STUDIES ON THE WEEDS OF IMPORTANT CEREAL CROPS OF N-W.F.P. (PAKISTAN)

By

KHAN BAHADAR MARWAT

Ph. D. THESIS

DEPARTMENT OF BOTANY
UNIVERSITY OF PESHAWAR
Pakistan

JUNE, 1984

بسم الله الرحمن الرحيم

In the Name of ALLAH
the most merciful,
the most gracious.

STUDIES ON THE WEEDS OF IMPORTANT CEREAL CROPS OF N-W.F.P. (PAKISTAN)

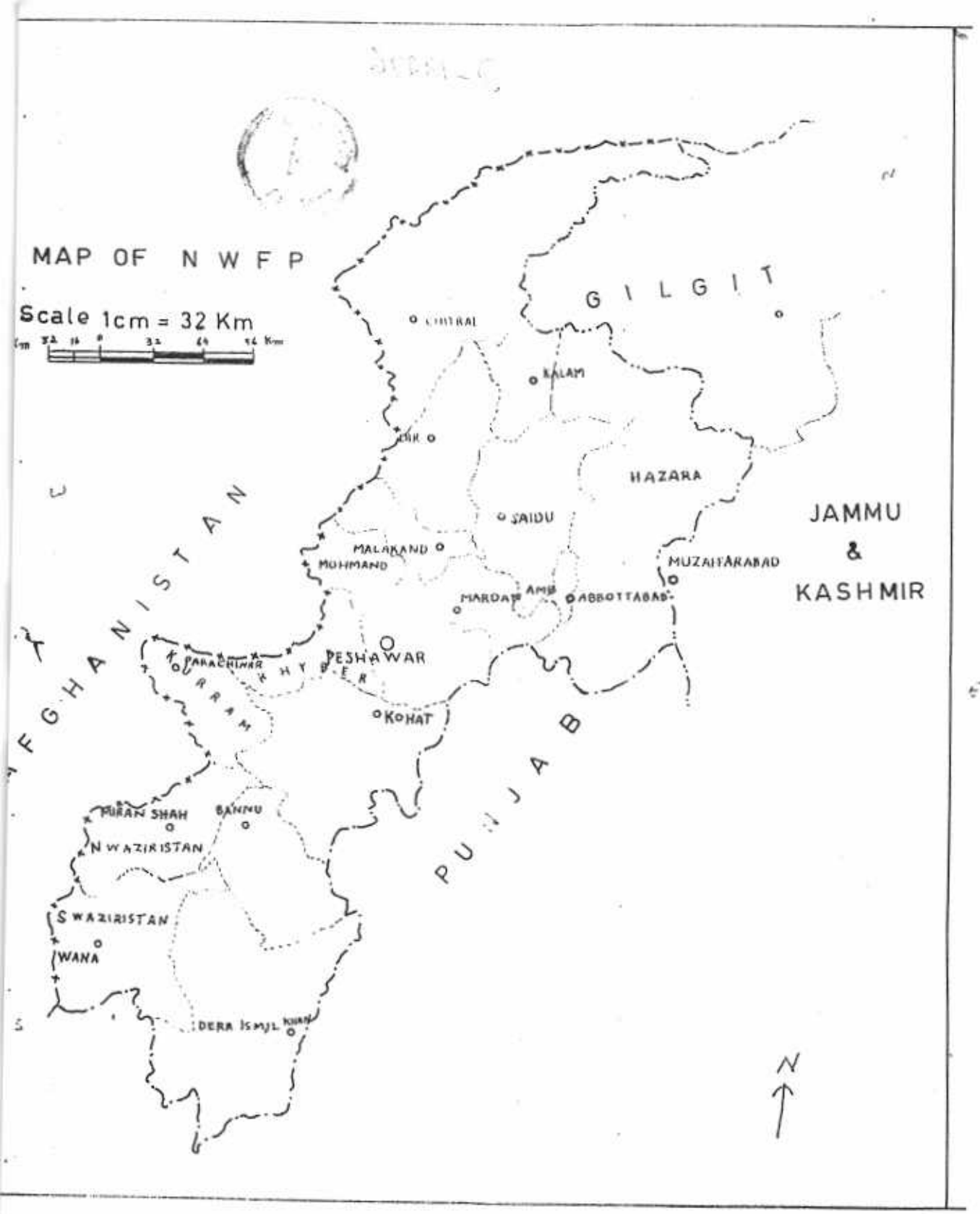
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MAP OF N W F P
Scale 1cm = 32 Km
GILGIT
CHITRAL
KALAM
DIR
HAZARA
SAIDU
MALAKAND
MOHMAND
MUZAFFARABAD
MARDAN
ABBOTTABAD
PARACHINAR
PESHAWAR
KHYBER
KOHAT
BANNU
PURAN SHAH
N WAZIRISTAN
S WAZIRISTAN
WANA
DERA ISMAIL KHAN
JAMMU
&
KASHMIR
PUNJAB
N

