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THE GENUS *ACACIA S.L.* IN PAKISTAN

S.I. ALI

Centre for Plant Conservation, University of Karachi, Karachi, Pakistan.

Abstract

The molecular studies clearly indicate that *Acacia s.l.* is non-monophyletic and there is robust support for the recognition of five genera. Hence the classical identity of *Acacia* has to change. The pros and cons of typifying and retypifying *Acacia* by different types are discussed. It is argued that under the circumstances, the only option available is to accept the decision taken at the XVIII International Botanical Congress at Melbourne. Consequently the current position of various taxa present in Pakistan, formerly placed in *Acacia s.l.*, have been transferred to *Acacia s.s. Vachellia* and *Senegalia.* This has resulted in five new combinations in the genus *Vachellia* and one new combination in *Senegalia*.

Classically the genus *Acacia* Miller was typified by *Acacia scorpioides* (L.) W. Wight, a synonym of *A. nilotica* (L.) Delile. However, Orchard and Maslin (2003) submitted a proposal to retypify *Acacia s.l.* by *A. penninervis* Sieber ex DC., an Australian species. According to McNeill *et al*., 2005, this proposal was accepted. However, acceptance of this retypification remained controversial (Luckow *et al*., 2005, Moore 2007, Smith *et al*., 2010, Brummitt, 2011, Linder & Crisp 2011, Smith & Figueiredo 2011, Thiele *et al*., 2011). In the XVIII International Botanical Congress at Melbourne (2011), the retypification was discussed again and upheld (McNeill & Turland, 2011). The inclusion of *Acacia* Mill. in Appendix III, Nomina Generica Conservanda et Rejicienda with *A. penninervis* Sieber ex DC. as a conserved type (Vienna Code, 2006: 286) resulting in the adoption of *Vachellia* and *Senegalia* in place of *Acacia s.l.* in Asia, Africa and Americas in well known publications like Plant Book (Mabberley, 2008) and limited representation in Melbourne from the developing countries is likely to have swayed the discussion at Melbourne. Smith & Figueiredo (2011) have suggested that further proposals to amend the code, including to have the name *Acacia* retypified with the original type, the African *A. scorpioides* (L.) W. Wight (*A. nilotica* (L.) Delile) and therefore its retypification with *Acacia penninervis* Sieber ex DC. removed from future editions, will likely be made and voted on before and at the next Congress in 2017 in China. Until then they have recommended the use of *Acacia s.l.*

Due consideration will have to be given to the fact that molecular studies clearly indicate that *Acacia s.l.* is non-monophyletic. According to Miller & Seigler (2012) current phylogenies provide robust support for the recognition of five genera. In case *Acacia* is typified by *A. scorpioides* (L.) W. Wight (*A. nilotica* (L.) Delile) it will be divided into *Acacia* s.s. (c. 163 species), *Senegalia* (c. 203 species), *Acaciella* (c. 15 species), *Mariosousa* (c. 13 species) and it will be necessary to adopt the generic name *Recosperma* for c. 960 Australian *Acacia* species. Thus it is obvious that the genus *Acacia* that we are familiar with, will disappear any way.

In case *Acacia* Mill. is typified by *A. penninervis* Sieber ex DC., an Australian species, it will not be necessary to adopt the generic name *Recosperma* for 960 Australian species, the generic name *Vachellia* with c. 160 species (Asia 36 species, Africa 73 species, America 60 species and Australia 7 species) and *Senegalia* with 203 species [Asia 43 species (7 species common with Africa also), Africa with 69 species, c. 117 species in America and 2 species in Australia], *Acaciella* (c. 15 species in America) will replace *Acacia s.l. Mariosousa* Seigler & Ebinger, a recently described genus from Americas will maintain its separate generic identity (Mabberley, 2008).

Hence the recommendations of Smith & Figuairedo (2011) that we should continue using *Acacia* s.l. and try to submit a proposal in the next Congress to be held in 2017 to retypify *Acacia* Mill. by the original type, the African *A. scorpioides* (L.) Wight (a synonym of *A. nilotica* (L.) Delile) is not tenable. The only option available is to accept the decision taken at the Melbourne Conference.

