

Taxonomic Study of the Genus *Sonchus* L. from Pakistan

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Abstract: The genus *Sonchus* L. belongs to the tribe Lactuceae in family Asteraceae/Compositae whose taxonomic study has been carried out from Pakistan. Its seven species were studied namely *Sonchus asper*, *S. oleraceus*, *S. tenerrimus*, *S. uliginosus*, *S. palustris*, *S. arvensis* and *S. maritimus*. In *Sonchus arvensis* radical and cauline leaves are runcinate, pinnatifid, spinate, margin toothed, caudate and glabrous. In *S. arvensis* the achenes oblanceolate, \pm 7 ribs on each face and in *S. asper* achenes compressed, \pm 3 ribs on each face. In *S. maritimus* lateral lobes of leaves are incised and glabrous. *Sonchus palustris* has glandular hairs on stem, achenes has \pm 3 ribs on each face and neck absent. In *S. tenerrimus* achenes compressed thick margined, 5-ribbed appearing 1-ribbed and 2-grooved on each face while in *S. uliginosus* achenes lanceolate \pm 4 ribs on each face, pappus 0.7 cm long, neck absent. It is concluded that in plant taxonomy morphological characters have given great weightage in identification and classification of plants. In this research project the species *Sonchus palustris* has been reported first time from Pakistan.

Key words: *Sonchus*, Asteraceae, Lactuceae, taxonomy

Introduction

The Compositae is the largest family in temperate countries; that is, they include the most species. (In the tropics the orchids may dispute the title). Many Compositae are familiar in our gardens B dehlias, chrysanthemums, asters, zinnias, many others; several are known in the herb garden B costmary, tansy, fever few, southernwood, wormwood; others come to our tables B lettuce, endive, artichoke, salsify; sunflowers furnish food for livestock; pyrethrum yields an insecticide; and others are among our least welcome weeds B dandelions, ragweed's, cockleburs, thistles, and such plants as the bitterweeds which are poisonous to livestock. The weeds, indeed, in their worldwide presence and abundance, justify the elevation of the family to the summit of the plant kingdom.

The family Asteraceae (Compositae) has the distinction of an extremely natural taxon, with its unique floral theme and micro morphological features including those of pollen grains. It has attracted fascinated and even repelled botanists for over two centuries (Heywood, 1977). The Asteraceae is cosmopolitan in distribution, occurring in all continents except Antarctica, having an estimated number of about 1317 genera and 21,000 species (Hickey and King, 1997) and in Pakistan it is represented by 142 genera and 620 species (Stewart, 1972).

Members of Asteraceae can easily be identified by their typical capitulate inflorescence, 5-lobed gamopetalous corolla, syngeneicous stamens, inferior bicarpellary unilocular ovary with a single basal ovule. The fruit is an achene with a non-endospermic seed and the usual presence of pappus. According to Bentham and Hooker (1873), the family has two sub-divisions:

- 1 Tubiflorae with 12 tribes, all characterized by the corolla of disc florets, tubular, bilabiate and the presence of laticiferous vessels.
- 2 Liguliflorae with a single tribe (Cichorae) characterized by the flowers, which are all ligulate, anastomosing and with laticiferous vessels.

According to Stebbins (1973) has shown that developmental studies have indicated a probable explanation for the existence of some achenes which in spite of very large size have a small number of ovarian traces. The *Sonchus* (sow thistles) are as unbeautiful as their name. They are troublesome weeds, from the Old World. Most are prickly, with small heads of yellow flowers in clusters. They range from 1 to 6 feet tall, or taller. *S. asper* has prickly-edged leaves, with large round lobes at the base, which extend on either side of the stem. *S. arvensis* is smooth, with a bloom. The leaves are prickly-edged, the lower cleft into narrow, backward-pointing lobes. Less common in our range. *S. uliginosus* is similar, with leaves less lobed and heads smaller and without

glands; perhaps a variety of *S. arvensis*.

The main objective of this study to record the taxonomic study with reference to *Sonchus* L. which is a contribution towards the publication of the family Asteraceae/Compositae with a finding of reporting a species of *Sonchus palustris* from Pakistan as well recording the diagnostic characters of the genera in tribe Lactuceae.

Materials and Methods

Plant specimen of various species from the Herbarium of Quaid-I-Azam University (ISL) and fresh material from the wild was used for morphological studies six to ten specimens per species were used for assessment of morphological characters, seven to ten values were noted for each character of a representative plant. This research project was conducted during June 1999 to July 2001.

Gross morphology of the taxa studied: The following characters were studied as habit of the plant, height of the plant, stem branching, stem diameter, length X breadth (L X B of leaf), presence or absence of radical leaves, margin of the leaves, petiole of the leaf, series of involucre bracts, shape of outer most & inner most involucre bracts, shape of capitulum, diameter of capitulum, flower colour, shape of achene, length of achene, presence or absence of pappus.

