
17	.148	.464	97.376
18	.125	.390	97.766
19	.108	.338	98.104
20	9.423E-02	.294	98.399
21	9.004E-02	.281	98.680
22	7.985E-02	.250	98.930
23	6.718E-02	.210	99.139
24	6.016E-02	.188	99.327
25	4.684E-02	.146	99.474
26	4.145E-02	.130	99.603
27	3.844E-02	.120	99.724
28	2.584E-02	8.074E-02	99.804
29	2.212E-02	6.913E-02	99.873
30	1.871E-02	5.848E-02	99.932
31	1.443E-02	4.509E-02	99.977
32	7.374E-03	2.304E-02	100.000

Table 5.3 Factor loading of 18 taxa based on 32 characters before rotation

Character	Factor						
	1	2	3	4	5	6	7
LMW	.902		-.320				
TLL	.886		-.349				
DBLP	.865		-.280				
BTWP	.832	.212	-.224	.295			
TLW	.820	.232	-.380	.270			
PTW	.818			-.203	-.250		
ATD	.813		.366				
PTL	.765	-.375	.266		-.335		
PED	.738	.381		.351			
RCD	.734		-.463				
POLL	.720	-.263	-.386				
RCL	.719		.485				-.217
FLD	.651	-.531	.201		-.376		
OVL	.637	-.612		.219		-.227	
SPL	.632	.562					
PSL	.623		.251	-.245		-.516	
FMD	.581		.204		.253		.527
STD	.484	-.402	.374	-.274	.228	-.392	
FML	.529	-.723		.297		.222	
FTL	.625	-.674		.232			
ATL	.569	.664		-.264	-.234		
BTW	.384	.662	.450	.247			
PCL	.573	-.651			-.264		
OSL	.437	-.636	.212	.276			.322
BTL	.475	.610	.299	.348			
STL	.425	.553			-.302	.505	
NOL	-.256		.756		.351		
PET	.427		-.660	-.382			
LS	-.421			.616	-.359		.279
SPW	.455	.326		-.609		-.292	
LWR	-.294		.433	-.513	.312		-.315
OVD	.414		.349		.384		.488

Table 5.4 Factor loading of 18 taxa based on 32 characters after rotation

Character	Factor						
	1	2	3	4	5	6	7
TLL	.881	.277	.217				
RCD	.873						
TLW	.871		.361				
LMW	.865	.287	.245	.204			
DBLP	.816	.355	.272				
BTWP	.736	.238	.428				-.268
POLL	.729	.446					
PET	.672		-.451			.311	
NOL	-.596		.375		.240	-.297	.329
PCL		.910					
FLD		.883		.287			
FTL	.286	.875				-.211	
FML	.247	.866		-.320			
OVL	.265	.848				-.291	
PTL		.822	.210	.411			
OSL		.802			.332		
PTW	.324	.633		.400	.222	.289	
STD		.531		.445		-.450	.316
BTW			.881			.235	
BTL			.858				
PED	.519		.751				
RCL	.220	.352	.751		.234		.227
ATD	.279	.403	.594	.307	.329		
ATL	.292		.554	.451		.543	
SPW				.837			
PSL	.202	.294	.289	.729			
SPL	.403		.436	.500	.394		
OVD			.259		.813		
FMD	.238			.250	.771		
STL	.207		.473			.736	
LWR	-.453						.767
LS	-.449			-.213			-.736

**Table 5.5 Commuality of all character**

<b>Character</b>	<b>Initial</b>	<b>Extraction</b>
PET	1.000	.816
PED	1.000	.919
RCL	1.000	.878
RCD	1.000	.873
DBLP	1.000	.930
NOL	1.000	.784
TLL	1.000	.963
TLW	1.000	.957
BTWP	1.000	.891
LWR	1.000	.805
LS	1.000	.842
LMW	1.000	.965
POLL	1.000	.764
FLD	1.000	.926
BTL	1.000	.842
BTW	1.000	.902
PCL	1.000	.888
SPL	1.000	.803
SPW	1.000	.821
PTL	1.000	.941
PTW	1.000	.836
PSL	1.000	.794
FML	1.000	.956
FMD	1.000	.785
ATL	1.000	.932
ATD	1.000	.842
OSL	1.000	.836
OVL	1.000	.907
OVD	1.000	.753
STL	1.000	.840
STD	1.000	.818
FTL	1.000	.921

Note: extraction method = Principal Component Analysis.

**Table 5.6 Classification function coefficients of 18 categories based on 19 reproductive characters.**

Character	Taxa								
	1	2	3	4	5	6	7	8	9
FLD	2.432	.401	3.138	1.860	.229	.356	.580	-.639	.564
SPL	3.516E-02	9.645	.968	7.052	7.412	11.367	7.408	14.118	12.874
SPW	-6.633	-3.287	-8.648	-4.486	-2.488	-5.561	-1.271	-6.821	-2.324
PTL	2.989	-1.402	5.523	1.099	-1.384	-1.874	-.759	-.903	-2.621
PTW	-6.266	-2.646	-4.891	-2.414	.677	.642	-1.712	-8.560E-02	.859
PSL	2.819	-.536	-2.212	-2.808	1.684	1.453	4.366	8.000	6.968
FMD	50.059	56.493	48.149	48.589	7.441	18.786	20.402	26.439	46.584
ATL	-25.748	-23.496	-27.734	-24.301	-4.964	-2.557	-3.471	18.055	-1.360
ATD	50.003	32.806	62.205	41.992	10.410	10.146	18.416	56.682	20.843
OVD	-7.301	9.539	-2.484	-6.636	37.007	54.059	-1.602	27.092	44.259
STL	-2.167	-1.622	-2.117	.579	4.375	4.879	6.931	12.484	5.115
STD	52.432	32.526	68.614	43.620	13.998	28.343	1.835	5.183	31.922
BTL	22.990	15.230	-2.817	9.079	38.157	37.309	9.237	88.387	16.827
BTW	20.049	-14.920	33.515	-66.213	-69.265	-18.212	-27.263	75.281	-41.018
PCL	331.204	289.240	380.803	345.541	107.274	172.502	233.563	86.859	190.132
FML	261.910	264.638	253.194	274.017	-4.955	-59.601	10.753	-55.617	83.458
OSL	83.222	109.610	123.837	99.765	-46.234	-42.420	16.042	-10.931	-30.790
OVL	363.365	318.111	367.141	368.020	83.156	155.450	326.014	286.102	186.001
FTL	838.024	769.718	867.718	852.734	496.902	582.415	716.199	705.987	683.528
(Constant)	-1990.083	-1635.808	-2362.131	-2097.113	-492.741	-749.071	-1187.894	-1411.878	-1107.247

**Table 5.6 (continued)**

Character	Taxa								
	10	11	12	13	14	15	16	17	18
FLD	.780	1.697	1.480	.309	.821	1.017	.756	1.319	.698
SPL	9.035	5.642	8.124	8.331	9.400	10.122	10.499	6.109	5.468
SPW	-2.055	-3.441	-1.039	-3.006	-1.189	-.787	-.122	.736	-1.706
PTL	-2.985E-03	.232	.439	-1.554	-1.015	-.697	-1.814	2.828	-2.196
PTW	-1.259	-.852	-1.805	.308	-1.655	-2.196	-2.090	-3.627	-.505
PSL	-4.055	8.296	5.500	4.582	6.908	5.487	6.866	17.946	7.805
FMD	27.637	33.626	34.005	24.088	14.544	14.189	20.055	23.201	42.028
ATL	-1.552	.676	.108	.585	-8.409	7.733	11.185	-5.625	.679
ATD	32.371	21.423	29.860	24.604	18.077	43.449	23.053	42.101	37.127
OVD	13.837	9.750	3.575	15.771	11.166	23.062	26.234	-10.920	37.496
STL	5.068	1.761	11.070	6.292	5.642	12.393	13.023	.999	11.877
STD	14.806	19.822	-6.687	17.219	12.698	29.624	16.617	76.882	19.526
BTL	-21.010	18.255	-14.147	83.865	31.613	30.866	-30.100	-40.019	26.142
BTW	-24.442	25.974	25.026	12.438	-66.890	79.007	-10.113	1.291	-9.332
PCL	196.562	269.305	263.989	159.903	162.853	250.125	273.717	271.101	282.435
FML	95.909	-41.678	-64.424	64.880	-39.691	-102.791	-9.785	-44.184	87.776
OSL	8.640	59.835	67.163	-23.979	-1.969	-7.360	30.817	28.257	33.219
OVL	206.782	221.884	316.670	211.648	318.385	219.382	114.010	350.888	162.135
FTL	638.974	628.449	687.350	642.910	679.086	670.242	716.344	768.976	757.744
(Constant)	-970.118	-1030.311	-1268.586	-983.403	-1031.319	-1232.875	-1199.212	-1529.786	-1381.264