Enumeration of species

A. *Acacia* Miller s.s. typified by *A. penninervis* Sieber ex DC.

Stipular spines absent or if present then leaves modified into phyllodes. Leaves modified into phyllodes or if bipinnate then with extra floral nectaries. Flowers in spikes or heads, the later never with an involucel on peduncle. Flowers without a disc and not on gynophores; plants without prickles.

1. *Acacia auriculiformis* A. Cunn. ex Benth. in Hook. Lond. J. Bot. 1: 377. 1842; Ali in Nasir & Ali, Fl. W. Pak. 36: 14. 1973.

Distribution: An ornamental tree from Tropical Australia, cultivated in gardens.

2. *Acacia aneura* F. v Muell. in Linnaea 26: 627. 1855; Ali in Nasir & Ali, Fl. W. Pak. 36: 16. 1973.

Distribution: Native of S. W. Australia, cultivated in gardens.

3. *Acacia saligna* (Labill.) Wendl. Comm. Acac. Aphyll.: 26. 1820; Ali in Nasir & Ali, Fl. W. Pak. 36: 16. 1973.
Mimosa saligna Labill., Pl. Nov. Holl. 2: 86. t. 235.1806.

Distribution: S.W. Australia, cultivated in Rawalpindi, Peshawar etc.

4. *Acacia melanoxylon* R. Br. in Ait. Hort. Kew. ed. 2.5: 462. 1813; Ali in Nasir & Ali, Fl. W. Pak. 36: 16. 1973.

Distribution: Native of Australia, cultivated in gardens.
5. *Acacia homalophylla* A. Cunn. ex Benth. in Hook., Lond. J. Bot. 1: 365. 1842; Ali in Nasir & Ali, Fl. W. Pak. 36: 16. 1973.

B. *Vachellia* Wight & Arn. typified by *V. farnesiana* (L.) Wight & Arn.

Stipular spines present at least on young plants. Leaves bipinnate, flowers in spikes or heads, the latter always with an involucre on the peduncle.

1. *Vachellia nilotica* (L.) P. J. Hurter & Mabb. in Mabberley's Plant Book 1021. 2008.
Mimosa nilotica L., Sp. Pl. 521. 1753.

Acacia nilotica (L.) Delile, Fl. Aegypt. Ill. 79. 1813; Brenan in Hubbard & Milne-Redhead, Fl. Trop. East Afr. (Mimosoideae) 109. 1959, Ali & Faruqi in Pak. J. Bot. 1: 1-8. 1969; Ali in Nasir & Ali, Fl. W. Pak. 36: 9. 1973.

i. subsp. *nilotica*

Distribution: Senegal, Mali, Southern Egypt, Sudan, N. Nigeria and Nile Banks, Pakistan, India, Sri Lanka.

ii. *Vachellia nilotica* subsp. *hemispherica* (Ali & Faruqi) Ali comb. nov.

Acacia nilotica subsp. *hemispherica* Ali & Faruqi in Pak. J. Bot. 1: 4. 1969.

Distribution: Endemic to Karachi, near Paradise Point.

iii. *Vachellia nilotica* subsp. *cupressiformis* (J. L. Stewart) Ali comb. nov.

Acacia arabica var. *cupressiformis* J. L. Stewart, Punjab Plants 51. 1869.

