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REVISION OF *SIDA* LINN. (MALVACEAE) FROM PAKISTAN*

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Abstract

The present paper includes 12 specific and infraspecific taxa belonging to the genus *Sida* Linn. Of these 2 are new species viz. *Sida alii* S. Abedin and *Sida pakistanica* S. Abedin previously included under *Sida ovata* Guill. & Perr.; 2 are new varieties viz., *Sida cordata* var. *nasirii* S. Abedin and *Sida spinosa* var. *kazmii;* 1 is a new combination *Sida alii* var. *ovata* (Baker) S. Abedin and 3 are new records viz., *Sida mysorensis* Wight & Arn., *Sida yunnanensis* Hu and *Sida alii* var. *ovata* (Baker) S. Abedin. The relationships of *Sida yunnanensis* Hu, *Sida spinosa* Linn; *Sida alii* S. Abedin and *Sida pakistanica* S. Abedin with the allied taxa are critically discussed.

Introduction

The genus *Sida* Linn., is one of the most difficult genera of the family Malvaceae. The genus has been treated by many workers from time to time but due to the wide range of variation, the delimitation of various species and infraspecific taxa is still debatable. There is also no critical and complete account of locally occuring members nor any monographic account of this genus. Hooker's "Flora of British India" and Boissier's "Flora Orientalis" were published about 100 years ago. Since then many areas botanically unknown at that time have been explored and a vast amount of collecting has been done. Some regional floras, e.g. Cooke (1901): Parker (1918): Kashyap (1936), included various species of this genus. "A working list of flowering plants of Baluchistan" by Burkill (1909) and "Flora of Rawalpindi District" by Stewart (1956) include only a list of plants. The latter work only occasionally contains very brief descriptions and keys. Stewart (1972) in his "Annotated catalogue of Vassular Plants of West Pakistan and Kashmir" has enumerated 8 species including 2 doubtful ones. Of these only 4 are included in the present work and the rest either do not occur in our area, or the names are reduced to synonymy. Recently some work on this genus has been done outside Pakistan. Hu (1955) and Borssum Waalkes (1966) included the account of this genus in the family revised for China and Malesia, respectively. These works are extremely useful and informative because many species are common to our area.

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The present paper is based on the study of a vast number of herbarium specimens and fresh material as well, covering the whole of Pakistan. In most of the cases type specimens have been studied. Each taxon, wherever necessary, has been critically discussed.

Sida

Linn., Sp. Pl. 683. 1953; Gen. Pl. ed. 5.306 1754; Boiss., Fl. Or. 1: 835. 1867; Mast. in Hook. f., Fl. Brit. Ind. I: 322. 1874; Hu, Fl. China, fam. 153. 13. 1955; Borss. in Blumea, 14(1): 177. 1966; Hutch., Gen. Fl. Pl. 2:560. 1967.

Type Species: *Sida rhombifolia* Linn.

Distribution: About 150 species in the tropics and subtropics of both hemispheres. Of these c. 2/3rds are restricted to America.

In Pakistan it is represented by 12 specific and infraspecific taxa.

Key to the species

1.	+Mericarps generally 5.		2
	–Mericarps generally 7-10		6
2.	+Branches, petiole and pedicel with stellate and simple, spreading hairs, leaves palminerved. Mericarps smooth, mucronate.		3
	–Branches, petiole and pedicel with stellate hairs only. Leaves penninerved. Mericarps reticulate, awned.		4
3.	+Plant prostrate or subprostrate, eglandular hairy.	1.	*S. cordata*
	–Plant erect, glandular hairy.	2.	*S. mysorensis*
4.	+1-3 spiny structures present on the stem at the base of petiole. Mericarps with a pair of divergent apical awns.	5.	*S. spinosa*
	–Spiny structures absent. Mericarps with a pair of convergent apical awns.		5
5.	+Flowers usually solitary. Pedicel in fruit 1-2 cm long.	4.	*S. alba*

	- Flowers fasciculate. Pedicel in fruit usually less than 1 cm long.	3. *S. yunnanensis*
6.	+Mericarps usually 9-10, dehiscent; awns 3-5 mm long, retrorsely hairy.	6. *S. cordifolia*
	–Mericarps usually 7-8, indehiscent; awns c.1 mm long, not retrorsely hairy.	7
7.	+Calyx 6-10 mm long, 5-7 mm broad, tube prominently angular. Fruit completely enclosed by calyx. (Flowers yellow).	9. *S. pakistanica*
	–Calyx 4-6 mm long, 3-5 mm broad, tube not or subangular. Fruit never completely enclosed by calyx.	8
9.	+Flowers solitary, pale yellow. Fruiting pedicel 2-3.5 cm long, with a joint at the apex.	7. *S. alii*
	-Flowers usually paired, white. Fruiting pedicel usually 0.5-1.5 cm long, without or with a joint in the middle.	8. *S. ovata*

1. *Sida cordata* (Burm. f.) Borss. in Blumea 14 (1): 182. 1966; Stewart in Nasir & Ali, Ann. Cat. Vasc. Pl. W. Pak. Kash. 483. 1972.

Syn : *Melochia cordata* Burm. f. Fl. Ind. 143. 1768.

Holotype: (G *n.v.*)

Sida veronicifolia Lamk., Encycl. 1:5. 1783.

Holotype: Les Indes, Sonnerat s.n. (P-LA!).

Sida humilis var. *veronicifolia* (Lamk.) Mast. in Hook. f., l.c. 322.

Sida radicans Cav., Dis. 1:8 t. 9. f. 3. 1785.

Holotype: Rheede, Hort, Malab. t. 69

Sida morifolia Cav., l.c. 9. t. 10. f. 2. Isotype: (P-JU!).

Sida humilis Cav., Dis. 5:277. t. 134. f. 2. 1788; Mast. in Hook. f. l.c. 322.

TYPE: Luzon, Port Cavite, *Nee* s.n. (MA *n.v.*)

Sida veronicifolia var. *humilis* (Cav.) K. Sch. in Mart., Fl. Bras. 12(3): 320. 1891.

Sida unilocularis L, Herit, Stirp. Nov. 1:117 bis t. 56. 1789.

Holotype: Strip. Nov. 1:117 bis t. 56.

This species is highly variable in indumentum and inflorescence. Variation in the inflorescence sometimes gives the illusion of the presence of at least two taxa. A critical study of herbarium specimens indicates that the variation in the length of the inflorescence is continuous hence the separation of taxa on the basis of this character is not possible.

However, discontinuous variation has been observed in the colour of branches and pedicels, and in the stiffness of pedicels, on the basis of which two taxa may easily be delimited.

Key to the varieties

+Entire plant green; pedicel slender.	a, var. *cordata*
–Branches and pedicels purple; pedicel wiry, very thin, thread-like.	b, var. *nasirii*

1.a *Sida cordata* (Burm. f.) Borss. var. *cordata* (Fig. 1, E).
Syn : *Sida cordata* (Burm. f.) Borss. in Blumea 14(1): 182 1966.