UNIVERSITY OF PESHAWAR

Studies on the weeds of important cereal crops of N-W.F.P.(Pakistan)

A thesis submitted in partial fulfilment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

Botany

By

Khan Bahadar Marwat

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A C K N O W L E D G E M E N T S

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V I T A

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A B S T R A C T

The present study, first of its nature for North-West Frontier Province is an attempt to work out the weed flora of cereal crops, with special emphasis on wheat, rice and maize crops. In all, two hundred and eighty four species and one hundred and ninety six genera distributed among fifty five families are described.

Out of fifty five families, thirteen families are monocotyledonous, having sixty four genera and ninety five species viz. Hydrocharitaceae (2 genera and 2 species), Iridaceae (1 genus and and 1 species), Poaceae (forty three genera and fifty five species), Cyperaceae (4 genera and fourteen spp), Lemnaceae (3 genera and 3 species), Zenicheliaceae (1 genus and 1 sp), Alismataceae (2 genera and 3 species), Potamogetonaceae 1 genus and 2 species), Juncaceae (1 genus and 5 species), Commelinaceae (1 genus and 2 species), Alliaceae (1 genus and 3 species), Pontederiaceae (2 genera and 2 species) and Liliaceae (2 genera and 2 species).

Rest of the forty two families are dicotyledonous, consisting of one hundred and thirty two genera and one hundred and eighty nine species, viz. Ranunculaceae (1 genus and 3 spp), Capparidaceae (1 genus and 4 species), Resedaceae (1 genus and 1 species), Papaveraceae (3 genera and 5 spp), Fumariaceae (1 genus & 1 sp), Brassicaceae (11 genera and twenty one spp), Frankeniaceae(1 genus and 1 sp), Zygophyllaceae (2 genera and 2 spp), Malvaceae (3 genera and 3 spp), Tiliaceae (1 genus and 4 spp), Caryophyllaceae (6 genera and 7 spp), Portulaceae (1 genus and 1 sp), Euphorbiaceae (3 genera and six spp), Oxalidaceae (1 genus and 3 spp), Linaceae (1 genus and 2 spp), Umbelliferae (7 genera & seven spp), Papilionaceae

(eleven genera and twenty spp), Lythraceae (3 genera & 7 spp), Parnassiaceae (1 genus & ssp), Onagraceae (2 genera & 2 spp), Amaranthaceae (six genera & ten spp), Polygonaceae (2 genera & 7 spp), Chenopodiaceae (1 genus & 2 spp), Urticaceae (1 genus & 1 sp) Cannabaceae (1 genus & ssp), Thymelaeaceae (2 genera & 2 spp), Aizoaceae (3 genera & 4 spp), Illecebraceae (1 genus & ssp), Primulaceae (1 genus & 1 sp), Boraginaceae (4 genera & 4 ssp), Plantaginaceae (1 genus & 5 ssp), Verbenaceae (2 genera & 2 spp), Solanaceae (3 genera & 4 spp) Convolvulaceae (2 genera & 2 spp)., Scrophulariaceae (1 genus & 2 spp)., Acanthaceae (2 gener & 2 spp), Labiatae (4 genera & 4 spp), Orobanchaceae (1 genus & 1 sp), Compositae (twenty four genera and thirty spp), Sphenocleaceae (1 genus & 1 sp), Valerianaceae (2 genera and 4 spp) and Rubiaceae (1 genus and 1 sp).

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Chapter - I

INTRODUCTION

Introduction to N-W.F.P. As indicated by its name, the province is located in the north-west frontier part of Pakistan. It extends from latitude, 31° 4' to 37° 8' N and from logitude 69° 16' to 74° 7' E., having an area of 39,283 sq.miles and population of 8.4 million in 1972 (Kureshy, 1978). On the north of it lies Gilgit; to the south it is bounded by Baluchistan and Dera Ghazi Khan Districts of Punjab; on the east by Kashmir and by the Punjab; on the west of Afghanistan (Rose and Howell, 1979); N-W.F.P. has a length of 408 miles is 60 to 280 miles wide at various places (Dichter, 1967).

