CLASSIFICATION AND DESCRIPTION OF A COLLECTION OF THE LEGUME GENUS AESCHYNOMENE

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ABSTRACT

A collection of 316 accessions, representing 29 species, of the tropical legume genus Aeschynomene was grown and described at Mackay (21°10'S 140°10'E), Queensland, and classified on morphologic and agronomic attributes. The 2 largest species were A. americana (146 accessions divided into 6 groups) and A. villosa (58 accessions divided into 7 groups). Another 8 species were each represented by fewer than 4 accessions and 10 species each represented by only 1 accession. Most accessions were of American origin and only 10 accessions (from 7 species) were African. The classification techniques successfully divided a large collection of accessions into groups to aid further evaluation. A total of 55 Aeschynomene groups were distinguished. The groups and main characteristics of individual accessions are tabulated. Wide diversity within and between the Aeschynomene species should provide more pasture cultivars from this genus, with accessions potentially adapted to high and low rainfall, seasonally waterlogged and swampy sites, and to heavy grazing.

RESUMEN

Una colección de 316 accesiones, representando 29 especies, de la leguminosa tropical del género Aeschynomene fue cultivada, descrita y clasificada por sus atributos morfológicos y agronómicos en Mackay (21°10′S-140°10′E), Queensland. Las 2 especies con más entradas fueron A. americana (146 accesiones divididas en 6 grupos) y A. villosa (58 accesiones divididas en 7 grupos). Otras 8 especies fueron representadas por menos de 4 accesiones y 10 especies fueron representadas solamente por 1 accesión. La mayoria de accesiones son de origen Americano y solo 10 accesiones (de 7 especies) provienen de Africa.

Las técnicas de clasificación utilizadas exitosamente dividieron esta colección grande en grupos para facilitar evaluaciones futuras. Un total de 55 grupos de Aeschynomene fueron distinguidos. La tabulación de las principales caracteristicas de las accesiones individuales y los grupos, muestra la amplia diversidad dentro y entre las especies de Aeschynomene, lo que debería ser base para seleccionar más cultivares forrajeros de este género adaptados a altas y bajas precipitaciones, inundaciones estacionales, sitios cenagosos y pastoreo pesado.

INTRODUCTION

Aeschynomene is chiefly a tropical genus. In the Americas it occurs from 40°N to 35°S along the Atlantic coast and from 28°N to 17°S on the Pacific coast. Rudd (1955; 1959a) listed 67 Aeschynomene species of American origin in 2 sections and 8 series, as represented by Kretschmer et al. (1980) and shown in Table 1.

Greatest species diversity occurs in Africa (Rudd 1955) but a complete inventory of the African species is not available. Gillett *et al.* (1971) recorded 45 species occurring in East Africa, 43 of which are not found in the Americas. Seven species occur in Malaysia (Rudd 1959b), but only 1 (*A. aspera*) is truly native. In Australia, only *A. brevifolia* is regarded as native (Rudd 1955); *A. indica* and *A. villosa* are probably introduced. However, Verdcourt (1979) suggests *A. indica* is native to Papua New Guinea.

About half of the species within the genus are hydrophytes, occurring in marshes, rice paddies, wet meadows, and along stream banks (Rudd 1955). The others are more xeric, growing in savanna, pine barrens, oak woods, on rocky hillsides, sandy beaches or in dry waste places.

Although initially regarded as unimportant as forage plants (Rudd 1955), Aeschynomene has been used for hay in Ceylon (Paul 1951) and green manure in India (Sing 1968). A selection of A. americana is used as a pasture legume in Florida (USA) (Hodges et al. 1982) and collections of the genus have been grown, described and evaluated (Kretschmer et al. 1980; Quesenberry and Ocumpauch 1981; and Kretschmer and Snyder 1981). Two commercial cultivars, A. falcata cv. Bargoo (Wilson 1980) and A. americana cv. Glenn (Bishop et al. 1985a), are now in use in Australia.

A wide range of material from overseas collections has been introduced into Australia during the past 30 years. All available accessions were assembled and grown at Mackay, Queensland. This paper presents the agronomic and morphological data collected and discusses the characterisation and classification of the accessions into groups to aid future evaluation programmes.

TABLE 1

List of sections and series, major distribution, and brief description of American Aeschynomene spp. Species grown at

Mackay are listed in brackets () under series name

Sections and series	No. of species		Brief description
Section: Aeschynomene (A. aspera is the genus and section type plant)			
Series 1. Americanae (A. americana, A. villosa)	4	Mexico	mostly amphibious, somewhat flexible adaphic requirements
Series 2. Fluminensis (A. parviflora)	2	Caribbean, east and central South America	wet soil areas
Series 3. Montevidensis (A. filosa)	8	Eastern Brazil to Buenos Aires	erect herbs or shrubs, swampy area
Series 4. Sensitiva (A. deamii, A. sensitiva)	4	Guatemala to South Brazil	erect herbs, wet soil areas
Series 5. Indicae (A. ciliata, A. denticulata, A. evenia, A. indica, A. scabra, A. rudis, A. virginica)	11	Widespread from latitudinal extremes	erect herbs, predominantly coastal, tidal and other marshes and wet areas
Section: Ochopodium (A. falcata is the section type plant)			
Series 6. Viscidulae (A. brasiliana, A. brevifolia, A. elegans, A. falcata, A. histrix)	12	Mexico, eastern South America to Argentina	mesophytes, prostrate to suberect herbaceous or suffrutescent perennials
Series 7. Pleuronerviae (A. brevipes, A. fascicularis, A. paniculata, A. pinetorum)	15	California, Caribbean and Brazil highlands	shrubby, mesic to subxeric
Series 8. Scopariae	18	California, Mexico to Highlands of Peru, Brazil and Guiana	shrubby, mesic to subxeric

MATERIALS AND METHODS

Evaluation was in 2 stages. The major assessment of 284 accessions was grown in 1982 (Experiment A) and an additional 48 accessions were grown at a different site in 1986 (Experiment B).

Experiment A

Seedlings were raised in peat pots in the glasshouse and transplanted at 2 weeks into a cultivated seedbed during the first week of January 1982. The site (21°10′S, 149°10′E, elevation 5 m) was flat with a shallow, loamy-surfaced duplex soil (Dy 3.41), and an average annual rainfall of 1670 mm. Each plot was a single row of 5 plants spaced 40 cm apart with 1.5 m between rows and there were 2 replicates. A mixed Aeschynomene inoculum was watered on before transplanting and 20 kg/ha phosphorus applied 4 weeks after transplanting. Irrigation was applied to aid establishment, and plots were hand-weeded.

Characters recorded every 4 weeks included vigour, greenness, perenniality, insect and disease damage. Flowering (days from Jan. 1) was recorded twice per week. Morphological characters such as stem and leaf hairs, stem and leaf colour, stem thickness and hardness, plant habit, plant height and width, and rooting from lower branches, were recorded when the majority of accessions were flowering. Seed characters such as seed retention, potential seed yield and 1000-seed weight were recorded subsequently. Characters used in the classification analysis are shown in Table 2.

TABLE 2
Characters used in classification analysis

Character	Observation
Agronomic Days to first flower Days to first ripe seed Seed set Seed retention 1000-seed weight (g) Perenniation (%) Leaf/stem ratio (%) Powdery mildew disease Anthracnose disease	Date when 50% of plants commenced flowering. Date when 50% of plants carried ripe pods. Rating 1-4 scale; 1 = very poor, 4 = good. Rating 1-4 scale; 1 = very poor, 4 = good. Air dried Percentage of crowns surviving 12 months after planting. Visual estimate to nearest 5% at flowering. Susceptibility rating 1-5 scale; 1 = no effect, 5 = very severe. Susceptibility rating 1-4 scale; 1 = no effect, 4 = dead.
Gross Morphology Habit Plant height (cm) Plant width (cm)	Erect, semi-erect, ascendent, decumbent, prostrate, shrubby, trailing. Maximum attained. Maximum attained.

Numerical Methods

The mixed data set was analysed using various programs available on the TAXON library (Ross 1983). The data set was converted to a matrix using the program MSED (Lance and Williams 1967). This matrix was then used in generating a hierachial classification using the intensely clustering strategy, SAHN (Lance and Williams 1966), and with program MST (Prim 1957) to generate a minimum spanning tree. The diagnostic program GCOM (Lance *et al.* 1968) was used to interpret the classification.

From previous experience, it was obvious that the initial set of 284 accessions would present problems in interpretation and presentation of the minimum spanning tree because of its size. It was difficult to decide on what basis to split the set. One option was to treat the 2 sections of the genus, Aeschynomene and Ochopodium, separately, but the section Aeschynomene would still be too large. It was finally decided to distinguish between A. americana accessions (126) and accessions of other species. (Nineteen A. americana accessions were also included in the latter group because they had similar attributes to some A. villosa accessions).

A hierachial classification and minimum spanning tree were constructed on each of the 2 data sets. As A. villosa was the best represented species in the 'other species' set of data, a hierachial classification and minimum spanning tree were also constructed on its 49 accessions.

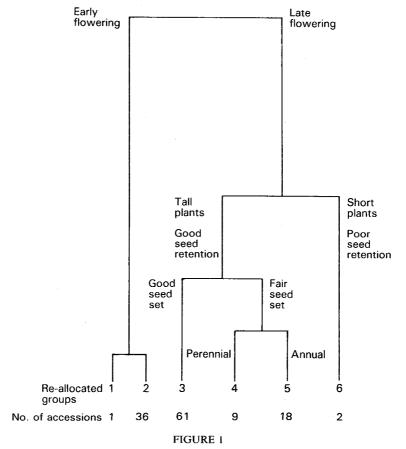
Experiment B

In a second experiment in Mackay in January 1986, seedlings of 48 accessions were transplanted into a clay loam alluvial soil using unreplicated rows of 5 plants, 40 cm apart and 2.5 m between rows. Sufficient data was recorded for intuitive allocation of accessions to groups defined in the previous experiment and the accession data (annotated B) is included in Table 3.

RESULTS

A. americana

The SAHN dendogram for the 127 A. americana accessions is shown in Figure 1. Although SAHN is an agglomerative classification, we will, as is the convention, treat it as divisive in examining the groupings.



Hierachial Classifications of the A. americana accessions derived from SAHN analysis using attributes listed in Table 2. Main attributes contributing to SAHN divisions are listed on the dendrogram. Accessions in each group are identified in Table 3

The first division was on plant maturity with 37 members early maturing (mean first flowering < 80 days, mean first ripe seed < 113 days) and 90 members late maturing (mean first flowering > 122 days, mean first ripe seed > 170 days). Potential seed production also influenced this first division; early maturing members all had fair

to good seed production potential. Subsequent splits were on attributes such as seed set and retention, perenniality and growth habit. Five groups were chosen as the most appropriate level of subdivision and this was increased to 6 groups after some re-allocation.

A minimum spanning tree was constructed to confirm the inter-relationships between the final groups. The tree revealed considerable diversity to Group 2 accessions and 1 accession with quite distinct features and located terminally on one of the Group 2 branches was re-allocated (Group 1), as in figure 1. The tree is not presented.

The A. americana groups and their distinguishing characteristics are: Group 1 (1 member)—very large seeded, early maturing with some perennation; Group 2 (36 members)—early flowering (mean 79 days), annuals; Group 3 (60 members)—good seed set and retention, mid season flowering (mean 118 days), annuals; Group 4 (9 members)—perennials, fair set and good seed retention, late flowering (mean 135 days); Group 5 (18 members)—poor or fair seed set and good retention, late flowering (mean 134 days), annuals; Group 6 (2 members)—low growing with poor seed retention, mid season flowering (mean 118 days), annuals. Of the 20 A. americana accessions grown in experiment B, 18 were allocated intuitively to Group 3, one to Group 2 and one to Group 5. Individual accessions showing group allocations and main characteristics are presented in Table 3.

Species other than A. americana

A minimum spanning tree of the 177 accessions from 23 species is shown in Figure 2. A. villosa is the best represented species (with 49 accessions) and is centrally situated on the tree, dividing a fairly loosely related group of early maturing, shrubby, mainly annual species on the left, from a closely related group of perennial species on the right. Accessions on the left are mainly Section Aeschynomene species and those on the right, Section Ochopodium species, as delineated in Table 1.

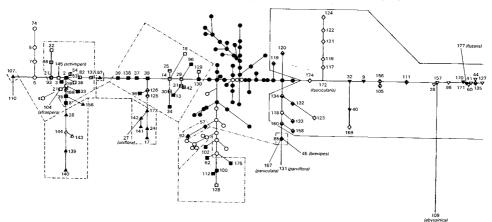


FIGURE 2

Minimum spanning tree derived from NEBALL analysis. Symbols indicate species names and boxed-in areas indicate species with similar agronomic characteristics. Species represented by a single accession are named. M-A groups within species are indicated in Table 3. A. americana (\bigcirc) (accessions not identified); A. brasiliana (\bigcirc); A. brevifolia (\bigcirc); A. ciliata (\bigcirc); A. deamii (\triangle); A. denticulata (\square); A. elegans (\bigcirc); A. evenia (\square); A. filosa (\bullet); A. histrix (\bigcirc); A. indica (\blacksquare); A. sensitiva (\triangle); A. villosa (\bullet) (accessions not identified)

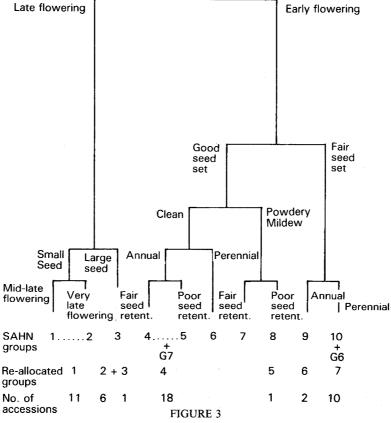
Of the Section Aeschynomene species, A. indica has 19 accessions; all are annuals but are diverse and scattered over 3 main areas of the tree. Closely related and inter-mingled with A. indica on the tree is A. scabra (7 accessions), A. evenia (8

accessions), A. denticulata (7 accessions), A. ciliata (2 accessions) and A. filosa (2 accessions). The other main species is A. sensitiva (11 accessions) and the closely related A. deamii (2 accessions). Most of the accessions from these 2 species are perennials but have similarities of plant habit (shrubby, thick stems), low leaf/stem ratios and early maturity. The 3 single accession species (A. afraspera, A. uniflora and A. schimperi) are annuals of African origin, have similar agronomic features, and are terminally located on branches on the left of the tree.