Results

***Sonchus* L.:** Linn. Gen. Pl. ed. 5: 347 (1754); Bentham and Hooker, Gen. Pl. 2: 528 (1873); Hooker, fil., Fl. Brit. Ind. 3: 413 (1881); Kashyap and Joshi, Lah. Distr. Fl. 154 (1936); S. M. H. Jafri, Fl. Kar. 346 (1966); V. A. Mathews in P. H. Davis, Fl. Turk. 5: 890 (1975); *L. Boulos* in Tutin et al., Fl. Europ. 4: 327 (1976); Grierson in Dassanayake and Fosberg, Rev. Handb. Fl. Cey. 1: 272 (1980). Annual to perennial herbs with copious latex. Leaves rosetted, radical and cauline, cauline amplexicaule. Stem clasping, pinnatifid, spinulose-dentate with pointed or rounded auricles. Heads terminal, peduncled, irregularly corymbose or panicle ligulate, ligules yellow. Involucre cylindrical to campanulate bracts, herbaceous, green, white floccose when young and or with black glandular hairs, pluriseriate, imbricate. Outer bracts becoming swollen at base on nearing maturity and the heads looking urceolate. Receptacle naked. Achenes obovate or oblanceolate, \pm compressed, erostrate ribbed. Pappus hairs 2-seriate, white, coherent at the base into a ring. Achenes without beak or beak very small.

Key based on morphological characters of *Sonchus*:

- 1a. Radical leaves obovate-spathulate, \pm pinnatifid with 6-8 lateral

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- lobes, cauline leaves sessile, amplexicaul, teeth spiny.....2
- 1b. Radical leaves ovate-lanceolate, runcinate-pinnatifid with 4-6 lateral lobes, cauline leaves with singed petiole, teeth not spinulose.....3
- 2a. Achenes obtuse \pm 7 ribs on each face.....4
- 2b. Achenes elliptic, \pm ribs on each face YY.....5
- 3a. Rounded auricles, heads larger in size 1.5-2 X 0.5-1 cm, achenes smooth.....YYY.....*S. asper*
- 3b. Acute pointed auricles, heads smaller in size, 1-1.2 X 0.3-0.5 cm, achenes transversely rugose... *S. oleraceus*
- 4a. Leaves glabrous, achenes lanceolate, \pm 5 ribs on each face, different in colour, outer green, inner brown.....*S. tennerrimus*
- 4b. Leaves spinats, achenes oblanceolate, \pm 4 ribs on each face, same in colour*S. uliginosus*
- 5a. Pappus 0.5 cm long.....*S. palustris*
- 5b. Pappus 0.6 cm long.....YYY.....6
- 6a. Radical leaves rumcinate pinnatifid, achene oblanceolate..YYY.....*S. arvensis*
- 6b. Radical leaves pinnatifid to lanceolate, achene elliptic.....YYY.. *S. maritimus*

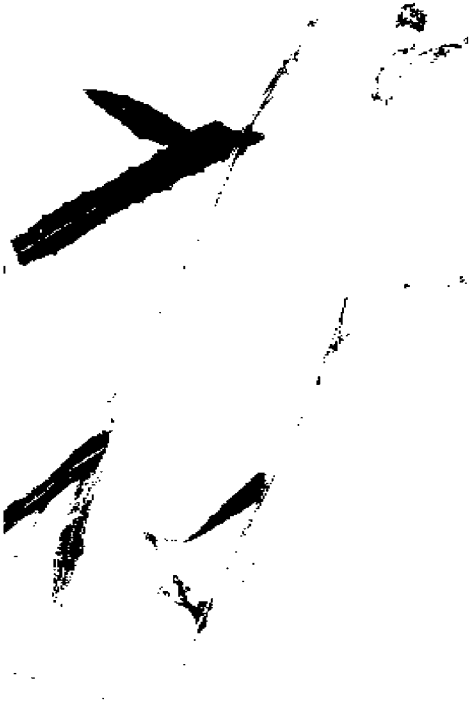


Plate 1: *Sonchus arvensis*

Sonchus arvensis: f. *brachyotus* (DC.) Kirp. Fl. URSS 29: 253. 1964. Guenth., Grab. Wimm. Kirp. I. C. 251. (Plate 1).

Syn.: *Sonchus brachyotus* DC.; *Sonchus arvensis* var. *laevipes* Boiss; *Sonchus arvensis* var. *glaber* Haines; *Sonchus arvensis* ssp. *brachyotus* Kitam.; *Sonchus wightianus* DC.; *Sonchus wightianus* var. *wallichianus* (DC.) Boulos. *Sonchus lachnocephalus* Rechf.; *Sonchus brachyotus* DC. *Sonchus uliginosus* M.B.; Annual or perennial, 64 cm tall herb. Stem erect, cylindrical furrowed, branched near inflorescence. Hairs are present on main stem with glandular tips. Leaves both radical and cauline, radical leaves 7 X 2.2 cm², runcinate pinnatifid, margin spiny-toothed lobes, glabrous, cauline, 7 X 2.3 cm², margin toothed, caudate, glabrous. Uppermost leaves 4 X 0.4 cm², linear-lanceolate, spinose, glabrous.