Mountain Systems: Hazara Division lies on the east bank of the Indus among the mountains formed by the meeting of the Outer and Mid-Himalayan ranges enclosing Kaghan and meet at Babusar pass (13, 589 feet). West of Indus, Hindu Kush runs almost due east and west and at its north-eastern corner meets a continuation of the Outer Himalayan chain which crosses the Indus above the Kaghan valley. From this chain minor ranges descend in a north-westerly direction, traversing Bajaur and Swat, untill they meet the curved range of hills which connects the Mid-Himalaya with Kohi Safed and encircle the Peshawar valley on the north (Rose and Howell, 1979).

The Kohi-Safed also runs almost due east and west, forming the watershed between the Kabul and Kurrum rivers. Eastwards minor ranges descend from its southern slopes to the Indus. The Sulaiman range runs up the western border of the province to meet the Kohi

Sofed and also throws out a series of parallel spurs to the east. These traverse the whole of Kohat District. The Sheikh Badeen range, the southern extremity of the salt range, forms the boundary between Bannu and D.I.Khan and emerges eventually in the Sulaiman range.

General climatic conditions: N-W.F.P. is mainly a mountainous region, but including the Peshawar valley and the broad riverain tract of Indus in D.I.Khan District, its climatic conditions are extremely diversified, the latter District being one of the hottest areas in the Indo-Pak subcontinent, while over the mountain region to the north the weather is temperate in summer and intensively cold in winter. The air is generally dry, and hence the daily and annual ranges of temperature are frequently large.

The province has two wet seasons: one, the monsoon, when mositure is brought up by the winds from the Arabian sea and Bay of Bengal; the other is winter, when storms from Iraq and Iran bring widespread rain and snowfall. Both sources of supply are precarious, and not infrequently either the winter or summer rainfall fails almost entirely. (Rose and Howell, 1979).

Temperature

In Hazara division, snow-fall is common during the months of December - February. Maximum and minimum temperature during summer is 144°F and 52°F. In winter the temperature is between 70°F to 28°F. The lower altitudes and plains are characterised by tropical and subtropical type of climates, while higher altitudes indicate the temperate of sub-alpine types of climatic

conditions. Peshawar Division has dry subtropical thorny deciduous types of natural vegetation, growing under dry arid, continental climate with a slight touch of Mediterranean type at certain places. Summers are hot and winters cold. The average summer temperature is 90°F with a maximum of 105°F which may decline to 70°F. Khyber and Mohmand agency has almost the same climatic features as that of Peshawar District. In D.I.Khan division, average temperature is 92°F with a maximum of 117°F and minimum of 79°F in summer; with a maximum of 80°F and minimum of 47°F in winter. In Malakand division (Swat, Dir, Chitral and Malakand agency), the plains and the foot hills have relatively warmer temperatures as compared with the chilling temperatures at altitudes having snowfall. The summer temperature rises upto 110°F in Chitral and descends to 41°F.

In Waziristan, the mean maximum and minimum temperature is 100°F and 92°F in summer while in winter it is 37°F and 56°F in South and North Waziristan respectively (Census Report, NWFP and tribal Agencies, 1961).

Rainfall: In Peshawar Division the average rain fall varies from 15"-20"-(21").(However in Swabi area of Mardan district the rainfall is 25" - 30"). Khyber Agency receives 6.7 - 7" of annual rainfall. In Bannu annual rainfall is 11.93" while in D.I.Khan it is still less as 5.8". In Hazara and Malakand divisions, there is great variation in the amount of rainfall due to variation in topography. In Hazara, the plains of Haripur and Mansehra receive 30" - 32", while Abbottabad receives almost 45" of rainfall. In Gallies it reaches upto 70" and even more at higher altitudes.

In Malakand rainfall is 32 - 35" in the lower elevations and 60" - 70" at higher altitudes (Census Report N-W.F.P. and Tribal Agencies, 1961).

The Weeds:

Undesirable plants growing in the crop fields are termed as weeds. Such plants are useless and rather dangerous for the farmer, as they affect the crop through competition for light, space, nutrients; through allelopathy and seed contamination etc. Moreover some of the weeds harbour insect pests which are injurious for crops. In certain other cases some of the thorny weeds like Carthamus, Silybum and Alhagi etc. make it quite difficult for a farmer to harvest the crop. The quality of milk in milking cattles is affected by certain weeds like Coronopus. Aristida and Cenchrus cause wounds around the face, ears or in mouth of the grazing animals and in this way the animal may be in dangerous condition. Some of the weeds like Xanthium and Sorghum have poisonous effects; still other cause water blooms and as a result the living organisms like fish etc. are killed.

Bedides these harmful effects, some of the weeds are useful to the farmers in terms of fodder for grazing animals, nitrogen fixers and soil binders etc. Some of the weeds also share the spread of the disease which in its absence will occur on the crop species only.

