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ILLUSTRATED WEED FLORA OF WHEAT CROP OF KHAIRPUR DISTRICT, SINDH

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Abstract

An illustrated account of weed flora of wheat crop of Khairpur district, Sindh was compiled, reporting 23 weed species distributed in 10 families. A check list along with illustrations of all the species are provided which will enable the users to identify the common weeds.

Introduction

Weeds have harmful effects on crop quality as well as quantity. According to Shah & Khan (2006) weeds lower crop yield, increase cost to control insects and plant diseases, give poor quality products and create more water management problems and lower human efficiency. They are constant component of our agro-ecosystem (Powell & Justum, 1993). The presence of certain weeds greatly reduces the market value of wheat. In Pakistan, the annual losses in wheat grains due to weeds could be amounting to more than Rs. 28 billion (Hassan & Marwat, 2001).

Taxonomy provide basement for carrying out all aspects of plants specially of weeds. To develop any weed control programme identification of species is always required, because taxonomically weeds are diverse and are only important for their nuisance value in crops. Two species may be superficially very similar in the vegetative stages but they differ in their growth habit, reproductive, time of maximum competition and response to individual control methods. Unless all problem species surviving the current cropping system are identified and characterized, research results will usually be unacceptable and incomplete. Scientific illustrations are significant by portraying plant species with accuracy and detail to be recognized and distinguished from other species. A number of studies have been conducted on the weed flora of wheat from different regions of Pakistan (Hussain *et al.*, 2004; Mohammad *et al.*, 2005; Naveed & Hussain, 2007; Qureshi *et al*., 2009 and Waheed *et al*., 2009). The distribution, density and frequency percentage of weed species of wheat crop of Khairpur district was determined by Memon *et al*., (2003). Present paper is an attempt to provide the checklist of fully identified information required to identify the problematic weeds of the study area. The illustrations/line drawings are made with supplemented morpholological description of recorded species.

Materials and Methods

All the recorded weed species were collected at the time of flowering and seed maturation. The collected specimens were then pressed and mounted on herbarium sheets and deposited in Shah Latif University Botanical Garden & Herbarium (SLUBGH), Khairpur, Pakistan. They were identified with the help of Flora of Pakistan (Nasir & Ali, 1970-1979, 1980-1989; Ali & Nasir, 1990-1992 and Ali & Qaiser, 1993-2009); Flora of Karachi (Jafri, 1966); Flora of Bombay (Cooke, 1903-1906); Crop weeds of Nepal (Rajbhandari & Joshi, 1998) and Flora of Egypt (Boulos, 1999). Fresh and dried specimens were examined and their parts were dissected in order to make permanent slides, using DPX mountant without staining. Line drawings/illustrations of each taxa were made depicting their habit and diverse parts. Short/diagnostic taxonomic descriptions along with dichotomous key of each species is made and provided in this paper.

Results and Discussion

All the species recorded from study area belonged to ten families, distributed into 8 dicotyledonous and 2 monocotyledonous families. The checklist of recorded species, arranged alphabetically into their respective genera and families is provided below. Furthermore, dichotomous keys are constructed and provided for quick identification.

Dicotylodons

Asteraceae

Sonchus oleraceus L., Sp. Pl. 794 (1753). (Fig. 1).

Annual, up to 180 cm tall. Stem erect, branched. Leaves alternate, crowded at the base, upper leaves mostly unlobed, lower deeply cut into 1-3 lobes each side.

Fl. Per.: March-April.
Distribution: Wide spread in cooler climates and many tropical countries (Jafri, 1966).

Caryophyllaceae

1. Styles 3. Capsule dehiscing by 3 valves. Seeds often winged …….……... (1) *Spergularia*
1* Styles 2. Capsule dehiscing by 4 teeth. Seeds not winged ……. (2) *Vaccaria*

Spergularia marina (L.) Griseb., Fl. Rumel. 1: 213. 1843. (Fig. 2).

Syn: *Arenaria rubia* var. *marina* L., Sp., Pl. 423. 1753; *Spergularia salina* J. & C. Presl., Fl. Cechica 95. 1819.

A small herb, up to 23 cm tall, erect, green, branched, geniculate. Leaves linear to subulate, groaved beneath on adaxial surface, fleshy.

Fl. Per.: November-February.
Distribution: Mediterranean Europe, S. W & E. Asia, Egypt, Iran, Turcomania, Afghanistan, Pakistan (Ghazanfar & Nasir, 1986).

Vaccaria hispanica (Miller) Rauschert in Feddes Rep. 73:52. 1966. (Fig. 3).

Syn: *Saponaria hispanica* Miller, Gard. Dict. Ed. 8, in errodis (1768); *S. ampicimus* Miller, I. c. no. 4-nomen invalid. (in erratis in hispanica corrig.) 1798; *Saponaria vaccaria* L., sp. Pl. 409. 1753; *Vaccaria pyramidata* Medik., *Phil. Bot*, 1: 96. 1789; *V. oxydonta* Boiss., Diagn ser. 2 (1): 68. 1953; *Saponaria oxydonta* (Boiss.) Boiss., *Fl. Or*. 1: 525. 1867.