Representative specimens: Peshawar Dist.: Jhagra Forest Nursery, Peshawar Jan Mohammad s.n. (RAW); Attock Hills, 3.5. 1968. S.A. Khan s.n. (PFI-B) Jummu-Kashmir Road, ± 3000' 6.9. 1929. R.R. Stewart s.n. (RAW); Swat Dist.: Buner, Stewart. Nasir & Siddiqi 1314 (RAW); Hazara Dist.: Garhi, Jhelum Valley 2500' R.R. Stewart 9469 (RAW); 3 miles from Garhi Habibullah on way to Abbottabad, flowers yellow, M. Qaiser & S.A. Faruqi 3384 (KUH); 12 miles from Nathiagali on way to Abbottabad, 30 cm high, flowers yellow M. Qaiser 3430 (KUH); Muzaffarabad Dist.: 2 miles from Muzaffarabad on way to Abbottabad, 90-120 cm, erect shrub, flowers yellow, M. Qaiser & S. A. Faruqi 3156 (KUH); Rawalpindi Dist.. National Park, flowers yellow, semierect, S. Abedin 7399 (KUH); 10 miles from Rawalpindi on way to Murree, 25 cm high, suberect, flowers yellow, S. Abedin & M. Qaiser 9281 (KUH); Karot, 2300 ft, rocky hills with sand. 25 cm tall, flowers yellow, S. Abedin 2781, 2782 (KUH); Karot, Tehsil Kahuta, Siddiqi & Y. Naisir 6098 (RAW); Ghattar Garden on way to Murree. 45 cm high, ± 3000 ft. flowers yellow, M. Qaiser 223 (KUH); Ayub Park. Rawalpindi, Siddiqi 1311, 1312 (RAW); Saidpur, Rawalpindi. R.R. Stewart 6987, 27533 (RAW); Topi Park, Rawalpindi, Narain-dar Kaur 63 (RAW); Panjar, Rawalpindi, R.R. Stewart 28652 (RAW); Topi Park, Rawal-pindi, Mohindar Nath 153 (RAW); Margala Hills, 20 miles from Rawalpindi, prostrate herb, flowers yellow; Saida Qureshi 277 (KUH); Sargodha Dist.: Phulwari, Sakesar Road, Salt Range, 31. 7. 1954 I. Ahmad s.n. (RAW): 4 miles from Pattoki on way to Sahiwal, flowers yellow, S. Abedin & M. Qaiser 9347 (KUH); Sakesar, near Air Force Halt, 60 cm tall, flowers crimson yellow, M.Qaiser 2651 (KUH); c. 2 miles from Sakesar on way to Naushera, 20-25 cm tall, flowers yellow, M. Qaiser 2676 (KUH); c. 4 miles from Pail on way to Khushab, flowers yellow M. Qaiser & S.A. Faruqi 2758 (KUH); Lahore Dist.: University Campus, Lahore, K. Gul s.n. (KUH); Changa Manga, April, 1885. Saudul Hac,

(PUH); Changa Manga, Prostrate herb, flowers yellow, S. Abedin 2583, 2593, 2618 (KUH); 3 miles from Lahore on way to Wagah, along Ravi River 40 cm, flowers yellow, S. Abedin 2414 (KUH); Karachi Dist.: Darsano Chano, near cultivated field, 70 cm tall herb, flowers yellow, S. Abedin 20 (KUH); Tharparker Dist.: Nagarparker, 80 cm tall, flowers yellow, M. Qaiser. A. Ghafoor & A. Hussain 3996 (KUH).

Distribution: Tropical and subtropical regions of the world.

In Pakistan it occurs in N.W.F.P., Punjab and Lower Sind.

1.b *Sida cordata* (Burm. f.) Borss. var. *nasirii* S. Abedin var. nov.

Holotype: Peshawar University, small herb, May 1968. *Munir Abid* s.n (KUH).

Herba prostrata vel subprostrata cum ramis purpurescentibus. Pedicelli tenuiores quam varietate procedents, filiforme purpurei.

It differs from var. *cordata* in having purple branches and pedicels. Wiry and very thin pedicels are also important characters of the variety.

Distribution: Known from type lacolity only.

2. *Sida mysorensis* Wight & Arn., Prodr. 59. 1834; Mast. in Hook. f., l.c. 322.

TYPE: Mysore, *Wight* 183 (K!).

Syn : *Sida hirta* Wall., Cat. n. 1855. 1828, non Lamk.

Sida glutinosa Roxb. (Hort. Beng. 97. 1814, *nom. nud.*) Fl. Ind. ed. Carey 3: 172. 1832, non Cav. 1785.

Sida urticifolia Wight & Arn., l.c., 59, non St. Hil. 1818.

TYPE: Trichnopoly, *Wight* 182 (K!)

Sida wightiana Dietr., Synops. 4:854. 1847.

TYPE: Trichnopoly, *Wight* 182 (K!).

It is very close to the preceding species from which it may be distinguished by the presence of glandular hairs on branches, petioles and pedicels.

Representative specimens: Rawalpindi Dist.: Topi Park, Rawalpindi R.R. & I.D. Stewart 1495 (RAW); Sialkot Dist.: Zafarwal, R.R. & I.D. Stewart 656 (RAW).

Distribution: Tropical Asia.

It is recorded for the first time from Pakistan. It is of rare occurrence.

3. *Sida yunnanensis* Hu, Fl. China, fam. 153. 16. t. 16. f. 1955. (Fig. 1, A-B).

TYPE: China, Yunnan, *Forrest* 11088 (K!; BM!).

Syn : *Sida obovata* Wall., Cat. n. 1864. 1828. *nom. nud. Sida rhombifolia* var *obovata* Wall. ex Mast. in Hook. f., fl. Brit. Ind. 1:321 1874.

Holotype: Burr *Wallich* 1864 (K!).

Fig. 1. *Sida yunnanensis* A, Fruiting twig; B, Mericarp. *Sida cordifolia*. C, Fruiting twig; D, Lateral view of mericarp; E, Dorsal view of mericarp. *Sida alba:* F, Fruiting twig. *Sida spinosa* var *spinosa*. G, Fruiting twig; H, Mericarp.

Representative specimens: Hazara Dist: Garhi, J.V. Road, R.R. Stewart 10081 (RAW); 12 miles from Nathiagali on way to Abbottabad, flowers yellow, erect, c. 70 cm tall, M. Qaiser & S.A. Faruqi 3429 (KUH); Abbottabad, dry hills, alt. 4000', not common, flowers yellow, Drumond 24459 (K); Muzaffarabad Dist.: Neelum Valley Road, 6 miles from Muzaffarabad, flowers yellow, 45-60 cm, M. Qaiser & A. Ghafoor 4899 (KUH); Village Sarwar, near Dulai, soil silty clay loam with gravel, flowers yellow, 50 cm erect herb, M. Qaiser & A. Ghafoor 4964 (KUH); Village Kangar between Berarkot & Muzaffarabad, ± 3500 ft., flowers yellow, 35 cm tall, M. Qaiser & A. Ghafoor 4880 (KUH); Kashmir, near Ramban, Jammu-Kashmir Road, 3000 ft., R.R. Stewart 10744 (KUH); Rawalpindi Dist.: Rawalpindi, 1700 ft. R.R. Stewart 15111 (RAW); Panjar, R.R. Stewart 28251 (RAW); Jhelum Dist.: Mt. Tilla, salt range, Drummond 24887 (KUH;K). Lyallpur Dist.: Lyallpur, 13. 10. 1916. Rawal Chand s.n. (KUH); Lahore Dist.: Lahore 1953. M. Shafi s.n. (Lahore).