In Pakistan, weed science is almost neglected as compared to the other branches of Plant Protection, like Entomology and Plant Pathology; although the losses caused by weeds are much more than the combined losses of plant diseases and insect pest attacks (Whittel, 1958) According to Ennis (1967) weeds are the most serious

threats to our food supplies; the losses caused by them are often far more serious, but less dramatic than those caused by plant diseases organisms or by insects. Cramer (1967) estimated the losses due to weeds alone amounting to 11.3% of the potential yield of crops. According to his estimate 34.4 million tons of whorld wheat is lost annually due to weeds alone, being more than the actual production of wheat in Asia (excluding China). Muzik (1970) has also reported that weeds cause greater losses than either insects or plant diseases.

Researches are going on in Pakistan for the control of weed, specially oriented towards chemical control that might kill weeds without being ascertained whether a particular weed is harmful to the crop or otherwise. And in this way it is more likely that the germplasm of certain individual plant species is lost which grow with the crop for centuries in the ecosystem for mutual benefits. Moreover, due to the application of weedicides, the flora of cultivated fields (disturbed habitats) is also in danger.

In view of the forementioned facts this study was aimed to explore the flora of cereal crops, with special emphasis on wheat, maize and rice. In the forthcoming Chapter (Review of literature) the intensity of the problem will be further discussed.
Further support for such study is given by the statement of Stewart (1982) "Swamps are drained, deserts are being irrigated, productive fields are replaced by towns and cities ..... As forests disappear, habitats disappear, and with the habitats plants and animals go. Trained botanists are needed to study such problems which are of practical importance".

The present effort, the first of its nature in our country, is hoped the cover the weeds flora of Cereal crops of N-W.F.P. in particular and Pakistan in general.

Chapter - II

REVIEW OF LITERATURE

Prior to the existance of Pakistan, Luthra (1938) was probably the first who worked on Punjab Weeds and their Control. This work is outdated and covers only a fraction of the total weeds found in our area. Nomenclature of this manuscript is now changed and no key has been provided for identification of weed specimens.

In Pakistan no true taxonomic work has been carried out on weeds so far. A brief picture of the related work, done in weed science of Pakistan is, Jalis and Brohi, 1970; Jalis, 1978; Saeed et al., 1977; Kalwar et al., 1971; Ahmad and Jameel, 1965; Marwat and Haq, 1979, Khan, et al. 1974; Baluch & Ahmad, 1965; 1968; Mohibullah and Ali, 1974; Hussain & Shah, 1978; Chaudhri et al., 1978; Ahmad & Amjad, 1977; Arai & Kawashima, 1956.

Many workers have contributed towards the flora of N-W. Frontier Province, prominent amongst them are, Stewart, 1862/64; Anderson, 1867; Hooker, 1872-1897; Brandis, 1879; (dealing with trees & shrubs mostly); Aitchison, 1881; 1881-82; 1888; Duthie, ~~J.F.~~ 1886; 1896; Boissier, 1867-84; Gage, 1903; Blatter & Hallberg, 1918; Parker, 1924 (forest flora); Blatter and Fernandez, 1933-35; McCann, 1942; Nasir, 1959; 1959; Ahmad & Stewart, 1958-59; Ali, 1965; Koyama, 1957; Kitamura, 1960, 1964; Bor, 1960; Bor & Melderis, 1965; Salim and Khan, 1965; Webster and Nasir, 1965; Stewart, 1945, 1967 (a), 1967 (b); Kazmi, 1970-71; Qureshi & Khan, 1971, 1972; Beg & Khan, 1976; Bhopal and Chaudhri, 1977.

Stewart (1972) prepared an annotated catalogue to the Flora of Pakistan, which is the only representative literature, covering almost all the plants of N-W.F.P. Nasir and Ali (1970-84) are editing the Flora of Pakistan under joint editorship and they are adding excellent information to the Flora; one hundred & forty six families of Pakistan Flora so far have been published in fascicles. Still some of the large families like Compositae, Rosaceae, Caryophyllaceae, Euphorbiaceae, Boraginaceae, Chenopodiaceae etc. are yet to be published and therefore the completion of this task will take at least 5-10 years more. Some of the authors have described weed species of N-W.F.P. while working on various families of the Flora of Pakistan, e.g. Aziz & Ali, 1972; Aziz & Jafri, 1975; Ghafoor, 1973 (a); 1973 (b), 1974 (a) & (b), 1974 (c), 1981; Ali, 1977; Ghazanfar, 1977; Abdullah, 1972; Siddiqi, 1973; Kazmi, 1974; Townsend, 1974; Dar, 1975; Austin and Ghazanfar, 1979; Abedin, 1979; Hoch and Raven, 1981; Jafri, 1972; 1973 (a), 1973 (b), 1974, 1976, 1981; Jafri and Ghafoor, 1974; Jafri and Qaiser, 1974; Nasir, y., 1971 (a), 1971 (b), 1971 (c), 1973, 1975, 1976, 1977; Nasir, E., 1972, 1975; Qaiser, 1973 and Qaiser & Jafri, 1975.