Annual herb, up to 70 cm tall. Stem erect, glabrous. Leaves ca. 7.5x1.6 cm, lanceolate-ovate, sessile, clasping the stem, acute, entire.

Fl. Per.: February-April.
Distribution: Commonly distributed in cultivated fields of Chitral, Swat, Hazara, Punjab and Baluchistan (Ghazanfar & Nasir, 1986).

Chenopodiaceae

1. Flowers in cymose clusters combined into spikes forming a panicle ……..…. (3) *C. murale*
1* Flowers in paniculate clusters combined into a large, terminal, leafy, lax panicle
2. Leaf blade often somewhat 3- lobed, margin irregularly serrate to entire. Seed orbicular, ocellate glandular … ……..……. (1) *C. album*
2* Leaf blade with a forward-projecting tooth or lobes near base, margin with several teeth or sometimes subentire. Seed sub-orbicular, compact cup like glandular …….……. (2) *C. ficifolium*

Chenopodium album L., Sp. Pl. 219. 1753. (Fig. 4).

Annual herb, up to 100 cm tall, erect, branched, mealy, green or redish. Stem often striped. Leaf blade up to 6 cm long.

Fl. Per.: January-March.
Distribution: Almost cosmopolitan, common in subtropical to temperate zones, more infrequent in the tropics and cooler regions (Freitag *et al.,* 2001).

Chenopodium ficifolium Sm., Fl. Brit. 1: 276. 1800. (Fig. 5).

Syn: *Chenopodium serotinum* Sm., Fl. Brit. 1: 276. 1800. subsp. *blomianum* (Aellen) Aellen in Hegi, III. Fl. Mitt.-eur., ed. 2, Bd. III/2: 624. (1960).
Annual herb, up to 80 cm tall, erect, green striped, sometimes tinged with red spots in leaf axils, branched. Leaves glabrous-farinose-greyish green.

Fl. Per.: January-March.

Distribution: From Afghanistan to India, China, Japan and SE Asia; introduced to N Australia (Freitag *et al.,* 2001).

Chenopodium murale L., Sp. Pl. 1753. (Fig. 6).

An annual herb, up to 1 m tall. Stem herbaceous, cylindrical, often branched at base, erect or sub opposite, green, sometimes red in branch and leaf axils.

Fl. Per.: January-March.

Distribution: C and S. Europe, N. Africa to Caucasia, Iran, Afghanistan, Turkmenistan, India, Ceylon and to the Arabian peninsula; introduced in subtropical and tropical C, E and S Africa, America, Australia and Oceanic islands (Freitag *et al*., 2001).

Convolvulaceae

1. Stamens included, Stigma linear or oblong ……..……..…… (1) *Convolvulus*
1* Stamens exserted, stigma capitate ……..… (2) *Cressa*

Convolvulus arvensis L., Sp. Pl. 153. 1753. (Fig. 7).

Herb, up to ca.113 cm in height, twining, branched twisted. Petiole ca. 3 cm long. Leaves ca. 2-4x1-2.5 cm.

Fl. Per.: Throughout the year.
Distribution: Throughout the temperate and tropical regions of the world, except Australia. Very common found throughout Pakistan (Austin & Ghazanfar, 1979).

Cressa cretica L., Sp. Pl. 223. 1753. (Fig. 8).

A perennial much branched herb, up to 50 cm tall. Stem woody at base, pilose, leaves ca. 5x3 mm, closely condensed, sessile.

Fl. Per.: Almost throughout the year.
Distribution: Widely distributed in the xeric tropical zones of both the hemispheres (Austin & Ghazanfar, 1979).

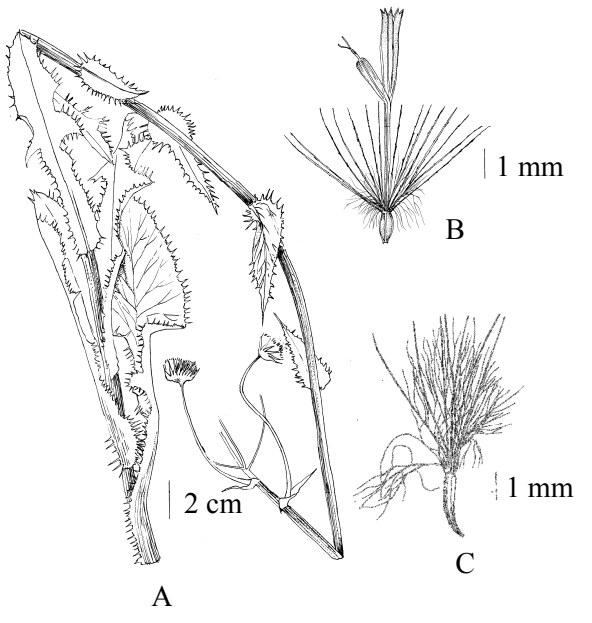

Fig. 1. *Sonchus oleraceus*: A, habit; B, bisexual floret; C, cypsela with pappus.