Distribution: Burma, China, India and Pakistan.

It is a new record from Pakistan. It occurs in the upper Punjab, Hazara (N.W.F.P.) and Azad Kashmir.

Sida rhombifolia Linn. var. *obovata* Wall. ex Mast. which by Hochreutiner (1955) and Borssum Waalkes (1966) has been considered to be synonymous with *Sida rhombifolia* L. is based on Wallich's specimen no. 1864. This specimen has subsessile, fasciculate flowers and fruits with 5 mericarps which are disintegrated at base and with a pair of less than 1 mm long, convergent, apical awns, and matches in all respects with the type of *Sida yunnanensis* Hu. *Sida rhombifolia* L. on the contrary is characterised by long pedicel, usually solitary flowers and fruits with 9-12 mericarps which are not disintegrated at base and with a pair of usually 1-3 mm long, divergent, apical awns.

Hu mentioned 6 or 7 carpels in her species description. I have seen fruits with 5 mericarps only in the type specimens of *Sida rhombifolia* L. var. *obovata* Wall. ex Mast. and *Sida yunnanensis* Hu.

Sida yunnanensis Hu resembls *Sida alba* L. and *Sida spinosa* L. in its fruits. However, it differs from the former in the fasciculate flowers which are short pedicelled. It may be distinguished from *Sida spinosa* L. by the absence of spiny structures on the stem at base of the petiole. Further, the mericarps are provided with a pair of convergent apical awns, and the leaves are not lanceolate or ovate, while in *Sida spinosa* L. spiny structures are present at base of petiole, mericarps are provided with a pair of divergent awns and leaves are lanceolate to ovate.

Stewart (1972) under *Sida alba* Linn. cites "*Sida rhombifolia* var. *obovata* auct." and this is followed by "FBI 1:394" where Masters has described this variety. Some of the specimens cited by Stewart (1972) under *Sida alba* L. belong to *Sida yunnanensis* Hu.

4. *Sida alba* Linn., Sp. Pl. ed. 2. 960. 1763; Stewart. l.c. 483 p.p. (Fig. 1, F).

Holotype: H.U. *Herb. Linn.* n. 866. 2. (LINN!).

Syn : *Sida alnifolia* var. *obovata* sensu Hu, Fl. China, fam. 153. 22. t. 16. f. 5. 1955, non *Sida rhombifolia* var. *obovata* Wall. ex Mast. 1874.

Distribution: India and Pakistan.

It closely resembles *Sida yunnanensis* Hu from which it may readily be differentiated by solitary or paired flowers with long pedicels.

Hu (1955) treated *Sida rhombifolia* L. var. *obovata* Wall. ex Mast. as a variety of *Sida alnifolia* L. As discussed earlier *Sida rhombifolia* L. var. *obovata* Wall. ex Mast. is synonymous with *Sida yunnanensis* Hu (see discussion under *Sida yunnanensis* Hu). Though I have not seen the specimens cited by her under *Sida alnifolia* L. var. *obovata* sensu Hu, yet the photograph of this varety (Lau 3508) seems to indicate that her concept about this taxon is different from that of Masters (1874). The presence of solitary flowers in the photograph suggests that it may belong to *Sida alba* L.

5. *Sida spinosa* Linn., Sp. Pl. 683. 1753; Mast. in Hook. f., l. c. 323; Cooke, Fl. Pres. Bomb. rep. ed. 98. 1958; Parker, For. Fl. Punj. ed. 3. 33. 1956; Borss., l. c. 191.

Lectotype: *Herb. Linn.* n. 866.1 (LINN!).

This species has been confused with *Sida alba* Linn. and *Sida alnifolia* Linn. According to Masters (1874) both *Sida alba* L. and *Sida alnifolia* L. are conspecific with *Sida spinosa* L. Parker (1918), under *Sida spinosa* L., writes that it has 2 forms, one with leaves cuneate at the base (*Sida alba* L.) and the other with leaves cordate at the base (*Sida alnifolia* L.). Cooke (1901), Hochreutiner (1955) and Robyns (1965) considered *Sida alba* L. to be conspecific with *Sida spinosa* L. while Andrews (1952), Hutchinson & Dalziel (1958) and V. Tackholm (1956, 1974) considered *Sida spinosa* L. partly to be conspecific with *Sida alba* L. and Stewart (1972) considered *Sida spinosa* L. partly to be conspecific with *Sida alnifolia* L.

The critical study of the type specimens reveals that all these 3 species are distinct. *Sida alnifolia* L. is characterised by having 9 or 10 mericarps which are neither membranous nor disintegrated at the base, while *Sida alba* L. and *Sida spinosa* L. have only 5 mericarps which are membranous and disintegrated at the base. *Sida spinosa* L. differs from *Sida alba* L. in the presence of 1-3 spiny tubercles on the stem at base of petiole and mericarps with divergent awns. In *Sida alba* L. spiny tubercles are lacking and the mericarps have convergent awns.

Key to the varieties

+Leaves mostly large, 1-4 cm long, 0.5-3 cm broad. a. var. *spinosa*

–Leaves mostly small, 5-10 mm (-20) long, 3-8 (-10) mm broad. b. var. *kazmii*

5.a *Sida spinosa* Linn. var. *spinosa* (Fig. 1, G-H).

Syn : *Sida spinosa* Linn., Sp. Pl. 683. 1753.

Representative specimens: Jhelum Dist.: 3 miles from Choia Saidan Shah on way to Kalar Khar, erect, 30 cm, M. Qaiser 2812B (KUH); Larkana Diat.: Larkana 28. 4. 1958 A. Hussain s.n. (RAW); Khairpur Dist.: Pirylaoi machche. common, undershade of trees, near canal, S. M. H. Jafri 1175 (KUH); Khairpur, near cultivated field and canal, common, flowers yellow, S. M. H. Jafri 2426 (KUH); Sukkur Dist.: Sukkur, Naima Yakoob s.n. (KUH); Karachi Dist.: 21 miles from Karachi on way to Thatta. with fruits, s. Abedin 5304-5 (KUH); Darsano Chano, Guava garden, with fruits, 1 m tall, S. Abedin 9769 (KUH); Dadu Dist.: Jamshoro, N.A. Rajput 123 (KUH); Jamshoro. 30.8. 1967 F. Yasmin s.n. (KUH); Hydreabad Dist.: Miani Forest, S. Yasmin s.n. (KUH); Miani Forest, between Hala and Hyderabad, 35 cm, flowers yellow, A. Ghafoor & Qaiser 414 (KUH); between Tandojam Mirpur Khas, flowers white, erect, 40 cm, A. Ghafoor & M. Qaiser 456 (KUH); Tandojam, fruit garden, 9.10. 1959 A. Jalis s.n. (RAW); Tajpur Nisarpur, along the edge of canal, 21. 10. 1059 A. Jalis s.n. (RAW); near Miani Forest, flowers white, 60 cm tall, S. Abedin 3915 (KUH); 6 miles from Hyderabad on way to Tandojam, with fruits, 25 cm tall, S. Abedin 4026 (KUH); Thatta Dist.: 3 miles from Garho on way to Keti Bunder, flowers white, 35 cm tall, S. Abedin., S. I. Ali & A Ghafoor 4148 (KUH).