Regarless of flora type of work, much attention has been given to the various aspects of weed science on the global level. Important reference work in this field is as follows. Adam et al. 1970; Agriculture Research Service, 1970; Anonym; 1960, 1968, 1971 (a), 1971 (b); Arai, 1969; Bews, 1929, Baloch and Gani, 1969; Brod, 1968; Cardenas et. al. 1972; Delorit, 1970; Dirven, 1970; Edgecombe, 1970; Gopal & Mani, 1970; Haselwood & Motter, 1966;

Henderson and Anderson, 1966; Holm and Herberger, 1971; Holm et. al. 1977; Horowitz, 1971; Ivens, 1968; Jordan et. al. 1972; Kasahara, 1970; Kasasian, 1970; Krans et. al. 1977; Lin, 1968; Little, 1973; Madrid et. al. 1972; Musil, 1963; Negre and Maghami, 1968; Palmer, 1973; Parker, 1960, 1972; Ramarkrishan, 1971 Ranade & Burns, 1925; Schwerzel, 1970; Seeyave and Kasanian, 1969; Smith, 1968; Smith & Shaw, 1966; Tadulingam et. al. 1955; Thomas, 1970; Vegar & Siera, 1968; Thorton & Harrington, 1965.

The literature quoted on weeds in Pakistan is in general not acknowledged in the description of individual weed species. The same applies for the general floras which are used when dealing with each weed species. Only in exceptional cases are they quoted in the list of references.

As could be seen from the literature cited that much work has been done on weed taxonomy in the developed and developing countries, but unfortunately, our area is lacking such a reference literature regarding particular weed species its habitat, distribution and identification.

Chapter - III

MATERIALS AND METHODS

Weed specimens were collected from cereal crops of N-W.F.P. with special emphasis on the fields of wheat, maize and rice. Soon after collection, specimens were placed in a folded newspaper, like file cover with a tag showing the locality, date and number of collection and other relevant informations, like, colour of the flower, crop concerned and local name of the weed etc. Specimens were pressed keeping blotting paper between adjacent specimens. Blotting papers were changed from time to time, depending on weather and succulence of plants, till the specimens were dried.

During lengthy field trips corrugating sheats were placed in between pressed specimen to avoid blackening of the specimens. Great difficulty was experienced in hill stations during rainy season in drying the specimens. At such places driers were used to be changed 2-3 times a day after the sweating period was over. The blotting papers were not used, because they hold and absorb water too strongly. Newspapers, instead of blotters donot, blacken the specimens.

Dried specimens were, poisoned, so as to preserve them from insects by dipping them in a 2% solution of mercuric chloride in a mixture made by adding 1 part of petroleum ether and 2 parts of 95% alcohol. This method is not convenient for the mounted specimens. In some cases it may be applied by means of a flat brush instead of dipping it in solution. Other insecticides as dusting of D.D.T. on the plants as soon as they dry is most effective (Gupta, 1961).

Moth balls and nephthalene flakes are effective repellents of insects. A mixture of 2 parts of nephthalene and one part paradichlorobenzene was placed in muslin bags in each almira to avoid the attack of insects (Merrill, 1948).

Many specimens in addition to personal collection were placed at the disposal of the auther by the staff and students of Botany Department, Peshawar University, Agricultural University Peshawar and various research organisations of N-W.F.P. All these specimens were preserved in the same way as mentioned above and numbered.

Mounting of specimens was made on herbarium sheats of standard size of 11.5" by 16.5" (Lawrence, 1970).

Plants were identified taking help of Ahmad, 1954; 1964; 1980; Ahmad and Stewart 1958-59; Bor, 1960; Bor and Melderis, 1965; Jafri, 1966; Nasir and Ali (1970 - 1984); Kashyap and Joshi, 1936; Hooker, 1872 - 1897. Many of my specimens were identified and confirmed by people at National Herbarium Islamabad, Department of Botany, University of Karachi, Kew and Pakistan Forest Institute, Peshawar.

The nomenclature followed is that of Nasir and Ali (1970 - 84) in case of published families, and of Stewart (1972) in case of unpublished families or otherwise stated.