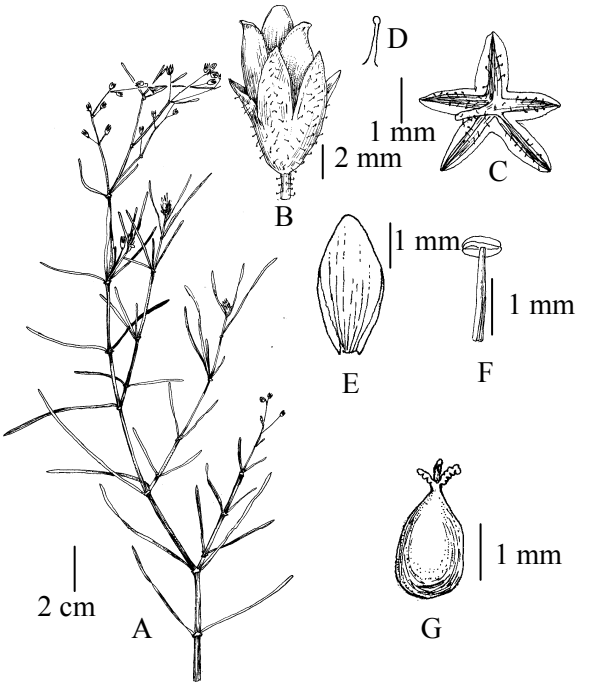

Fig. 2. *Spergularia marina*: A, habit; B, flower; C, calyx; D, glandular trichome on calyx; E, petal; F, stamen; G, pistil.

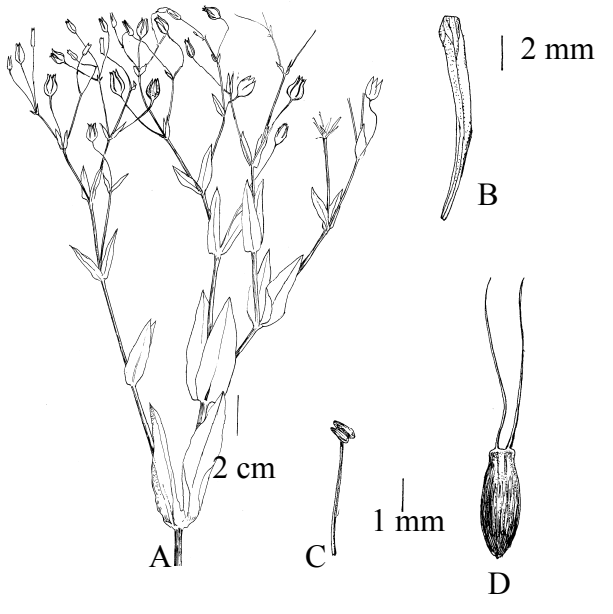

Fig. 3. *Vaccaria hispanica*: A, habit; B, petal; C, stamen; D, pistil.

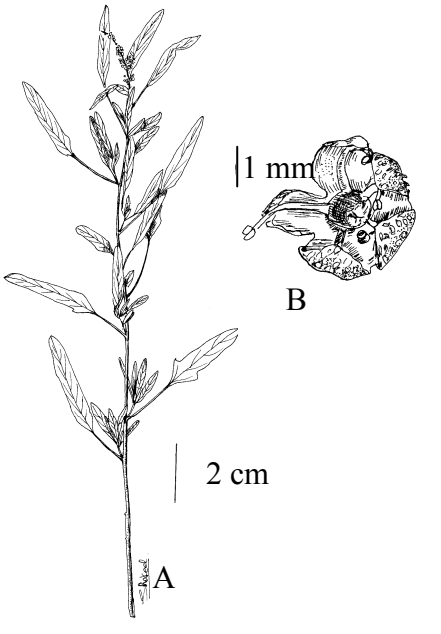

Fig. 4. *Chenopodium album*: A, habit; B, flower.

Papilionaceae

1. Plants spiny …… (1) *Alhagi*
1* Plants not spiny.
2. Rachis ending in a tendril.
2* Rachis not ending in a tendril.
3. Staminal sheath truncate at the apex ……..…… (2) *Lathyrus*
3* Staminal sheath oblique at the apex ……..…….. (5) *Vicia*
4. Fruit spirally coiled ……..…….. (3) *Medicago*
4* Fruit not spirally coiled ……..…… (4) *Melilotus*

Fig. 5. *Chenopodium ficifolium*: A, habit; B, flower.

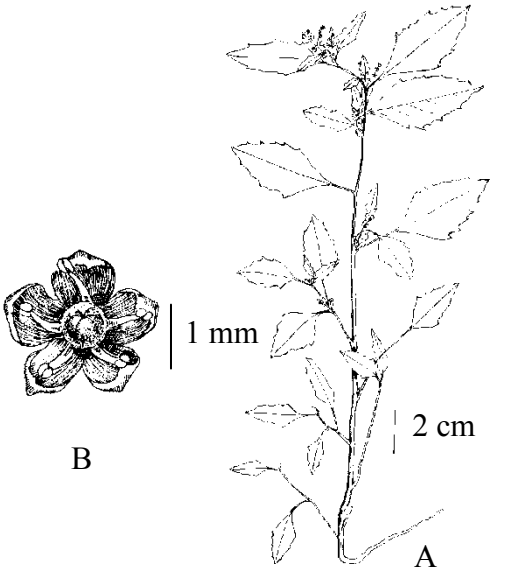

Fig. 6. *Chenopodium murale*: A, habit; B, flower.