Distribution: Pakistan (Punjab, Sind), India (Punjab, Rajasthan, Haryana, Uttar Pradesh, Delhi, Gujrat, Madhya Pradesh, Maharashtra, Andhra Pradesh.

iv. *Vachellia nilotica* subsp. *adstringens* (Schum. & Thonn.) Kyal. & Boatwr. in Bot. J. Linn. Soc., 172(4): 515. 2013 [20 May 2013); *Mimosa adstringens* Schum. & Thonn., Beskr.Guin. Pl. 327. 1827; *Acacia nilotica* subsp. *adstringens* (Schum. & Thonn.) Roberty in Candollea 11: 150. 1948; *Acacia adansonii* Guill. & Perr. in Guill., Perr. & Rich., Fl. Senegamb. Tent. 249. 1832; *A. nilotica* (L.) Delile var. *adansoniana* (Dubard) A. F. Hill in Bot. Mus. Leafl. Harvard Univ. 8: 99. 1940; *Acacia arabica* (Lam.) Willd. var. *adstringens* (Schum. & Thonn.) E. G. Baker, Legum. Trop. Afr. 3: 349. 1930.

Distribution: Senegal, Gambia, Guinea Bissau, Ghana, Togo, Nigeria, Sudan, N. Somalia, S. Arabia, Pakistan, India.

v. *Vachellia nilotica* subsp. *subalata* (Vatke) Kyal. & Boatwr. in Bot. J. Linn. Soc. 172(4): 515. 2013 [20 May, 2013] epublished; *Acacia subalata* Vatke in Oesterr. Bot. Zeitschr. 30: 276. 1880; *A. nilotica* subsp. *subalata* (Vatke) Brenan in Kew Bull. 1957: 85. 1957; Ali & Faruqi in Pak. J. Bot. 1: 7. 1969; Ali in Nasir & Ali, Fl. W. Pak. 36: 12. 1973.

Distribution: Sudan, Kenya, N.E. Uganda, Tanzania, Pakistan: Sind; India (Berar, Andhra Pradesh, Maharashtra and Rajasthan).

vi. *Vachellia nilotica* subsp. *tomentosa* (Benth.) Kyal. & Boatwr. in Bot. J. Linn. Soc. 172(4): 515. 2013 (20 May 2013) [epulished]; *Acacia arabica* (Lam.) Willd. var. *tomentosa* Benth. in Hook. Lond. J. Bot. 1: 500. 1842; *A. nilotica* var. *tomentosa* (Benth.) A. F. Hill in Bot. Mus. Leafl. Harvard Univ. 8: 98. 1940.

Distribution: India (Punjab, Rajasthan) and Africa.

vii. *Vachellia nilotica* subsp. *indica* (Benth.) Kyal & Boatwr. in Bot. J. Linn. Soc. 172 (4): 515. 2013 (20 May 2013) [epublished]; *A. arabica* var. *indica* Benth. in Hook. Lond. J. Bot. 1: 500. 1842; *Acacia nilotica* (L.) Delile var. *indica* (Benth.) A. F. Hill in Bot. Mus. Leafl. Harvard Univ. 99. 1940.

Distribution: Tanzania, Pakistan (Sind, Punjab); India (widely distributed), Nepal, Bangladesh, Myanmar, Sri Lanka, Andaman, Maldives.

2. *Vachellia farnesiana* (L.) Wight & Arn., Prodr. Pl. Ind. Orient. 1: 272. 1834.

Mimosa farnesiana L., Sp. Pl. 521. 1753.

Acacia farnesiana (L.) Willd. Sp. Pl. 4: 1083. 1806; Baker in Hook. f., Fl. Brit. Ind. 2: 292. 1878; Parker, For. Fl. Punj. ed. 3. 190. 1956; Ali in Nasir & Ali, Fl. W. Pak. 36: 13. 1973.

Distribution: Native of America. Cosmopolitan in Tropics, often planted in Pakistan.

3. *Vachellia eburnea* (L. f.) P. J. Hurter in Mabberley's Pl. Book. 1021. 2008.

Mimosa eburnea L. f., Suppl. 437. 1781.

Acacia eburnea (L. f.) Willd., Sp. Pl. 5(4) 1081. 1805; Baker in Hook. f., Fl. Brit. Ind. 2: 293. 1878; A. H. Khan, Acacias in Pakistan 14. 1958; Ali in Nasir & Ali, Fl. W. Pak. 36: 14. 1973; Kumar & Sane, Legumes S. Asia: 84. 2003.