List of Collectors

In addition to my personal collection a large body of the students, friends, colleagues and professionals have added thousands of specimen to the herbarium. Names of some of the known collectors is as follows:

Mr. Mohammad Subhan and Mr. Amir Khan collected weeds from D.I.Khan, Mr. Ayub Shah in South Waziristan, Mr. Taj Malook in N.Waziristan, Mr. Ijaz Wazir and Mr. Javed from Bannu, Mr. Noor Mohammad, Mr. Gul Baz, Mr. Salim Khattak and Mr. Zabita Khan from Kohat, Karak and Kurrum, Mr. Hidayatur Rehman and Dr. Farrukh Hussain from Mardan; Mr. Mohammad Naeem and Mr. Javed from Malakand, Mr. Mian Mohibjan, Mr. Sher Ali Khan and Mr. Iqbal Hussain from Swat; Mr. Riaz Akhtar and Mr. Iqbal Hussain from Dir, Mr. Abdul Qayyum and Mr. Taj Mohammad from Chitral, Mr. M. Shaukat, Mr. Nisar Ahmad, Mr. Mohammad Irshad, Mr. Mohammad Farid, Mr. Mohammad Ashraf and Mr. Ejaz Qadir from Hazara Division.

The names of collectors, collection numbers and the date of collection have been left out in distribution otherwise, the thesis would have been of the twice the present size.

Chapter - IV

R E S U L T S

Total weeds collected from cultivated fields of cereals crops are distributed among 55 families, out of which 13 families are monocotyledonous, while rest of 42 are dicotyledonous.

	+	Flowers mostly 3-merous, radicle not elongated to form primary root, cotyledon one, venation (usually) parellel	A. MONOCOTYLEDONS
	-	Flowers mostly 4-5 merous, radicle elongated to form primary root, cotyledons two, venation (usually) reticulate	B. DICOTYLEDONS

A. MONOCOTYLEDONS

Key to families

1	+	Ovary inferior	2
	-	Ovary superior	3
2	+	Flowers unisexual (submerged aquatic, ovary 1-locular with axile placentation)	1. HYDROCHARITACEAE
	-	Flowers bisexual (perienth zygomorphic; stamens 3)	2. IRIDACEAE
3	+	Perienth absent or represented by hypogynous bristles; flowers in spikelets in the axils of bracts (glumes)	4
	-	Otherwise	5
4	+	Flowers enclosed by a bract (lemma) and bracteole (palea); leaves mostly with open sheaths; stem hollow, terete; seeds adnate to the pericarp	3. GRAMINEAE(POACEAE)
	-	Flowers in the axils of single bracts; leaves usually with a closed sheath; stem solid, triquetrous; seeds free from the pericarp	4. CYPERACEAE

5	+	Perianth usually present, when absent the flowers not in spikelets; aquatic floating plants, with thalloid plant body	5. LEMNACEAE
	-	Otherwise	6
6	+	Gynaecium apocarpous or reduced to 1 carpel with a stigma	7
	-	Gynaecium syncarpous	10
7	+	Flowers unisexual	8
	-	Flowers bisexual	9
8	+	Carpels 2 or more; ovules pendulous	6. JUNCAGINACEAE
	-	Carpel 1; ovule basal	7. ALISMATACEAE
9	+	Flowers in umbelled or panicled whorls, corolla white; perianth segments 6 (Alisma)	7. ALISMATACEAE
	-	Flowers in dense spikes (flowers all around the axis; stamens 4, inserted on the claw of the perianth segments	8. POTAMOGETONACEAE
10	+	Perianth sepaloid or dry and glumaceous (annual or perennial herbs)	9. JUNCACEAE
	-	Perianth not above	11
11	+	Perianth of dissimilar segments, the outer sepaloid and the inner petaloid, (flower bracteate) ..	10. COMMELINACEAE
	-	Perianth of similar segments in 2 or 1-series, petaloid	12
12	+	Flowers arranged in scapose umbel subtended by spathaceous bracts	11. ALLIACEAE
	-	Flowers not unbellate, if so then without spathaceous bracts ..	13
13	+	Aquatic plants with swollen petioles; flowers zygomosphic	12. PONTEDERIACEAE
	-	Terrestrial plants; flowers usually actinomorphic (leaves radical or alternate; placentation axile)	13. LILIACEAE

1. Family HYDROCHARITACEAE

Aquatic, freshwater or marine, usually submerged herbs; leaves radical or on elongated stems and alternate, opposite or whorled, flowers regular, rarely hermaphrodite, usually dioecious, enclosed in an entire or toothed spathe or arranged within 2 opposite bracts; in male flower, sepals 3, petals 3 or 6; stamens 3-12 or many; pistillodes usually present; in female flower, perianth superior, sepals 3, petals 3 or 3, staminodes sometimes present; ovary inferior, sometimes beaked, 1-celled, with 3-6 parietal placentes which sometimes protrude to the middle of ovary; fruit globose or ovoid, dry or fleshy, rupturing irregularly; seeds few or many. Two species & 2 genera are found as weeds.