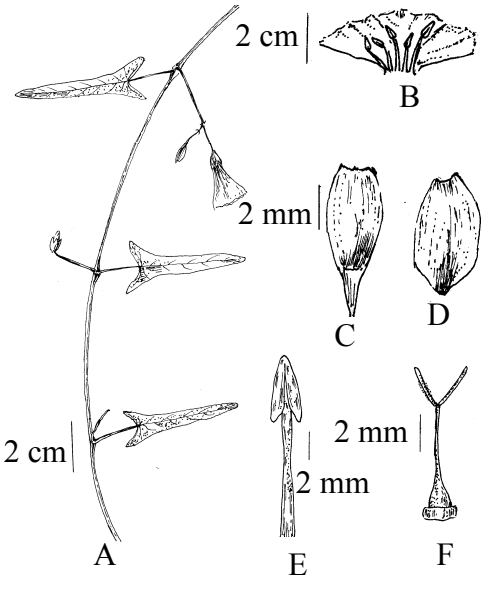

Fig. 7. *Convolvulus arvensis*: A, habit; B, flower opened; C, sepal; D, petal; E, stamen; F, pistil.

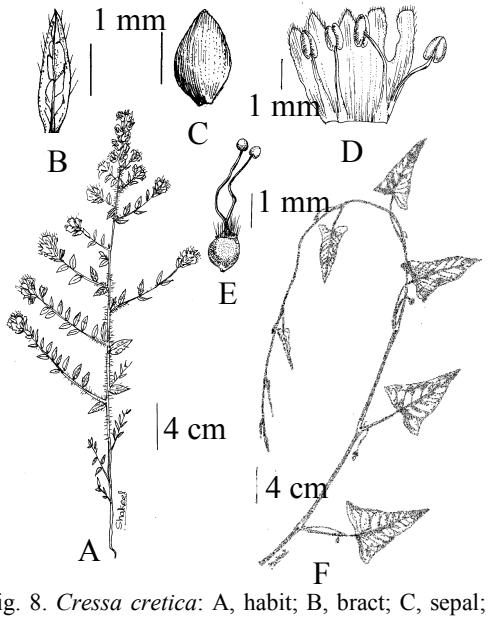

Fig. 8. *Cressa cretica*: A, habit; B, bract; C, sepal; D, corolla & stamens; E, pistil. *Ipomoea aquatica*: F, habit.

Alhagi maurorum Medic. In Vorles, Churpf. Phys. Oek. Ges., 2:397. 1787. (Fig. 9).

Syn: *Hedysarum alhagi* L., Sp. Pl. 745 (1753); *H. pseudalhagi* M. Bieb., Fl. Taur.-Cauc.2: 174 (1808); *A. camelorum* Fisch. ex DC., Prodr. 2: 352 (1825); *A. persarum* Boiss & Buhse in Mem. Soc. Nat. mosc.12: 77 91860).

A low perennial erect shrub, armed, up to ca. 110 cm tall, branches terete, glabrous or pubescent, spiny. Leaf simple, ca. 17x9 mm.

Fl. Per.: April-September.

Distribution: Pakistan, Kashmir, Iran, Afghanistan, Russia, Turkey, Iraq, Syria, Palestine, Cyprus & N. Africa (Ali, 1977).

Lathyrus aphaca L., Sp. Pl. 729. 1753. (Fig. 10).

Annual trailing herb, up to ca. 40 cm tall. Stem glabrous. Leaves modified into tendrils.

Fl. Per.: December-February.

Distribution: Pakistan; Kashmir; India; Europe, N. Africa; S.W. & C. Asia, often cultivated (Ali, 1977).

Medicago polymorpha L., Sp. Pl. 779. 1753. (Fig. 11).

Syn: *Medicago denticulata* Willd., Sp. Pl. 3: 1414. 1802.

An annual herb, up to 40 cm tall, erect, somewhat spreading. Petiole up to 18 cm tall; rachilla hairy, disarticulating the leaflets. Leaflets obovate.

Fl. Per.: December-February.

Distribution: Pakistan; widely distributed throughout the world, except for tropical regions and desert (Ali, 1977).

1. Corolla white. Seed ovate, smooth. ……..…..…. (1) *M. alba*
1* Corolla yellow. Seed widely ovate, tuberculate ……..…….. (2) *M. indica*

Melilotus alba Desr. In Lam., Encycl. Meth. 4: 63. 1776. (Fig. 12).

Annual herb, ca. 80 cm tall, stem erect, pubescent, petiole 3 cm long, leaflets ca. 2x1.5 cm, obovate, oblong, dentate, obtuse, retuse.

Fl. Per.: December-February.
Distribution: Pakistan, India, Kashmir; Tibet, Persia, Afghanistan, Central Asia, Turkey, Arabia, Europe, introduced in America and Australia (Ali, 1977).

Melilotus indica (L.) All., Fl. Pedem. 1: 308. 1785. (Fig. 13).

Syn: *Trifolium M. indica* L., Sp. Pl. 765. 1753; *Melilotus parviflorus* Desf., Fl. Alt. 2: 192. 1799.