The perennial Section Ochopodium species (on the right of the tree) consist of A. brasiliana (9 accessions), A. histrix (8 accessions), A. falcata (5 accessions), A. brevifolia (3 accessions), A. elegans (8 accessions), A. paniculata (1 accession), A. brevipes (1 accession) and A. fascicularis (1 accession). Other perennial species on the right are 1 A. filosa accession, 1 A. parviflora accession (both Section Aeschynomene) and A. flutans and A. abyssinica, both of African origin. Allocation to groups and accession attributes are presented in Table 3.

A. villosa

The SAHN dendrogram of the *A. villosa* accessions is shown in Figure 3. The collection of this species also proved to be diverse. The classification was taken to 10 groups, but was subsequently reduced by re-allocation to 7 groups as indicated in Figure 3.



Hierachial Classification of the A. villosa accessions showing original SAHN 10 group level and (authors) re-allocation to 7 groups. Main attributes contributing to SAHN divisions are listed on the dendrogram.

Accessions in each group are identified in Table 3

The first split was on plant maturity with 31 early maturing accessions (mean 90 days to first flowering, mean 120 days to first ripe seed) and 18 late maturing accessions (mean 113 days to first flowering, mean 153 days to first ripe seed). The early accessions tended to be ascendant and prostrate with thinner stems compared to the late accessions which were more semi-erect and prostrate forms with thicker stems; some tended towards shrubby types. Subsequent splits involved characteristics such as seed set and retention, perenniality, seed size, plant habit and vigour.

A minimum spanning tree was constructed (Figure 4) and the SAHN groups superimposed to check their pattern of distribution. A good correlation was achieved and this helped in the re-allocation and re-combination of the 10 groups to 7, as shown on the dendrogram (Figure 3).

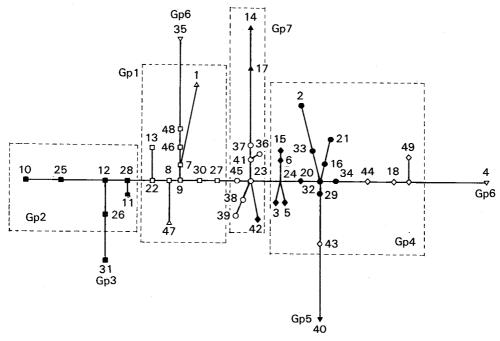


FIGURE 4

Minimum spanning tree for A. villosa derived from NEBALL analysis. Symbols indicate original SAHN groups and boxed-in areas indicate the re-allocated groups from Figure 3. Group 1 (Δ); Group 2 (\square); Group 3 (\blacksquare); Group 4 (\bullet); Group 5 (\bullet); Group 6 (\circ); Group 7 (\diamond); Group 8 (\blacktriangledown); Group 9 (\circ); Group 10 (Δ)

The groups and their characteristics are: Group 1 (11 accessions)—late, short to medium height, small seeded annuals; Group 2 (6 accessions)—late, tall, large seeded annuals; Group 3 (1 accession)—tall, shrubby, perennial; Group 4 (18 accessions)—early, ascendent-prostrate annuals with good seed set and poor to fair retention; Group 5 (1 accession)—very small, compact, annual with high leaf-stem ratio but poor seed retention; Group 6—(2 accessions) short annuals (although terminally located and wide apart on the tree they have been left in the same group), accession 4 having best seed retention and accession 35, the only one with trailing growth habit; Group 7 (10 accessions)—strong perennials. The main characteristics of individual accessions and their allocated groups are shown in Table 3.

The accessions grown in experiment B contained 3 new species (A. pinetorum, A. virginica and A. rudis). There was also 1 accession from Madagasca (52332) not yet named. Data from all accessions in experiment B are presented in Table 3.

TABLE 3
Aeschynomene species, their M-A Groups and main characteristics of accessions

Accession	Code			Annual-	Uahit	P	lant	Stem	L/S	Days to flower-	Seed set	1000-
Accession	Code	Cry	Lat.	Perennial	Habit	Ht	ensions Wdth	thickness	ratio	ripe seed (from Jan. 1)	retention	seed wt
A. abyssinica			10.00		_	400						
52331A 52331B	В 109	ZIM ZIM	19.00 19.00	P P	E E Sh	100 120	30 40	2- 5	20	240/270	F/F	NA
52334	В		13.05	P	E Sn	100	30	2- 5 2- 5	25 20	320/ NA 240/270	F/F F/F	10.0 NA
A. afraspera			15.05	•	-	100	30	2- 3	20	240/270	r/r	INA
52333	158	ZMB		Α	S Sh	130	140	> 10	2,5	68/ 88	G/G	10.3
A. american	a Group			_					,			
93060	~ C		17.36	P	E A Sh	130	160	5 - 10	30	95/131	F/G	8.9
A. americano 40016*	a Group		17.42	Α	E A Sh	100	160	5 10	25	95/131	0.0	2.7
40017*			14.46	A	S A Sh	120	130	5-10 5-10	35 40	74/104	G/G G/G	3.7 4.3
40021A*			18.08	Ā	A Sh	95	150	5-10	30	81/109	G/G	4.9
43997		USA		A	A Sh	130	170	5-10	30	74/104	F/F	3.5
43998* 53950		LKA ARG		A A	E Sh S A Sh	150	130	> 10	30	124/153	F/F	2.8
70253		ZMB		A	A Sh	100 150	140 150	5–10 > 10	35 30	46/ 65 117/153	G/G F/F	4.2 2.4
81958			20.24	Â	S Sh	70	120	5-10	30	88/109	G/G	5.8
87814			18.10	Α	S A Sh	90	130	5-10	30	54/ 81	G/G	4.0
90811			22.55	A	S A Sh	150	170	> 10	30	88/124	G/G	4.0
91070 91092			24.12	A	S A Sh	130	160	5-10	25	60/ 81	G/G	3.9
91092			22.49 22.40	A A	S A Sh E A Sh	190 160	170 170	> 10 > 10	30 30	68/109 68/104	G/G G/G	4.3 4.3
91099A			22.25	Â	S A Sh	155	170	5-10	30	95/131	G/G G/G	4.3
91102			23.00	Ä	S	90	145	2- 5	30	54/ 81	G/G	4.3
91145			18.27	Α	S A	110	160	5-10	35	88/117	G/F	3.6
91155			18.26	A	S A Sh	140	150	5-10	35	104/146	G/P	3.1
91160			18.24	A	SA	80	170	5–10	25	74/109	F/F	6.0
91235 91241			18.50 18.53	A A	S A S A	70 120	160 160	2- 5 5-10	40	88/117	G/P	2.6
92766	В	MEX	10.33	A	S	80	150	5-10 5-10	35 45	95/124 69/ 99	G/G G/G	3.1 4.8
93556	_	BRA	21.25	Ä	S A Sh	140	160	> 10	30	74/109	G/G	3.5
93557		COL	4.10	Α	S A Sh	130	160	5-10	30	65/ 95	G/G	4.1
93576		VEN		A	S A Sh	170	180	> 10	30	88/124	G/G	3.9
93579 93581		BRA COL		A A	E A Sh	170	130	5-10	30	68/104	G/G	4.4
93582		COL		A	E A Sh E A Sh	150 135	150 145	5–10 > 10	30 30	88/124 81/109	G/G F/G	3.9 4.4
93586		PAN		A	E A Sh	150	135	5-10	30	74/109	G/G	4.6
93588		COL		Α	E A Sh	140	150	5-10	30	109/146	F/G	3.8
93589		MEX	18.00	A	E A Sh	120	150	5-10	25	60/ 95	G/G	4.1
93614A 93624		RR A	20.02	A A	E A Sh E A Sh	105 120	160 150	5-10 5-10	25 30	95/131 65/ 95	F/G G/G	3.9
93632		COL	20.02	A	E A Sh	160	160	> 10	30	109/153	G/G	6.5 3.1
93660			18.00	A	E A Sh	100	130	5-10	25	54/ 88	G/G	3.9
93665			17.38	Α	E A Sh	170	150	> 10	30	68/109	G/G	4.4
93668			18.32	A	S A Sh	120	140	5-10	30	104/146	G/F	4.9
93670 A. americano	a Group		19.27	A	E A Sh	165	170	5–10	30	95/131	G/G	3.9
15287	2 Oloup	,		Α	E A Sh	200	160	> 10	35	117/153	G/G	3.0
18648				Ä	E A Sh	200	165	> 10	35	117/153	G/G	2.8
29549				Ā	E A Sh	210	160	> 10	35	117/153	G/G	3.4
30656				A	E A Sh	175	150	> 10	35	117/153	F/G	3.4
36373		CTM	1407	A	S A Sh	175	150	5-10	40	117/153	F/G	2.6
36592* 36594*			14.07 14.07	A A	E A Sh E A Sh	160 180	160 190	5-10 > 10	40 40	117/153 117/153	F/G F/G	2.8
37138			19.10	A	E Sh	190	160	> 10	35	109/153	G/G	4.3 3.9
37240		SLV	13.40	A	S A	130	150	5-10	35	162/251	G/G	3.0
37255*		SLV	13.40	Ą	S A	125	230	5-10	35	155/183	G/G	2.5
37264 * 37327			14.10	A	SA	85	160	5-10	35	104/183	G/G	2.6
38308A		NIC VFN	10.14	A A	A Sh S A Sh	190 190	250 200	> 10 5-10	30 40	109/177 117/153	G/G F/G	4.0 3.4
38566		· 1.11	10.14	Â	E A Sh	170	130	> 10	30	124/166	P/G	3.8
40029		BRA		A	SAS	70	210	5-10	35	121/142	F/G	6.8
56282				A	E Sh	190	230	> 10	35	74/104	G/G	4.0
58491 (Glen	n)		22.10	A	S A Sh	130	180	5-10	40	104/146	G/G	2.7
58522* 67763		VEN	7.00	A	E A Sh	185	170	> 10	35	124/153	G/G	4.1
70244		VNM IDN	6.34	A A	S A E A Sh	80 170	290 170	5-10 5-10	45 40	111/156 117/153	C/C	3.6
85839			16.35	A	S A Sh	160	170	5-10 5-10	35	117/153	G/G G/G	2.4 3.4
86168			19.27	Â	S A Sh	150	160	5-10	35	95/138	G/G	3.6
87529			18.30	Α	S A Sh	90	160	5-10	35	153/209	P/G	4.0
87545			18.28	P	S A Sh	120	150	5-10	35	117/166	F/G	3.8
87552		MEX	18.20	Α	S A Sh	160	170	5–10	30	170/153	F/G	2.7