Key to the genera of

+ Plants with elongated stem and whorled leaves .. .. 1. Hydrilla

- Plants with radical leaves; peduncle spirally twisted .. .. 2. Vallisneria

1. HYDRILLA Rich.

Fresh water dioecious herb, submerged; leaves in whorls of 3-8, or the lower opposite; male flowers solitary, sepals 3, petals 3, stamens 3, pistillodes small; female flowers solitary or in pairs, sessile, perianth same as in males, ovary produced beyond the spath into a filiform beak; styles 3; fruit subulate, smooth or muricate.

Hydrilla verticillata (L.f.) L.C. Rich., in Mem. de. 2:61. 1811. Stewart Ann. Cat.Vas. Pl. W.Pak. & Kash. 32. 1972. Plants up to 75 cm long, stem leafy, branched, often rooting at

nodes; leaves, 5-20 mm long and 2-9 mm broad, linear oblong, entire or fine serrulate, flowers 3-8 mm long.

Distribution and habitat; Found in rice fields of Swat (Thana) --- Tropical Asia, eastwards to S. Europe, and Australia.

2. V A L L I S N A R I A L.

Fresh water submerged herb, stoloniferous; leaves all radical, very long; flowers dioecious; male numerous, minute in an ovoid 3-lobed shortly peduncled spathe; sepals 3, petals 0, Stamens 1-3, pistillode 0; female flowers solitary in a tubular 3-toothed spathe terminating a very long filiform spiral scape; perianth similar to that found in male flowers, staminodes 3, 2-fid; ovary narrow, not beaked; stigma 3, ovules many; fruit linear included in the spathe; seed numerous.

Vallisneria spiralis L., Sp. Pl. 1015. 1753; Stewart, Ann. Cat. Vas. Pl. W. Pak. & Kashm. 33. 1972.

Submerged stoloniferous herbs, found in fresh water, upto 45 cm tall; leaves varying in length with the depth of water, upto 18 cm long, linear, entire or serrulate at the tips.

Distribution and habitat; Collected from rice fields in Charsadda (Peshawar) --- Warm regions of the Old and New World.

2. Family I R I D A C E A E

Perennial herbs with underground rhizomes, corms or bulbs; leaves mostly basal and sheathing at the base; flowers bisexual, actinomorphic or zygomorphic, brightly coloured, solitary or in racemes or panicles; perianth 6, 2-seriate; stamens 3, opposite the outer perianth segments, filaments free or partially connate;

carpels 3, united; ovary inferior, 3-locular with axile placentation or 1-locular with parietal placentation, ovules numerous, fruit a capsule.

1. I R I S Linn.

Perennials, with rhizome or bulbs; leaves mostly radical and basal but usually a few on the stem, linear to sword - shaped, flat, many-nerved legthwise; flowers showy in many colours, borne in 'heads', (terms used to denote the issue from each spathe or pair of bracts, one flower following another, but sometimes only 1 flower is borne) sometimes the inflorescence is clearly racemose or paniculate; segments of flower united into a tube; 3 outer segments hanging or reflexed, 3 inner erect or arched; 3 style- branches expanded covering the 3 stamens, bifid; ovary 3-celled, many ovuled capsule oblong 3 or 6-angled, many seeded.

1. Iris aitchisonii (Baker) Boiss. Fl. Or. 5: 123. 1881; Stewart, Ann. Cat. Vas. Fl. W. Pak. & Kash. 63. 1972. (Syn. Xiphion aitchisonii Baker)

Perennial herb; root-stock a corm; perianth tube 2.5 to 4 cm long; stamens 3; carpels 3, united, ovary inferior, 3-locular, ovules many, placentation axile; capsule oblong, seed many.

Distribution and habitat: Very abundant in wheat fields of Nar Asparlai near S. Naurang (Bannu).