Annual herb, ca.13-60 cm tall, stem erect, pubescent, petiole ca. 3 cm long, leaflets ca. 2-8 cm long, 1.3 cm broad, obovate, oblong, dentate, obtuse, retuse.

Fl. Per.: December-February.
Distribution: Pakistan, India, Orient, Europe, introduced in warm temperate regions (Ali, 1977).

Vicia sativa L., Sp., Pl. 736. 1753. (Fig. 14).

Annual herb, up to 85 cm tall. Stem erect-decumbent, winged-quadrangular, pubescent. Leaves pinnately compound ca. 5 cm long.

Fl. Per.: December-February.
Distribution: Pakistan, Kashmir, India, Orient, Europe, Russia, Far East (Ali, 1977).

Polygonaceae

Rumex dentatus L., Mantissa II: 226. 1771. (Fig. 15).

Annual herb, erect, woody, circular, upto 48 cm tall, glabrous with large basal leaves and oblong to linear upper leaves.

Fl. Per.: January-March.
Distribution: Afghanistan, Pakistan, India, East India. (Rechinger, 2001).

Primulaceae

Anagallis arvensis var. ***coerulea*** (L.) Gouan, Fl. Monsp. 2930. 1765. (Fig. 16).

Syn: *Anagallis coerulea* L., Amoen. Acad. 4:479. 1759.

Herb, up to 10-25 cm in length, winged, glabrous, weak. Leaves simple, opposite, obovate, amplexicaule.

Fl. Per.: November-February.
Distribution: N.W. Africa, the Mideterranean, Europe to W. Asia, Australia, N. America, temperate and E. tropical South America (Nasir, 1984).

Monocotyledons

Cyperaceae

Cyperus rotundus L., Sp. Pl. 45. 1753. (Fig. 17).

Syn: *Chlorocyperus rotundus* (L.) Palla, Allg. Bot. Zeitschr. 6: 61 (1900); *Schoenus tuberosus* Burm. f., Fl. Ind: 19 (1768); *C. tuberosus* Rottb. Descr. et Icon. 28. t. 7. f. 1 (1773).

Perennial herb, up to 50 cm high. Stolons slender, producing tubers, ca. 20 mm in diameter, becoming black. Culms corm like at the base, 3-angled, green. Leaves crowded at the base.

Fl. Per.: June-September.
Distribution: Australia, Mauritius, Ceylon, Indo-Pak subcontinent (Kukkonen, 2001).

Poaceae

1. Ligule a ring or line of hairs ……..……...…… (4) *Phragmites*
1* Ligule membranuous …… 2
2. Glumes with long slender awns ……... (5) *Polypogon*
2* Glumes awnless …….…….…… (3) *Phalaris*
3. Spikelets 2-6 flowered. Glumes 5-9 nerved …… (1) *Avena*
3* Spikelets 1-flowered. Glumes 1-nerved ……..……... (2) *Cynodon*

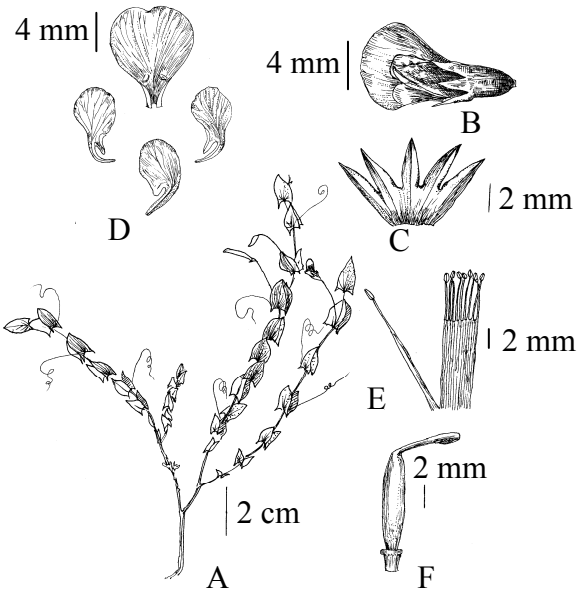

Fig. 9. *Lathyrus aphaca*: A, habit; B, flower; C, calyx; D, vexillum, wings & keel petals; E, stamen; F, pistil.

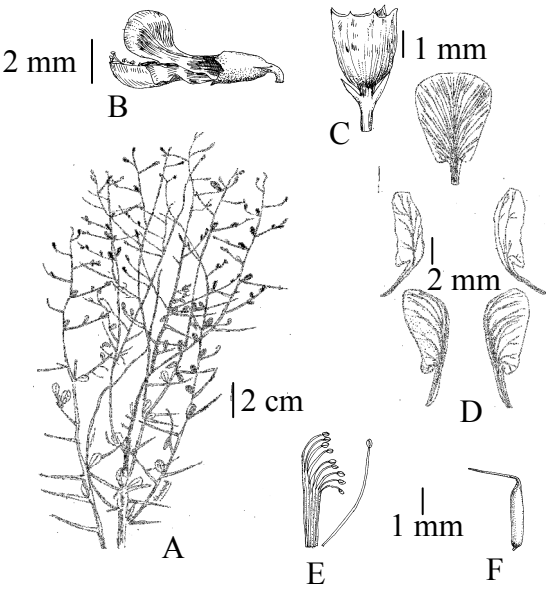

Fig. 10. *Alhagi maurorum*: A, habit; B, flower; C, calyx subtending by bracts; D, vexillum, wings & keel petals; E, stamen; F, pistil.