**Table 5.7 Pooled within canonical structure of 18 categories based on 19 reproductive characters.**

Character	Discriminant function							
	1	2	3	4	5	6	7	8
FTL	<b>.400</b>	.230	.049	.040	.366	.210	-.355	.260
BTW	-.034	<b>.575</b>	.238	-.181	-.431	-.257	.161	.280
ATL	-.093	<b>.560</b>	.164	.262	.136	.200	.030	-.393
FML	.557	-.029	<b>.575</b>	.133	-.048	.144	.056	-.279
OVL	.355	.270	-.143	<b>-.514</b>	.321	-.121	-.036	-.183
PCL	.283	.219	-.312	<b>.456</b>	-.069	-.001	-.031	.117
OSL	.322	.153	.033	.123	.073	<b>-.521</b>	.308	-.102
SPL	-.025	.289	.160	-.052	.348	.042	<b>.454</b>	-.241
STL	-.056	.320	.176	.320	-.010	-.075	<b>-.421</b>	-.214
PTL	.240	.333	-.153	-.059	-.226	.347	.192	<b>-.508</b>
PTW	.127	.234	.044	.035	-.044	.159	.301	<b>-.470</b>
FLD	.264	.251	-.199	.075	-.353	.270	.019	<b>-.449</b>
BTL	.009	.368	.388	-.234	-.272	.043	-.148	.126
PSL	.048	.203	-.102	-.079	.106	.316	.291	.137
OVD	.015	.080	.131	.068	.040	.150	.222	.162
SPW	-.014	.234	-.142	.081	.291	.072	.327	-.016
FMD	.049	.120	.173	.073	.119	.055	.395	.040
ATD	.101	.370	.177	.042	.124	.235	.148	-.136
STD	.096	.072	-.095	-.064	.053	.387	.259	.244



**Table 5.7 (continued)**

Character	Discriminant function									
	9	10	11	12	13	14	15	16	17	
FTL	-.080	.150	-.003	-.229	-.083	.018	-.189	-.367	-.036	
BTW	.110	-.229	-.087	-.039	.097	.103	-.303	-.144	-.042	
ATL	.055	.033	-.397	-.190	-.016	-.107	.243	-.069	.090	
FML	.115	-.104	-.274	.021	.017	.166	-.100	.057	-.071	
OVL	.319	-.083	.016	.010	.200	-.161	.075	.007	.069	
PCL	.443	-.183	-.039	-.009	-.106	-.355	.134	.323	-.160	
OSL	-.389	.395	.093	.065	-.243	.180	-.031	-.175	.126	
SPL	.298	-.249	.149	-.181	-.304	.349	-.044	.199	-.182	
STL	.077	.063	.291	.255	.072	.292	-.335	.263	.262	
PTL	.150	.121	-.017	.020	-.121	.163	-.328	.061	-.107	
PTW	.468	.236	-.019	.302	-.121	-.171	-.333	-.152	-.086	
FLD	.368	.025	.046	-.069	-.001	.445	.158	-.176	-.014	
BTL	<b>.430</b>	.161	-.090	.119	-.396	.181	.181	.016	.026	
PSL	-.015	<b>.485</b>	-.187	.081	.019	.321	-.134	.369	-.328	
OVD	.097	.184	<b>.510</b>	-.126	.215	-.068	.006	-.306	-.135	
SPW	.228	-.279	-.184	<b>.470</b>	-.051	.309	.025	-.380	-.057	
FMD	.153	.179	.067	.126	<b>.530</b>	.029	.198	.166	.346	
ATD	-.378	-.107	.246	.417	-.003	-.224	<b>.448</b>	.124	-.198	
STD	-.002	-.110	.139	.069	-.233	.007	-.083	-.075	<b>.729</b>	

**Note:** The number in **bold letter** represent the largest absolute correlation between each variable and any discriminant function

**Table 5.8 Summary of canonical discriminant function of 18 categories based on 19 reproductive characters.**

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Coorrelation	Wilk's Lambda	Chi-square	Df	Sig.
1	135.872	52.7	52.7	.996	.000	13666.473	323	.000
2	46.015	17.9	70.6	.989	.000	11263.519	288	.000
3	25.109	9.7	80.4	.981	.000	9382.566	255	.000
4	15.149	5.9	86.2	.969	.000	7788.941	224	.000
5	11.839	4.6	90.8	.960	.000	6429.997	195	.000
6	6.194	2.4	93.2	.928	.000	5183.094	168	.000
7	4.307	1.7	94.9	.901	.000	4219.159	143	.000
8	3.953	1.5	96.4	.893	.001	3403.864	120	.000
9	2.859	1.1	97.5	.861	.005	2622.275	99	.000
10	2.200	.9	98.4	.829	.018	1962.575	80	.000
11	1.673	.6	99.1	.791	.058	1394.390	63	.000
12	.899	.3	99.4	.688	.154	914.177	48	.000
13	.789	.3	99.7	.664	.292	600.973	35	.000
14	.446	.2	99.9	.555	.523	316.794	24	.000
15	.251	.1	100.0	.448	.756	136.751	15	.000
16	.049	.0	100.0	.216	.946	27.164	8	.000
17	.008	.0	100.0	.088	.992	3.771	3	.000

**Table 5.9 Classification function coefficients of 18 categories based on 13 vegetative characters.**

Character	Taxa								
	1	2	3	4	5	6	7	8	9
PET	-.386	.219	-3.358E-02	.276	8.796E-02	.355	.212	-.723	.236
RCD	43.650	43.911	40.419	53.956	52.308	54.863	42.514	50.783	57.693
DBLP	1.340	1.023	1.219	3.226	2.825	3.979	.133	1.524	.809
TLL	-4.382	-4.186	-4.538	-3.588	-1.388	4.094E-02	-4.692	-4.847	-4.369
BTWP	-11.138	-10.990	-10.924	-12.933	-10.265	-9.107	-10.315	-9.787	-11.716
LWR	221.672	226.851	224.712	212.866	161.123	122.343	227.687	216.616	223.108
LS	845.276	899.491	833.708	898.603	846.493	766.728	870.011	813.366	812.204
LMW	.990	.902	1.097	1.289	.660	.418	1.006	1.054	1.183
PED	-350.878	-404.008	-372.910	-376.488	-393.179	-397.526	-316.896	-316.915	-358.656
RCL	67.316	-13.935	57.524	30.284	-88.721	-114.348	-34.334	55.179	38.844
NOL	598.150	763.397	581.347	578.449	797.072	955.919	495.653	592.504	496.161
TLW	1669.480	1717.592	1701.524	1622.903	1137.269	800.603	1730.435	1719.850	1696.751
POLL	4.278	-5.605	-3.502	38.219	-90.706	-74.696	-29.860	-43.964	-4.189
(Constant)	-1769.421	-1869.619	-1782.518	-1781.150	-1204.366	-1169.831	-1611.305	-1834.838	-1679.121

**Table 5.9 (continued)**

Character	Taxa								
	10	11	12	13	14	15	16	17	18
PET	.237	.174	.233	.155	.429	-.119	.265	-7.074E-02	-3.097E-02
RCD	41.532	41.105	42.101	44.475	48.855	42.865	49.844	42.224	48.976
DBLP	.830	.244	.428	.834	.221	1.665	.950	.802	1.362
TLL	-4.701	-4.147	-4.666	-4.444	-4.754	-4.397	-4.562	-4.343	-4.526
BTWP	-10.737	-10.806	-10.626	-10.937	-10.220	-11.365	-11.732	-11.427	-11.002
LWR	242.461	219.435	224.168	224.702	230.133	219.730	222.375	235.300	228.408
LS	779.999	868.995	838.993	796.043	836.629	867.432	828.649	832.669	848.284
LMW	1.080	.944	1.014	1.050	.944	1.176	1.239	1.119	1.056
PED	-395.106	-389.935	-372.090	-356.105	-316.212	-390.355	-393.363	-383.826	-387.495
RCL	-1.308	19.403	13.109	48.364	-101.545	41.504	52.158	26.663	52.186
NOL	598.193	612.986	572.142	489.889	569.363	702.414	566.968	667.162	597.337
TLW	1731.333	1675.751	1740.572	1673.815	1763.466	1620.507	1718.795	1736.814	1679.617
POLL	-42.073	-12.590	6.382	-18.349	-22.703	-15.635	24.992	-7.306	7.277
(Constant)	-1728.609	-1692.557	-1725.691	-1630.891	-1591.691	-1783.839	-1791.666	-1865.627	-1776.471

**Table 5.10 Pooled within canonical structure of 18 categories based on 13 vegetative characters.**

Character	Discriminant function							
	1	2	3	4	5	6	7	8
TLW	<b>.639</b>	.169	-.239	-.460	-.027	.303	.064	-.421
RCL	.135	<b>.843</b>	.113	-.079	-.146	-.009	.063	-.191
NOL	-.371	<b>.674</b>	.456	-.021	.046	.256	-.263	.036
DBLP	.232	.389	<b>-.610</b>	-.311	-.158	.074	.450	-.011
LWR	-.118	.130	.108	<b>.514</b>	-.425	.257	.214	.352
BTWP	.207	.144	-.118	<b>-.508</b>	-.134	.320	.430	-.305
PED	.237	.315	-.004	<b>-.458</b>	-.160	.251	-.374	.290
POLL	.431	.283	-.216	-.033	<b>.508</b>	.041	-.200	.153
TLL	.248	.253	-.423	-.242	-.276	<b>.501</b>	.167	-.330
LMW	.256	.278	-.416	-.244	-.230	<b>.459</b>	.182	-.197
LS	-.102	-.202	.324	-.419	.435	-.096	<b>.586</b>	.121
RCD	.202	.054	-.282	-.374	-.074	.327	-.274	.026
PET	.184	-.048	-.295	.256	.098	.155	.172	-.283