Distribution: Tropical and subtropical regions of both the old and the new world.

In Pakistan it is common in Sind.

5.b. *Sida spinosa* Linn. var *kazmii* S. Abedin var. *nov.*
Holotype: Bahawalpur, Model Town, flowers yellow; 30 cm tall herb, 22. 12. 1968, Manzoor Ashraf s.n. (KUH).

Planta minus pubescens. Folia parviora, 5-10 (-20) mm longa, 3-8 (-10) mm lata. Haec est varietate precedente in allis characteribus.

It differs from the var. *spinosa* by having mostly smaller leaves and the entire plant comparatively less hairy.

Representative specimens: Bahawalpur Dist.: Model Town, Bahawalpur, Manzoor Ashraf s.n. (KUH) type; Khairpur Dist.: Khairpur, under the shade of mango tree, common 3 ft. tall, S.M.H. Jafri 1239 (KUH); Thatta Dist.. c. 7 miles from Dhabeji on way to Thatta, with fruit, 45 cm tall, M. Qaiser., Saida & S. Asad Raza 456 (KUH); Malirari village, bank of R.D. 133, with fruits, associated with dry hedge of *Acacia* sp., soil sandy loam and saline, S. Abedin., M. Qaiser & A. Ghafoor 9396 (KUH); Karachi Dist.: Nazimabad 26. 10. 1968 S. Akhter s.n (KUH); Darsano Chano, flowers yellow, 30 cm tall.

S. Abedin 12 (KUH); Hyderabad Dist.: Chaudhri Murad Khan's Farm, Deh Band, with fruits, 35 cm tall, S. Abedin., M. Qaiser & A. Ghafoor 9246 (KUH); Miani Forest N. Bhutto s.n. (KUH); near Miani Forest, 2.31965 I. Hussain s.n. (KUH); Dadu Dist.: Jamshoro, B. Abbasi s.n. (KUH).

Distribution: Endemic to Pakistan (Lower Punjab & Sind)

6. *Sida cordifolia* Linn, Sp. Pl. 684 1753; Mast. in Hook. f., l.c. 324: Stewart, l.c 483. (Fig. 1, C-E).

TYPE: *Herb. Linn.* n. 866. 12 (LINN!).

Syn : *Sida herbaceae* Cav., Diss. 1:19. t. 12. f. 1. 1785 Type: (P-LA).

Type: (P-LA).

Sida holosericea Willd. ex Sprengel, Syst. Veg. 3: 112. 1826.

TYPE : n. 879 (B-W!).

Representative specimens: Swat Dist.: Buner, *Stewart,* Nasir & Siddiqi 1313 (RAW); Muzaffarabad Dist.: 2 miles 90-120 cm tall, flowers yellow, M. Qaiser & S.A. Faruqi 3156 (KUH); Lyallpur Dist.: Lyallpur, 9. 10. 1922 *Rawal Chand* s.n. (KUH); Karachi Dist.: Manghopir, flowers yellowish, 60 cm tall, S. Abedin 5701 (KUH); Tharparkar Dist.: 12 miles from Mithi on way to Diplo, erect, 45 cm, tall flrs. Yellow, M. Qaiser, A. Ghafoor & A. Hussain 3716 (KUH); Malihar Goth, Mithi-Diplo Road, sandy soil, erect, 60 cm tall, with fruits, M. Qaiser, A. Ghafoor & A. Hussain 3776A (KUH); Nagarparker, Shrub, 3. 10. 1956. M.B. Zaman s.n. (PFI-M); Nagarparker, shrub, 1-3 ft. tall, Qadri s.n. (KUH); Nagarparker, Verawa Rangers Post, flowers white to very faintly yellowish, erect shrub, M. Qaiser, A. Ghafoor & S. A. Hussain 3943 (KUH); Nagarparker, on hills, c. 80 cm tall, flowers greenish yellow M. Qaiser, A. Ghafoor & S. A. Husain 4033 (KUH); Nagarparker, Chandan Bund, 5-10 cm high, flowers yellow, S. Abedin., S.I. Ali. & S.A. Faruqi 4461, 4474 (KUH).

Distribution: Common in tropical and subtropical countries.
In Pakistan it is common in Sind particularly in Tharparker district.

7. *Sida alii* S. Abedin sp. *nov.*

Holotype: Jhelum Dist.: 3 miles from Choia Saidan Shah on way to Kalar Kahar, flowers yellow *M. Qaiser* 2812 A (KUH).

Suffrutex erectus, folia lanceolata ad ovata. Flores flavi; pedicelli longi, 1.5-2 cm in flore, 2-3.5 cm in fructu, articulati ad apicem. Corolla luteola, mericarpia (6-)7-8, indehiscentia, reticulata, aristis 2, conniventia. Fructus calyce appressus, non inclusus, brevis.

Fig. 2. *Sida alnifolia* var. *alnifolia*. A. Flowering twig; var. *ovata*, B. Fruiting twig.

An undershrub, ± 60 cm tall, stellate tomentose. Leaves variable in size and shape, 1.5-3.5 cm long, 1-1.5 cm broad, lanceolate to ovate, crenate, regularly or irregularly serrate or dentate, obtuse or acute, stipules linear, 2-4 mm long; petiole 7-15 mm long. Flowers axillary, solitary; pedicel 1.5-2 cm long, in fruit 2-3.5 cm, glabrescent, articulate near the top, in flowering articulation not prominent. Calyx fused to the middle, ± 5 mm long and broad, lobes acuminate, triangular, c 3 mm broad. Corolla yellow. Fruit depres

sed-globular, beaked, 5-6 mm across, pubescent at the top; mericarps (6-) 7-8, with 2 less than 1 mm long connivent awns, indehiscent, radially and dorsally with raised reticulation, c. 3 mm long, radially c. 3 mm broad, dorsally c. 2 mm broad. Seed c. 2 mm in diameter, dark brown.

Distribution: Endemic to Pakistan (Punjab).

This species is closely allied to *Sida ovata* Forssk. from which it may be differentiated by its solitary and yellow flowers, long glabrescent pedicels which are jointed near the top, and mericarps with rraised reticulation on the radial surface. It resembles *Sida pakistanica* S. Abedin in its mericarp, but differs by the small subangular calyx not enclosing the fruit.

Stewart (1972) has cited only one specimen (RRS 11058) under *Sida orientalis* Cav. *Sida orientalis* Cav. is conspecific with *Sida acuta* Burm. f. which has glabrous leaves and long, lanceolate stipules. RRS 11058 belongs to the present species.

Further, Stewart cited Drumm. 24862 collected from Choia Saidan Shah, Jhelum Dist. under *Sida compressa* DC. which is conspecific with *Sida rhombifolia* L. This number seems to be erroneously printed. The correct number is 24852 which has been verified at Karachi, Kew, Edinburgh and Vienna. This specimen also matches with the present taxon.