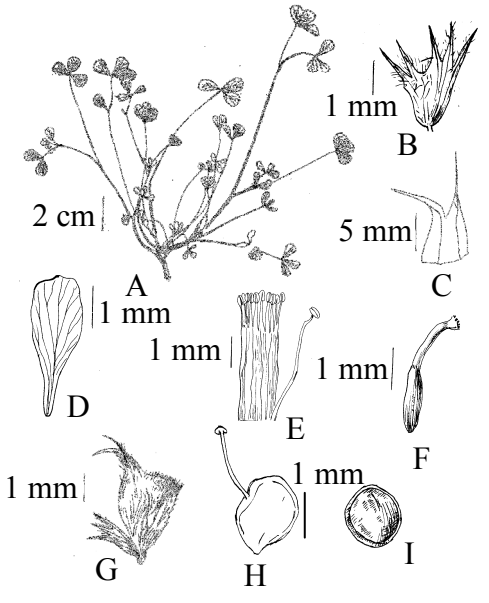

Fig. 11. *Medicago polymorpha*: A, habit; B, calyx; C, sheath giving rise stipules; D, vexillum; E, stamen; F, pistil; G, calyx forming pouch like structure having seed within; H, fruit; I, seed.

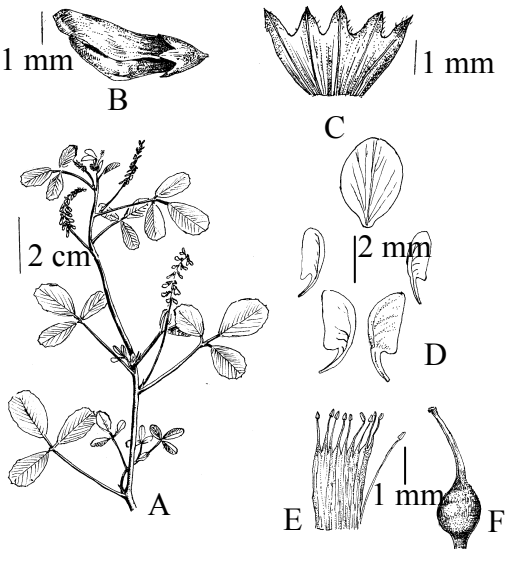

Fig. 12. *Melilotus alba*: A, habit; B, flower; C, calyx; D, vexillum, wings & keel petals; E, stamen; F, pistil.

Avena fatua L., Sp. Pl. 1:80. 1753. (Fig. 18).

Syn: *Avena sativa* L. Var. *sericea* Hook. f., Fl. Brit. Ind. 7:275. 1896.

Annual herb, up to 160 cm high. Culms erect or geniculately ascending.

Fl. Per.: February-March.
Distribution: Pakistan (Sindh, Baluchistan, Punjab, N.W.F.P. & Kashmir); Mediterranean eastwards to Pakistan and Northeast Africa (Cope, 1982).

Cynodon dactylon (L.) Pers., Syn. Pl. 1:85. 1805. (Fig. 19).

Syn.: *Panicum dactylon* L., Sp. Pl. 1:85. (1753).

Perennial grass, up to 50 cm tall, extensively creeping by rhizome or by strong flat stolon and rooting at nodes. Culms slender, glabrous at nodes.

Fl. Per.: Throughout the year.
Distribution: Pakistan (Sindh, Baluchistan, Punjab, N.W.F.P. & Kashmir); tropical and warm temperate regions throughout the world (Cope, 1982).

Phalaris minor Retz., Obs. Bot. 3:8. 1783. (Fig. 20).

Annual herb, up to 100 cm tall, with erect or decumbent-ascending culms.

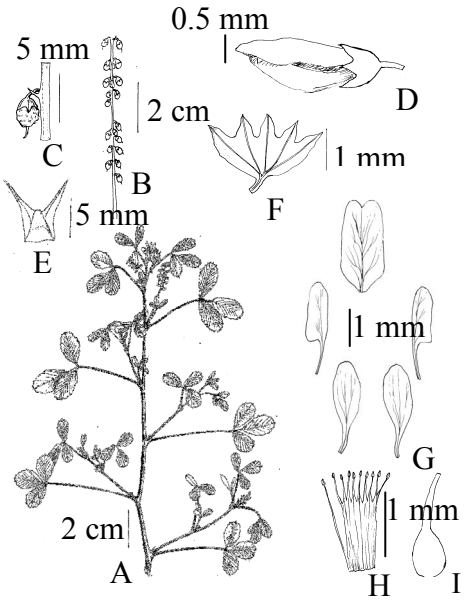

Fig. 13. *Melilotus indica*: A, habit; B & C, fruiting branch D, flower; E, stipules; F, calyx; G, vexillum, wings & keel petals; H, stamen; I, pistil.