**Table 5.10 (continued)**

Character	Discriminant Function				
	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>
TLW	.059	-.084	.024	-.081	.065
RCL	-.067	.114	-.142	.277	.274
NOL	.027	.129	-.107	.094	.152
DBLP	-.136	.133	.150	-.148	.111
LWR	-.368	-.085	-.146	.330	-.066
BTWP	-.351	.055	-.246	.245	-.136
PED	-.090	.077	-.329	.243	.376
POLL	-.496	-.138	-.109	-.030	-.292
TLI	-.185	-.239	-.222	.177	-.039
LMW	-.004	.055	-.453	.190	-.212
LS	.050	.028	-.095	.313	-.039
RCD	-.097	.188	.337	.611	-.131
PET	-.070	.477	-.212	.310	.542

**Note:** The number in **bold letter** represent the largest absolute correlation between each variable and any discriminant function

**Table 5.11 Summary of canonical discriminant function of 18 categories based on 13 vegetative characters.**

<b>Function</b>	<b>Eigenvalue</b>	<b>% of Variance</b>	<b>Cumulative %</b>	<b>Canonical Correlation</b>	<b>Wilk's Lambda</b>	<b>Chi-square</b>	<b>df</b>	<b>Sig.</b>
1	64.462	57.4	57.4	.992	.000	8247.861	221	.000
2	20.701	18.4	75.8	.977	.000	6192.666	192	.000
3	11.502	10.2	86.1	.959	.000	4680.152	165	.000
4	7.659	6.8	92.9	.940	.001	3438.697	140	.000
5	3.265	2.9	95.8	.875	.008	2377.722	117	.000
6	1.474	1.3	97.1	.772	.034	1664.878	96	.000
7	1.033	.9	98.0	.713	.084	1219.663	77	.000
8	.857	.8	98.8	.679	.170	870.931	60	.000
9	.508	.5	99.3	.580	.316	566.716	45	.000
10	.340	.3	99.6	.503	.476	364.882	32	.000
11	.216	.2	99.8	.421	.638	221.200	21	.000
12	.164	.1	99.9	.375	.775	125.232	12	.000
13	.109	.1	100.0	.313	.902	50.651	5	.000

**Table 5.12 Classification function coefficients of 18 categories based on 32 characters.**

Character	Taxa					
	1	2	3	4	5	6
PET	.502	.929	.888	1.137	.554	.893
DBLP	5.306	4.516	5.791	7.865	4.292	6.034
TLL	-3.483	-2.852	-3.462	-2.034	-.703	.389
BTWP	-10.349	-10.750	-10.252	-12.182	-8.963	-7.953
LWR	199.563	205.660	198.269	186.590	152.891	110.952
LS	827.128	904.170	829.891	887.416	809.190	720.898
FLD	2.249	.163	2.870	1.255	8.640E-02	.138
SPL	-4.179	4.620	-3.289	2.577	3.544	7.541
SPW	1.422	4.519	-.561	4.143	2.583	-1.947
PTL	5.592	1.049	8.498	4.111	.524	4.117E-02
PTW	-7.337	-3.555	-6.090	-2.999	-7.706E-02	-.403
PSL	-2.057	-4.974	-5.866	-7.816	-2.721	-4.086
FMD	72.273	78.200	72.761	84.514	27.950	51.036
ATL	-35.855	-32.621	-36.841	-34.526	-8.719	-3.939
ATD	43.671	27.419	56.802	39.225	7.783	8.675
OVD	-42.607	-27.051	-36.847	-37.681	11.277	28.277
STL	-2.846	-2.722	-2.895	.362	3.441	4.802
STD	55.277	37.461	77.058	52.275	16.866	22.929
LPED	-316.343	-373.172	-345.887	-328.439	-344.119	-353.148
LRCL	30.547	-33.666	19.450	-10.848	-128.235	-149.454
LNOL	632.084	777.182	612.144	602.653	802.162	953.082
LTLW	1537.040	1570.984	1543.463	1445.369	1069.714	690.237
LPOLL	-5.515	-4.070	-20.255	42.125	-80.384	-65.776
LBTL	-53.817	-63.562	-84.811	-69.429	-17.915	-.118
LBTW	73.389	43.057	90.148	-14.108	-21.506	22.016
LPCL	363.113	311.846	406.022	367.757	110.269	172.188
LFML	294.266	290.931	291.706	313.111	19.934	-40.606
LOSL	55.487	86.771	94.249	75.717	-48.221	-26.304
LOVL	412.834	353.960	416.390	437.266	93.595	192.807
LFTL	772.260	705.962	812.342	792.797	462.805	563.887
(Constant)	-3569.544	-3299.442	-3956.799	-3681.456	-1561.564	-1806.189



Table 5.12 (continued)

Character	Taxa					
	7	8	9	10	11	12
PET	1.026	.315	1.039	.961	.960	1.084
DBLP	3.159	4.811	3.921	3.898	3.234	4.016
TLL	-4.109	-3.365	-3.050	-3.673	-3.501	-3.941
BTWP	-8.746	-8.583	-10.381	-9.509	-9.478	-9.374
LWR	219.677	196.123	209.635	231.852	210.378	215.405
LS	815.236	791.919	786.995	751.867	832.480	802.640
FLD	.289	-.800	.135	.362	1.474	1.144
SPL	2.853	9.565	8.591	4.646	.900	3.322
SPW	6.687	1.083	5.750	5.653	4.134	7.037
PTL	1.723	1.612	-.229	2.620	2.606	3.036
PTW	-2.318	-1.233	.104	-2.463	-1.680	-2.575
PSL	3.108	3.561	4.456	-6.795	5.566	2.808
FMD	28.067	47.641	63.667	44.293	47.229	49.771
ATL	-11.961	8.638	-11.362	-10.285	-7.952	-9.303
ATD	13.699	51.093	17.457	28.769	16.138	24.722
OVD	-31.252	-3.382	15.737	-17.432	-24.307	-30.823
STL	5.462	10.883	4.194	4.096	.406	9.857
STD	11.800	12.845	44.379	23.253	27.439	.280
LPED	-263.864	-279.413	-292.192	-348.418	-344.131	-323.592
LRCL	-95.104	11.413	-9.448	-56.995	-46.036	-51.729
LNOL	537.570	595.432	493.939	634.471	667.539	628.176
LTLW	1656.199	1525.088	1578.615	1646.455	1605.503	1651.855
LPOLL	-21.657	-43.491	1.459	-42.296	-12.184	11.302
LBTL	-76.596	-3.659	-65.824	-105.755	-61.980	-97.661
LBTW	30.488	133.790	14.433	34.271	83.043	81.330
LPCL	263.149	107.715	214.144	223.179	293.112	293.971
LFML	33.078	-33.198	108.099	113.696	-18.731	-42.240
LOSL	-29.123	-41.767	-65.715	-24.970	28.308	29.763
LOVL	334.610	319.076	218.595	232.725	241.751	345.922
LFTL	655.921	639.497	616.950	575.730	568.016	623.717
(Constant)	-2601.292	-2889.259	-2533.845	-2505.369	-2541.721	-2803.293

Table 5.12 (continued)

Character	Taxa					
	13	14	15	16	17	18
PET	.966	1.145	.833	1.133	.974	.850
DBLP	3.725	2.618	4.991	3.930	4.321	4.741
TLL	-3.373	-4.130	-3.476	-3.441	-3.625	-3.370
BTWP	-9.791	-8.573	-9.844	-9.882	-9.855	-9.796
LWR	211.047	223.469	212.886	211.700	228.609	212.479
LS	774.313	778.495	824.574	772.728	790.666	821.104
FLD	-6.281E-02	.509	.734	.351	.915	.274
SPL	4.180	4.645	5.402	5.737	1.080	.877
SPW	4.773	6.691	6.909	7.896	8.895	6.127
PTL	.930	1.234	1.860	.624	5.340	.451
PTW	-.634	-2.097	-3.425	-2.880	-4.801	-1.354
PSL	2.350	5.609	.938	3.781	13.901	4.118
FMD	39.948	19.324	36.106	38.539	44.130	63.842
ATL	-8.748	-16.951	-1.429	1.148	-15.871	-8.812
ATD	20.789	13.438	38.064	18.677	37.561	32.970
OVD	-13.299	-19.511	-12.471	-7.396	-45.609	5.301
STL	5.415	4.002	11.804	11.945	-3.158E-03	11.193
STD	28.832	20.343	29.808	24.730	81.708	25.246
LPED	-306.500	-255.873	-328.334	-333.487	-338.065	-340.056
LRCL	-.363	-145.706	-31.344	-24.975	-30.996	-11.036
LNOL	505.997	582.984	750.564	613.340	705.655	629.027
LTLW	1563.606	1691.997	1529.759	1621.559	1662.165	1542.994
LPOLL	-15.374	-8.156	-14.519	24.606	-3.845	11.651
LBTL	2.693	-52.856	-45.395	-112.246	-126.870	-52.630
LBTW	68.028	-10.189	135.188	45.060	60.784	44.620
LPCL	183.872	196.414	282.877	300.817	301.372	307.997
LFML	89.604	-23.754	-83.439	9.799	-31.770	107.706
LOSL	-58.815	-47.682	-33.826	-2.172	-3.344	2.850
LOVL	242.329	319.965	265.612	149.861	391.474	203.553
LFTL	581.373	613.894	604.368	648.547	694.396	695.598
(Constant)	-2399.780	-2411.860	-2817.396	-2720.727	-3194.982	-2899.255