Plate 2: *Sonchus asper*



Plate 3: *Sonchus maritimus*

Heads 1.2 X 0.8 cm², peduncled \pm 1.6 cm, axillary and terminal, involucre campanulate, bracts 3-serriate, outer 0.5 X 0.1 cm², lanceolate, obtuse, entire, glabrous, middle 0.7 X 0.1 cm², elliptical,



Plate 4: *Sonchus oleraceus*

obtuse, entire, glabrous, inner 1.1X0.1 cm², linear-lanceolate, obtuse, entire, glabrous. Flowers ligulate, ligules yellow; style bifid. Achenes 0.3X0.1 cm², oblanceolate, compressed, two faced, ± 7 ribs on each face. Pappus 0.6 cm long white slender, spreading. Neck absent. Fl. fr. 5-11. Common on roadsides and waste places. 2n = 18, 36, 54.

Specimen examined: Baluchistan: Singhai, Sibbi, Manzoor and Maqsood, 1416, 74260, 30-09-1977 (ISL); Bubri, Quetta, Muqarrab Shah and Wali-ur-Rehman, 620, 112869, 11-05-1979 (ISL); Mastung, Kalat, Manzoor and Maqsood, 571, 52950, 28-04-1977 (ISL); Sinjani, Loralai, Iqbal Dar, Tariq Rafeq and M. Arif, 6, 34864, 24-05-1976 (ISL); Makran, Turbat, Ashraf and Lal Hussain, 55, 45432, 05-03-1977 (ISL); Rani Garden, Quetta, Manzoor and Maqsood, 187, 52806, 19-04-1977 (ISL); Mach, Quetta, Manzoor and Maqsood, 1602, 71484, 06-10-1977 (ISL); NWFP: Manghzar, Swat, Muqarrab Shah and Dilawar, 832, 35775, 15-05-1975 (ISL); Pista Khan, Peshawar, Muqarrab Shah and Ayaz, 816, 52762, 15-04-1979 (ISL); Shankai, Chitral, Muqarrab Shah and Dilawar, 1044, 59801, 15-06-1977 (ISL); Serman, Chitral, Muqarrab Shah and Dilawar, 57, 54492, 22-05-1977 (ISL); Pater San Mountain Kalakot, Dir, Mir Ajab Khan and Zawar, 1070, 112898, 15-05-1979 (ISL); Manzai, Dera Ismail Khan, Hafizullah and Ayaz, 90, 61213, 01-04-1977 (ISL); Moosa Zai, D. I. Khan, Shahzad and Dilawar, 754, 47560, 23-03-1977 (ISL); Moochi tora, Hazara, A. Saboor and Ayaz, 689, 62836, 10-08-1977 (ISL); Al Zai, Khurram Agency, Hafizullah and Ayaz, 14, 53068, 14-05-1978 (ISL); Kwaiz, Orakzai Agency, Hafizullah and Dilawar, 813, 75199, 27-09-1977 (ISL); Bakakhel, N. Waziristan, Hafizullah and Ayaz, 574, 61120, 01-07-1977 (ISL); Kako Khail, Khyber Agency, Hafizullah and Nisar, 814, 70292, 02-10-1977 (ISL); Havalian, Hazara, Muqarrab Shah and Dilawar Khan, 233, 78334, 13-03-1978 (ISL). Azad Kashmir: Dongi, Kotli, Shahzad and Nisar, 1609, 54563, 01-06-1979 (ISL); Chanunkot, Poonch, Shahzad, Nisar and Zulfikar, 29, 57712, 17-06-1977 (ISL); Dawarian, Muzaffar Abad, Shahzad and Ayaz, 1371, 67164, 04-10-1977 (ISL); Bagh, Poonch, Bashir Ahmad and Javid, 688, 108789, 10-05-1979 (ISL); Chian, Mir Pur, Shahzad and