87556		MEX 18.28	A	E A Sh 140	180	5-10	35	117/153	P/G	3.4
91099B		MEX 22.25	A	S A Sh 155	170	5-10	35	88/131	G/G	4.1
91158		MEX 18.26	Α	S A Sh 150	160	5-10	35	109/146	G/G	3.9
91327		MEX 16.09	Ą	E A Sh 160	150	5-10	35	104/146	G/G	3.0
91345		MEX 16.19	Ą	E A Sh 160	160	5–10	35	109/138	G/G	3.5
91458 92506		MEX 19.45	Ą	E Sh 210	130	> 10	35	117/153	G/G	4.2
92500		COL VEN	A	E A 100	160	5-10	30	128/162	G/G	2.9
93554		BLZ	A A	E S A S 200 S A Sh 100	250	> 10	45	101/150	G/G	5.4
93555		HND 15.55	A	S P Sh 120	² 150 160	5-10 5-10	35 30	124/166 124/176	F/G P/G	3.3
93558		BLZ 17.25	A	SAPSh 80	150	5-10	35	153/209	P/G P/G	3.3 4.0
93567		ARG	A	SAPSh 120	200	5-10	35	124/166	G/G	2.4
93569		PAN	Α	S A Sh 125	190	5-10	35	117/153	G/G	3.1
93570		PAN	Α	SAP 80	220	2- 5	30	131/166	P/G	2.3
93571 93572		PAN	Ą	A P 80	230	2- 5	35	109/153	P/G	3.2
93573		PAN PAN	A P	S A P 130 S A P 110	220 160	5-10 5-10	35	117/153	F/G	3.6
93577		VEN	À	E A Sh 170	160	5-10	35 35	117/166 109/138	G/G G/G	1.9 3.5
93578		VEN	Ā	S A Sh 160	150	5-10	30	109/153	G/G	3.4
93587		VEN	Α	SAPSh 130	180	5-10	35	109/146	G/G	3.1
93591		MEX	A	S A Sh 170	180	> 10	30	117/153	F/G	2.9
93607		VENI	Ą	ESASh 170	200	5-10	35	153/209	F/G	4.4
93639 93640		VEN COL	A	SAPSh 150	180	5-10	35	117/153	F/G	3.6
93641		VEN 9.00	A A	S A Sh 110 S A Sh 125	140	5-10	35	117/153	F/G	3.7
93642		VEN 9.00	A	SAPSh 100	160 140	5-10 5-10	35 30	117/153	G/G	3.5
93651		MEX 18.30	P	S A Sh 120	180	5-10	30	124/166 153/166	F/G P/G	3.5 4.2
93652		MEX 18.28	P	S A Sh 130	160	5-10	30	117/153	P/G	3.5
93656		MEX 18.25	Ā	S A Sh 150	180	5-10	30	117/153	P/G	3.4
93657		MEX 18.25	Α	S A Sh 160	160	5-10	30	131/166	F/G	3.9
93658		MEX 18.25	Α	S A Sh 140	160	5-10	30	109/153	P/G	3.3
93659 93664		MEX 17.50	P	S A Sh 135	150	5-10	30	109/148	P/G	3.6
105103	В	MEX 17.50 IDN	P A	S A Sh 150 E A S 70	150	5-10	25	124/202	P/G	3.9
105120	В	IDN	Â	EAS 70 AS 40	140 170	> 10 5-10	20 30	105/146 109/150	F/G F/G	2.6
105215	В	IDN	Ã	A S 80	180	> 10	40	105/146	VG/G	3.0
105228	В	IDN	Α	D S 70	200	> 10	35	109/150	G/G	3.2
105237	В	IDN	A	S A S 60	230	5-10		109/146	G/G	2.9
105243 105280	B B	IDN	Ą	S A S 60	200	5-10	30	100/146	G/G	2.7
105286	В	IDN IDN	A	SAS 40	220	> 10	30	105/155	VG/G	2.8
105305	В	IDN	A A	SAS 80 EAS 60	210 180	> 10 > 10	30	100/146	G/G	3.5
105810	B	IDN	Ā	S A S 40	160	5-10	30 35	100/121 109/150	G/G F/G	3.3 2.5
105868	B	IDN	A	EAS 60	200	> 10	30	109/146	F/G F/G	4.0
105905	В	IDN	Α	S A S 120	240	> 10	40	120/140	G/G	3.0
106906	В	IDN	Α	S A 80	260	5-10	50	111/143	G/G	2.8
Q10854			A	E Sh 125	130	5-10	50	104/146	G/G	4.8
Q20737 P6698		MEV 10.10	A	EA 110	220	> 10	30	128/163	G/G	4.3
P6699*		MEX 19.10 MEX 19.10	A A	E A Sh 185 E Sh 190	160 170	> 10 > 10	35	109/153	F/G	3.9
P6703*		NIC 12.16	Â	E A Sh 200	160	> 10	35 35	104/146 109/177	G/G G/G	3.4
P6704A*		NIC 12.52	A	A Sh 150	180	5-10	35	109/183	. G/G	3.3
P6704B*	_	NIC 12.52	Α	A Sh 150	180	5-10	35	117/183	G/G	3.0
A. america 87809				G + G1 + 4.0						
87815	141 142	MEX 18.15 MEX 18.10	P P	S A Sh 160 E A Sh 110	170	5-10	30	153/209	P/G	3.7
87816	143	MEX 18.05	P	E A Sh 110 S A Sh 130	160 160	5-10 5-10	30 30	117/166	F/G	4.0
87824	144	MEX 17.38	P	E A Sh 150	160	5-10	35	124/166 153/209	P/G P/G	3.9 4.3
87835	145	MEX 17.45	P	E A Sh 160	170	5-10	35	131/166	P/G	4.2
92689	280	COL 11.14	P	E A Sh 130	150	5-10	30	131/202	P/G	3.2
93574	180	PAN	P	S A Sh 110	160	5-10	35	153/209	P/G	2.4
93608 93667	238	MEX 17.50	P	S A Sh 150	160	5-10	30	124/169	P/G	3.7
A. america	275	MEX	P	S A Sh 130	130	5–10	30	131/209	P/G	3.3
38759	na Oroup	COL 4.12	Α	E D Sh 110	130	> 10	30	129/202	D/C	2.1
38802		COL 4.11	Â	E A Sh 90	110	> 10	30	138/202 138/202	P/G P/G	3.1 3.4
85901		MEX 17.31	A	E A Sh 190	150	> 10	30	153/209	P/F	4.9
85927		MEX 18.20	Α	E A Sh 180	160	> 10	30	153/209	P/G	5.3
87548		MEX 18.15	A	E Sh 90	170	5-10	30	153/209	P/G	3.5
92508 92712	В	COL 5.55	P	S A 50	130	5-10	30	135/	F/G	1.3
93575		COL 11.18 VEN	A A	S Sh 75 E A Sh 130	130	5-10	20	131/202	P/G	2.2
93580		COL	P	E A Sh 130 E A Sh 120	150 140	> 10 5–10	30 30	131/202 138/202	P/G F/G	3.7
93583		COL	Â	E A Sh 205	150	> 10	30	117/153	F/G F/G	1.6 3.3
93584		PAN	Α	EAPSh 160	100	5-10	30	109/153	F/G	3.4
93585 93590		MEV 19.00	A	E A Sh 150	190	5-10	30	166/292	P/G	5.6
93653		MEX 18.00 MEX 18.28	A P	E A Sh 150	150	5-10	30	138/202	P/G	4.3
/3033		WIEA 10.20	P	E A Sh 140	160	5–10	30	117/176	P/G	3.2