Distribution: Afghanistan, Pakistan (Punjab), Nepal, India, widely distributed, Sri Lanka, Oman, S. Arabia.

4. *Vachellia cornigera* (L.) Seigler & Ebinger in Phytologia 87(3): 153. 2005.

Mimosa cornigera L., Sp. Pl. 520. 1753.

Acacia cornigera (L.) Willd. Sp. Pl. 4: 1080. 1806; Ali in Nasir & Ali, Fl. W. Pak. 36: 16. 1973; Kumar & Sane, Legumes S. Asia: 83. 2003.

Distribution: Native of Mexico and Central America. Introduced in Pakistan (Punjab), India (Maharashtra and West Bengal).

5. *Vachellia seyal* (Del.) P. J. Hurter in Mabberley's Pl. Book. 1021. 2008.

Acacia seyal Delile, Fl. Egypt. 142. t. 52. f. 2. 1813; Ali in Nasir & Ali, Fl. W. Pak. 36: 17. 1973; Kumar & Sane, Legumes S. Asia: 97. 2003.

Distribution: Pakistan, India, Africa, Saudi Arabia and Yemen.

6. *Vachellia tortilis* (Forsk.) Galasso & Banfi in Atti Soc. Ital. Sci. Nat. Mus. Civico Storia Nat. Milano 149(1) 150. Jan. 2008.

Mimosa tortilis Forsk., Fl. Aegypt.-Arab. 176. 1775.

Acacia tortilis (Forsk.) Hayne, Arzneyk. 10. t 31. 1827; Ali in Nasir & Ali, Fl. W. Pak. 36: 18. 1973; Kumar & Sane, Legumes South Asia: 99. 2003.

Distribution: Algeria to Egypt and Saudi Arabia, Southwards to S. Africa, India (Rajasthan), introduced in Changa-Manga in Pakistan.

7. *Vachellia leucophloea* (Roxb.) Maslin, Seigler & Ebinger in Blumea 58(1): 42. 2013 [26 June 2013] [epublished].

Mimosa leucophloea Roxb., Cor. Pl. 2: 27. t. 150. 1798.

Acacia leucophloea (Roxb.) Willd., Sp. Pl. 4: 1083. 1806; Baker in Hook. f., Fl. Brit. Ind. 2: 294. 1878; Ali in Nasir & Ali, Fl. W. Pak. 36: 9. 1973; Kumar & Sane, Legumes South Asia: 89. 2003.

Distribution: Pakistan (Nagar Parkar), India, (widely distributed) Sri Lanka, Myanmar, Malaysia and Indonesia.

8. *Vachellia sieberiana* (DC.) Ali, comb. nov.

Acacia sieberiana DC., Prodr. 2: 463. 1825; Ali in Nasir & Ali, Fl. W. Pak. 36: 18. 1973; Kumar & Sane, Legumes South Asia: 98. 2003.

Distribution: Widely distributed in Africa, introduced in Pakistan (Dera Ismail Khan).

9. *Vachellia jaquemontii* (Benth.) Ali, comb.nov.

Acacia jaquemontii Benth. in Hook. Lond. J. Bot. 1: 499. 1842; Baker in Hook. f., Fl. Brit. Ind. 2: 293. 1878; Ali in Nasir & Ali, Fl. W. Pak. 36: 13. 1973; Kumar & Sane, Legumes South Asia: 88. 2003.

Distribution: Pakistan (Sind, Punjab, Baluchistan); India (Gujrat, Haryana, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Uttar Pradesh).

10. *Vachellia hydaspica* (Parker) Ali, comb. nov.

Acacia hydaspica Parker in Kew Bull. 1921: 309. 1921; Parker, For. Fl. Punjab ed. 3: 191. 1956; Ali in Nasir & Ali, Fl. W. Pak. 36: 14. 1973; Kumar & Sane, Legumes S. Asia: 87. 2003.

Distribution: Pakistan (Punjab), India (Punjab).