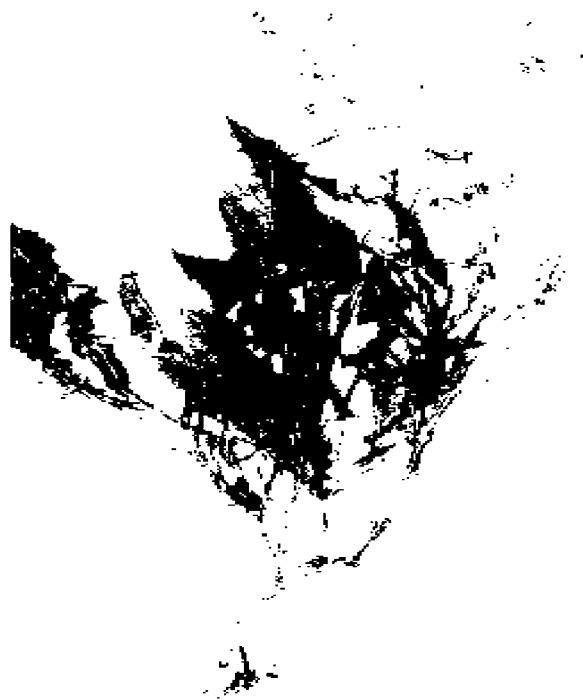


Plate 5: *Sonchus palustris*

Arif, 414, 52739, 11-04-1977 (ISL); Jatlan, Mir pur, Shahzad and Arif 967, 48580, 11-04-1977 (ISL); Sahen, Kotli, Shahzad and Nisar, 1870, 57022, 05-06-1977 (ISL); Muzaffarabad, Shahzad Iqbal and Nisar Ahmad, 69, 90942, 20-04-1978 (ISL); Surgan, Muzaffarabad, Shahzad and Ayaz, 1142, 711112, 02-10-1977 (ISL); Sudahan gali ti ganga choti, Muzaffarabad, Shahzad Iqbal, Nisar and Farooq, 794, 87510, 25-05-1975 (ISL); Chatter Khan, Muzaffarabad, Shahzad Iqbal and Wali-ur-Rehman, 365, 86789, 26-04-1978 (ISL); Punjab: Muzaffar Gar, Mir Ajab Khan and Manzoor Hussain, 663, 45508, 15-03-1977 (ISL); Chistian, Bahawalnagar, Mir Ajab Khan and Manzoor, 619, 51647, 10-03-1977 (ISL); Yasmin, Bahawalpur, Mir Ajab Khan and Manzoor, 85, 45392, 25-02-1977 (ISL); Samasata, Bahalpur, Mir Ajab Khan and Manzoor, 130, 45401, 26-02-1977 (ISL); Mughal Garden, Campbellpur, Maqsood and Arif, 323, 50496, 17-03-1977 (ISL); Rajan Pur, D. G. Khan, A. Saboor and Nisar Ahmad, 546, 48588, 13-04-1977 (ISL); Dina, Jhelum, A. Saboor, Manzoor, Maqsood, Akram and Arif, 75, 78358, 02-03-1976 (ISL); Choa Saiden Shah, Jhelum, M. A. Saddiqi, M. Akram and Lal Khan, 68, 37682, 24-09-1976 (ISL); Achra, Lahore, Muqarrab Shah and Ayaz Abbasi, 179, 50478, 27-02-1977 (ISL); Jallo Crossing, Lahore, Muqarrab Shah and Ayaz, 105, 42871, 25-02-1977 (ISL); Vihari, Multan, Mir Ajab Khan, 627, 45501, 14-03-1977 (ISL); Kala Wala Isakhel, Mialwali, Mir Ajab Khan and Maqsood, 200, 81048, 10-03-1978 (ISL); Kala Bagh, Mianwali, Shahzad and Dilawar, 131, 45438, 06-03-1977 (ISL); Colony Area Mianwali, Mir Ajab Khan and Maqsood, 51, 84890, 08-03-1978 (ISL); University Campus, Islamabad, Javid Akhtar and Nisar Abbasi, 258, 1739, 15-01-1975 (ISL); Paltriata, Rawalpindi, Anjum Amin and Muqarrab Shah, 393, 1793, 10-06-1975 (ISL); Stream near Abapara, Nisar, Akram and Wali, 368, 103824, 22-06-1979 (ISL); Faizabad, Rawalpindi, Shahzad Arif 7 Manzoor, 568, 40727, 16-10-1976 (ISL); Company Bagh Rawalpindi, Anjum

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Plate VI: *Sonchus uliginosus*

Amin, Nisar and Javid, 4, 14576, 19-05-1975 (ISL); Sahiwal, Mir Ajab Khan Manzoor, 698, 45514, 16-03-1977 (ISL); Sargodha City, Mir Ajab Khan and Ashraf, 994, 51702, 12-04-1977 (ISL); 10 Chak Jasuharabad, Sargodha, Mir Ajab Khan and Maqsood Ahmad, 1085, 93523, 27-04-1978 (ISL); Katha, Sargodha, Shahzad, Iqbal and Maqsood Ahmad, 287, 81655, 31-03-1978 (ISL); Kufry Skesar, Sargodha, Mir Ajab Khan and Maqsood, 1479, 89197, 04-05-1978 (ISL); Sialkot, Muqarrab Shah and Akram, 149, 45540, 18-03-1977 (ISL); Pasroor, Sialkot, Muqarrab Shah and Akram, 54, 45088, 16-03-1977 (ISL); Sind: Sukkur Bridge, Sind, A. Saboor and Nisqar Ahmad, 192, 45426, 05-03-1977 (ISL); Mir Pur Khas, Abdul Saboor and Nisar, 27, 45393, 25-02-1977 (ISL); Khair Pur College, A. Saboor and Nisar Ahmad, 225, 45439, 06-03-1977 (ISL); Tandojam, Haiderabad, A. Saboor and Nisar, 114, 45409, 01-03-1977 (ISL); Dera Nawab Shah, Mir Ajab Khan and Manzoor, 214, 45407, 28-02-1977 (ISL).

***Sonchus asper*:** (L.) Hill, Herbar. Brit. 1: 47. 1769; Hooker, fil., Fl. Brit. Ind. 3: 413 (1881); Kashyap and Joshi, Lah. Distr. Fl. 154 (1936); C. J. Bamber, Pl. Punj. 380 (1916); S. M. H. Jaffri, Fl. Kar. 346 (1966); V. A. Mathews in P. H. Davis, Fl. Turk. 5: 890 (1975); L. Boullos in Tutin et al., Fl. Europ. 4: 327 (1976); Grierson in Dassanayake and Fosberg, Rev. Handb. Fl. Cey. 1: 272 (1980). (Plate 2)

Syn.: *S. oleraceus* L. var. *asper* L. Sp. Pl. 794. 1753; *Sonchus nymanii* Tinn. and Guss. (1845).