93654		18.26	Α	E A Sh	170	170	> 10	30	131/166	P/G	3.1
93661		18.07	P	E A Sh	180	170	5-10	30	131/166	P/G	3.9
93662 93663		18.07 17.50	A P	E A Sh	170	180	5-10	30	124/166	P/G	3.8
93672	COL	17.30	A	E A Sh E A Sh	130 185	150 130	5–10 > 10	35 30	117/202	P/G	3.6
A. americana Group				. A Sii	103	130	/ 10	30	131/202	F/G	2.4
91132		18.26	Α	ΑP	40	160	2- 5	35	109/146	G/P	2.9
91139		18.27	Α	A P	40	140	2- 5	35	109/146	G/P	2.4
A. brasiliana Group 93056 174		17.40	D	C CI-	00	110		•			
92592 116		17.48 21.25	P P	S Sh S	80 90	110 125	5-10 2- 5	20	74/117	F/P	2.6
93593 117		21.23	P	S	70	120	2- 3 2- 5	25 25	48/ 74 48/ 68	F/G F/F	3.3 2.4
93627 121	COL		P	ŠT	55	140	2- 5	25	60/ 88	F/G	1.6
93630 122	VEN		Α	SDT	65	140	2- 5	30	65/ 88	F/G	1.7
93643 124	VEN		Α	S D	80	150	2- 5	30	65/ 88	F/F	1.6
A. brasiliana Group 92499 B	COL			S	0.0	220					
93594 118	VEN		A P	S P	80 55	220 110	2- 5 2- 5	45 30	97/154 109/146	F/F	2.1
93637 123	BRA		P	S Sh	110	110	5-10	40	131/202	F/F F/F	1.6 3.5
A. brasiliana Group	3		_		•••	*10	5 10	••	1311202	1/1	3.3
92519 169	BRA		P	PΤ	25	240	2- 5	30	48/ 88	F/F	4.9
A. brevifolia Group 1 52335 111		19.04	Р	PТ	-	CO		20	45.574		
52336 105		19.04	P	PT	5 5	60 40	< 2 < 2	30 30	47/NA 54/NA	F/F	3.0
52337 # 106		15.40	P	PΤ	10	70	$\stackrel{>}{<}$ $\stackrel{>}{2}$	NA	54/ 68	F/F NA	2.8 NA
A. brevipes Group 1						, 0	` -	1171	347 00	INA.	11/1
34717 45	BRA	21.45	P	S	150	140	5-10	15	104/196	F/P	3.6
A. ciliata Group I	CDI	10.00		0.01	400						
93597 125 93666 126		10.00 18.00	A A	S Sh S Sh	120	150	> 10	20	88/109	F/G	7.8
A. deamii Group 1	MEA	18.00	А	3 311	105	135	> 10	20	57/ 74	F/G	8.3
93611 143	MEX	18.48	P	E Sh	170	60	> 10	15	81/104	P/G	12.0
93612 144		18.48	P	E Sh	170	70	> 10	15	88/117		10.4
A. denticulata Group									00/11/	1,0	10
37550 14		26.35	Ą	S Sh	60	90	5-10	15	24/ 41	F/F	5.6
38175 42		26.47	A	S Sh	80	120	5-10	20	24/ 39	G/G	5.2
39058 25 53951 29	ARG	24.49	A	S	50	80	2- 5	15	20/ 39	G/F	6.1
78348 30		24.46	A A	S Sh E Sh	80 60	120 70	5-10 5-10	20 20	24/ 41 24/ 39	G/F F/F	6.2 5.3
78351 31		28.53	A	S Sh	75	115	> 10	20	19/ 39	G/G	5.9
93623		20.07	P	S A Sh	95	130	5-10	30	24/ 41	G/G	5.7
A. elaphroxylon Grov		A C-1			,				~		
46891 (occurs in Tro A. elegans Group 1	p. Easi	Airica,	iarge per	enniai sni	ruo witi	n spiny s	stems; dug	out beto	ore flowering)		
90896 60	MEX	26.40						NA	461.60		1.7
A. elegans Group 2		20.40	A	SPT	15	70	2- 5		46/ 6X	\mathbf{P}/\mathbf{P}	
		20.48	Α	SPT	15	70	2- 5	1974	46/ 68	P/P	1.7
37552 # 26	ARG	26.38	P	S P	15	70	2- 5	25	46/ 68 183/NA	P/P NA/NA	
40020 B	ARG BOL		P P	S P P	15 20	70 160	2- 5 2- 5	25 45	183/NA 77/127	NA/NA G/F	
40020 B 57978 B	ARG BOL BRA	26.38	P P P	S P P P	15 20 25	70 160 110	2- 5 2- 5 2- 5	25 45 45	183/NA 77/127 96/173	NA/NA G/F G/F	2.0
40020 B 57978 B 92523 B	ARG BOL BRA COL	26.38	P P P	S P P P S P	15 20 25 25	70 160 110 130	2- 5 2- 5 2- 5 2- 5	25 45 45 45	183/NA 77/127 96/173 97/169	NA/NA G/F G/F G/F	2.0
40020 B 57978 B 92523 B 93628 157	ARG BOL BRA	26.38	P P P	S P P P	15 20 25	70 160 110	2- 5 2- 5 2- 5	25 45 45	183/NA 77/127 96/173	NA/NA G/F G/F	2.0
40020 B 57978 B 92523 B	ARG BOL BRA COL COL	26.38	P P P	S P P P S P	15 20 25 25	70 160 110 130	2- 5 2- 5 2- 5 2- 5 2- 5	25 45 45 45 NA	183/NA 77/127 96/173 97/169 NA/290	NA/NA G/F G/F G/F P/P	2.0 2.0 1.5
40020 B 57978 B 92523 B 93628 157 A. elegans Group 3 P6814 # 41 40019 # 44	ARG BOL BRA COL COL HND BOL	26.38 18.00	P P P P P	S P P P S P S P S P	15 20 25 25 10	70 160 110 130 60	2- 5 2- 5 2- 5 2- 5	25 45 45 45	183/NA 77/127 96/173 97/169	NA/NA G/F G/F G/F	2.0 2.0 1.5 1.7
40020 B 57978 B 92523 B 93628 157 A. elegans Group 3 P6814 # 41 40019 # 44 93598 # 127	ARG BOL BRA COL COL	26.38 18.00	P P P P	S P P P S P S P	15 20 25 25 10	70 160 110 130 60	2- 5 2- 5 2- 5 2- 5 2- 5 2- 5	25 45 45 45 NA NA	183/NA 77/127 96/173 97/169 NA/290 NA/NA	NA/NA G/F G/F G/F P/P	2.0 2.0 1.5 1.7 NA
40020 B 57978 B 92523 B 93628 157 A. elegans Group 3 P6814 # 41 40019 # 44 93598 # 127 A. evenia Group 1	ARG BOL BRA COL COL HND BOL PAN	26.38 18.00	P P P P P P NA	S P P P S P S P S P	15 20 25 25 25 10 25 15 20	70 160 110 130 60 50 30 20	2- 5 2- 5 2- 5 2- 5 2- 5 2- 5 NA 2- 5 2- 5	25 45 45 45 NA NA NA NA	183/NA 77/127 96/173 97/169 NA/290 NA/NA NA/NA NA/NA	NA/NA G/F G/F G/F P/P NA/NA NA/NA	2.0 1.5 1.7 NA 1.5
40020 B 57978 B 92523 B 93628 157 A. elegans Group 3 P6814 # 41 40019 # 44 93598 # 127 A. evenia Group 1 28755 36	ARG BOL BRA COL COL HND BOL PAN SEN	26.38 18.00 14.09 17.20	P P P P P P NA	S P P P S P S P S P T NA S P P T	15 20 25 25 25 10 25 15 20	70 160 110 130 60 50 30 20	2- 5 2- 5 2- 5 2- 5 2- 5 2- 5 NA 2- 5 2- 5 > 10	25 45 45 45 NA NA NA NA NA	183/NA 77/127 96/173 97/169 NA/290 NA/NA NA/NA NA/NA	NA/NA G/F G/F G/F P/P NA/NA NA/NA NA/NA	2.0 2.0 1.5 1.7 NA 1.5 4.3
40020 B 57978 B 92523 B 93628 157 A. elegans Group 3 P6814 # 41 40019 # 44 93598 # 127 A. evenia Group 1	ARG BOL BRA COL COL HND BOL PAN	26.38 18.00	P P P P P P NA	S P P P S P S P S P	15 20 25 25 25 10 25 15 20	70 160 110 130 60 50 30 20	2- 5 2- 5 2- 5 2- 5 2- 5 2- 5 NA 2- 5 2- 5	25 45 45 45 NA NA NA NA	183/NA 77/127 96/173 97/169 NA/290 NA/NA NA/NA NA/NA 65/ 81 63/ 81	NA/NA G/F G/F G/F P/P NA/NA NA/NA G/F	2.0 2.0 1.5 1.7 NA 1.5 4.3 2.7
40020 B 57978 B 92523 B 93628 157 A. elegans Group 3 P6814 # 41 40019 # 44 93598 # 127 A. evenia Group 1 28755 36 40026 22 40027 21 40028 20	ARG BOL BRA COL COL HND BOL PAN SEN BRA	26.38 18.00 14.09 17.20 14.38 8.10	P P P P P P NA A	S P P S P S P S P NA S P P T E S Sh E Sh	15 20 25 25 25 10 25 15 20 200 135	70 160 110 130 60 50 30 20	2- 5 2- 5 2- 5 2- 5 2- 5 2- 5 NA 2- 5 2- 5 > 10 > 10 > 10	25 45 45 45 NA NA NA NA NA 30 30	183/NA 77/127 96/173 97/169 NA/290 NA/NA NA/NA NA/NA	NA/NA G/F G/F G/F P/P NA/NA NA/NA NA/NA	2.0 2.0 1.5 1.7 NA 1.5 4.3
40020 B 57978 B 92523 B 93628 157 A. elegans Group 3 P6814 # 41 40019 # 44 93598 # 127 A. evenia Group 1 28755 36 40026 22 40027 21 40028 20 40031 19	ARG BOL BRA COL COL HND BOL PAN SEN BRA BRA	26.38 18.00 14.09 17.20 14.38 8.10 8.06	P P P P P P NA A A	S P P S P S P S P NA S P P T E S Sh E Sh	15 20 25 25 25 10 25 15 20 200 135 190	70 160 110 130 60 50 30 20 140 135 160	2- 5 2- 5 2- 5 2- 5 2- 5 2- 5 NA 2- 5 2- 5 > 10 > 10	25 45 45 45 NA NA NA NA 30 30 30	183/NA 77/127 96/173 97/169 NA/290 NA/NA NA/NA NA/NA 65/ 81 63/ 81 81/ 95	NA/NA G/F G/F G/F P/P NA/NA NA/NA O/F P/G F/F	2.0 1.5 1.7 NA 1.5 4.3 2.7 5.0
40020 B 57978 B 92523 B 93628 157 A. elegans Group 3 P6814 # 41 40019 # 44 93598 # 127 A. evenia Group 1 28755 36 40026 22 40027 21 40028 20 40031 19 A. evenia Group 2	ARG BOL BRA COL COL HND BOL PAN SEN BRA BRA BRA BRA	26.38 18.00 14.09 17.20 14.38 8.10 8.06 3.41 5.30	P P P P P NA A A A	S P P P S P S P S P NA S P P T E S Sh E Sh E Sh	15 20 25 25 10 25 15 20 200 135 190 160 190	70 160 110 130 60 50 30 20 140 135 160 150	2- 5 2- 5 2- 5 2- 5 2- 5 2- 5 NA 2- 5 2- 5 > 10 > 10 > 10 > 10	25 45 45 45 NA NA NA NA 30 30 30 30 30	183/NA 77/127 96/173 97/169 NA/290 NA/NA NA/NA 63/ 81 63/ 81 81/ 95 112/117 74/117	NA/NA G/F G/F G/F P/P NA/NA NA/NA NA/NA G/F P/G F/F G/G	2.0 1.5 1.7 NA 1.5 4.3 2.7 5.0 NA 4.2
40020 B 57978 B 92523 B 93628 157 A. elegans Group 3 P6814 # 41 40019 # 44 93598 # 127 A. evenia Group 1 28755 36 40026 22 40027 21 40028 20 40031 19 A. evenia Group 2 43192 18	ARG BOL BRA COL COL HND BOL PAN SEN BRA BRA BRA BRA	26.38 18.00 14.09 17.20 14.38 8.10 8.06 3.41	P P P P P P NA A A A A	S P P P S P S P S P S P T E S Sh E Sh E Sh E Sh S Sh	15 20 25 25 10 25 15 20 200 135 190 160 190	70 160 110 130 60 50 30 20 140 135 160 150	2- 5 2- 5 2- 5 2- 5 2- 5 2- 5 NA 2- 5 2- 5 > 10 > 10 > 10 > 10 > 10	25 45 45 45 NA NA NA NA 30 30 30 30 30 30	183/NA 77/127 96/173 97/169 NA/290 NA/NA NA/NA NA/NA 65/ 81 63/ 81 81/ 95 112/117 74/117	NA/NA G/F G/F G/F P/P NA/NA NA/NA O/F P/G G/G G/G	2.0 1.5 1.7 NA 1.5 4.3 2.7 5.0 NA 4.2
40020 B 57978 B 92523 B 93628 157 A. elegans Group 3 P6814 # 41 40019 # 44 93598 # 127 A. evenia Group 1 28755 36 40026 22 40027 21 40028 20 40031 19 A. evenia Group 2 43192 18 93674 129	ARG BOL BRA COL COL HND BOL PAN SEN BRA BRA BRA BRA	26.38 18.00 14.09 17.20 14.38 8.10 8.06 3.41 5.30	P P P P P NA A A A	S P P P S P S P S P NA S P P T E S Sh E Sh E Sh	15 20 25 25 10 25 15 20 200 135 190 160 190	70 160 110 130 60 50 30 20 140 135 160 150	2- 5 2- 5 2- 5 2- 5 2- 5 2- 5 NA 2- 5 2- 5 > 10 > 10 > 10 > 10	25 45 45 45 NA NA NA NA 30 30 30 30 30	183/NA 77/127 96/173 97/169 NA/290 NA/NA NA/NA 63/ 81 63/ 81 81/ 95 112/117 74/117	NA/NA G/F G/F G/F P/P NA/NA NA/NA NA/NA G/F P/G F/F G/G	2.0 1.5 1.7 NA 1.5 4.3 2.7 5.0 NA 4.2
40020 B 57978 B 92523 B 93628 157 A. elegans Group 3 P6814 # 41 40019 # 44 93598 # 127 A. evenia Group 1 28755 36 40026 22 40027 21 40028 20 40031 19 A. evenia Group 2 43192 18	ARG BOL BRA COL COL HND BOL PAN SEN BRA BRA BRA BRA	26.38 18.00 14.09 17.20 14.38 8.10 8.06 3.41 5.30	P P P P P P NA A A A A	S P P P S P S P S P S P T E S Sh E Sh E Sh E Sh S Sh	15 20 25 25 10 25 15 20 200 135 190 160 190	70 160 110 130 60 50 30 20 140 135 160 150	2- 5 2- 5 2- 5 2- 5 2- 5 2- 5 NA 2- 5 2- 5 > 10 > 10 > 10 > 10 > 10	25 45 45 45 NA NA NA NA 30 30 30 30 30 20 25	183/NA 77/127 96/173 97/169 NA/290 NA/NA NA/NA 63/ 81 63/ 81 81/ 95 112/117 74/117 54/ 95 48/ 65	NA/NA G/F G/F G/F P/P NA/NA NA/NA NA/NA G/F P/G G/G G/G	2.0 1.5 1.7 NA 1.5 4.3 2.7 5.0 NA 4.2 3.3 4.7
40020 B 57978 B 92523 B 93628 157 A. elegans Group 3 P6814 # 41 40019 # 44 93598 # 127 A. evenia Group 1 28755 36 40026 22 40027 21 40028 20 40031 19 A. evenia Group 2 43192 18 93674 129 A. evenia Group 3 93633 128 A. falcata Group 1	ARG BOL BRA COL COL HND BOL PAN SEN BRA BRA BRA BRA BRA	26.38 18.00 14.09 17.20 14.38 8.10 8.06 3.41 5.30 12.40	P P P P P P P NA A A A A A A A A A A A A	S P P P P S P S P S P S P T E S Sh E Sh E Sh S Sh S P E S Sh	15 20 25 25 10 25 15 20 200 135 190 160 190 60 50	70 160 110 130 60 50 30 20 140 135 160 150 150	2- 5 2- 5 2- 5 2- 5 2- 5 2- 5 NA 2- 5 2- 5 > 10 > 10 > 10 > 10 > 10	25 45 45 45 NA NA NA NA 30 30 30 30 30 30	183/NA 77/127 96/173 97/169 NA/290 NA/NA NA/NA NA/NA 65/ 81 63/ 81 81/ 95 112/117 74/117	NA/NA G/F G/F G/F P/P NA/NA NA/NA O/F P/G G/G G/G	2.0 1.5 1.7 NA 1.5 4.3 2.7 5.0 NA 4.2