C. *Senegalia* Ref. typified by *Senegalia angustisia* (Miller) Pedley

Stipular spines absent. Leaves bipinnate. Plants with prickles or if not then extra floral nectaries absent from leaves (petiole, rachis). Flowers with a disc and ovary with a gynophore.

1. *Senegalia senegal* (L.) Britton, Sci. Surv. Porto Rico & Virgin Islands 6: 538. 1930.

Mimosa senegal L., Sp. Pl. 521. 1753.

Acacia senegal (L.) Willd., Sp. Pl. 4: 1077. 1806; Baker in Hook. f., Fl. Brit. Ind. 2: 295. 1878; Ali in Nasir & Ali, Fl. W. Pak. 36: 6. 1973; Kumar & Sane, Legumes South Asia: 97. 2003.

Distribution: Pakistan (Sind, Baluchistan); India (Gujrat, Haryana, Madhya Pradesh, Punjab, Rajasthan, Uttar Pradesh, Saudi Arabia, Oman, widely distributed in Tropical Africa.

2. *Senegalia catechu* (L. f.) P. J. Hurter & Mabb. in Mabberley's, Pl. Book. 1021. 2008.

Mimosa catechu L. f., Suppl. Plant. Syst. Veg. 439. 1781.

Acacia catechu (L. f.) Willd., Sp. Pl. 4: 1079. 1806; Baker in Hook. f., Fl. Brit. Ind. 2: 295. 1878; Ali in Nasir & Ali, Fl. W. Pak. 36: 5. 1973; Kumar & Sane, Legumes South Asia: 83. 2003.

Distribution: Pakistan: scattered on foothills in Western Himalayas ascending to 4000 ft; Punjab, Sindh, Khyber Pakhtunkhwa, widely distributed in India, Bangladesh, Bhutan, Myanmar, Yamen, Nepal, China, Thailand.

3. *Senegalia modesta* (Wall.) P. J. Hurter in Mabberley's Pl. Book. 1021. 2008.

Acacia modesta Wall., Pl. As. Rar. 2: 27. t. 130. 1831; Baker in Hook. f., Fl. Brit. Ind. 2: 296. 1878; Ali in Nasir & Ali, Fl. W. Pak. 36: 6. 1973; Kumar & Sane, Legumes South Asia: 91. 2003.

Distribution: Pakistan (Khyber Pakhtunkhwa, Punjab, Baluchistan), India widely distributed in the northern areas, Afghanistan.

4. *Senegalia torta* (Roxb.) Ali comb. nov.

Mimosa torta Roxb., Fl. Ind. 2: 566. 1832.

Acacia torta (Roxb.) Craib in Kew Bull. 1915: 410. 1915; Parker, For. Fl. Punj. ed. 3. 194. 1956; Ali in Fl. W. Pak. 36: 8. 1973; Kumar & Sane, Legumes South Asia: 99. 2003.

Distribution: Widely distributed in India, Pakistan (Punjab).

5. *Senegalia mellifera* (Vahl.) Seigler & Ebinger in Phytologia 92(1): 94. 2010.

Mimosa mellifera (Vahl.) Benth. in Hook., Lond. J. Bot. 1: 507. 1842; Ali in Fl. W. Pak. 36: 17. 1973; Kumar & Sane, Legumes South Asia: 91.2003.

Distribution: Widely distributed in Africa and Saudi Arabia, India (Tamil Nadu), Pakistan (introduced in Dera Ismail Khan).

6. *Senegalia gageana* (Craib) Maslin, Seigler & Ebinger in Blumea 58(1): 40. 2013 (26 Jun. 2013) (epublished).

Acacia gageana Craib in Kew Bull. 1915: 409. 1915; Parker, For. Fl. Punj. ed. 3: 195. 1956; Ali in Nasir & Ali, Fl. W. Pak. 36: 8. 1973; Kumar & Sane, Legumes South Asia: 86. 2003.

Distribution: Jammu & Kashmir, India (Arunachal Pradesh, Assam, Behar, Himachal Pradesh, Uttar Pradesh, W. Bengal), Nepal, Sikkim, Bhutan, Bangladesh.

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