Annual or biennial herb, glandular or sparsely hairy above. Stem erect, branched from the base, ribbed, smooth below and glandular above. Leaves both radical and cauline, glabrous, radical leaves sessile or subsessile, 7-18 x 2-4 cm², obovate-spathulate, ± pinnatifid with 6-8 lateral 1-1.5 cm long, triangular or oblong lobe. Cauline sessile with broad, amplexicaul, prominently dentate, rounded auricles, teeth spiny. Heads 1.5-2 x 0.5-1 cm², peduncled, peduncle sparsely glandular-hairy. Involucre urceolate-

campanulate; bracts 2-3 seriate, outer 2 mm long, ovate, median 8 mm long, lanceolate with slightly dentate, acute tip, hooked in the middle; innermost 12 mm long, lanceolate with acute tip and scarios margin, smooth. Achenes compressed, 3 mm long, obovoid-lanceolate, 3-ribbed or nerved, smooth, winged margin, the latter slightly dentate, pointed downward; pappus 7 mm long, white, minutely scabrous. Fl. fr. 6-9. Alt. ± 2600 m. 2n = 18, 36. Described from S. France (Type in LINN.)

Specimen examined: NWFP: Bokhi, Hazara, Mir Ajab Khan and Maqsood, 1410, 85167, 03-05-1978 (ISL); Hazro, Batal-ur-Mansehra, Muqarrab Shah and Dilawar, 1552, 84936, 02-04-1978 Bokhi, Hazara, Mir Ajab Khan and Maqsood, 1410, 85167, 03-05-1978 (ISL); Kiwai, Hazara, M. N. Chaudhri, M. A. Siddiqi, Shahzad, Ashraf, Maqsood and Arif, 1250, 35874, 19-06-1976 Bokhi, Hazara, Mir Ajab Khan and Maqsood, 1410, 85167, 03-05-1978 (ISL); Sanda, Khyber Agency, Hafizullah and Nisar, 862, 67157 (ISL); Gurnai, Sawat, Muqarrab Shah and Dilawar, 660, 19165, 04-05-1976 (ISL); Sayad Ghi, N. Waziristan, M. Zubair and Saeed, 760, 112857, 28-04-1979 (ISL). Northern areas: New Ranga, Skardu, Awalbadsha, Manzoor and Ashraf, 134, 38644, 11-09-1976 (ISL); Danin, Chitral, Muqarrab Shah and Ayaz, 2573, 36343, 17-08-1976 (ISL); Punjab: Faizabad, Rawalpindi, Manzoor and M. Arif, 51, 76410, 02-02-1978 (ISL); Margilla Hills, Islamabad, Maqsood and Afzal, 47, 76423, 08-07-1978 (ISL); National Park, Islamabad, Nasir and Ayaz, 516, 76398, 12-10-1978 (ISL); Sargodha, Mir Ajab Khan and Ayaz Abbasi, 343, 87460, 12-04-1978 (ISL); Jauhar abad, Sargodha, Mir Ajab Khan and Maqsood Ahmad, 1085, 93517, 27-04-1978 (ISL); Pasroor, Sialkot, Muqarrab Shah and Akram, 54, 45089, 16-03-1977 (ISL); Rehmanabad, Rawalpindi, Iqbal Dar, M. Arif and Sarfraz Khan, 413, 1780, 10-06-1975 (ISL); Pindi Point, Murree, Anjum Amin and Muqarrab Shah, 450, 1773, 12-06-1975 (ISL); Khan Pur, Raheem Yar Khan, Mir Ajab Khan and Manzoor, 237, 45065, 01-03-1977 (ISL); Panawali Bagahar, Attock, Shahzad and Nisar, 2441, 82821, 21-03-0978 (ISL).

General distribution: common along the roadside.

***Sonchus maritimus* L.:** Syst. Nat. ed. 10.2; 1192. 1759. Plate Comp. 125, b. L. Sp. Pl. ed. 2, 1116. 1763; FBI 3: 414. (Plate 3). Annual to perennial herb, simple or branched, 40-cm tall, glandular hairs on stem, cylindrical, ribbed. Leaves both radical and cauline, radical leaves 10 X 4.5 cm², pinnatifid, lanceolate, the margins not or weakly spinulose rather denticulate, glabrous, auricles rounded, middle leaves 7 X 4 cm², pinnatifid, lanceolate, dentate lobes, glabrous, auricles rounded, inner leaves 5.5X1.2 cm², pinnatifid lanceolate, lateral lobes incised, glabrous, rounded auricles. Campanulate head 1.4X0.9cm², axillary and terminal, bracts 3-seriate, outer bract 0.7X0.1 cm², ventrally glandular hairs are present, entire, glabrous above, middle bracts 1.1X0.1 cm², lanceolate, glabrous, acute, entire, inner bracts 1.2X0.2 cm², lanceolate, glabrous, acute, entire. Flowers ligulate, ligules yellow ligule transversely rugose. Achenes 0.3X0.1 cm², elliptic, ± 3 ribs on each face. Pappus 0.5 cm long, slender, whitish, deciduous, neck absent. Fl. and fr. 2-7. 2n = 18.