It would not be out of place to mention here that the so clalled Drummond 24852 and 6313 are actually 2 sheets of one and the same collection made by Narain Das at Choia Saidan Shah on 20. 8. 1886. Narain Das has collected plants in Jhelum for Drummond (Stewart, 1972). The discrepency in these 2 numbers seems to be possible in view of the fact that no. 6213 may have been given by N. Das and that no. 24852 by Drummond.

Key to the varieties

+ Leaves mostly lanceolate or ovate, minutely and regularly serrate or crenate, longer than broad.	a. var. *alii*
- Leaves mostly oblong-ovate, deeply and irregularly serrate or dentate, usually as long as broad.	b. var. *ovata*

7.a *Sida alii* S. Abedin var. *alli* (Fig. 2, A).
Representative specimens: Jhelum Dist.: Choia Saidan Shah, M. Qaiser 2812-A (KUH); ibid, Narain Das 6313 / Drummond 24852 (KUH; K; E; W); Mt. Tilla, alt. ± 2000; R.D. & I.D. Stewart 696 A (KUH); Mogli, Mt. Tilla, alt. 1500', R.R. Stewart 696 (KUH); Rawalpindi Dist.: Ayub Park, Rawalpindi, R.R. Stewart 11058 (KUH).

Distribution: Endemic to Pakistan.

7.b *Sida alii* S. Abedin var. *ovata* (Baker) A. Abedin comb. nov. (Fig. 2, B)

Sida rhombifolia Linn. var. *ovata* Baker, in Journ. Bot. 30: 239. 1892.

Holtype: Beluchistan, Mehrab Tangi, rare, 2 ft. high, *J. H. Lace* 3491 (E!).

Distribution: Known from type locality only.

Baker (1892) placed this variety under *Sida rhombifolia* Linn. which is entirely a different species and is characterised by rhomboid leaves, 9-10 mericarps with comparatively longer awans. Further, Baker remarked that possibly S. rhombifolia Linn. var. *ovata* Baker is allied to *Sida grewioides* Guill. & Perr. This shows that Baker was not sure about thies taxon. However, the present variety resembles the var. *alii* in its long glabrescent pedicel but differs from it in shape, size and incision of the leaves.

SIDA OVATA COMPLEX

Sida ovata has differently been characterized by various workers particularly in the flower colour. According to Masters (1874) and Murray (1881) the flower is yellow, while Cooke (1901) and Chavan & Oza (1966) describe it as white, and Duthie (1905), Blatter & Halberg (1918), and Parker (1918) mention it as white or yellow.

It was observed in the field that white and yellow flowers are found on separate plants. Besides this difference in flower colour, variation was also noticed in certain other characters.

In order to study the variation in plant populations random representative samples were collected from four different localities viz. Karachi University Campus, Hub River, Managhopir, and Pipri. In all 136 specimens were collected. Each individual was tagged and proper record was maintained. The characters taken into consideration were (i) plant height, (ii) flower colour, (iii) calyx angular or subangular, (iv) plant erect or suberect, (v) sepal length, (vi) sepal breadth, (vii) petal length, and (viii) diameter of flowers.

Histograms of the quantitative characters such as height of plant, length of petal, and diameter of flower are bimodal (Fig. 3), showing the possibility of two different populations. The characters were also plotted on polygraph (Fig. 4) and sacttered diagram (Fig. 5). These graphs show some overlapping in a few characters such as plant height, sepal and petal length. But the study of these graphs clearly indicates the presence of two populations.

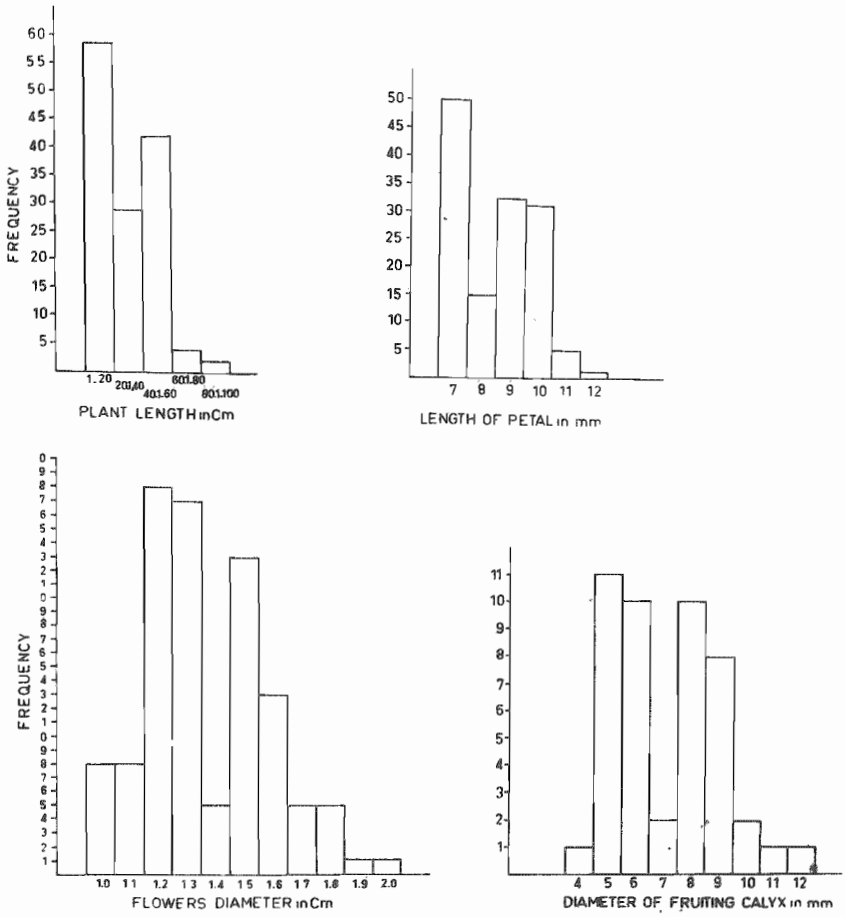

Fig. 3. Histograms showing various characters of *Sida ovata* and *Sida pakistanica*.

Further, variation was also observed in some other characters, viz. mericarps and fruiting calyx. The correlation of these characters with others already discussed could not be studied graphically as these characters were available in 46 plants only. However, the same two populations may also be descriminated on the basis of these characters. Mericarps are characterized by the presence of reticulations on the radial surfaces in one kind of population, and by the absence of these in the other. The diameter of the fruiting calyx in one kind usually ranges from 4-7 mm, while in the other it ranges from 7-12 mm. Histogram of this character is bimodal (Fig. 3).