Fisher's linear discriminant functions

**Table 5.13 Pooled within canonical structure of 32 characters.**

Character	Discriminant function							
	1	2	3	4	5	6	7	8
FML	<b>.518</b>	-.165	.079	-.476	.013	-.232	-.077	-.142
TLW	.236	<b>.475</b>	-.143	-.307	-.060	.199	-.015	.105
ATL	-.029	<b>.424</b>	.301	-.145	.201	.069	-.114	-.006
POLL	.219	<b>.284</b>	-.059	-.119	.183	.127	.010	.144
PED	.118	<b>.204</b>	.122	-.149	-.123	.202	.124	-.005
NOL	-.030	-.227	<b>.562</b>	.180	.068	-.027	.444	-.161
BTW	.003	.291	<b>.510</b>	-.002	-.241	-.312	-.163	-.023
RCL	.164	.130	<b>.441</b>	-.103	.196	.083	.236	-.237
OVL	.348	.138	.019	.152	<b>-.454</b>	.293	.130	.046
PCL	.279	.079	.071	.310	<b>.389</b>	.008	-.174	.164
DBLP	.151	.132	.087	-.345	.136	<b>.433</b>	-.183	.052
LMWa	.111	.150	.035	-.171	.029	<b>.396</b>	-.010	-.008
TLL	.126	.162	.005	-.253	.059	<b>.392</b>	-.023	-.056
RCDa	.112	.142	-.031	-.132	-.128	<b>.160</b>	-.041	.039
FLD	.261	.084	.129	.217	.071	.087	<b>-.511</b>	-.178
PTL	.245	.142	.187	.177	-.029	.199	<b>-.362</b>	-.248
LWR	-.017	-.099	.070	.088	.166	-.058	.127	<b>-.420</b>
STD	.093	.008	.063	.097	.014	.203	.120	<b>-.247</b>
FTL	.392	.095	.058	-.038	-.027	.171	.152	.155
OSL	.307	.012	.099	.052	.008	-.180	.207	.344
SPL	.010	.229	.140	-.167	-.006	.201	.239	-.037
BTL	.035	.184	.343	-.245	-.273	-.117	-.274	-.027
BTWP	.090	.168	.042	-.185	-.136	.201	.021	.171
PSL	.062	.137	.085	.093	-.029	.195	.080	-.153
OVD	.020	.023	.110	-.099	.053	.038	.078	.008
PTW	.140	.126	.127	-.041	.043	.122	-.205	-.097
FMD	.059	.071	.096	-.140	.058	-.031	.161	-.051
ATD	.124	.198	.280	-.103	.020	.101	.134	-.099
LS	-.053	-.052	.014	.106	-.278	-.195	.062	.438
PET	.064	.100	-.161	-.104	.184	.077	-.069	-.014
STL	-.021	.223	.205	-.144	.197	-.069	-.231	.297
SPW	.014	.212	.041	.103	.139	.151	.222	-.096

**Table 5.13 (continued)**

Character	Discriminant function								
	9	10	11	12	13	14	15	16	17
FML	.080	-.077	.066	.097	-.009	-.133	.014	-.012	-.054
TLW	.186	-.100	-.305	-.268	-.053	.024	.132	.016	.026
ATL	.135	-.191	.002	.114	.026	-.337	.111	-.145	.279
POLL	-.079	.171	-.198	-.263	-.041	.107	-.249	.072	.240
PED	-.167	-.048	-.174	-.148	-.161	.026	.062	-.111	.164
NOL	-.118	-.002	-.075	-.097	-.084	.097	-.024	-.021	.115
BTW	.069	.330	.105	.008	-.107	-.169	-.064	.122	-.219
RCL	-.005	-.017	-.139	-.239	.072	-.048	-.011	-.068	.034
OVL	.131	.174	.308	.218	.034	-.089	-.156	-.186	.058
PCL	-.099	.199	.128	.193	.048	-.242	.301	-.196	.099
DBLP	.105	-.066	-.011	-.309	.190	-.010	.115	-.014	.102
LMW <sup>a</sup>	.165	-.126	-.091	-.072	.068	-.173	.090	.100	.089
TLL	.184	-.137	-.115	-.116	.113	-.181	.040	.094	.091
RCD <sup>a</sup>	.008	-.067	-.153	-.062	-.043	.004	.040	.109	.065
FLD	.204	.062	-.020	.116	-.134	.205	.030	.009	.117
PTL	.312	-.060	-.114	.188	-.011	.053	.048	.123	-.165
LWR	-.062	-.104	.337	.263	.293	-.130	-.132	.142	.254
STD	-.145	.128	-.147	.124	-.070	.064	.221	.239	-.089
FTL	<b>-.473</b>	-.174	-.068	.127	-.058	-.213	.009	.258	-.043
OSL	<b>.433</b>	-.201	-.195	-.005	.053	.085	-.154	.317	.028
SPL	<b>.344</b>	.262	.141	.158	-.331	.032	.231	.116	-.090
BTL	-.112	<b>.376</b>	-.013	-.022	.245	.025	.088	.339	.200
BTWP	.133	<b>-.222</b>	-.148	.052	.187	-.141	.152	.031	.064
PSL	-.017	.084	<b>-.518</b>	.136	.171	.021	-.129	.036	-.183
OVD	-.060	.110	-.193	<b>.464</b>	-.260	.289	.018	.026	.071
PTW	.396	.165	-.049	<b>.431</b>	.267	.048	.064	.056	-.123
FMD	.124	.157	-.183	<b>.419</b>	-.021	.169	-.235	-.369	.042
ATD	.028	-.328	.057	.179	.069	<b>.347</b>	.166	-.001	.096
LS	-.022	-.048	-.080	.141	.245	.079	<b>.480</b>	-.216	-.111
PET	.173	.162	.149	.058	-.017	-.167	.048	<b>.354</b>	-.007
STL	-.102	-.199	.219	.084	.027	.307	-.226	.132	<b>-.345</b>
SPW	.130	.217	.138	.084	.147	.089	.101	-.003	<b>-.302</b>

**Note:** The number in **bold letter** represent the largest absolute correlation between each variable and any discriminant function  
<sup>a</sup> This variable not used in the analysis.

**Table 5.14 Summary of canonical discriminant function of 18 categories based on 32 characters.**

<b>Function</b>	<b>Eigenvalue</b>	<b>% of Variance</b>	<b>Cumulative %</b>	<b>Canonical Coorrelation</b>	<b>Wilk's Lambda</b>	<b>Chi-square</b>	<b>df</b>	<b>Sig.</b>
1	155.171	42.1	42.1	.997	.000	17515.300	510	.000
2	70.046	19.0	61.1	.993	.000	15075.691	464	.000
3	43.309	11.8	72.9	.989	.000	13016.503	420	.000
4	28.468	7.7	80.6	.983	.000	11185.360	378	.000
5	19.216	5.2	85.8	.975	.000	9551.222	338	.000
6	12.724	3.5	89.3	.963	.000	8099.092	300	.000
7	10.395	2.8	92.1	.955	.000	6834.052	264	.000
8	8.942	2.4	94.5	.948	.000	5658.833	230	.000
9	5.340	1.4	96.0	.918	.000	4549.512	198	.000
10	4.410	1.2	97.1	.903	.001	3657.471	168	.000
11	3.738	1.0	98.2	.888	.003	2842.063	140	.000
12	2.035	0.6	98.7	.819	.013	2090.748	114	.000
13	1.596	0.4	99.1	.784	.040	1554.575	90	.000
14	1.237	0.3	99.5	.744	.104	1093.759	68	.000
15	0.779	0.2	99.7	.662	.232	704.866	48	.000
16	0.708	0.2	99.9	.644	.413	426.693	30	.000
17	0.417	0.1	100.0	.542	.706	168.242	14	.000

**Table 5.15 Classification function coefficients of 4 categories according to the result of cluster analysis.**

Character	Categories			
	1	2	3	4
PET	1.434	.851	1.390	.694
TLL	-4.159	-2.387	-4.262	-3.987
BTWP	-1.998	-.863	-1.427	-.248
LWR	140.732	76.703	136.204	120.234
FLD	3.847E-02	.801	.561	.141
SPL	11.094	8.006	11.094	13.717
SPW	-.471	-3.761	-2.922	-9.106
PTL	-1.910	-1.645	-3.366	-2.346
PTW	-1.130	1.920	1.341	1.132
PSL	5.998	.734	.869	-.628
ATL	-14.700	-6.744	-6.960	5.777
ATD	-29.423	-35.362	-33.295	-13.880
OVD	-81.099	-30.634	-47.250	-46.209
STL	-21.536	-7.499	-15.429	-18.561
STD	66.698	-1.980	22.525	12.737
PED	-323.282	-295.734	-299.597	-269.949
RCL	-58.152	-53.019	-88.200	-77.659
NOL	622.360	494.407	563.748	563.838
TLW	1226.298	773.724	1162.992	1140.903
POLL	-10.266	-57.912	-16.742	-56.788
BTW	27.219	-17.673	25.410	29.462
PCL	87.683	16.461	79.934	-25.407
FML	48.340	-4.112	16.580	-1.256
OSL	-63.681	-83.446	-81.168	-59.781
OVL	270.693	131.825	210.315	234.612
FTL	418.137	333.396	373.662	394.457
(Constant)	-1800.558	-843.657	-1425.628	-1541.561