40020 B 57978 B 92523 B 93628 157 A. elegans Group 3 P6814 # 41 40019 # 44 93598 # 127 A. evenia Group 1 28755 36 40026 22 40027 21 40028 20 40031 19 A. evenia Group 2 43192 18 93674 129 A. evenia Group 3 93633 128 A. falcata Group 1 11500 (Bargoo) 40	ARG BOL BRA COL COL HND BOL PAN SEN BRA BRA BRA BRA BRA	26.38 18.00 14.09 17.20 14.38 8.10 8.06 3.41 5.30	P P P P P P NA A A A A A A A A A	P P P P S P S P S P S P P T E S Sh E Sh E Sh S P F S P T E S Sh F S P E S Sh P T	15 20 25 25 25 10 25 15 20 200 135 190 60 50 140 20	70 160 110 130 60 50 30 20 140 135 160 150 150	2- 5 2- 5 2- 5 2- 5 2- 5 2- 5 NA 2- 5 2- 5 2- 10 > 10 > 10 > 10 > 10 > 10 > 10 > 10 >	25 45 45 45 NA NA NA NA 30 30 30 30 30 25 25	183/NA 77/127 96/173 97/169 NA/290 NA/NA NA/NA NA/NA 63/ 81 63/ 81 81/ 95 112/117 74/117 54/ 95 48/ 65 34/ 41	NA/NA G/F G/F G/F P/P NA/NA NA/NA NA/NA G/F P/G G/G G/G F/F	2.0 1.5 1.7 NA 1.5 4.3 2.7 5.0 NA 4.2 3.3 4.7 3.6 2.4
40020 B 57978 B 92523 B 93628 157 A. elegans Group 3 P6814 # 41 40019 # 44 93598 # 127 A. evenia Group 1 28755 36 40026 22 40027 21 40028 20 40031 19 A. evenia Group 2 43192 18 93674 129 A. evenia Group 2 43192 18 93674 129 A. evenia Group 3 93633 128 A. falcata Group 1 11500 (Bargoo) 40 43745 32	ARG BOL BRA COL COL HND BOL PAN SEN BRA BRA BRA BRA BRA BRA BRA	26.38 18.00 14.09 17.20 14.38 8.10 8.06 3.41 5.30 12.40	P P P P P NA A A A A A A	P P P S P S P S P P T E S Sh E Sh E Sh E Sh P P T E S Sh F P T E S Sh F P T E S Sh	15 20 25 25 25 10 25 15 20 200 135 190 160 190 60 50	70 160 110 130 60 50 30 20 140 135 160 150 150 160 100	2- 5 2- 5 2- 5 2- 5 2- 5 2- 5 NA 2- 5 2- 5 >10 >10 >10 >10 >10 >10 >10 >10 >10 >10	25 45 45 45 NA NA NA 30 30 30 30 30 20 25 25	183/NA 77/127 96/173 97/169 NA/290 NA/NA NA/NA NA/NA 65/ 81 63/ 81 81/ 95 112/117 74/117 54/ 95 48/ 65 34/ 41 41/ 54 41/ 60	NA/NA G/F G/F G/F P/P NA/NA NA/NA NA/NA G/F P/G F/F G/G G/F F/G	2.0 1.5 1.7 NA 1.5 4.3 2.7 5.0 NA 4.2 3.3 4.7 3.6 2.4 2.4
40020 B 57978 B 92523 B 93628 157 A. elegans Group 3 P6814 # 41 40019 # 44 93598 # 127 A. evenia Group 1 28755 36 40026 22 40027 21 40028 20 40031 19 A. evenia Group 2 43192 18 93674 129 A. evenia Group 3 93633 128 A. falcata Group 1 11500 (Bargoo) 40 43745 32 74865 9	ARG BOL BRA COL COL HND BOL PAN SEN BRA BRA BRA BRA BRA	26.38 18.00 14.09 17.20 14.38 8.10 8.06 3.41 5.30 12.40	P P P P P P NA A A A A A A A A A A	P P P P S P S P S P S P P T E S Sh E Sh E Sh S P F S P T E S Sh F S P E S Sh P T	15 20 25 25 25 10 25 15 20 200 135 190 60 50 140 20	70 160 110 130 60 50 30 20 140 135 160 150 150	2- 5 2- 5 2- 5 2- 5 2- 5 2- 5 NA 2- 5 2- 5 2- 10 > 10 > 10 > 10 > 10 > 10 > 10 > 10 >	25 45 45 45 NA NA NA NA 30 30 30 30 30 25 25	183/NA 77/127 96/173 97/169 NA/290 NA/NA NA/NA NA/NA 63/ 81 63/ 81 81/ 95 112/117 74/117 54/ 95 48/ 65 34/ 41	NA/NA G/F G/F G/F P/P NA/NA NA/NA NA/NA G/F P/G G/G G/G F/F	2.0 1.5 1.7 NA 1.5 4.3 2.7 5.0 NA 4.2 3.3 4.7 3.6 2.4
40020 B 57978 B 92523 B 93628 157 A. elegans Group 3 P6814 # 41 40019 # 44 93598 # 127 A. evenia Group 1 28755 36 40026 22 40027 21 40028 20 40031 19 A. evenia Group 2 43192 18 93674 129 A. evenia Group 3 93633 128 A. falcata Group 1 11500 (Bargoo) 40 43745 32 74865 9 A. falcata Group 2	ARG BOL BRA COL COL HND BOL PAN SEN BRA BRA BRA BRA BRA BRA BRA	26.38 18.00 14.09 17.20 14.38 8.10 8.06 3.41 5.30 12.40	P P P P P P NA A A A A A A A A P P P	S P P P S P S P S P S P S P S P S P S S P E S S S P E S P E S P	15 20 25 25 25 10 25 15 20 200 135 190 160 190 140 20 15 15	70 160 110 130 60 50 30 20 140 135 160 150 50 160	2- 5 2- 5 2- 5 2- 5 2- 5 2- 5 NA 2- 5 2- 5 > 10 > 10 > 10 > 10 > 10 > 10 > 10 > 10	25 45 45 45 NA NA NA NA 30 30 30 30 30 20 25 25 20 20	183/NA 77/127 96/173 97/169 NA/290 NA/NA NA/NA 65/ 81 63/ 81 81/ 95 112/117 74/117 54/ 95 48/ 65 34/ 41 41/ 54 41/ 60 48/ 68	NA/NA G/F G/F G/F P/P NA/NA NA/NA NA/NA G/F G/G G/G G/G F/F F/G F/P F/P	2.0 1.5 1.7 NA 1.5 4.3 2.7 5.0 NA 4.2 3.3 4.7 3.6 2.4 2.4 2.0
40020 B 57978 B 92523 B 93628 157 A. elegans Group 3 P6814 # 41 40019 # 44 93598 # 127 A. evenia Group 1 28755 36 40026 22 40027 21 40028 20 40031 19 A. evenia Group 2 43192 18 93674 129 A. evenia Group 1 28756 36 40027 21 40028 20 40031 30 40031	ARG BOL BRA COL COL HND BOL PAN SEN BRA BRA BRA BRA BRA BRA COL	26.38 18.00 14.09 17.20 14.38 8.10 8.06 3.41 5.30 12.40 25.24	P P P P P P NA A A A A A A A A A A A A A	P P P S P S P S P P T E S Sh E Sh E Sh E Sh P T P T P T P T P T P T P T P S P T	15 20 25 25 25 10 25 15 20 200 135 190 160 190 50 140 20 15 15	70 160 110 130 60 50 30 20 140 135 160 150 150 160 100 230 110 90	2- 5 2- 5 2- 5 2- 5 2- 5 2- 5 2- 5 3- 5 3- 10 3-	25 45 45 45 NA NA NA NA 30 30 30 30 30 20 25 25 20 20 NA	183/NA 77/127 96/173 97/169 NA/290 NA/NA NA/NA 63/ 81 63/ 81 81/ 95 112/117 74/117 54/ 95 48/ 65 34/ 41 41/ 54 41/ 60 48/ 68	NA/NA G/F G/F G/F P/P NA/NA NA/NA NA/NA G/F P/G G/G G/F F/F F/G F/P F/P P/P	2.0 1.5 1.7 NA 1.5 4.3 2.7 5.0 NA 4.2 3.3 4.7 3.6 2.4 2.4 2.0 NA
40020 B 57978 B 92523 B 93628 157 A. elegans Group 3 P6814 # 41 40019 # 44 93598 # 127 A. evenia Group 1 28755 36 40026 22 40027 21 40028 20 40031 19 A. evenia Group 2 43192 18 93674 129 A. evenia Group 3 93633 128 A. falcata Group 1 11500 (Bargoo) 40 43745 32 74865 9 A. falcata Group 2 92652 # 170 92685 # 171 A. fascicularis Group	ARG BOL BRA COL COL HND BOL SEN BRA BRA BRA BRA BRA COL COL	26.38 18.00 14.09 17.20 14.38 8.10 8.06 3.41 5.30 12.40 25.24	P P P P P P NA A A A A A A A A A A A A A	S P P P S P S P S P S P S P S P S P S S P E S S S P E S P E S P	15 20 25 25 25 10 25 15 20 200 135 190 160 190 140 20 15 15	70 160 110 130 60 50 30 20 140 135 160 150 50 160	2- 5 2- 5 2- 5 2- 5 2- 5 2- 5 NA 2- 5 2- 5 > 10 > 10 > 10 > 10 > 10 > 10 > 10 > 10	25 45 45 45 NA NA NA NA 30 30 30 30 30 20 25 25 20 20	183/NA 77/127 96/173 97/169 NA/290 NA/NA NA/NA 65/ 81 63/ 81 81/ 95 112/117 74/117 54/ 95 48/ 65 34/ 41 41/ 54 41/ 60 48/ 68	NA/NA G/F G/F G/F P/P NA/NA NA/NA NA/NA G/F G/G G/G G/G F/F F/G F/P F/P	2.0 1.5 1.7 NA 1.5 4.3 2.7 5.0 NA 4.2 3.3 4.7 3.6 2.4 2.4 2.0
40020 B 57978 B 92523 B 93628 157 A. elegans Group 3 P6814 # 41 40019 # 44 93598 # 127 A. evenia Group 1 28755 36 40026 22 40027 21 40028 20 40031 19 A. evenia Group 2 43192 18 93674 129 A. evenia Group 1 28756 36 40026 22 40027 21 40028 20 40031 19 A. evenia Group 2 43192 18 93674 129 A. evenia Group 3 93633 128 A. falcata Group 1 11500 (Bargoo) 40 43745 32 74865 9 A. falcata Group 2 92652 # 170 92685 # 171 A. fascicularis Group 2 92748 172	ARG BOL BRA COL COL HND BOL SEN BRA BRA BRA BRA BRA COL COL	26.38 18.00 14.09 17.20 14.38 8.10 8.06 3.41 5.30 12.40 25.24	P P P P P P NA A A A A A A A A A A A A A	P P P S P S P S P P T E S Sh E Sh E Sh E Sh P T P T P T P T P T P T P T P S P T	15 20 25 25 25 10 25 15 20 200 135 190 160 190 50 140 20 15 15	70 160 110 130 60 50 30 20 140 135 160 150 150 160 100 230 110 90	2- 5 2- 5 2- 5 2- 5 2- 5 2- 5 2- 5 3- 5 3- 10 3-	25 45 45 45 NA NA NA NA 30 30 30 30 30 20 25 25 20 20 NA	183/NA 77/127 96/173 97/169 NA/290 NA/NA NA/NA 63/ 81 63/ 81 81/ 95 112/117 74/117 54/ 95 48/ 65 34/ 41 41/ 54 41/ 60 48/ 68	NA/NA G/F G/F G/F P/P NA/NA NA/NA NA/NA G/F P/G G/G G/F F/F F/G F/P F/P P/P	2.0 1.5 1.7 NA 1.5 4.3 2.7 5.0 NA 4.2 3.3 4.7 3.6 2.4 2.4 2.0 NA
40020 B 57978 B 972523 B 93628 157 A. elegans Group 3 P6814 # 41 40019 # 44 93598 # 127 A. evenia Group 1 28755 36 40026 22 40027 21 40028 20 40031 19 A. evenia Group 2 43192 18 93674 129 A. evenia Group 1 11500 (Bargoo) 40 43745 32 74865 9 A. falcata Group 1 11500 (Bargoo) 40 43745 32 74865 9 A. falcata Group 2 92652 # 170 92685 # 171 A. fascicularis Group 2 92748 172 A. filosa Group 1	ARG BOL BRA COL COL HND BOL PAN SEN BRA BRA BRA BRA COL COL COL	26.38 18.00 14.09 17.20 14.38 8.10 8.06 3.41 5.30 12.40 25.24	PPPPPNAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	S P P P S P S P S P T E S Sh E Sh E Sh E Sh E Sh S P T T P T S P T S P T S P T S P T S P T S	15 20 25 25 25 10 25 15 20 200 135 190 60 50 140 20 15 15	70 160 110 130 60 50 30 20 140 135 160 150 150 160 100 230 110 90 80 80	2- 5 2- 5 2- 5 2- 5 2- 5 2- 5 2- 5 2- 5	25 45 45 45 NA NA NA NA 30 30 30 30 30 20 25 25 20 20 NA NA	183/NA 77/127 96/173 97/169 NA/290 NA/NA NA/NA 65/ 81 63/ 81 81/ 95 112/117 74/117 54/ 95 48/ 65 34/ 41 41/ 54 41/ 60 48/ 68 41/ NA NA/NA	NA/NA G/F G/F G/F P/P NA/NA NA/NA NA/NA G/F P/G G/G G/G P/G F/P F/P NA	2.0 1.5 1.7 NA 1.5 4.3 2.7 5.0 NA 4.2 3.3 4.7 3.6 2.4 2.4 2.0 NA NA 4.4
40020 B 57978 B 92523 B 93628 157 A. elegans Group 3 P6814 # 41 40019 # 44 93598 # 127 A. evenia Group 1 28755 36 40026 22 40027 21 40028 20 40031 19 A. evenia Group 2 43192 18 93674 129 A. evenia Group 1 28756 36 40026 22 40027 21 40028 20 40031 19 A. evenia Group 2 43192 18 93674 129 A. evenia Group 3 93633 128 A. falcata Group 1 11500 (Bargoo) 40 43745 32 74865 9 A. falcata Group 2 92652 # 170 92685 # 171 A. fascicularis Group 2 92748 172	ARG BOL BRA COL COL HND BOL SEN BRA BRA BRA BRA BRA COL COL COL MEX	26.38 18.00 14.09 17.20 14.38 8.10 8.06 3.41 5.30 12.40 25.24	P P P P P P NA A A A A A A A A A A A A A	P P P P S P S P S P S P T E S Sh E Sh E Sh E Sh E Sh E Sh E Sh	15 20 25 25 25 10 25 15 20 200 135 190 160 190 60 50 140 20 15 15	70 160 110 130 60 50 30 20 140 135 160 150 150 160 100 230 110 90 80 80	2- 5 2- 5 2- 5 2- 5 2- 5 2- 5 2- 5 2- 5	25 45 45 45 NA NA NA NA 30 30 30 30 30 20 25 25 20 20 NA	183/NA 77/127 96/173 97/169 NA/290 NA/NA NA/NA 65/ 81 63/ 81 81/ 95 112/117 74/117 54/ 95 48/ 65 34/ 41 41/ 54 41/ 60 48/ 68	NA/NA G/F G/F P/P NA/NA NA/NA NA/NA G/F P/G G/G G/G F/F F/G F/P NA NA	2.0 1.5 1.7 NA 1.5 4.3 2.7 5.0 NA 4.2 3.3 4.7 3.6 2.4 2.4 2.0 NA