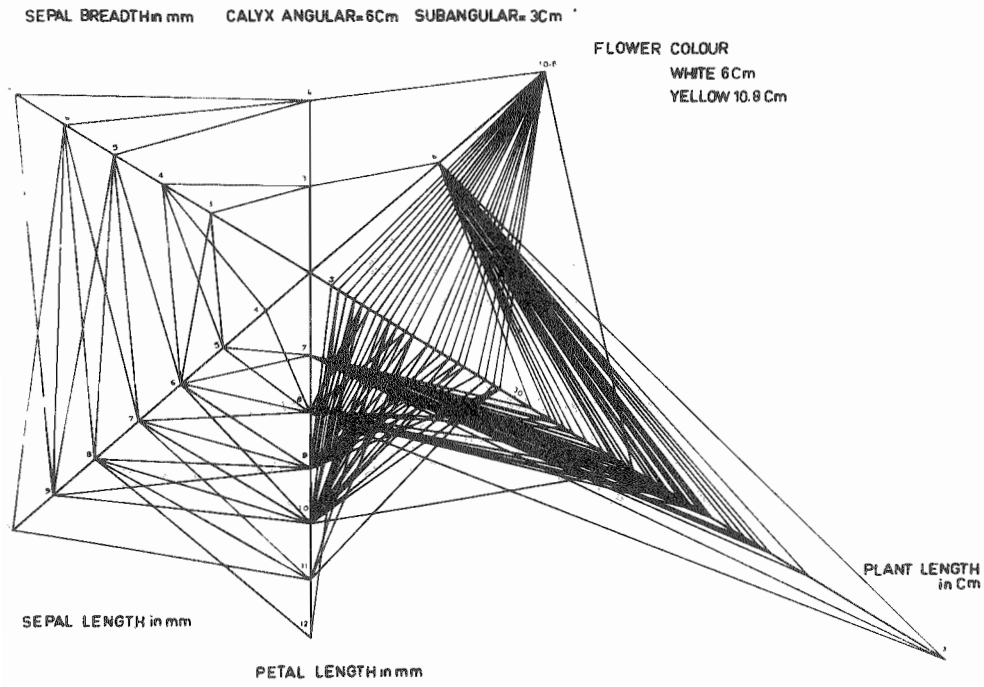

Fig. 4. Polygraph showing various characters of *Sida ovata* and *Sida pakistanica*

It has also been observed that the opening time of the flowers is different in these two populations. In one population the flowers usually open at about 9 A.M. and close at about 3.0 P.M., while in the other they open at about noon and close at about 5.30 P.M. This time may vary according to the fluctuations in the weather conditions. In cloudy weather the flowers open late and close early.

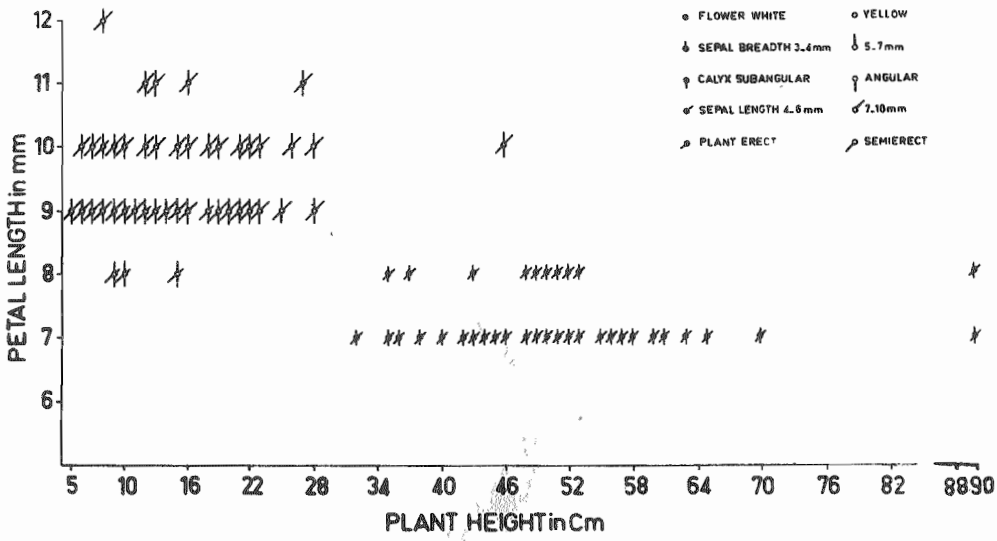

Fig. 5. Scatter diagram showing various characters of *Sida ovata* and *Sida pakistanica.*

It is concluded from the above discussion that two taxa may be recognized in the *S. ovata* complex on the basis of the combination of the following characters:

Table -1

S. No.	Character	New Taxon	*Sida ovata* Forsk
1.	Habit	Prostrate-semi-erect	Erect
2.	Height	5-46 cm	32-90 cm
3.	Flower colour	yellow	white
4.	Diameter of flower	15-20 mm	10-15 mm
5.	Opening time of flower	12-5.30 P.M.	9 A.M. -3 P.M.
6.	Calyx	Prominently angular	subangular
7.	Sepal length	6-10 mm	4-6 mm
8.	Sepal breath	5-7 mm	3-4 mm
9.	Petal length	8-12 mm	7-8 mm
10.	Diameter of fruiting calyx	7-12 mm (enclosing the fruit)	4-7 mm (scarcely enclosing the fruit)
11.	Radial surface of the mericarp	Prominently reticulate all over	Reticulate towards the margin, not or inconspicuous towards the centre

The new taxon is *Sida pakistanica* S. Abedin and is here accorded the rank of a species.

8. *Sida ovata* Forsk., Fl. Aegypt. -Arab. 124. 1775; Andr., Fl. Pl. Aug. Egypt. Sud. 2: 41. 1952; Hutch. & Dalz., Fl. W. Trop. Afr. ed. 2. 1 (2): 339. 1958; Meeuse in Exell & Wild, Fl. Zamb. 1: 479. 1960; R.R. Stewart in Nasir & Ali, I. c. 483. 1972. (Fig. 6, C-D)

Holotype: Arabia, Surdud (C!)

Syn : *Sida grewioides* Guill. & Perr. in Guill. et al, Fl. Seneg. Tent. 1:71. 1830. Boiss. Fl.Or. 1: 835. 1867; Mast. in Hook. f., 1. c. 323; Duthie, Fl. Up. Geng. Pl. 1: 81. 1905; Blatt. & Hallb. in Journ. Bomb. Nat. Hist. 26 (1): 226. 1918; Cooke, 1. c. 98; Chavan & Oza, Fl. Pansg. 43. 1966.

Holotype: Senegal, *Perrottet* 51 (P! Iso. in K!)

Erect, perennial herb, up to 90 cm tall, all parts stellate pubescent. Leaves with 3-7 mm long, filiform or linear stipules, and 0.5-1.5 cm long petiole; blade 2-5 cm long, 1-4 cm broad, ovate-oblong, coarsely serrate-crenate, entire towards the base, obtuse or somewhat truncate at apex, stellate pubescent on both sides, darker above, cinereous below, penninerved, at base mostly 5 nerved. Flowers white, axillary, solitary or paired; pedicel 5-8 mm, in fruit up to 10 mm, rarely up to 15 mm long, with or without articulation in the middle. Calyx 5 lobed, c. 4 mm across, 4-6 mm long, slightly angular; lobes triangular deltoid, acuminate, 2-3 mm long, 3-4 mm broad. Corolla 1-1.5 cm across; petals 7-8 mm long, 4-5 mm broad, oblique, unguiculate, claw hairy. Staminal tube up to 3 mm long, hairy. Carpels 7-8. Fruit depressed globose, 3-5 mm in diameter, incompletely enclosed by calyx; mericarps 2-3 mm long, radially 2-2.5 mm broad, dorsally 1-1.5 mm broad, reticulate towards the margin, not so towards the centre, glabrous except awns, indehiscent; awns 2, 0.5 mm long, connivent, inflexed. Seeds 1.5-2 mm long, somewhat reniform, slightly longitudinally grooved on the dorsal surface, brown to dark borwn.