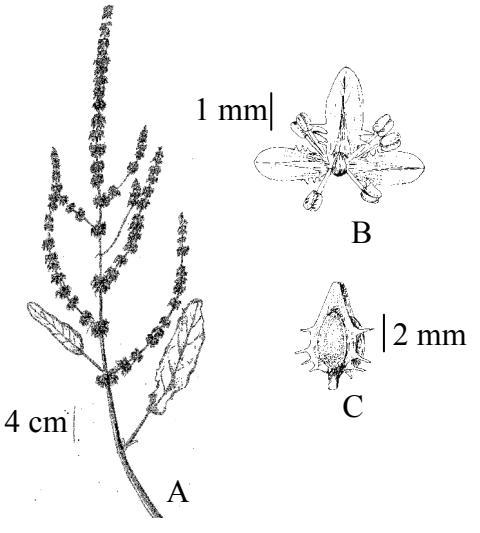

Fig. 15. *Rumex dentatus*: A, habit; B, flower dissected, showing perianth segments, stamens & pistil.

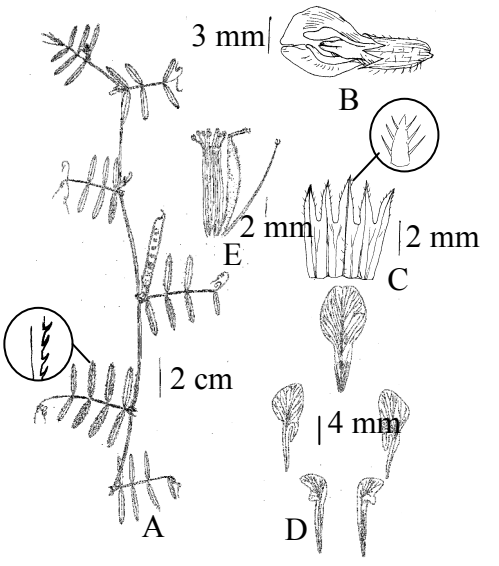

Fig. 14. *Vicia sativa*: A, habit; B, flower opened; C, calyx; D, vexillum, wings & keel petals; E, stamen & pistil.

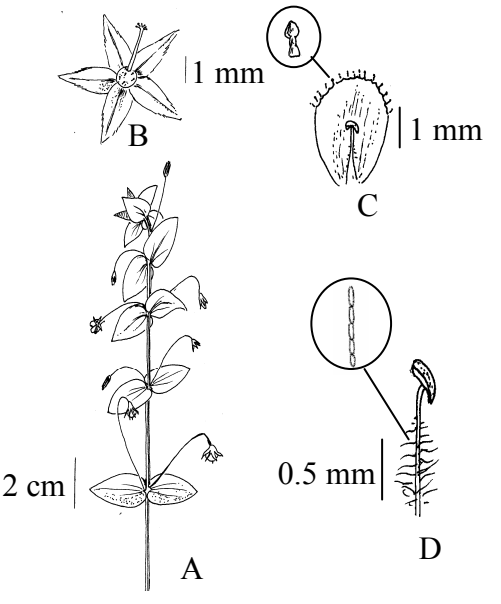

Fig. 16. *Anagallis arvensis*: A, habit; B, calyx & pistil; C, petal with epipetalous stamen & glandular trichomes; D, stamen showing monoliform hairs.

Fl. Per.: January-March.
Distribution: Pakistan (Baluchistan, Punjab, N.W.F.P. & Kashmir); throughout the world, but apparently native only in the Mediterranean region and eastwards to Baluchistan and the Northwest Himalayas (Cope, 1982).

Phragmites australis (Cav.) Trin. ex Steud., Nom. Bot., ed. 2, 2: 324. 1841. (Fig. 21).

Syn: *Arundo phragmites* L., Sp., Pl. 1: 81. 1753; *A. australis* in Anales Hist. nat. Madrid 1: 100. 1799.

A semi-aquatic perennial, with creeping rhizomes. Culms erect, up to 1-5 m high.

Fl. Per.: July-October.

Distribution: Pakistan (Punjab & Kashmir) temperate regions of both hemispheres in the Old World and the New (Cope, 1982).

Polypogon fugax Nees ex Steud., Syn. Pl. Glum. 1: 184. 1854. (Fig. 22).

Syn: *Polypogon littoralis auct. non* J. E. Sm.; *P. lutosus auct. non* (Poir.) Hitchc.; *P. interruptus auct. non* H.B.K.

Annual herb, culms up to 70 cm high, decumbent at the base and rooting from the lower nodes.

Fl. Per.: February-March.
Distribution: Pakistan (Baluchistan, Punjab, N.W.F.P. & Kashmir); Iraq eastwards to Burma, mainly in the Himalayas (Cope, 1982).

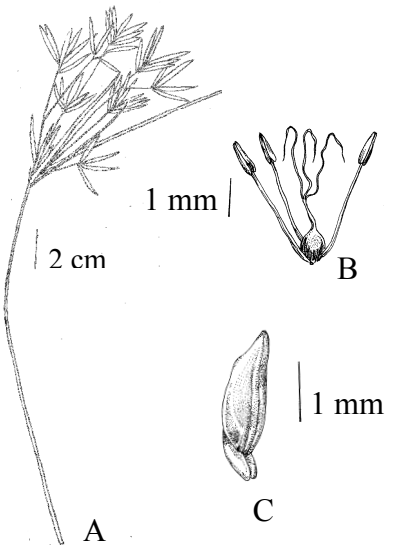

Fig. 17. *Cyperus rotundus*: A, habit; B, floret; C, glume.