Fisher's linear discriminant functions

**Table 5.16 Pooled within canonical structure of 4 categories according to the result of cluster analysis.**

Character	Discriminant function		
	1	2	3
FTL	.287	-.026	-.093
OVL	<b>.255</b>	.011	-.110
POLL	<b>.208</b>	.146	.098
OSL	<b>.190</b>	-.040	-.078
PCL	<b>.166</b>	-.086	.121
FML	<b>.160</b>	-.072	-.086
PTL	<b>.147</b>	.012	-.054
FLD	<b>.135</b>	-.036	.013
STD	<b>.130</b>	-.082	-.077
FMD <sup>a</sup>	<b>.127</b>	.026	-.098
PTW	<b>.110</b>	.069	-.027
PSL	<b>.093</b>	.071	-.065
DBLP <sup>a</sup>	<b>.088</b>	.088	-.058
LS <sup>a</sup>	<b>-.071</b>	.027	-.031
ATL	.022	<b>.297</b>	.004
TLW	.202	<b>.282</b>	.037
PED	.195	<b>.255</b>	-.189
BTWP	.123	<b>.234</b>	-.163
SPL	.056	<b>.223</b>	-.061
STL	-.013	<b>.192</b>	.034
ATD	.133	<b>.175</b>	-.154
BTW	.026	<b>.173</b>	-.069
LMW <sup>a</sup>	.100	<b>.131</b>	-.074
RCD <sup>a</sup>	.112	<b>.121</b>	-.052
TLL	.109	<b>.120</b>	-.084
SPW	.066	<b>.114</b>	.085
LWR	-.012	<b>-.108</b>	.021
NOL	-.019	-.092	<b>-.183</b>
PET	.075	.050	<b>.176</b>
BTL <sup>a</sup>	.010	.145	<b>-.147</b>
RCL	.111	.058	<b>-.142</b>
OVD	.020	.054	<b>-.067</b>

**Note:** The number in **bold** letter represent the largest absolute correlation between each variable and any discriminant function

<sup>a</sup> This variable not used in the analysis.

**Table 5.17 Summary of canonical discriminant function of 4 categories according to the result of cluster analysis.**

Function	Eigenvalue	% of Variance	Cumulative %	Canon. Corre.	Wilk's lamda	Chi-square	df	Sig.
1	46.312	60.2	60.2	.989	.000	4627.622	78	.000
2	18.350	23.8	84.0	.974	.004	2730.089	50	.000
3	12.280	16.0	100.0	.962	.075	1272.454	24	.000



Table 5.18 Classification function coefficients of 4 categories according to Manit (2001).

Character	Categories			
	1	2	3	4
PET	.750	.462	.852	.878
DBLP	1.890	2.041	1.190	1.392
TLL	-1.762	3.150E-02	-1.931	-2.077
BTWP	-10.946	-8.984	-9.256	-9.695
LWR	141.804	103.755	155.111	163.625
LS	744.025	667.473	652.105	679.443
LMW	.451	.102	.237	.310
FLD	1.498	.876	.997	.695
SPL	15.169	7.670	11.492	9.982
SPW	-1.675	3.954E-02	-.695	2.050
PTL	-4.799	-2.390	-4.958	-5.176
PTW	-2.751	.564	.628	2.352E-02
PSL	-23.919	-7.859	-13.042	-9.274
FMD	-35.116	-24.191	-20.644	-34.173
ATL	-14.941	-4.082	-2.096	-2.548
ATD	-18.622	-23.518	-22.800	-16.721
STL	-.763	6.933	2.374	4.984
STD	16.770	9.207	9.477	30.822
NOL	401.805	328.576	313.012	346.893
TLW	1028.352	677.624	1001.172	1028.449
POLL	-24.660	-73.207	-34.558	-25.063
BTL	121.293	69.983	102.957	107.791
BTW	-36.960	-68.892	-45.899	-53.278
PCL	177.246	93.373	158.217	188.550
FML	47.086	-51.459	-53.391	-67.500
OSL	9.080	-42.190	-35.788	-41.973
OVL	-7.826	-86.282	-31.652	-71.440
FTL	379.509	333.580	354.772	393.415
(Constant)	-1759.109	-1000.628	-1451.609	-1638.551

Fisher's linear discriminant functions

**Table 5.19 Pooled within canonical structure of 4 categories according to Mani (2001).**

Character	Discriminant function		
	1	2	3
FML	<b>.343</b>	-.065	-.026
FTL	<b>.326</b>	.095	.170
OSL	<b>.263</b>	.019	.050
OVL	<b>.211</b>	.071	-.088
FLD	<b>.135</b>	.046	.043
PTL	<b>.124</b>	.064	.033
OVD <sup>a</sup>	<b>.111</b>	-.022	.079
PTW	<b>.097</b>	.081	-.028
DBLP	<b>.084</b>	.048	.018
TLW	.140	<b>.244</b>	-.146
POLL	.185	<b>.239</b>	.038
SPW	-.003	<b>.224</b>	.123
ATL	-.028	<b>.189</b>	.054
PED <sup>a</sup>	.098	<b>.138</b>	.067
SPL	.014	<b>.126</b>	-.036
PET	.052	<b>.115</b>	-.074
STL	-.020	<b>.109</b>	.075
PSL	.038	<b>.104</b>	.082
LMW	.082	<b>.097</b>	-.002
BTWP	.076	<b>.094</b>	-.085
RCD <sup>a</sup>	.062	<b>.088</b>	-.058
TLL	.080	<b>.087</b>	-.025
BTW	.011	<b>.079</b>	.001
FMD	.064	<b>.068</b>	-.004
BTL	.032	<b>.052</b>	-.047
NOL	-.003	-.118	<b>.278</b>
RCL <sup>a</sup>	.111	.077	<b>.218</b>
PCL	.160	.086	<b>.216</b>
STD	.091	.026	<b>.175</b>
LWR	-.025	-.034	<b>.159</b>
ATD	.088	.110	<b>.114</b>
LS	-.027	-.058	<b>-.073</b>

**Note:** The number in **bold letter** represent the largest absolute correlation between each variable and any discriminant function

a This variable not used in the analysis.

**Table 5.20 Summary of canonical discriminant function of 4 categories according to Manit (2001).**

Function	Eigenvalue	% of Variance	Cumulative %	Canon. Corre.	Wilk's lamda	Chi-square	df	Sig.
1	41.599	56.3	56.3	.988	.000	4490.673	84	.000
2	24.665	33.4	89.7	.980	.005	2648.519	54	.000
3	7.576	10.3	100.0	.940	.117	1055.168	26	.000

**Table 5.21 Classification function coefficients of 3 categories according to Irwin and Baneby (1981).**

Character	Categories		
	1	2	3
PET	.958	.700	1.078
DBLP	.767	.919	5.448E-02
TLL	-.370	1.444	-.501
BTWP	-9.300	-7.634	-7.832
LWR	96.878	63.211	113.370
LS	672.146	610.881	592.206
LMW	-3.872E-02	-.372	-.253
FLD	2.520	1.776	1.922
SPL	14.307	7.040	10.714
PTL	-4.389	-2.162	-4.791
PTW	-2.527	1.073	1.213
PSL	-37.829	-21.386	-26.573
ATL	-16.933	-6.445	-4.351
OVD	3.337	16.197	16.576
STL	-9.582	-1.826	-6.434
NOL	237.059	169.929	153.073
TLW	852.139	515.852	836.349
POLL	-47.060	-88.718	-51.383
BTL	110.170	56.813	89.317
BTW	1.011	-29.924	-6.354
PCL	74.595	2.770	64.491
FML	117.562	8.322	11.163
OSL	23.990	-27.575	-21.085
OVL	80.610	-4.122	50.745
FTL	229.758	189.042	208.413
(Constant)	-1386.445	-680.913	-1120.097

Fisher's linear discriminant functions

**Table 5.22 Pooled within canonical structure of 3 categories according to Irwin and Baneby (1981).**

Character	Discriminant function	
	1	2
FML	<b>.341</b>	-.064
FTL	<b>.289</b>	.072
OSL	<b>.261</b>	.014
OVL	<b>.208</b>	.077
PCL	<b>.135</b>	.058
FLD	<b>.134</b>	.043
PTL	<b>.123</b>	.061
FMD <sup>a</sup>	<b>.104</b>	.021
RCL <sup>a</sup>	<b>.098</b>	.047
PTW	<b>.098</b>	.084
DBLP	<b>.084</b>	.047
STD <sup>a</sup>	<b>.071</b>	.020
OVD	<b>.025</b>	.012
TLW	.137	<b>.253</b>
POLL	.179	<b>.230</b>
SPW <sup>a</sup>	.060	<b>.185</b>
ATL	-.027	<b>.180</b>
SPL	.015	<b>.131</b>
PED <sup>a</sup>	.093	<b>.124</b>
PET	.052	<b>.122</b>
NOL	-.002	<b>-.118</b>
BTWP	.076	<b>.101</b>
STL	-.019	<b>.100</b>
ATD <sup>a</sup>	.066	<b>.098</b>
LMW	.082	<b>.098</b>
PSL	.037	<b>.094</b>
RCD	.050	<b>.093</b>
TLL	.080	<b>.090</b>
BTW	.011	<b>.080</b>
BTL	.032	<b>.056</b>
LS	-.026	<b>-.052</b>
LWR	-.023	<b>-.044</b>

**Note:** The number in **bold letter** represent the largest absolute correlation between each variable and any discriminant function

a This variable not used in the analysis.