A. filosa G 85843	roup 2 85	MEX	16.30	P	s	100	120	2- 5	15	95/138	G/F	3.1
A. flutans (52338	Group 1 177	7MD	15.44	N/ A	D.T							
73047	В	ZMB	15.44	NA P	P T P T	5 10	100 130	> 10 5-10	5 10	NA 97/128	P/F P/P	43.7 65.8
A. histrix (DD 4		D								
93600	132 133	BRA VEN		P P	S A S A P	80 35	75 100	2- 5 < 2	40 25	104/153 104/153	F/F P/F	1.4 1.1
93636	134	BRA		P	SAP	40	105	2- 5	30	104/153	F/F	1.6
93638 A. histrix (160 Group 2	BRA		P	S	70	125	2- 5	20	104/153	F/F	1.6
92509 93595	В	VEN		NA	S P	20	90	2- 5	50	111/162	F/F	2.4
93595	119 120	VEN MEX		P P	S DPT	75 30	160 135	2- 5 2- 5	40 40	88/117 109/146	G/F F/F	2.2 1.6
93629 A. histrix (158	PAN		P	s	50	90	2- 5	30	117/153	P/F	1.5
93673 #	135	BRA		NA.	S P	10	30	< 2	NA	NA	NA	NA
A. indica C 43744	Group 1 35	ZMB										
50967	33	ZIVID		A A	E Sh E Sh	230 250	160 150	> 10 > 10	20 30	65/ 81 65/ 74	G/G G/G	7.6 13.0
70254 Q9147	8 3			Á	E Sh	220	145	> 10	20	63/ 81	F/G	7.8
Q9845	2			A A	E Sh E Sh	150 190	130 160	> 10 > 10	30 30	74/104 74/ 95	G/F G/F	3.9 5.6
A. indica C											0/1	3.0
26709 50792	37 34			A A	S Sh E Sh	65 45	90 45	> 10 5-10	20 20	19/ 39 19/ 34	G/F	10.4
84122	96		17.32	Α	S Sh	100	130	5-10	30	34/ 65	G/F F/F	8.8 4.4
93604 93675	138 130	BRA BRA	21.25	A A	E S Sh S P	70 65	100 150	> 10	15	19/ 39	G/F	11.5
93677	136	COL		À	S Sh	110	150	5-10 5-10	25 20	41/ 57 65/ 88	G/F G/G	4.2 9.9
104676 104798	B B	IND IND		A	ΕA	110	120	5-10	15	48/ 56	F/F	5.6
106316	В	IND		A A	S A E A	60 110	120 120	5-10 5-10	20 30	52/ 78 59/ 76	F/F G/G	4.9 6.6
CQ541* CO993*	39 13	AUS		A	E Sh	100	130	> 10	20	19/ 48	F/F	9.9
P4956*	38	AUS	26.10	A A	S A S Sh	80 75	120 110	5-10 5-10	25 20	19/ 35 24/ 74	G/G F/F	6.9 9.1
A. indica C 90919			22.56									
93553	62 112	COL	23.56	A A	E Sh E Sh	110 150	120 110	> 10 5-10	30 . 25	54/ 74 76/ 95	G/G F/G	3.4 6.5
CQ2704	102	AUS	21.25	Α	S A Sh	120	100	5-10	20	88/104	G/G	3.8
CQ2962 CQ2964	175 100	AUS AUS	21.35 17.12	A A	E A Sh E Sh	150 115	150 120	5-10 2- 5	20 25	74/ 95 57/ 88	F/ F F/ G	4.3 5.4
A. panicula 93635											170	3.4
107160	167 B	BRA MEX		P P	E E	105 120	60 160	2- 5 5-10	15 15	95/146 100/146	F/F G/G	2.1
A. parviflor		1		_				3-10	13	100/140	G/G	2.6
93631 A. pinetoru	131 m Group	COL		P	S A Sh	105	80	> 10	10	124/176	F/F	4.5
107132	В	MEX		NA	E	40	25	2- 5	15	100/ NA	NA	NA
A. rudis Gr 78350	oup I B	ARG	23.32	Α	E Sh	100	90	5 10	25	207.40		
78477	В		23.32	A	E Sh	100	90	5–10 5–10	25 25	30/ 40 32/ 42	G/F G/F	5.2 6.1
A. scabra C 89285	Froup 1 53	MEX		Α	E Sh	230	130	> 10	20			
90298	54	MEX	18.53	Α	E Sh	230	130	> 10 > 10	30 30	60/ 81 57/ 74	G/F G/F	6.0 5.9
91096 91097	68 93		22.40 22.40	A A	E A Sh E Sh	140 160	120 120	> 10	30	57/ 74	F/G	3.6
91328	82		16.09	A	E Sh	160	150	> 10 > 10	25 30	68/ 95 41/ 60	F/F G/G	3.4 6.4
92517 93601	168 137	BRA	6.00 17.55	A A	E Sh	250	170	> 10	25	65/ 95	G/G	5.5
A. sensitiva		ZMD	17.55	А	E A Sh	170	140	> 10	20	46/ 54	G/G	6.8
63920	28	SUR		P	E Sh	160	130	> 10	15	65/ 88	F/G	8.9
93605 93606	139 140		21.21 20.02	P P	E Sh E Sh	260 270	100 100	> 10 > 10	10	104/146	P/G	11.3
93625	156		10.00	P	S Sh	230	120	> 10	10 15	65/ 88 65/ 88	F/G G/G	11.9 7.6
A. sensitiva		001	2.52	-								7.0
81320 A. sensitiva	170 Group 3	COL	3.53	P	E Sh	120	70	> 10	30	124/166	P/G	2.8
34714	17 17	BRA	22.54	P	S Sh	50	70	5-10	10	74/146	P/F	8.8
40015 92777	24		22.54	A	S Sh	100	110	5-10	10	81/104	P/F	8.3
93609	173 141	COL MEX	3.40 17.50	A P	S Sh S Sh	175 140	120 150	> 10 5-10	15 10	104/131 117/176	P/G	6.5
93610	142		17.38	Â	S Sh	120	110	5–10	15	117/176	P/G P/G	5.8 5.2
A. sensitiva CQ2705	Group 4 96	ΔΙΙΩ	16.30	Α	EASL	160	120	> 10	20	244.50		
A. schimper			10.30	A	E A Sh	160	130	> 10	20	34/ 50	G/G	9.1
93613	145	TZA		Α	E Sh	200	130	> 10	25	54/ 98	P/F	5.7