Representative specimens: Sargodha Dist.: 7 miles from pail on way to Khushab, semi prostrate, with fruits, M. Qaiser & S. A. Faruqi 2748 (KUH); Campbellpur Dist.: Kahiri Murat, Attock 13. 4. 1957, R. R. Stewart & E. Nasir 27929 (RAW); Gujranwala Dist.: Kharian Forest, 94 miles from Lahore on way to Rawalpindi, erect, 40 cm high, flowers white, c. 1 cm across, along road side, soil sandy clay, S. Abedin 7601, 7602 (KUH); Rawalpindi Dist.: Rawalpindi. alt. 1700 ft. R.R. Stewart 15129 (RAW); Sargodha Dist. Sakesar Road, 31. 7. 1954, I. Ahmad s.n. (RAW); Bela Dist.: Sonmiani, 60 cm tall herb, flowers white, sandy soil, S. Abedin, S.I. Ali & S. A. Faruqi (KUH); Karachi Dist.: common between Manghopir and Bund Murad, Karachi, sandy soil, near water, carpels 7-8, S.M.H. afri 1345 (KUH); Drigh Road, Karachi, 15. 4. 1955, K.M.Khan s.n. (KUH); Manghopir, Karachi, 16. 9. 1956. S.A. Qadir s.n (KUH); near Chemistry Block, University Campus, Karachi, 27. 3. 1967, A. Husain s.n. (KUH); Botany Department, University Campus, Karachi, 28. 8. 1967, A. Husain s.n. (KUH); near Chemistry Department, University Campus, 4. 10. 1967, K. Gul s.n. (KUH); Darsano Chano, flowers white,

sandy soil, 35 cm tall, S. Abedin & Ghafoor 1384-1385 (KUH); Botany Department, University Campus, Karachi. Flowers white, 35 cm tall, sandy clay soil, S. Abedin 3580-3581 (KUH); Micro. Dept., near Guest House, University Campus, flowers white, erect, 35 cm long, sandy loam, S. Abedin & A. Husain 3801 (KUH); Botany Dept., University of Karachi, flowers white, 1-1.3 cm across, 40 cm tall herb, sandy soil, S. Abedin 5057, 5062 (KUH); Physics Department, University of Karachi, with fruits, herb, 40 cm, sandy clay soil, S. Abedin 5077 (KUH); University Campus, Karachi, flowers white, soil sandy, S. Abedin 5082-5084, 5086-9, 5093-5, 5101-5, 5101-17 (KUH); 21 miles from Karachi on way to Thatta, flowers white, 38-58 cm tall, erect herb, clayey soil. S. Abedin & A. Husain 5306, 5308-5329, 5331-2, 5335-9, 5341-5 (KUH); Darsano Chano, flowers white, 1 cm across, 110 cm tall herb, sandy clay soil, S. Abedin 5431 (kUH); police post, Hub River, with fruits, 70 cm tall herb, S. Abedin 5369 (KUH); Thatta Dist. Charo, flowers white, 35 cm tall, along roadside, S. Abedin, S.I. Ali & S. A. Faruqi 177 (KUH);

Distribution: In drier parts of Africa, Arabia, India, Pakistan and Persia.

In Pakistan it is common in lower Baluchistan, Sind and Punjab.

9. *Sida Pakistanica* S. Abedin *sp. nov.* (Fig. 6, A-B).

Holotype: Karachi, Chemistry Department, University of Karachi, 40 cm high, with fruits S. Abedin 5074 (KUH).

Syn : *Sida grewioides* var. *microphylla* Hochr. in Ann. Cons. Jard. Bot. Gen. 6: 37. 1902. syn. nov.

Holotype: Island of Socotra, Welsted, 1899. *Hochreutiner* s.n. (G!).

Planta suberecta, rami inferiores prostrati, c. 50 cm alta. Flores flavi, pedicellis 5-10 mm longis, in fructu 10-20 mm longis, lobi calyeis 5-7 mm lata, accrescentes. Corolla 1.5-2 cm diametralis; petala 8-12 mm longa, 6-7 mm lata. Calyx persistens, fructum tegens. Mericarpia reticulata.

Plant suberect, lower branches prostrate, up to 46 cm tall, stellate pubescent. Leaves ovate, oblong-ovate or ellipitc, c. 1-4 cm long, 0.5-c. 3 cm broad, penninerved, serrate-crenate, obtuse; petiole 5-15 mm long; stipules filiform or linear, 3-8 mm long. Flowers yellow, axillary, usually solitary; pedicel (5-) 10 mm long, in fruit up to 2 cm, with or without articulation in the middle or near the top. Calyx 6-10 mm long, fused to the middle; prominently angular, accrescent in fruit; lobes deltoid, 5-7 mm broad, acuminate. Corolla 1.5-2 cm across; petals 8-12 mm long, 5-7 mm broad. Fruit depressed-globose, enclosed by calyx; mericarps 7-8, 3-4 mm long, radially c. 3 mm broad, dorsally c. 2 mm broad, reticulate all over, glabrescent, indehiscent; awns 2, c. 1 mm long, connivent. Seeds 2-2.5 mm long, dark brown.

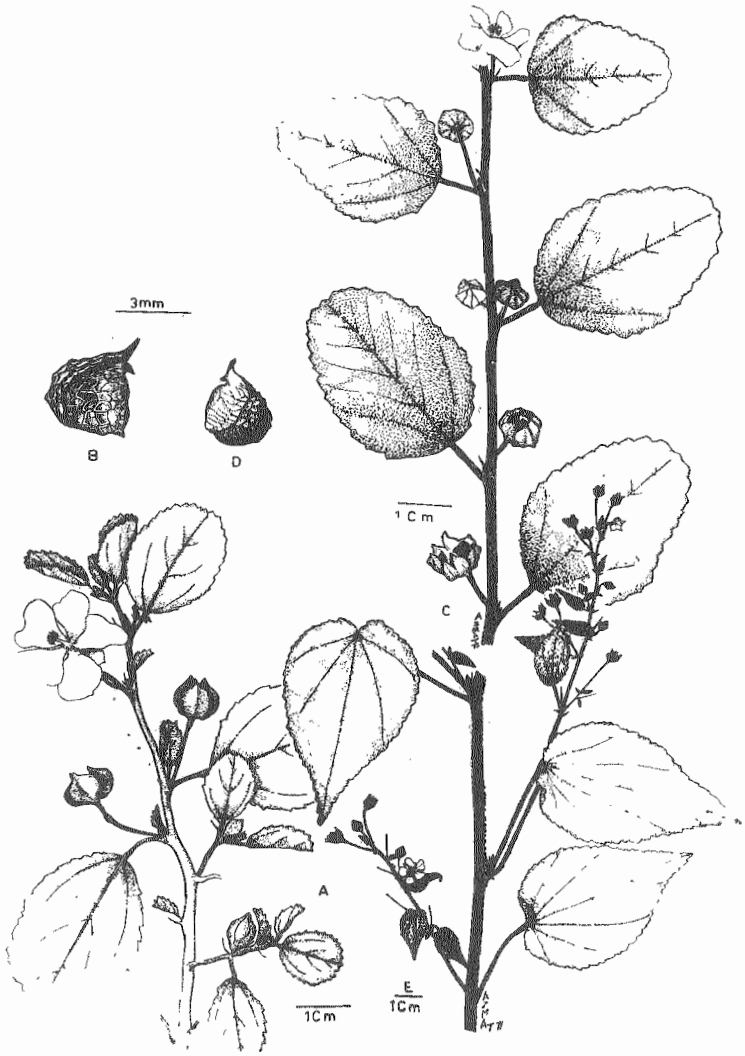

Fig. 6. *Sida pakistanica*· A, Flowering twig; B, Mericarp. *Sida ovata*. C, Flowering twig; D, Mericarp. *Sida cordata* var. *cordata*. E, Flowering twig.