Specimen examined: Northern area: Rambur, Chitral, Muqarrab Shah and Dilawar, 925, 59779, 13-08-1977 (ISL). NWFP: Sasul Gali, Hazara, Muqarrab Shah and Ayaz Khan, 1058, 50566, 27-04-1977 (ISL); Toghsara, Kohat, M. Zubair and Saeed, 105, 104630, 04-04-1979 (ISL). Azad Kashmir: Tarar Khel, Poonch, Bashir Ahmad and Javid, 125, 108816, 23-04-1979 (ISL); Punjab: Yasman, Bahawal Pur, Mir Ajab Khan and Manzoor, 74, 45385, 25-02-1977 (ISL); Choa Saidu Shah, Jhalum, Mir Ajab Khan and Ayaz, 82,84899, 08-04-1978 (ISL); Sheikhupura, Lahore, Muqarrab Shah and Ayaz, 6, 42884, 24-2-1977 (ISL); Near Railway Station, Mianwali, Mir Ajab Khan and Maqsood, 10, 87448, 07-03-1978 (ISL); Stream near Abapara, Rawalpindi, Nisar, Dilawar and wali-ur-Rehman, 138, 103789, 03-01-1979 (ISL); Saiwal, Mir Ajab Khan and Manzoor, 698, 45523, 16-03-1977 (ISL); Near Canal Sargodha, Mir Ajab Khan

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and Ayaz Abbasi, 412, 87461, 12-04-1978 (ISL); Kile Shero, Fort Sedman, Manzoor Hussain and M. Arif, 641, 90199, 17-04-1978 (ISL); Sind: S. S. C. College, Khairpur, A. Sqaboor and Nisar, 225, 45440, 25-06-1978 (ISL);

General distribution: Common on irrigation drainage channels, roadsides.

***Sonchus oleraceus* L.:** Sp. Pl. 764. 1753; Hooker, fil. Fl. Brit. Ind. 3: 413 (1881); Kashyap and Joshi, Lah. Distr. Fl. 154 (1936); C. J. Bamber, Pl. Punj. 380 (1916); M. H. Jafri, Fl. Kar. 346 (1966); R. R. Stewart, op. Cit. 785 (1972); V. A. Mathews in P. H. Davis, Fl. Turk. 5: 890 (1975); *L. Boulos* in Tutin *et al.*, Fl. Europ. 4: 327 (1976); Grierson in Dassanayake and Fosberg, Rev. Handb. Fl. Cey. 1: 272 (1980). (Plate 4).

Annual 25-50 cm tall herb. Stem erect, branched near the inflorescence, ribbed, smooth. Leaves both radical and cauline, radical leaves 6-15 x 2-5 cm², ovate-lanceolate, runcinate-pinnatifid with 4-6 lateral lobes and winged petiole, terminal lobe broader than the uppermost pair of lateral lobes. Cauline with broadly winged petiole, 4-11 x 2-4 cm², ovate-lanceolate or spatulate with variable number of lateral lobes, margin toothed, teeth not spinulose, sessile with acute pointed auricles, smooth. Heads 1-1.2 x 0.3-0.5 cm², peduncled, peduncle sparsely glandular hairy when young, tomentose at the base. Involucre campanulate; bracts 2-seriate, outer 2-3 mm long, ovate-lanceolate, inner 10 mm long, lanceolate with acuminate tip, slightly thickened in the center and scarious margin, both sparsely glandular. Flowers ligulate, ligules yellow; style bifid. Achenes 3-4 mm long, oblanceolate, compressed, 2-faced with 3-ribs on each face, transversly rugose, outer yellow, inner brown, ridges with downwardly pointed dentition; pappus 6-7 mm long, white, spreading. Fl. and fr. 6-9. Alt. ± 2300-2600 m. 2n = 32, 64.

Type: Lectotype Hb. Linn. 949/6.

Specimen examined: Azad Kashmir: Chakkoti, Muzaffarabad, Shahzad Iqbal and Wali-ur-Rehman, 684, 89178, 01-05-1978 (ISL). NWFP: Asplash, Chitral, Muqarrab Shah and Dilawar, 198, 54506, 24-05-1975 (ISL); Kot Kashmir Banu, M. Zubair and Saeed, 706, 111754, 25-04-1979 (ISL); Lohari Top, Dir, Ghulam Farooq and Ayaz, 16, 35437, 01-07-1976 (ISL); Balakot, Mansehra, Mir Ajab Khan and Afzal, 1294, 71168, 03-10-1977 (ISL); Fozan, Kohat, Hafizullah and Dilawar, 848, 50563, 26-04-1977 (ISL); Parachinar, Khurram Valley, Iqbal Dar, Mehmood and Sarfraz, 73, 15012, 15-10-1975 (ISL); Takhalvala, Peshawar, M. Tanweer, Ashraf and Dilawar, 225, 104635, 22-04-1979 (ISL); Miran Shah, N. Waziristan, M. Zubair and Saeed Khan, 1012, 112851, 03-05-1979 (ISL). Northern areas: Baltistan, Skardu, Awalbadshah, Ashraf and Manzoor, 134, 36879, 11-09-1976 (ISL); Haz, Gilgit, Mir Ajab Khan and Afzal, 10, 56933, 26-05-1977 (ISL); Punjab: C. D. A. Nursery, Islamabad, Muqarrab Shah, Ayaz and Nisar, 1773, 70403, 22-01-1978 (ISL); Rawalpindi, M. Arif, Mehmood Hussain, 177, 14505, 27-01-1975 (ISL); 4 miles from Sargodha, Mir Ajab Khan and Maqsood, 1074, 90950, 27-04-1978 (ISL); Khan Pur, Sheikopura, Muqarrab Shah and Ayaz Abbasi, 44, 43972, 24-02-1977 (ISL); General distribution: Europe except extreme North, N. Africa, N. and S. Asia. Introduced worldwide as a weed of cultivated fields. Common on roadsides and waste places.