A uniflows Group 1 60164 ms Group 2 1 UGA 0.21	4:0	O 1										
			LICA 0.21		C A CL	110	120	> 10	25		2.0	
85888 27 MEX 17.12 A S A P 30 160 2-5 35 109/146 PF 2.4 87491* 30 MEX 16.27 A S P 30 160 2-5 40 1532020 PF 3.1 87491* 30 MEX 16.27 A S P 30 160 2-5 50 117/153 G/P 2.5 87491* 30 MEX 16.23 A S P 20 100 2-5 53 109/138 P/F 2.4 91231 8 MEX 19.00 A S P 50 160 2-5 30 119/143 GPF 2.4 91231 9 MEX 19.02 A S P 60 60 2-5 30 119/143 GPF 2.9 91231 9 MEX 16.21 A S A P 70 250 2-5 30 1117/153 GPP			UGA 0.21	A	S A Sn	110	130	> 10	25	117/131	P/F	5.2
86129 MEX 18.08 A SP 50 180 2-5 40 1171/153 GP 2.5 87825 B MEX 17.38 A P 2 25 200 2-5 55 178/NAA NA 1.6 879 30 160 2-5 35 178/NAA NA 1.6 1.6 19 1171 22 MEX 23.26 A SP 70 190 2-5 55 178/NAA NA 1.6 1.6 19 1171 22 MEX 23.26 A SP 70 190 2-5 55 178/NAA NA 1.6 1.6 19 1171 22 MEX 23.26 A SP 70 190 2-5 55 178/NAA NA 1.6 1.6 19 1171 22 MEX 23.26 A SP 70 190 2-5 30 1109/146 GP 1.9 18 18 18 18 18 18 18 19 18 18 18 19 18 18 18 19 18 18 18 18 18 18 18 18 18 18 18 18 18			MEX 17 12	٨	SAD	20	160	2 6	25	100/146	D/E	2.4
8749 * 30 MEX 16.27 A S P 50 160 2-5 5 30 117/153 G/P 2.0 91117 22 MEX 23.26 A S P 70 190 2-5 5 55 178/NA NA 1.6 91117 22 MEX 23.26 A S P 70 190 2-5 35 109/138 P/F 2.9 91219 7 MEX 19.04 A P 30 160 2-5 35 109/138 P/F 2.9 91221 8 MEX 19.00 A S P 60 200 2-5 30 117/153 G/P 1.8 91231 9 MEX 19.02 A S P 50 160 2-5 30 117/153 G/P 2.0 93656 46 46 MEX 17.10 A P 30 160 2-5 30 117/153 G/P 2.0 93656 47 MEX 18.18 A P T 20 160 2-5 35 109/146 G/P 2.4 93655 48 MEX 19.02 A S P 50 160 2-5 30 117/153 G/P 2.0 93655 48 MEX 18.18 A P T 20 160 2-5 30 117/153 G/P 2.0 93656 18 MEX 18.18 A P T 20 160 2-5 5 35 128/174 G/P 2.1 1071124 B MEX A A P T 30 160 2-5 5 35 128/174 G/P 2.0 107104 B MEX A A P T 30 160 2-5 5 35 128/174 G/P 2.0 107104 B MEX A A P T 30 170 2-5 5 15 128/174 G/P 2.1 107134 B MEX A A P T 30 170 2-5 5 15 128/174 G/P 2.1 107134 B MEX A A P T 30 170 2-5 5 15 128/174 G/P 2.1 107134 B MEX A A P T 30 170 2-5 5 15 128/174 G/P 2.1 107134 B MEX A A P T 30 170 2-5 5 15 128/174 G/P 2.1 107134 B MEX A A P T 30 170 2-5 5 15 128/174 G/P 2.1 107134 B MEX A A P T 30 170 2-5 5 15 128/174 G/P 2.1 107135 G/P 2.0 94090 10 MEX 18.53 A S S T 30 160 2-5 5 35 188/188 P/F 3.9 90490 10 MEX 18.53 A S S T 30 160 2-5 5 35 188/188 P/F 3.9 90490 10 MEX 18.53 A S S T 30 160 2-5 5 35 188/188 P/F 3.9 90490 10 MEX 18.53 A S S N 130 160 5-10 35 104/138 G/P 4.3 90778 11 MEX 26.40 A S 7 75 130 5-10 30 131/166 G/P 5.2 10710 MEX 18.53 A S A S N 10 160 5-10 35 104/138 G/P 4.3 90778 11 MEX 26.40 A S 7 5 130 5-10 30 131/166 G/P 5.2 10710 MEX 18.53 A S A S N 10 10 2-5 5 00 88/109 G/P 4.1 107134 B MEX 26.40 A S 7 5 130 5-10 30 131/166 G/P 5.2 10710 MEX 18.53 A S A S N 10 10 2-5 5 00 88/109 G/P 4.1 10710 MEX 18.53 A S A S N 10 10 2-5 5 00 88/109 G/P 4.1 107134 B MEX 26.40 A S 7 5 130 5-10 30 131/166 G/P 5.2 10710 MEX 18.53 A S A S N 10 10 2-5 5 00 88/109 G/P 4.1 10710 MEX 18.53 A S A S N 10 10 2-5 5 00 88/109 G/P 4.1 107114 MEX 26.40 A S 7 5 130 5-10 30 131/166 G/P 5.2 10710 MEX 18.53 A S A S N 10 10 2-5 5 00 88/109 G/P 4.1 10710 MEX 18.53 A S S N 10 10 2-5 5 00 88/10		21										
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93644 44 AUS A SA 70 150 2- 5 40 95/124 G/F 2.6 Q17395 34 AUS A SA 70 150 2- 5 40 95/117 G/F 2.5 CQ2703 32 AUS 17.26 A SAP 60 160 2- 5 35 88/109 G/F 2.4 CQ2706 33 AUS 19.34 A SAP 40 140 2- 5 30 54/81 G/F 2.5 CQ2708 AUS 17.50 A SAP 40 110 2- 5 35 95/124 F/P 2.4 CQ2963* 49 AUS 21.35 A AP 40 150 2- 5 35 95/124 F/P 2.4 CQ2965 AUS 17.12 A AP 40 150 2- 5 35 95/124 F/P NA P6701* 3 HND 14.10 A AP 40 180 2- 5 35 95/124 F/P NA P6701* 3 HND 14.10 A AP 40 180 2- 5 30 48/68 G/P 3.5 A. villosa Group 5 93619 40 PAN AP 10 90 > 2 50 124/166 F/P 2.0 A. villosa Group 6 37235 4 MEX 21.10 A AP 20 170 2- 5 40 85/106 F/G 3.3 9.3614B 35 A PT 20 170 > 2 40 117/NA NA 2.3 A. villosa Group 7 90897 14 MEX 26.48 PSP 30 110 2- 5 35 94/146 F/P 3.1 91081 17 MEX 24.20 PSP 55 130 2- 5 35 94/146 F/P 3.1 91081 17 MEX 24.20 PSP 55 130 2- 5 35 94/146 F/P 3.1 91209 23 MEX 22.26 PAP 30 150 2- 5 30 95/131 G/P 2.4 93615 36 BRA PSP 30 130 2- 5 35 94/146 F/P 3.1 93616 37 COL 3.40 PSP 30 130 2- 5 35 95/124 G/P 1.9 93617 38 COL 3.50 PAP 60 150 2- 5 30 95/131 G/P 2.4 93618 39 COL 3.50 PAP 60 150 2- 5 35 95/124 G/P 1.9 93620 41 COL 2.00 PSAP 30 130 2- 5 35 95/124 G/P 1.9 93621 42 MEX PAP 30 130 2- 5 35 95/124 G/P 2.3 93621 42 MEX PAP 30 130 2- 5 35 95/124 G/P 2.3 93621 42 MEX PAP 30 130 2- 5 35 95/124 G/P 2.3 93621 42 MEX PAP 30 130 2- 5 35 95/124 G/P 2.3 93645 45 MEX 17.13 PAP 30 130 2- 5 35 95/124 G/P 2.3 93645 45 MEX 17.13 PAP 30 130 2- 5 35 95/124 G/P 2.3 93645 45 MEX 17.13 PAP 30 130 2- 5 35 95/124 G/P 2.3 93645 45 MEX 17.13 PAP 30 130 2- 5 35 104/138 G/P 2.1 A. virginica Group 1 84952 BAD MDG 15.75 AP 5 80 2- 5 25 90/110 F/G 1.7												
Q17395	93644	44										
CQ2703 32 AUS 17.26 A S A P 60 160 2-5 35 88/109 G/F 2.4 CQ2706 33 AUS 19.34 A S A P 40 140 2-5 30 54/81 G/F 2.5 CQ2708 AUS 17.50 A S A P 40 110 2-5 35 95/124 F/P 2.4 CQ2963* 49 AUS 21.35 A A P 40 150 2-5 35 95/124 F/P 2.4 CQ2965* AUS 17.12 A A P 40 150 2-5 35 95/124 F/P NA P 30 120 2-5 35 95/124 F/P NA P 30 140 2-5 30 48/68 G/F 2.2 CQ2965 AUS 17.12 A A P 40 180 2-5 40 63/109 G/P 2.0 P6701* 3 HND 14.10 A A P 40 180 2-5 40 63/109 G/P 2.0 A. villosa Group 5 93619 40 PAN A P 10 90 > 2 50 124/166 F/P 2.0 A. villosa Group 6 37235 4 MEX 21.10 A A P 20 170 2-5 40 85/106 F/G 3.3 93614B 35 A. villosa Group 7 90897 14 MEX 26.48 P S P 30 110 2-5 20 88/131 F/P 3.2 91081 17 MEX 24.20 P S P 55 130 2-5 35 94/146 F/P 3.2 91081 17 MEX 24.20 P S P 55 130 2-5 35 94/146 F/P 3.2 93615 36 BRA P S A P 30 150 2-5 30 95/131 G/P 2.4 93617 38 COL 3.40 P S P 50 140 2-5 30 95/131 G/P 2.4 93617 38 COL 3.50 P A P 60 150 2-5 35 95/124 G/P 1.9 93617 38 COL 3.50 P A P 60 150 2-5 35 95/124 G/P 1.9 93618 39 COL 3.52 P E A P 50 150 2-5 35 95/124 G/P 2.1 93618 39 COL 3.52 P E A P 50 150 2-5 35 104/138 G/P 2.1 93645 45 MEX 17.13 P A P 30 140 2-5 35 109/146 G/P 2.1 A. virginica Group 1 84952 B A E Sh 230 200 > 10 30 86/99 F/G 18.3 A. species 52332 B MDG 15.75 A P 55 80 2-5 25 25 90/110 F/G 1.7	Q17395	34	AUS		SA	55						
CQ2706 33 AUS 19.34 A S A P 40 140 2-5 30 54/81 G/F 2.5 CQ2708 AUS 17.50 A S A P 40 110 2-5 35 95/124 F/P 2.4 CQ2963* 49 AUS 21.35 A A P 40 150 2-5 35 66/88 G/F 2.2 CQ2965 AUS 17.12 A A P 40 130 2-5 25 95/124 F/P NA P6701* 3 HND 14.10 A A P 40 180 2-5 40 63/109 G/P 2.0 P6811 2 MEX 20.46 A A P 70 150 2-5 30 48/68 G/P 3.5 A. villosa Group 5 93619 40 PAN A P 10 90 > 2 50 124/166 F/P 2.0 A. villosa Group 6 37235 4 MEX 21.10 A A P 20 170 2-5 40 85/106 F/G 3.3 93614B 35 A. P T 20 170 > 2 40 117/NA NA 2.3 A. villosa Group 7 90897 14 MEX 26.48 P S P 30 110 2-5 35 94/146 F/P 3.1 91081 17 MEX 24.20 P S P 55 130 2-5 35 94/146 F/P 3.1 91209 23 MEX 22.26 P A P 30 150 2-5 35 94/146 F/P 3.1 91209 23 MEX 22.26 P A P 30 150 2-5 35 95/131 G/P 2.4 93615 36 BRA P S P 30 130 2-5 35 95/131 G/P 2.4 93615 36 BRA P S P 30 130 2-5 35 95/131 G/P 1.8 93616 37 COL 3.40 P S P 30 130 2-5 35 95/124 G/P 1.9 93617 38 COL 3.50 P A P 60 150 2-5 40 104/138 G/P 2.1 93618 39 COL 3.52 P E A P 50 150 2-5 40 104/138 G/P 2.1 93618 39 COL 3.52 P E A P 30 130 2-5 35 95/124 G/P 2.3 93620 41 COL 2.00 P S A P 30 130 2-5 35 104/138 G/P 2.1 93645 45 MEX 17.13 P A P 30 230 20 > 10 30 86/99 F/G 18.3 A. species 52332 B MDG 15.75 A P 55 80 2-5 25 25 90/110 F/G 1.7		32	AUS 17.26	Α	SAP	60						
CQ2708	CQ2706	33	AUS 19.34	Α								
CQ2963* 49 AUS 21.35 A A P 40 150 2-5 35 60/88 G/F 2.2 CQ2965 AUS 17.12 A A P 40 150 2-5 25 95/124 F/P NA P 6701* 3 HND 14.10 A A P 40 180 2-5 40 63/109 G/P 2.0 MEX 20.46 A A P 40 180 2-5 30 48/68 G/P 3.5 A. villosa Group 5 93619 40 PAN A P 10 90 > 2 50 124/166 F/P 2.0 A. villosa Group 6 37235 4 MEX 21.10 A A P T 20 170 > 2 40 117/NA NA 2.3 P T 20 170 > 2 40 117/NA NA 2.3 A. villosa Group 7 90897 14 MEX 26.48 P S P 30 110 2-5 20 88/131 F/P 3.2 91081 17 MEX 24.20 P S P 55 130 2-5 35 94/146 F/P 3.1 91209 23 MEX 22.26 P A P 30 150 2-5 40 95/131 G/P 2.4 93615 36 BRA P S A P S O 140 2-5 30 95/131 G/P 2.4 93616 37 COL 3.40 P S P 50 140 2-5 35 95/124 G/P 2.9 93617 38 COL 3.50 P A P 60 150 2-5 35 95/124 G/P 1.9 93618 39 COL 3.52 P E A P 50 150 2-5 40 104/138 G/P 2.1 93618 39 COL 3.52 P E A P 50 150 2-5 40 104/138 G/P 2.1 93618 39 COL 3.52 P E A P 50 150 2-5 35 95/124 G/P 2.3 93620 41 COL 2.00 P S A P 30 130 2-5 35 104/138 G/P 2.1 93645 45 MEX 17.13 P A P 30 140 2-5 35 109/146 G/P 2.1 9.3 93621 42 MEX P A P 30 130 2-5 35 104/138 G/P 2.1 93645 45 MEX 17.13 P A P 30 140 2-5 35 109/146 G/P 2.1 9.4 A. virginica Group 1 84952 B A E Sh 230 200 > 10 30 86/99 F/G 18.3 4. species 52332 B MDG 15.75 A P 55 80 2-5 25 25 90/110 F/G 1.7			AUS 17.50	Α	SAP	40	110					
CQ2965		49		Α	ΑP	40	150	2- 5	35	60/ 88		
P6701* 3 HND 14.10 A A P 40 180 2-5 40 63/109 G/P 2.0 P6811 2 MEX 20.46 A A P 70 150 2-5 30 48/ 68 G/P 2.0 3.5 A. villosa Group 5 93619 40 PAN A P 10 90 > 2 50 124/166 F/P 2.0 A. villosa Group 6 37235 4 MEX 21.10 A A P 20 170 2-5 40 85/106 F/G 3.3 93614B 35 A P T 20 170 2-5 40 85/106 F/G 3.3 93614B 35 A P T 20 170 2-5 40 85/106 F/G 3.3 93614B 35 A P T 20 170 2-5 20 88/131 F/F 3.2 91081 17 MEX 24.20	CQ2965		AUS 17.12	Α	ΑP	40	130					
P6811	P6701*		HND 14.10	Α	ΑP	40	180	2- 5	40			
A. villosa Group 5 93619			MEX 20.46	Α	ΑP	70	150	2- 5	30	48/ 68		
A. villosa Group 6 37235												
37235			PAN	Α	P	10	90	> 2	50	124/166	F/P	2.0
93614B 35 A. villosa Group 7 90897 14 MEX 26.48 P S P 30 110 2- 5 20 88/131 F/P 3.2 91081 17 MEX 24.20 P S P 55 130 2- 5 35 94/146 F/P 3.1 91209 23 MEX 22.26 P A P 30 150 2- 5 40 95/131 G/P 2.4 93615 36 BRA P S P 50 140 2- 5 30 95/131 G/P 2.4 93616 37 COL 3.40 P S P 30 130 2- 5 35 95/124 G/P 1.9 93617 38 COL 3.50 P A P 60 150 2- 5 35 95/124 G/P 1.9 93618 39 COL 3.52 P E A P 50 150 2- 5 40 104/138 G/P 2.1 93618 39 COL 3.52 P E A P 50 150 2- 5 40 104/138 G/P 2.1 93620 41 COL 2.00 P S A P 30 130 2- 5 35 95/124 G/P 1.9 93621 42 MEX P A P 30 230 2- 5 40 104/138 G/P 2.1 93645 45 MEX 17.13 P A P 30 230 2- 5 40 104/138 G/P 2.1 93645 45 MEX 17.13 P A P 30 230 2- 5 40 104/138 G/P 2.1 93645 45 MEX 17.13 P A P 30 140 2- 5 35 109/146 G/P 2.1 A. virginica Group 1 84952 B A E Sh 230 200 > 10 30 86/ 99 F/G 18.3 A. species 52332 B MDG 15.75 A P 5 80 2- 5 25 90/110 F/G 1.7												
A. villosa Group 7 90897 14 MEX 26.48 P S P 30 110 2- 5 20 88/131 F/P 3.2 91081 17 MEX 24.20 P S P 55 130 2- 5 35 94/146 F/P 3.1 91209 23 MEX 22.26 P A P 30 150 2- 5 40 95/131 G/P 2.4 93615 36 BRA P S A P 50 140 2- 5 30 95/131 G/P 1.8 93616 37 COL 3.40 P S P 30 130 2- 5 35 95/124 G/P 1.9 93617 38 COL 3.50 P A P 60 150 2- 5 35 104/138 G/P 2.1 93618 39 COL 3.52 P E A P 50 150 2- 5 35 104/138 G/P 2.1 93618 39 COL 3.52 P E A P 50 150 2- 5 35 104/138 G/P 1.9 93620 41 COL 2.00 P S A P 30 130 2- 5 35 95/124 G/P 2.3 93621 42 MEX P A P 30 130 2- 5 35 95/124 G/P 2.3 93645 45 MEX 17.13 P A P 30 140 2- 5 35 109/146 G/P 2.1 93645 45 MEX 17.13 P A P 30 140 2- 5 35 109/146 G/P 2.1 9.3645 45 MEX 17.13 P A P 30 140 2- 5 35 109/146 G/P 2.1 9.3645 45 MEX 17.13 P A P 30 140 2- 5 35 109/146 G/P 2.1 9.3645 45 MEX 17.13 P A P 30 140 2- 5 35 109/146 G/P 2.1 9.3645 45 MEX 17.13 P A P 30 140 2- 5 35 109/146 G/P 2.1 9.3645 45 MEX 17.13 P A P 30 140 2- 5 35 109/146 G/P 2.1 9.3645 45 MEX 17.13 P A P 30 140 2- 5 35 109/146 G/P 2.1 9.3645 45 MEX 17.13 P A P 30 140 2- 5 35 109/146 G/P 2.1 9.3645 45 MEX 17.13 P A P 30 140 2- 5 35 109/146 G/P 2.1 9.3645 45 MEX 17.13 P A P 30 140 2- 5 35 109/146 G/P 2.1 9.3645 45 MEX 17.13 P A P 30 140 2- 5 35 109/146 G/P 2.1 9.3645 45 MEX 17.13 P A P 30 140 2- 5 35 109/146 G/P 2.1 9.3645 45 MEX 17.13 P A P 30 140 2- 5 35 109/146 G/P 2.1 9.3645 45 MEX 17.13 P A P 30 140 2- 5 35 109/146 G/P 2.1			MEX 21.10									3.3
90897				Α	PΤ	20	170	> 2	40	117/ NA	NA	2.3
91081 17 MEX 24.20 P S P 55 130 2-5 35 94/146 F/P 3.1 91209 23 MEX 22.26 P A P 30 150 2-5 40 95/131 G/P 2.4 93615 36 BRA P S A P 50 140 2-5 30 95/131 G/P 2.4 93616 37 COL 3.40 P S P 30 130 2-5 35 95/124 G/P 1.9 93617 38 COL 3.50 P A P 60 150 2-5 35 95/124 G/P 1.9 93617 38 COL 3.52 P E A P 50 150 2-5 35 104/138 G/P 2.1 93618 39 COL 3.52 P E A P 50 150 2-5 40 104/138 G/P 2.1 93620 41 COL 2.00 P S A P 30 130 2-5 35 95/124 G/P 2.3 93621 42 MEX P A P 30 230 2-5 40 104/138 G/P 2.3 93621 42 MEX P A P 30 230 2-5 40 104/138 G/P 2.1 93645 45 MEX 17.13 P A P 30 230 2-5 40 104/138 G/P 2.1 93645 45 MEX 17.13 P A P 30 140 2-5 35 109/146 G/P 2.1 A. virginica Group 1 84952 B A E Sh 230 200 > 10 30 86/ 99 F/G 18.3 A. species 52332 B MDG 15.75 A P 5 80 2-5 25 90/110 F/G 1.7			MEW 26 40	-	0 D	20			•••			
91209 23 MEX 22.26 P A P 30 150 2- 5 40 95/131 G/P 2.4 93615 36 BRA P S A P 50 140 2- 5 30 95/131 G/P 1.8 93616 37 COL 3.40 P S P 30 130 2- 5 35 95/124 G/P 1.9 93617 38 COL 3.50 P A P 60 150 2- 5 35 104/138 G/P 2.1 93618 39 COL 3.52 P E A P 50 150 2- 5 35 104/138 G/P 2.1 93620 41 COL 2.00 P S A P 30 130 2- 5 35 95/124 G/P 1.9 93620 41 COL 2.00 P S A P 30 130 2- 5 35 95/124 G/P 2.3 93621 42 MEX P A P 30 230 2- 5 40 104/138 G/P 2.1 93645 45 MEX 17.13 P A P 30 140 2- 5 35 109/146 G/P 2.1 4. virginica Group 1 84952 B A E Sh 230 200 > 10 30 86/99 F/G 18.3 4. species 52332 B MDG 15.75 A P 5 80 2- 5 25 90/110 F/G 1.7										88/131		
93615 36 BRA P S A P 50 140 2-5 30 95/131 G/P 1.8 93616 37 COL 3.40 P S P 30 130 2-5 35 95/124 G/P 1.9 93617 38 COL 3.50 P A P 60 150 2-5 35 104/138 G/P 2.1 93618 39 COL 3.52 P E A P 50 150 2-5 40 104/138 G/P 1.9 93620 41 COL 2.00 P S A P 30 130 2-5 35 95/124 G/P 2.3 93621 42 MEX P A P 30 130 2-5 35 95/124 G/P 2.3 93645 45 MEX 17.13 P A P 30 230 2-5 40 104/138 G/P 2.1 4. virginica Group 1 84952 B A E Sh 230 200 > 10 30 86/99 F/G 18.3 4. species 52332 B MDG 15.75 A P 5 80 2-5 25 90/110 F/G 1.7												
93616												
93617 38 COL 3.50 P A P 60 150 2-5 35 104/138 G/P 2.1 93618 39 COL 3.52 P E A P 50 150 2-5 40 104/138 G/P 1.9 93620 41 COL 2.00 P S A P 30 130 2-5 35 95/124 G/P 2.3 93621 42 MEX P A P 30 230 2-5 40 104/138 G/P 2.1 93645 45 MEX 17.13 P A P 30 140 2-5 35 109/146 G/P 2.1 A. virginica Group 1 84952 B A E Sh 230 200 > 10 30 86/99 F/G 18.3 A. species 52332 B MDG 15.75 A P 5 80 2-5 25 90/110 F/G 1.7												
93618 39 COL 3.52 P E A P 50 150 2-5 40 104/138 G/P 1.9 93620 41 COL 2.00 P S A P 30 130 2-5 35 95/124 G/P 2.3 93621 42 MEX P A P 30 230 2-5 40 104/138 G/P 2.1 93645 45 MEX 17.13 P A P 30 140 2-5 35 109/146 G/P 2.1 A. virginica Group 1 84952 B A E Sh 230 200 > 10 30 86/99 F/G 18.3 A. species 52332 B MDG 15.75 A P 5 80 2-5 25 90/110 F/G 1.7												
93620 41 COL 2.00 P S A P 30 130 2- 5 35 95/124 G/P 2.3 93621 42 MEX P A P 30 230 2- 5 40 104/138 G/P 2.1 93645 45 MEX 17.13 P A P 30 140 2- 5 35 109/146 G/P 2.1 A. virginica Group 1 84952 B A E Sh 230 200 > 10 30 86/99 F/G 18.3 A. species 52332 B MDG 15.75 A P 5 80 2- 5 25 90/110 F/G 1.7												
93621 42 MEX P A P 30 230 2-5 40 104/138 G/P 2.1 93645 45 MEX 17.13 P A P 30 140 2-5 35 109/146 G/P 2.1 A. virginica Group 1 A4952 B A E Sh 230 200 > 10 30 86/99 F/G 18.3 A. species 52332 B MDG 15.75 A P 5 80 2-5 25 90/110 F/G 1.7												
93645 45 MEX 17.13 P A P 30 140 2-5 35 109/146 G/P 2.1 A. virginica Group 1 84952 B A E Sh 230 200 > 10 30 86/99 F/G 18.3 A. species 52332 B MDG 15.75 A P 5 80 2-5 25 90/110 F/G 1.7												
A. virginica Group 1 84952 B A E Sh 230 200 > 10 30 86/99 F/G 18.3 A. species 52332 B MDG 15.75 A P 5 80 2-5 25 90/110 F/G 1.7												
84952 B A E Sh 230 200 > 10 30 86/99 F/G 18.3 A. species 52332 B MDG 15.75 A P 5 80 2-5 25 90/110 F/G 1.7				r	АГ	30	140	2- 3	33	109/140	G/P	2.1
A. species 52332 B MDG 15.75 A P 5 80 2- 5 25 90/110 F/G 1.7				A	E Cr	230	200	> 10	30	86/ 00	EIC	10 2
52332 B MDG 15.75 A P 5 80 2-5 25 90/110 F/G 1.7		D		A	E SII	230	200	> 10	30	80/ 99	r/G	18.5
		R	MDG 15.75	A	P	5	80	2- 5	25	90/110	F/C	17
				1	-		30		23	70/110	1/0	1./