**Table 5.23 Summary of canonical discriminant function of 4 categories according to Irwin and Baneby (1981).**

Function	Eigenvalue	% of Variance	Cumulative %	Canon. Corre.	Wilk's lamda	Chi-square	df	Sig.
1	41.387	63.8	63.8	.988	.001	3424.733	50	.000
2	23.529	36.2	100.0	.979	.041	1577.539	24	.000

**Table 5.24 Means and standard deviation of 32 quantitative characters of the 18 taxa of *Cassia* s.l.**

Charac ter	Taxa							
	<i>C. javanica</i>		<i>C. grandis</i>		<i>C. bakeriana</i>		<i>C. fistula</i>	
	mean	± SD	mean	± SD	mean	± SD	mean	± SD
PET	17.9483	3.7670	28.8187	7.4970	39.2683	12.2479	60.2190	8.0531
PED	2.5637	.4687	1.6080	.2234	2.0900	.3988	2.6527	.3399
RCL	264.4693	47.0217	203.0533	33.0136	247.3539	50.2431	239.3083	46.8152
RCD	.9443	.1348	.7427	.1371	.9717	.1390	1.7023	.1297
DBLP	22.8783	2.9254	10.6033	2.3224	29.5533	6.6199	57.2290	5.7519
NOL	12.1000	2.2027	16.2667	1.9815	8.6111	1.3346	5.4000	.6215
TLL	59.5030	7.3514	45.9550	5.9666	85.0172	9.0217	140.5913	20.2953
TLW	22.7790	2.3367	16.3147	2.5095	33.4989	7.7993	63.9587	9.0049
BTWP	30.6700	5.0718	31.1293	5.2057	44.2461	9.2030	55.9093	10.7640
LWR	2.6210	.2717	2.8333	.2195	2.6528	.5902	2.2113	.2409
LS	.5183	7.580E-02	.6753	4.732E-02	.5178	8.558E-02	.3987	5.544E-02
LMW	123.1027	13.6515	95.8010	11.1662	177.3050	17.6908	289.2843	39.8056
POLL	2.7610	.4906	1.6367	.2812	2.5072	.5297	6.2037	1.1583
FLD	62.5473	7.0642	24.7210	2.3055	87.5828	3.8396	60.9720	5.6153
BTL	7.3803	1.2109	4.0257	.9983	8.2122	.6591	4.6223	.3809
BTW	2.3487	.5618	1.3100	.3190	3.2161	.6779	.4580	5.653E-02
PCL	36.3750	5.1114	17.8663	2.1550	67.6633	6.3335	48.9927	8.8714
SPL	5.7910	.4246	9.9547	.6114	8.6172	.6156	10.3837	.9475
SPW	3.1490	.2373	5.6520	.6698	4.7467	.5033	6.2733	.6817
PTL	28.6997	3.0465	13.9367	.9098	43.3983	1.4831	29.7020	3.2191
PTW	12.5877	1.5754	10.8667	.6216	22.6722	.7738	19.4477	2.5470
PSL	2.3020	.4858	1.5797	.3033	2.7644	.5671	2.0203	.4149
FML	34.8927	2.8884	25.1323	2.4371	51.9944	2.8478	45.7960	4.8089
FMD	.6547	7.619E-02	.9373	.1318	.6900	.1134	.7243	.1361
ATNL	3.7963	.3689	2.6420	.2590	5.1839	.2223	4.7683	.2443
ATND	2.3243	.1739	2.0843	.2102	2.9622	.1875	2.4837	.1618
OSL	6.4277	.7121	12.8187	1.1581	15.2017	1.4141	9.2673	1.9492
OVL	25.8117	2.3280	18.4770	1.2135	34.5972	1.7297	31.7597	3.6086
OVD	.8907	9.322E-02	1.0380	.1232	1.1339	.1096	.9030	.1190
STL	2.6860	.3420	1.3450	.2519	4.1650	.5323	3.3590	.5903
STD	.6433	8.108E-02	.5500	9.067E-02	.7878	.1154	.6403	.1191
FTL	465.3970	73.1107	282.1187	52.5810	558.3861	54.7364	486.7637	39.5812

Table 5.24 (continued)

Charac ter	Taxa							
	<i>C. pumila</i>		<i>C. leschenaultiana</i>		<i>C. obtusifolia</i>		<i>C. alata</i>	
	mean	± SD	mean	± SD	mean	± SD	mean	± SD
PET	4.1553	.5152	2.9440	.4259	38.3947	4.1869	19.3857	7.6918
PED	.4653	8.577E-02	.5510	2.514E-02	1.3920	.2385	5.6000	1.4663
RCL	34.1950	4.6175	63.4240	4.0985	32.5540	7.1091	414.2700	117.1687
RCD	.1970	5.305E-02	.1450	2.224E-02	1.0493	.2197	1.7527	.3691
DBLP	1.9433	.2831	.9340	.1092	12.9480	2.9353	39.5687	6.6074
NOL	14.9667	1.5196	42.2000	3.0478	3.0000	.0000	11.0000	1.4622
TLL	6.3397	1.1341	2.6650	.4516	54.1180	9.7317	116.7200	15.4636
TLW	2.0680	.3844	.7430	.1645	27.4780	5.1886	70.9963	11.2529
BTWP	4.3590	.8647	1.6740	.5025	39.3867	6.2630	72.1327	9.4398
LWR	3.0967	.3723	3.7640	1.0768	1.9753	.1197	1.6530	.1079
LS	.6877	7.070E-02	.6180	.1087	.7393	6.080E-02	.6190	2.857E-02
LMW	12.4857	2.3449	5.5220	.7375	117.7363	9.1037	239.2397	33.0390
POLL	.1813	5.002E-02	.1530	2.263E-02	1.4817	.3027	2.1223	.3201
FLD	9.3323	1.1470	15.0420	2.2560	27.7647	2.2323	28.0180	2.9703
BTL	2.1370	.4223	3.5070	.6067	3.3333	.4283	25.5490	2.7011
BTW	.3497	7.744E-02	1.1110	.2044	.8907	.2096	14.4513	2.6558
PCL	3.9920	.8497	8.7110	1.1380	18.0667	3.0836	5.5370	1.1243
SPL	4.2340	.6699	7.3320	.9838	7.6057	.6951	15.1107	1.0014
SPW	1.5023	.2931	2.1150	.5872	5.5953	.7239	7.1097	1.1262
PTL	4.7647	.6184	7.5210	1.1280	14.4263	1.2565	22.1603	1.3465
PTW	3.9320	.8447	6.3460	.7693	9.5113	1.0312	15.9633	1.6884
PSL	.5483	.1535	.7220	.1798	1.3333	.2422	3.0263	.7885
FML	1.5680	.3558	1.3230	.2453	3.4987	.4317	4.5043	.4513
FMD	.1577	2.991E-02	.3990	8.660E-02	.3230	7.278E-02	.9783	.1612
ATNL	1.5163	.3806	2.8440	.3707	4.8710	.4392	10.6760	.5666
ATND	.6290	8.946E-02	.7150	5.421E-02	1.3130	.1670	3.5880	.2599
OSL	.5100	.1558	.5000	.1082	1.5390	.3210	2.2693	.4472
OVL	2.5627	.5004	4.9640	.4402	15.4320	2.2961	14.6493	1.4531
OVD	.7087	7.262E-02	1.1530	.1365	.6133	6.509E-02	1.1897	.1752
STL	1.4970	.2615	2.0690	.4517	3.2143	.4059	7.0460	.5571
STD	.2907	5.777E-02	.4660	7.260E-02	.3400	5.079E-02	.4400	4.472E-02
FTL	34.3277	4.5550	60.4030	6.3781	170.1237	9.6868	160.5467	13.4859



Table 5.24 (continued)