Note: This specie resembles *Sonchus asper* in general appearance but differ from the former in having radical leaves ovate-lanceolate, runcinate-pinnatifid with 4-6 lateral lobes; cauline leaves with winged petiole, teeth not spinulose, heads smaller in size 1-1.2x0.3-0.5 cm² and the achenes transversly rugose. In *Sonchus asper*, on the other hand the radical leaves are obovate-spatulate, ± pinnatifid with 6-8 lateral lobes, cauline leaves sessile, amplexical teeth spiny; heads larger in size 1.5-2 X 0.5-1 cm²; achenes smooth.

***Sonchus palustris* L.:** Spec. Plant. 2: 793 (1753). (Plate 5). Perennials herb, stem erect, branched, 50 cm tall, glandular hairs present on stem, cylindrical, leaves both radical and cauline, sessile, radical leaves 6.5x1.5 cm², runcinate pinnatifid, ± 6 lobes, spinose, acute, auriculed, glabrous, middle leaves alternate, 11 X 2 cm², runcinate pinnatifid, incised, acuminate. Uppermost leaves alternate, 4.5 X 0.6 cm², runcinate pinnatifid, incised, caudate. Head paniculiform, peduncled 2.2 cm long, 1.1 X 0.5 cm², axillary and terminal, bracts 3-seriate, outer-bracts lanceolate 0.4x0.1 cm², glabrous, entire, acute, middle bracts lanceolate, 0.5x0.1 cm², glabrous, entire, acute, innermost bracts lanceolate, 0.9x0.2 cm², glabrous, entire, acute. Flowers ligulate, achene oblanceolate, 3x0.1 cm², ± 3 ribs on each face, pappus 1 cm long, white, slender, deciduous, neck absent. Fl. and fr. 6-9. 2n = 18.

Specimen examined: Baluchistan: Ziarat, Sibi, Manzoor and Maqsood, 1322, 70973, 29-07-1979 (ISL);

General distribution: Common in the field.

***Sonchus tenerimus* L.:** Sp. Pl. 1117. 1753. Plate Comp. 124. Annual or perennial tender robust herb up to c. 1 m tall. Stem herbaceous, hollow, usually branched; peduncles stipitate-glandular in the upper parts. Radical and lower leaves petiolate, deeply pinnately divided into regular or irregular lobes, the lobes linear to oblong, acute; acute; cauline sessile, auriculate. Ligules yellow up to c. 6 mm long. Outer achenes greenish, inner brown, all muricate, oblanceolate c. 3 X 1 mm², compressed, thick-margined, 5-ribbed appearing 1-ribbed and 2-grooved on each face. Pappus c. 8 mm long. 2n = 14. General distribution: Widespread. Sometimes a serious weed of cereals.

Note: I could not see the specimens from the herbarium (ISL), therefore, the description has been written from Fl. Kingd. Of Saudi Arabia Vol. 11 (3).

***Sonchus uliginosus*:** M. B. var. of *S. arvensis* (Plate 6). Annual or perennial, 24cm tall herb, stem erect, branched, glandular hairs are present on stem. Leaves both radical and cauline, sessile, radical leaves 5 X 1.5 cm², runcinate, pinnatifid, spinose, acute, auriculed, glabrous, and auriculed. Middle leaves, alternate, 7.2 X 1 cm², runcinate, pinnatifid, spinose, acute, glabrous, auriculed. Uppermost leaf alternate, 5 X 0.5 cm², runcinate pinnatifid, spinose, acute, glabrous, auriculed. Head cylindrical, 1.4 X 0.8 cm². Bracts 3-seriate, outer 0.4 X 0.1 cm², elliptic, glabrous, entire, acute, middle bracts 0.5 X 0.1 cm², linear lanceolate, glabrous, entire, acute, innermost 0.9 X 0.1 cm², glabrous, entire, acute. Achene 0.3 X 0.1 cm², lanceolate, ± 4 ribs on each face, pappus 0.7 cm long, white, selender, neck absent. Fl. and fr. 3-8. 2n = 36.