Notes:

M-A Group:

Morphological-Agronomic Group (see Table 2).

Accession:

Numbers indicate CPI designation unless otherwise stated; Q = Queensland DPI plant introductions; CQ = CSIRO Queensland plant introductions; P = NSW Ag. Dept. plant introductions.

Code:

B = Experiment B (see text), all other accessions grown in Experiment A; numbers are for minimum spanning tree (see Figures 2 and 4).

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* have duplicate introduction numbers
# affected by anthracnose (Colletotrichum gloeosporioides)

Cry:
Cry:
Country of origin (AUS = Australia; ARG = Argentina; BLZ = Belize; BOL = Bolivia; BRA = Brazil; COL = Colombia; CRI = Costa Rica; GTM = Guatamala; HND = Honduras; IND = India; IDN = Indonesia; LKA = Sri Lanka; MEX = Mexico; MDG = Madagasca; MWI = Malawi; NIC = Nicaragua; PAN = Panama; PRY = Paraguay; SEN = Senegal; SLV = El Salvador; SUR = Suriname; TZA = Tanzania; UGA = Uganda; USA = United States of America; VEN = Venezuela; VNM = Vietnam; ZIM = Zimbabwe; ZMB = Zambia).

Lat.:
latitude, 19.0 = 19°00'
Annual-Perennial: A = annual; P = perennial.
Habit: A = ascendent; D = decumbent; E = erect; P = prostrate; S = semi-erect; Sh = shrubby; T = trailing.
Plant dimensions are in centimetres; Leaf/Stem ratio as a percentage; Seed weight is grams.

Seed set: G = good; F = fair; P = poor.
Duplicate introduction numbers: (the first number is the one used in this paper).

A americana CPI 43998 = 56283 = 93552; P6704A and P6704B = 37413; P6699 = 37139; 37264 = 93563; 37255 = 93562; 40021 = 93566; 40016 = 93564; 40017 = 93565; 36594 = 93560; 36592 = 93559; P6703 = 37373; $8522 = 93561.

A indica P4956 = CPI 93603; CQ541 = 93602; CQ993 = 93626; CQ2962 = Q23300.

A villosa 87491 = 93647; 87492 = 93648; P6701 = 37302; CQ2703 = Q17395; CQ2963 = Q23301; CQ2966 = CQ3301
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DISCUSSION

Our classification techniques successfully divided a very large legume genus into manageable groups. Fifty-five *Aeschynomene* groups have been distinguished, representing 29 species.

The well represented species, A. americana and A. villosa, contain some large groups with considerable variation (A. americana groups 2 and 3 and A. villosa, group 4). One reason for having fewer and larger groups is the limited amount of morphological data used in the analysis (Table 2). We also felt that some minor differences in subjectively assessed attributes (seed retention and severity of disease attack), or small differences in flowering time (late and very late), were insufficient basis for group divisions (Figure 3). Previous and subsequent observations of A. americana and A. villosa indicate that agronomic performance of accessions within the large groups will be similar, and representative accessions can confidently be selected for regional evaluation.

The minimum spanning tree of all accessions, other than A. americana (Figure 2), allows a quick and easy assessment of variation within the collection. Although some species are poorly represented, the tree indicates a close relationship between accessions of different species and highlights accessions with distinctive features by placing them terminally on group branches. Similarly, the A. villosa tree (Figure 4) portrays the variation within the 49 accessions analysed and confirms the earlier SAHN groupings.

The appropriateness of the minimum spanning tree is dependent on the attributes used and the accuracy with which they are recorded (Burt et al. 1980). With this large collection, we experienced considerable difficulty in recording some morphological attributes. Stem and leaf colour and hairiness often varied on different parts of the same plant. Similarly, A. americana accessions displayed a wide range in flower size and colour. Colours included pale cream, mauve and bright yellow-orange, although most accessions displayed multi-coloured flowers. We decided that these morphological attributes were exerting a fairly meaningless influence on SAHN groups and masked them from the final analysis (see Table 2). If more detailed classifications of well represented species (A. americana and A. villosa) are required in the future a more comprehensive list of morphological attributes should be used.

The classification of such a large and diverse collection at one (wet tropical coast) site may have discriminated against species from the sub-tropics, high elevations or dry regions. In this study, accessions of A. elegans, a sub-tropical, high-elevation species, performed poorly in the classification experiment, but grew vigorously and without disease at Brisbane (latitude 27°22′S, altitude 56 m). However, Burt et al. (1971) found that, although the value of agronomic characteristics depended on location, combined agronomic and morphological analysis, with agronomic data derived from 2 different tropical environments, produces very similar groupings of

accessions. We feel that future large diverse collections should be grown at sites with a more moderate climate or be divided and grown at several sites on the basis of the environment at their collection site.

Taxonomically, some of the species were difficult to separate using herbarium specimens alone. Difficulties occurred between A. brasiliana and A. histrix, A. falcata and A. elegans, and between A. evenia, A. indica, A. rudis, A. scabra and A. virginica and, to a lesser extent, between A. americana and A. villosa (G. Guymer, pers. comm.).

Most of the accessions in this collection are from the Americas but 5 species (A. abyssinica, A. afraspera, A. flutans, A. schimperi, A. uniflora) and 1 unidentified species are from Africa where most diversity occurs (Rudd 1955). Another African species (A. elaphroxylon, CPI 46891) had spiny stems and was dug out before flowering. Ten species are each represented by 1 accession only and 8 species by fewer than 4 accessions. There is no doubt that these poorly represented species contain material of wide diversity.

The classification of experiment A accessions, and allocation to groups, now provides a basis for the allocation, to groups, of any *Aeschynomene* accessions subsequently introduced and described. In fact this was accomplished with the 48 accessions grown in experiment B.

Agronomic potential

Many of the *Aeschynomene* species appear to have accessions with agronomic potential. In Queensland, the naturalised *A. indica* and commercial Glenn jointvetch (*A. americana*) offer substantial benefits to animal production (Bishop *et al.* 1985b). Research workers in Florida are experimenting with artificial hybridisation (Hardy *et al.* 1984) to achieve genetic recombination of favourable agronomic attributes, such as resistance to root knot nematodes (Quesenberry *et al.* 1985).

Many species come from wet, waterlogged and swampy environments to which most commercial legumes are unsuited. Some Series Ochopodium species are mesic to subxeric perennials and should be evaluated in drier regions. A range of plant habits occur, including low, prostrate forms which may combine with stoloniferous grasses and withstand heavy grazing. A. villosa contains accessions that were collected from heavily grazed situations (R. Reid, pers. comm.). A. brasiliana also has perennial accessions with some potential; most have a sticky exudate on the stem hairs and will require evaluation under grazing to determine their commercial value.

Most Aeschynomene accessions are characterised by seed pods which break at maturity into 1-seeded sections. A. villosa pods tend to "shatter" but selection for types less prone to shattering may be possible. Section Ochopodium species (A. brasiliana, A. falcata and A. histrix) drop their pods at maturity while those of A. americana are retained after maturity.

Some species of *Aeschynomene* have the potential to become weeds. *A. virginica* is a weed of rice in south-eastern parts of USA (Smith *et al.* 1978) and *A. indica* (Budda pea) causes some problems in Queensland rice crops (Kleinschmidt and Johnston 1977). Species with similar early maturity and the ability to grow in water should be evaluated with caution.

Disease and insect problems

A range of diseases were identified on several species of Aeschynomene. Powdery mildew (Oidium sp.) occurred on A. americana, A. villosa and A. indica. Powdery mildew damage was rated but accessions recorded as 'clean' were subsequently affected at another site. Powdery mildew is common on cv. Glenn but has little effect on animal performance or on seed yields (Bishop et al. 1985a). Botrytis stem rot (Botrytis cinerea) on mature A. americana, Sclerotium (Sclerotinium vollssii) on mature A. villosa and anthracnose (Colletotrichum gloeosporioides) on some A. elegans, A. falcata and A. histrix accessions were identified. Botrytis stem rot occurs in some commercial seed crops of Glenn jointvetch but is not a problem under grazing.

Anthracnose has not been reported in commercial A. americana in Florida or in Australia, although Sonoda and Lenne (1986) report it as a problem of Aeschynomene spp. in central and south America.

Heliothis larvae damaged growing tips and green pods on Section Aeschynomene species. Nursery rows required spraying for maximum seed yields, while commercial seed crops of Glenn jointvetch sometimes require spraying. However, in grazed pastures *Heliothis* larvae have not been a problem.

CONCLUSIONS

Aeschynomene is a diverse and interesting legume genus. Representatives from most species require further evaluation with emphasis on their likely environmental adaptation. Species of particular interest are perennial A. americana. perennial and early annual A. villosa, (particularly for the moderately dry to dry subtropics), A. brasiliana and A. histrix (for moderately dry to dry areas on free-draining soils), A. elegans (for cooler high elevation and sub-tropical areas) and the strong perennial A. abyssinica (for arid areas).

ACKNOWLEDGEMENTS

We are indebted to the late W. A. T. Harding and A. Peacock for technical assistance, to Dr G. Guymer and Dr Sally Reynolds for taxonomic assistance, to L. and J. Williams for the use of their land, and to the AMLRDC for funding.

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(Received for publication May 18, 1987; accepted March 10, 1988)