Charac ter	Taxa							
	<i>C. hirsuta</i>		<i>C. sophera</i>		<i>C. surattensis</i> subsp. <i>surattensis</i> ,		<i>C. surattensis</i> subsp. <i>glauca</i>	
	mean	± SD	mean	± SD	mean	± SD	mean	± SD
PET	52.0317	13.9899	43.1267	6.6956	31.3660	6.9106	39.4407	5.5660
PED	1.9577	.3460	1.0323	.2593	1.1040	.2286	1.4653	.2275
RCL	103.3653	22.7334	98.1573	27.0585	100.2567	27.2985	96.2477	18.8470
RCD	1.4823	.2276	.6260	.1487	.6060	.1381	.9463	.1339
DBLP	28.1123	4.5499	15.4550	2.8482	8.8947	4.1698	18.5687	2.7261
NOL	4.4000	.6215	6.6667	1.3476	7.9333	1.0483	5.6000	.5632
TLL	89.9603	10.2521	62.4183	12.7502	41.9237	9.5320	62.0793	14.3946
TLW	38.0887	4.2370	15.6080	3.6783	17.5380	3.4563	31.8403	4.3134
BTWP	33.0470	5.2410	24.1817	4.0974	27.1247	5.6990	36.8427	7.6258
LWR	2.3660	.1544	4.0497	.4283	2.3853	.2150	1.9353	.2284
LS	.3670	3.621E-02	.3923	4.329E-02	.6510	4.528E-02	.5963	4.972E-02
LMW	184.1030	22.8696	125.2863	23.5251	86.5903	19.1784	128.8160	29.0943
POLL	2.6420	.5399	.9823	.2141	1.4723	.2598	2.6933	.7189
FLD	32.1517	2.6381	34.6063	1.9576	48.7770	4.3050	49.0200	7.9910
BTL	4.4683	.8363	2.6197	.3212	5.6960	1.2797	4.4827	1.1734
BTW	.8033	.1898	.8367	.2250	2.9090	.6911	2.8760	.6171
PCL	12.2417	1.4974	12.2763	1.9879	24.5413	2.2681	25.7723	4.6010
SPL	12.0130	.9169	9.1597	.6285	8.5873	.5429	10.6873	1.4963
SPW	7.2460	.9363	5.9620	.6219	6.4147	.4321	8.5460	1.1467
PTL	16.6887	1.0299	17.8107	.9974	23.7863	2.2915	24.9670	4.1617
PTW	14.3303	1.5530	11.9283	1.0214	15.4187	1.4672	16.1630	1.9822
PSL	2.4167	.3538	.7717	.1533	2.5823	.3912	2.3090	.4737
FML	6.6480	.7773	6.9700	.4571	2.9757	.4698	3.0623	.7582
FMD	1.0487	.1906	.5980	.1570	.6477	.1518	.7233	.1530
ATNL	5.9030	.5904	5.8480	.2975	6.2057	.4686	6.7937	.7532
ATND	1.8227	.2837	2.1190	.1212	1.5753	.2468	2.1133	.1808
OSL	.9293	.1338	1.7303	.3101	3.1987	.5159	4.5523	.8918
OVL	8.4823	.4908	8.2680	.9317	9.5410	1.4002	16.8630	2.2700
OVD	1.2557	.1982	.7540	.1034	.8430	9.820E-02	.8583	.1279
STL	3.1200	.6328	3.3567	.2650	2.7173	.4791	5.9710	.8408
STD	.5743	7.238E-02	.3767	8.470E-02	.4417	5.180E-02	.3670	5.914E-02
FTL	126.3293	11.1319	96.5333	5.4048	89.5260	11.5259	132.9107	14.7112

Table 5.24 (continued)

Charac ter	Taxa							
	<i>C. occidentalis</i>		<i>C. tora</i>		<i>C. garrettiana</i>		<i>C. timoriensis</i>	
	mean	± SD	mean	± SD	mean	± SD	mean	± SD
PET	46.8740	7.4116	37.0480	4.3929	23.3590	2.7670	49.3690	10.6503
PED	1.4737	.1660	1.4507	.3216	1.7663	.3419	1.8233	.2946
RCL	102.9940	13.5287	20.4943	3.0764	280.6297	38.7155	180.9533	46.2314
RCD	.9663	.1582	1.2500	.3278	.5500	.1246	1.1870	.1782
DBLP	24.7513	3.3582	7.9357	1.3606	15.2650	1.8171	28.5543	4.5106
NOL	4.7333	.4498	3.0000	.0000	18.7333	1.7006	6.6667	1.1842
TLL	72.7197	12.9168	47.4667	4.5344	35.5723	5.0030	83.7990	12.7555
TLW	26.4960	4.8730	25.9853	2.9267	11.1113	1.5059	38.4690	6.8025
BTWP	31.2603	6.9226	31.0370	2.7420	20.1950	3.1052	34.1723	5.2078
LWR	2.7553	.2448	1.8330	9.802E-02	3.2027	.1429	2.2047	.2927
LS	.4307	5.024E-02	.6563	3.508E-02	.5677	4.057E-02	.4097	4.529E-02
LMW	145.5890	26.4529	98.9013	9.2555	100.9373	13.0597	180.8643	25.6999
POLL	1.7993	.3834	1.6313	.3361	1.3577	.1816	3.9507	.7307
FLD	33.1937	3.9686	22.9643	2.7591	42.3380	4.2176	32.2980	3.9499
BTL	13.4340	2.6221	2.8543	.6339	11.2240	1.8919	2.9697	.7450
BTW	3.5130	.6729	.4250	.1256	10.1037	1.9536	1.0927	.2203
PCL	9.3737	1.9902	8.1233	1.7564	26.5847	3.3168	25.7860	4.7678
SPL	9.7383	.7787	7.7393	.7995	11.8537	.8552	9.9510	1.2354
SPW	5.8493	.6022	5.1877	.6903	9.3990	1.9094	7.3183	1.1674
PTL	17.6523	1.6345	11.2687	.8133	20.7720	1.9577	15.8373	1.8920
PTW	13.7867	2.0213	6.4863	.6041	12.8910	1.5072	9.6637	1.9531
PSL	1.7967	.4832	1.6567	.2780	1.8800	.3375	1.9403	.2652
FML	6.4820	.5819	1.8730	.2210	2.0463	.3402	3.5797	1.0401
FMD	.5680	.1043	.2633	4.999E-02	.5940	9.291E-02	.5230	.1117
ATNL	6.1807	.5394	2.8040	.3351	8.1457	.5319	8.1080	1.0375
ATND	1.5930	.1694	1.1363	.1265	2.6390	.2641	2.0587	.3166
OSL	.9973	.2844	1.2433	.3417	1.1520	.2337	2.4773	.5380
OVL	8.4880	1.0724	12.7567	1.4577	9.8777	1.1493	5.0187	1.1173
OVD	.7653	.1046	.7700	8.749E-02	1.0100	9.653E-02	.8983	.2396
STL	4.2737	.4592	1.9017	.2331	6.4427	1.4265	6.3100	1.0730
STD	.4110	7.836E-02	.4453	8.997E-02	.5710	9.474E-02	.4247	.1011
FTL	104.1227	7.5596	128.8970	18.8503	114.1463	7.6405	165.9977	34.3652

Table 5.24 (continued)

Character	Taxa					
	<i>C. spectabilis</i>		<i>C. siamea</i>		Total	
	mean	± SD	Mean	± SD	mean	± SD
PET	30.9720	5.0199	34.5880	5.8812	34.3488	15.8693
PED	2.3280	.3329	1.6983	.1990	1.8791	1.1737
RCL	270.4773	44.2274	210.8980	36.5662	166.6463	113.8679
RCD	.9500	.1237	1.0153	.1596	.9803	.4494
DBLP	18.9150	3.8738	25.2487	4.6244	20.9595	13.6512
NOL	13.3000	1.5790	9.1333	1.1366	9.5748	6.6774
TLL	84.9980	11.3263	68.0293	9.6757	66.3834	33.5210
TLW	23.7437	2.7227	21.7660	2.9912	28.0269	18.0539
BTWP	34.5537	4.8571	37.2640	6.2439	33.6833	15.8714
LWR	3.6013	.4762	3.1410	.3331	2.6404	.7260
LS	.4097	4.279E-02	.5477	5.029E-02	.5423	.1293
LMW	172.6240	21.0746	143.8710	20.8645	138.9836	67.4501
POLL	2.1837	.4689	2.6907	.6651	2.2054	1.4173
FLD	47.3553	3.4241	35.5307	3.8979	38.3359	17.0943
BTL	2.7163	.3897	6.1527	.9504	6.4820	5.7953
BTW	1.0953	.1955	1.5417	.5010	2.7936	3.7845
PCL	27.7060	3.4138	27.5550	4.4476	22.1038	14.9464
SPL	10.3463	.8594	8.0153	1.1795	9.3771	2.5822
SPW	10.4760	.8577	6.4010	1.6420	6.2383	2.3330
PTL	28.6510	1.9669	17.6127	2.0538	19.9182	8.2733
PTW	14.4870	1.8234	14.0833	2.2545	12.8306	4.4708
PSL	4.1830	.3981	2.3253	.4630	2.0416	.9297
FML	2.7987	.3474	8.3720	1.2290	11.3290	14.8525
FMD	.6253	.1552	.9290	.2879	.6403	.2782
ATNL	5.8820	.5335	7.2163	.6082	5.6348	2.2861
ATND	2.5287	.2520	2.6370	.4384	2.0469	.7454
OSL	2.3413	.3543	3.0357	.5916	3.7664	3.9701
OVL	22.4433	1.5754	7.3670	1.1772	14.1857	8.6736
OVD	.8533	.1048	1.1913	.1988	.9217	.2240
STL	1.3237	.1692	6.7217	1.1278	3.8075	2.0390
STD	.9080	.1018	.4827	.1118	.5040	.1742
FTL	243.1440	41.4154	232.7633	31.3960	200.1268	143.3869