Representative specimens: Sargodha Dist.: c 3 miles from Khatwari on way to Naushera, flowers yellow, 30 cm tall, M. Qaiser 2633 (KUH); Jhelum Dist.: Mustafa'bad, near Choia Saidan Shah, flower yellow, c. 10 cm tall, suberect, sandy soil, M. Qaiser &

A. Ghafoor 4569 (KUH); Bela Dist.: Sonmiani flowers yellow, 30 cm high, sandy soil, S. Abedin & S. I. Ali, 6933 (KUH); Sonmiani, flowers yellow, 25-30 cm high, sandy soil, S. Abedin., S.I. Ali & S. A. Faruqi 1213, 1215, 1232 (KUH); 6 miles from Hub Chowki on way to Bela, flowers yellow, 20 cm high, sandy soil S. Abedin 3657 (KUH); 26 miles from Karachi on way to Bela, flowers yellow, c. 30 cm high, sandy soil, S. Abedin 3666 (KUH); Dadu Dist.: Near Thana Bula Khan, stony hills, S.M.H. Jafri 3699 (KUH); Karachi Dist.: stony hillock, Manghopir, flowers yellow, common, S.M.H. Jafri 1510 (KUH); common in sandy and stony flats, near PAF, Drigh Road, flowers yellow, S.M. H. Jafri 2491 (KUH); Nazimabad, Karachi, 17. 1. 1957, S.A. Alvi s.n. (KUH); Bund Murad, 6. 9. 1957, Anwar Iqbal s.n. (KUH); F. C. Area, 1. 10. 1958, T. R. Nasir s.n. (KUN); Malir, 10 9. 1958 M. A. Husain s.n. (KUH) Nazimabad, 21. 11. 1958, S. Akhtar s.n. (KUH); University Campus, 12. 12. 1963, A. Ahmad s.n. (KUH); Univeristy Campus, 16. 12. 1963, Y. Ahmad s.n. (KUH); P.E.C.H.S. 1963, K. Rehana s.n. (KUH); University Campus, 1965, S.A.A. Hyderi s.n. (KUH); c. 1 mile before Bund Murad, 28. 6. 1967, S.I. Ali s.n. (KUH); University Campus, flowers yellow; c. 12-35 cm high, S. Abedin 3565, 3583 (KUH); City College Campus, Nazimabad, flowers yellow, 20-30 cm tall, sandy clay soil, S. Abedin 3620-1 (KUH); University Campus, Karachi, flowers yellow, 1.7 cm across, collected at 2.45 P.M., no flowering up to 1 P.M., Weather cloudy, calyx angualar, wing like, snady clay soil, 45 cm high, S. Abedin 5058 (KUH); ibid, flowers yellow, 19-46 cm high, sandy clay soil, S. Abedin 5069, 5073, 5074, 5076, 5077, 5090, 5092, 5118-23, 5125-30 (KUH); Manghopir, flowers yellow, lower branches spreading, 5-22 cm high, sandy soil, S. Abedin 5171, 5173, 85, 5187-90, 5192-94 (KUH); 10 miles from Karachi on way to Bela, flowers yellow, up to 2 cm across, 8-18 cm high, sandy soil. S. Abedin 5251-6, 5258-9, 5261-70, 5273, 5275-85 (KUH); 21 miles from Karachi on wasy to Thatta, flowers yellow, 1.2 cm across, 53 cm high, S. Abedin & A. Husain 5307 (KUH); Darsano Chano, flowers yellow, 1.9 cm across, 22-25 cm high, sandy clay soil, S. Abedin 5432-3, 5437 (KUH); P.C.S.I.R. Campus, Karachi, with fruits only, c. 35 cm high, S. Abedin 5607 (KUH); Thatta Dist.: Hazrat Abdullah Shah Mazar, Thatta, with fruits only, 15 cm high, S. Abedin 5583 (KUH); Tharparker Dist.: 3 miles from Naokot on way to Diplo, flowers yellow, c. 15 cm high, sandy soil, M. Qaiser 3641 (KUH); Tharparker Dist.: Top Mallah, Vivawa, Nagarparker Road, flowers yellow; 35 cm high, erect herb, sandy soil, M. Qaiser 4149 (KUH).

Distribution: India, Pakistan and Socotra.

In Pakistan it is common in lower Sind and Baluchistan and upper Punjab

The type specimen of *Sida grewioides* var. *microphylla* Hochr. matches with the present species in prostrate habit, angular calyx and reticulate mericarps. Leaves are no doubt small but are within the range of variation.

Doubtful species

(i) *Sida acuta* Burm. f. is said to be common in Sind and Punjab (Murray 1881). Stewart (1972) has also enumerated this species. I have not seen any specimen of this species from Pakistan.

(ii) *Sida compressa* DC. enumerated by Stewart (1972) is conspecific with *Sida rhombifolia* L. which has not been recorded from Pakistan. The only specimen, Drummond 24852), which Stewart has cited under *Sida compressa* DC. belongs to *Sida alii* S. Abedin. Quraishi and Khan have reported *Sida rhombifolia* Linn. from Khairabad hills, Peshawar. But I have not seen any specimen of this species. The diagram of this species given by them seems to belong to *Sida alii* S. Abedin.

(iii) *Sida alnifolia* L. and *Sida orientalis* Cav. are listed by Stewart (1972) as doubtful species. *Sida orientalis* Cav. is conspecific with *Sida acuta* Burm. f. and the specimen "R.R.S. 11058" cited under this species by him belongs to *Sida alii* S. Abedin. *Sida alnifolia* L. most probably does not occur in Pakistan.

(iv) *Sida schimperiana* Hochst. ex A. Rich has been record from Sind by Chaudhry & Chuttar (1966). But the specimen identified by them and present in the Sind University Herbarium belongs to *Sida ovata* Guill. & Perr.

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Karachi University Herbarium, Karachi; National (previously Stewart) Herbarium, Rawalpindi; Medicinal Botany Herbarium, Pakistan Forest Institute, Peshawar; Agricultural University Herbarium, Faisalabad; Punjab University Herbarium, Lahore; PCSIR Laboratories Herbarium, Karachi; Natur historisches Museum, Wein; The Herbarium, Royal Botanic Gardens, Kew; The Royal Botanical Garden, Edinburgh Conservatorie et Jardin Botaniques, Geneva, and Botanical Museum and Herbarium, Copenhagen.

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