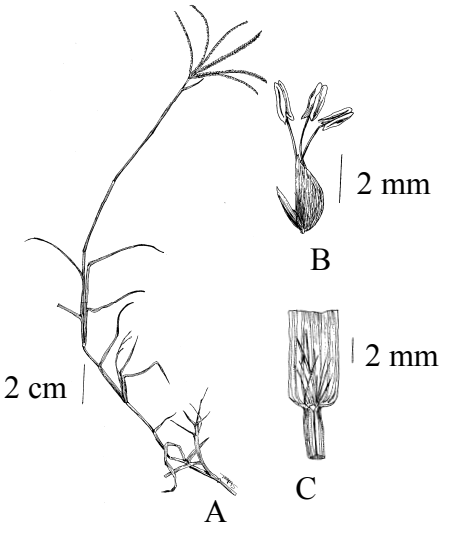

Fig. 19. *Cynodon dactylon*: A, habit; B, floret; C, ligule.

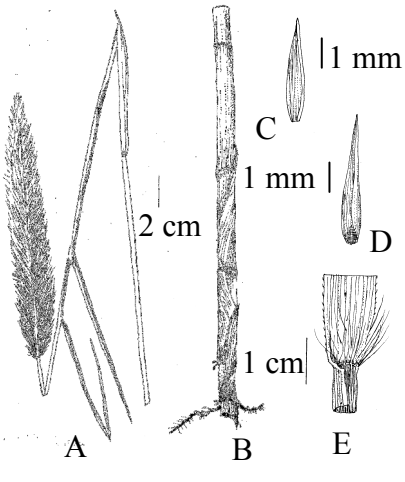

Fig. 21. *Phragmites australis*: A, habit; B, culm; C, upper glume; D, upper lemma; E, ligule.

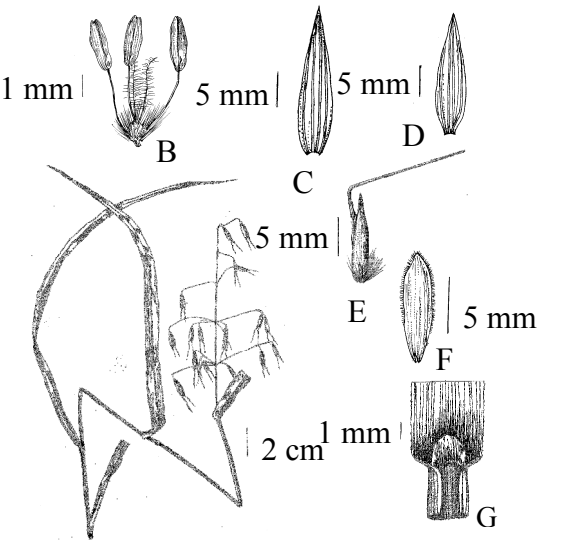

Fig. 18. *Avena fatua*: A, habit; B, floret; C, upper glume; D, lower glume; E, upper lemma; F, lower palea; G, ligule.

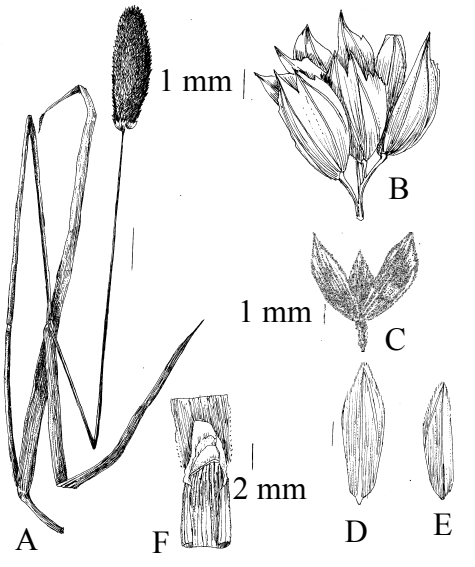

Fig. 20. *Phalaris minor*: A, habit; B, group of spikelet; C, floret; D, upper glume; E, lower glume; F, ligule.

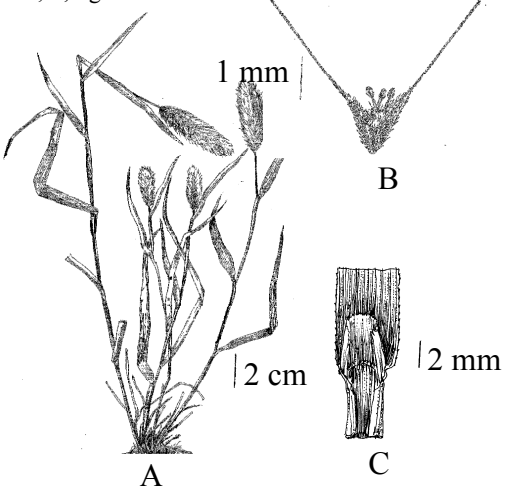

Fig. 22. *Polypogon fugax*: A, habit; B, floret; C, ligule.

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