Specimen examined: Azad Kashmir: Pir Gali Mirpur, Shahzad and Nisar, 1321, 50608, 1577 (ISL); Punjab: Kotli, Shahzad and Nisar, 1662, 54591, 02-06-1977 (ISL); Baseen, Gilgit, Mir Ajab Khan and Afzal, 223, 56865, 24-05-1977 (ISL). Northern areas: Ghar-Char ko, Chitral, Muqarrab Shah and Dilawar, 161, 56927, 23-06-1977 (ISL); Punjab: Noor por Shah, Rawalpindi, Wali and Nisar, 420, 103148, 23-11-1978 (ISL); General distribution: Common on roadsides and field.

Discussion

Although the micromorphological study of flowering pattern, shape and size in Composite/Asteraceae has demonstrated striking diagnostic features similar to the floral, chromosomal and vegetative characters of the family, these features show some inconsistencies with the taxonomic classification of the family into subfamilies, tribes, and sub tribes. However some genera retain individually unique surface pattern and some tribes and subtribes with a small number of genera show homogeneity.

In *Sonchus arvensis* radical and cauline leaves are runcinate, pinnatifid, spinate, margin toothed, caudate and glabrous. In *S. arvensis* the achenes oblanceolate, ± 7 ribs on each face and in *S. asper* achenes compressed, ± 3 ribs on each face. In *S. maritimus* lateral lobes of leaves are incised and glabrous. *Sonchus palustris* has glandular hairs on stem, achenes has ± 3 ribs on each face and neck absent. In *S. tenerrimus* achenes compressed thick margined, 5-ribbed appearing 1-ribbed and 2-grooved on each face while in *S. uliginosus* achenes lanceolate ± 4 ribs on each face, pappus 0.7 cm lon, neck absent. It is concluded that morphology can not be solely used as the base of taxonomic classification of the family. However, if it is accepted that morphology shows evolutionary sequences comparable to those in other organs, then it may need to be given great weightage. On this assumption, in the morphology of the species examined, some inconsistencies and alternative relationships have been suggested in correlation with the recent taxonomic classification proposed by Johnson & Briggs (1975).

The general features of the Asteraceae, taken together are not repeated in other families. This gives Asteraceae (Compositae) a unique taxonomic status. To quote Wagenitz (1976), A Combined efforts of systematic, evolutionary and ecological studies are still necessary to help us understand the evolution of this fascinating family.

Lactuceae is a tribe of Asteraceae; some plants in this tribe are of medicinal importance. Morphological studies of Lactuceae from Pakistan were carried out for the first time. The study of morphology has assumed great significance in plant taxonomy and the advancements in microscopy have led to the effective use of new morphological parameters for taxonomic purposes. This research project was aimed to examine the value of morphology in the taxonomy of Lactuceae and they have a great significance in taxonomy and may be considered as base for taxonomic decisions.

The genus *Sonchus* belongs to large and complicated tribe Lactuceae of family the Asteraceae/Compositae. It shows a wide range of variation in morphological character. The extensive availability of frequently misidentified plant specimens in different herbaria of Pakistan suggests that they are taxonomically difficult genera. Therefore a detailed study of the above-mentioned genera has been carried out for the first time in Pakistan.

Minute characters have been considered for the delimitation of various taxa e.g. pubescence, the length and position of pedicels, degree of union of the calyx lobes, length of the style, habit, height, stem branching, stem diameter, length X breadth (L X B of leaf), margin, petiol of the leaf, bracts, shape, flower colour, shape and length of achene, presence or absence of pappus etc. The previous taxonomic treatment of these genera from West Pakistan and Kashmir was limited to just a checklist written by Stewart (1970), *Sonchus* 6 species were included. A thorough description of the species with a dichotomous key has been presented in the results.

In nomenclatural review the genus *Sonchus* were placed in subtribe Crepidinae by Stebbins (1953); but Jeffrey (1966) and Wattstein (1964), included this genus in tribe Cichorieae. Solbrig (1963) included in tribe Lactuceae. The present author following the treatment of Solbrig (1963), who placed this genus in tribe Lactuceae.

Due to the problem of synonyms and nomenclature the number of species mentioned by Stewart (1972) of the genus *Sonchus* was 6. However in present studies 7 species of *Sonchus* were studied from Pakistan. One species of *Sonchus palustris* now first time reported from Pakistan due to its great variation in palynology as well as in morphology. In this species tetrazonocolporate pollens were studied which is a unique character of the *S. palustris*. This variation might be due to ploidy level but it needs further karyological and chemotaxonomic studies. It is suggested that in plant taxonomy morphological characters have given great weightage in identification and classification of plants. According to Mumtaz *et al.* (2001) the occurrence of *Artemisia maritima* L. in Pakistan is a matter of much coastal areas, the plant size is 40 cm and the capitula are crowded in dense fascicles.

So it is concluded that in the study of the plant taxonomy not only the morphology but the latest techniques also play a key role in identification and classification. But in this research project a large amount of data is recorded in morphology and palynology for the first time in Pakistan which is a contribution towards the publication of the family Asteraceae/Compositae with a finding of reporting a new specie of *Sonchus palustris* from Pakistan as well as recording the diagnostic characters of the genera in tribe Lactuceae.

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