**Table 5.25 Means and standard deviation of 32 quantitative characters of the 3 taxa of *Cassia* s.l. according to Irwin and Barneby (1981)**

Charac ter	Taxa						Total	
	<i>Cassia</i> s.s.		<i>Chamaecrista</i>		<i>Senna</i>			
	mean	± SD	mean	± SD	mean	± SD	mean	± SD
PET	36.2631	18.2345	3.8525	.7221	37.1629	11.9930	34.3488	15.8693
PED	2.2440	.5679	.4868	8.383E-02	1.9243	1.2612	1.8791	1.1737
RCL	237.5676	49.4325	41.5023	13.5656	159.2748	119.3745	166.6463	113.8679
RCD	1.1034	.4059	.1840	5.222E-02	1.0318	.3974	.9803	.4494
DBLP	30.1230	18.6362	1.6910	.5082	20.3514	9.6249	20.9595	13.6512
NOL	10.8148	4.5388	21.7750	12.1032	7.8472	4.5691	9.5748	6.6774
TLL	82.5166	40.2344	5.4210	1.8974	68.3171	24.6552	66.3834	33.5210
TLW	34.2088	20.2352	1.7368	.6736	29.0934	15.7664	28.0269	18.0539
BTWP	40.0712	13.4028	3.6878	1.4144	35.0998	13.6913	33.6833	15.8714
LWR	2.5715	.4019	3.2635	.6755	2.5919	.7743	2.6404	.7260
LS	.5286	.1224	.6703	8.589E-02	.5322	.1280	.5423	.1293
LMW	170.7142	81.9850	10.7447	3.6797	143.7132	47.5668	138.9836	67.4501
POLL	3.3627	1.9539	.1743	4.618E-02	2.0839	.9063	2.2054	1.4173
FLD	55.7750	22.0650	10.7597	2.9021	36.1681	9.2589	38.3359	17.0943
BTL	5.8210	1.9303	2.4795	.7606	7.1250	6.6278	6.4820	5.7953
BTW	1.6795	1.0800	.5400	.3544	3.3782	4.3109	2.7936	3.7845
PCL	39.9533	18.1242	5.1718	2.2624	18.6303	8.7829	22.1038	14.9464
SPL	8.6944	2.0158	5.0085	1.5501	10.0673	2.2803	9.3771	2.5822
SPW	4.9784	1.3593	1.6555	.4644	7.1254	1.8723	6.2383	2.3330
PTL	27.3270	10.0861	5.4537	1.4280	19.3028	5.0911	19.9182	8.2733
PTW	15.6959	4.9002	4.5355	1.3371	12.8928	3.2766	12.8306	4.4708
PSL	2.1002	.5917	.5918	.1755	2.1851	.9258	2.0416	.9297
FML	38.0605	10.5138	1.5068	.3458	4.4009	2.1751	11.3290	14.8525
FMD	.7584	.1626	.2180	.1166	.6518	.2752	.6403	.2782
ATL	3.9769	1.0043	1.8483	.6917	6.5528	1.9388	5.6348	2.2861
ATD	2.4082	.3427	.6505	8.973E-02	2.0937	.7001	2.0469	.7454
OSL	10.4541	3.4854	.5075	.1441	2.1222	1.1345	3.7664	3.9701
OVL	26.8907	6.5333	3.1630	1.1575	11.5989	4.9568	14.1857	8.6736
OVD	.9756	.1450	.8198	.2149	.9169	.2398	.9217	.2240
STL	2.7469	1.0880	1.6400	.4011	4.3666	2.0799	3.8075	2.0390
STD	.6406	.1262	.3345	9.803E-02	.4819	.1666	.5040	.1742
FTL	435.9197	114.9881	40.8465	12.4728	147.0867	52.0012	200.1268	143.3869

**Table 5.26 Comparison of 13 qualitative morphological characters of the *Cassia* s. l.**

<b>Character</b>	<i>C. javanica</i>	<i>C. grandis</i>	<i>C. bakeriana</i>	<i>C. fistula</i>	<i>C. pumila</i>	<i>C. leschenaultiana</i>	<i>C. obtusifolia</i>	<i>C. alata</i>	<i>C. hirsuta</i>
Habit	tree	tree	tree	tree	smallshrub	smallshrub	undershrub	shrub	undershrub
Branches	glabrous	glabrous	hairy	glabrous	pubescent	pubescent	glabrous	pubescent	hirsute
Upper leaf surface	pubescent	glossy	hairy	glossy	glossy	glossy	glossy	glossy	hirsute
Foliar gland	absence	absence	absence	absence	presence	presence	presence	absence	presence
Inflorescence	raceme, lateral	raceme, lateral	raceme, lateral	raceme, axillary	few, axillary	few, axillary	raceme, axillary	raceme, axillary	raceme, axillary
Petals color	red	pink	pink	yellow	yellow	yellow	yellow	yellow	yellow
Staminode	absence	absence	absence	absence	absence	absence	presence	absence	absence
Filament	long, recurved	medium, recurved	long, recurved	long, recurved	very short	very short	medium, straight	medium, straight	medium, straight
Enlargement at middle of filament	presence	absence	presence	absence	absence	absence	absence	absence	absence
Anther opening	pore, slit	pore, slit	slit	pore, slit	pore, slit	pore	pore	pore	Pore
Ovary	pubescent	tomentose	pubescent	velutinous	tomentose	tomentose	pubescent	glabrous	hirsute
Style	pubescent	pubescent	pubescent	glabrous	glabrous	glabrous	glabrous	glabrous	glabrous
Pods	terete, glabrous	cylindrical, glabrous	terete, pubescent	terete, glabrous	flat, glabrous	flat, glabrous	terete, glabrous	winged, glabrous	terete, hirsute

**Table 5.26 (continued)**

<b>Character</b>	<i>C. sophera</i>	<i>C. surattensis</i> subsp. <i>surattensis</i> ,	<i>C. surattensis</i> subsp. <i>glauca</i>	<i>C. occidentalis</i>	<i>C. tora</i>	<i>C. garrettiana</i>	<i>C. timoriensis</i>	<i>C. spectabilis</i>	<i>C. siamea</i>
Habit	shrub	shrub	shrub	undershrub	undershrub	tree	tree	tree	tree
Branches	glabrous	puberulous	puberulous	glabrous	glabrous	puberulous	pubescent	pubescent	pubescent
Upper leaf surface	glossy	glossy	glossy	glossy	glossy	glossy	glossy	glossy	glossy
Foliar gland	presence	presence	presence	presence	presence	absence	absence	absence	absence
Inflorescence	corymb, axillary	raceme, axillary	raceme, axillary	few, terminal	raceme, axillary	raceme, terminal	raceme, axillary	raceme, terminal	panicle, terminal
Petals color	yellow	yellow	yellow	yellow	yellow	yellow	yellow	yellow	yellow
Staminode	absence	absence	absence	absence	presence	absence	absence	absence	absence
Filament	medium, straight	medium, straight	medium, straight	medium, straight	medium, straight	medium, straight	medium, straight	medium, straight	medium, straight
Enlargment at midle	absence	absence	absence	absence	absence	absence	absence	absence	absence
Anther opening	pore	slit	slit	pore	pore	pore	pore	pore, slit	pore
Ovary	pubescent	puberulous	puberulous	tomentose	pubescent	glabrous	glabrous	pubescent	pubescent
Style	glabrous	glabrous	glabrous	glabrous	glabrous	glabrous	glabrous	glabrous	glabrous
Pods	swollen, glabrous	flat, glabrous	flat, glabrous	swollen, glabrous	terete, glabrous	flat, glabrous	flat, glabrous	terete, glabrous	flat, glabrescent

**Table 6.1 Summary of canonical discriminant function of 12 species of *Cassia (Senna)*.**

Function	Eigenvalue	% of Variance	Cumulative %	Canon. Corre.	Wilk's lamda	Chi-square	df	Sig.
1	57.691	31.0	31.0	.991	.000	8957.546	319	.000
2	40.527	21.8	52.7	.988	.000	7579.077	280	.000
3	28.976	15.6	68.3	.983	.000	6317.707	243	.000
4	17.180	9.2	77.5	.972	.000	5166.675	208	.000
5	14.369	7.7	85.2	.967	.000	4184.913	175	.000
6	8.164	4.4	89.6	.944	.000	3260.003	144	.000
7	6.967	3.7	93.3	.935	.001	2510.133	115	.000
8	5.670	3.0	96.4	.922	.005	1807.651	88	.000
9	3.190	1.7	98.1	.873	.032	1165.307	63	.000
10	2.189	1.2	99.3	.829	.134	680.336	40	.000
11	1.340	.7	100.0	.757	.427	287.755	19	.000

## BIOGRAPHY

Mr. Sahanat Phetsri was born on May 11, 1979, in Phatthalung Province. He was graduated in Science-Biology from Faculty of Science, Prince of Songkla University in 1999, then continued his study for Master of Science in Botany at the Department of Botany, Faculty of science, Chulalongkorn University from 2000-2002.