3. Family P O A C E A E (GRAMINEAE)

Annual or perennial herbs, rarely shrubs or trees, with usually hollow stems (culms) closed at the nodes, culms

cylindrical; leaves alternate, 2-ranked, consisting of a blade, sheath and ligule; blades generally linear to lanceolate, terete or convolute or involute; sheaths encircling the culms with the margins free and overlapping or more or less connate; ligule membranous or reduced to a ridge of hairs or absent; flowers usually hermaphrodite, rarely unisexual, usually consisting of 2 or 3 fleshy scales; stamens and pistil subsessile between the two bracts, the lemma and palea; florets 1-many, distichous, sessile on a minute axis (rhachilla) and bearing at the base two empty bracts (glumes), the florets and glumes forming a spikelet; spikelets pedicelled or sessile, arranged in open or contracted panicles or racemes or spikes; stamens 1-6, usually 3; gynoecium tricarpellary; ovary 1-celled, one ovuled; styles usually two, rarely 1 or 3; stigma papillate or more frequently plumose; fruit mostly a caryopsis, rarely a nut or berry or utricle; seed with copious endosperm and a small embryo at the base on the abaxial face, adnate to the fruit with their pericarp, rarely free. Forty three genera and 55 species are found as weeds of crop fields.

Key to Genera of Poaceae (Gramineae)

1 + Spikelets 2-flowered, falling entire at maturity, usually with the upper floret fertile and the lower male or barren and in the latter case often to the lemma, frequently dorsally compressed; rachilla not produced (Panicoideae) 2

\- Spikelets 1-many flowered, breaking up at maturity above the more or less persistent glumes, or if falling entire then not 2-flowered with the lower floret male or barren and the upper bisexual more or less laterally compressed or terete; rachilla produced (Pooideae) 17

2	+	Lower glume longer than the second or lemma, indurated; ~~wet~~ edges ~~in-fed~~ folded round and embracing the spikelets (Andropogoneae)	3
	-	Lower glume smaller or very small or absent; glumes and sterile lemma membranous; fertile lemma and palea firmer in texture (Paniceae)	7
3	+	Internodes of the rachis slender filiform and thickened upwards or throughout or flattened; spikelets 1 or 2-flowered	4
	-	Internodes of the rachis usually stout and thickened upwards or throughout or flattened; spikelets 1 or 2-flowered (Raceme, reduced with 3 heteromorphic 2-flowered spikelets, enclosed by a boat shaped spathe	1. Apluda
4	+	Spikelets of each node alike in sex and shape or if different in sex then the female pedicelled (spikelets awnless).	4. Imperata
	-	Spikelets of each pair different in sex or shape or both, or if similar then with thickened or stout pedicels and joints	5
5	+	Racemes arranged in panicles (spikelets dorsally compressed; lower glume flattened on the back).	5. Sorghum
	-	Racemes digitate, subdigitate, or arranged on a common axis	6
6	+	Sessile spikelets of all pairs perfect, awned, not closely imbricate	2. Bothrichloa
	-	Sessile spikelets of the lowest 1-3 pairs male or neuter, awnless and closely imbricate	3. Dicanthium
7	+	Spikelets surrounded by an involucre formed of either soft hairs or rigid bristles	8
	-	Spikelets not surrounded by an involucre formed of soft hairs or bristless	10

8	+	Involucre unilateral; bristles persisting after the spikelets have fallen; upper lemma transversely rugose	16. Setaria
	-	Involucre completely enveloping the spikelets; bristles falling with spikelets	9
9	+	Bristles united at the base into a hard cup	7. Cenchrus
	-	Bristles free at the base	15. Pennisetum
10	+	Fertile lemma thinly cartileginous, with hyaline flat margins (spikelets awnless)	8. Digitaria
	-	Fertile lemma herbaceous, the margin with a similar texture and inrolled ..	11
11	+	Spikelets with a ring like basal callus	10. Eriochloa
	-	Spikelets without a ring like callus ..	12
12	+	Spikelets arranged in open or contorted panicles, without deffinite orientation towards the rachis	12. Panicum
	-	Spikelets arranged in spike like 1-seeded racemes, abaxial or adaxial ..	13
13	+	Spikelets adaxial (the lower glume turned away from the rachis).	6. Brachiaria
	-	Spikelets abaxial	14.
14	+	Lower glume wanting; fertile lemma with 5-7 curved nerves	14. Paspalum
	-	Lower glume present; fertile lemma with indistinct nerves	15
15	+	Glumes obtuse or acute, awnless, (Fenale lemma acute or paniculate, but emucronate).	13. Paspalidium
	-	Glumes awned, rarely acuminate ..	16
16	+	Longest awn on the sterile lemma or glumes acuminate; leaves linear; racemes dense, culms erect	9. Echinochloa
	-	Longest awn on the lower glumes leaves lanceolate to ovate; racemes loose; culms prostrate-ascending	11. Oplismenus

17 + Spikelets borne in open on contorted panicles 20

\- Spikelets sessile or subsessile, borne along one side of the rachis of solitary digitate or scattered spike-like racemes 18

18 + Spikelets on opposite sides of the rachis of solitary spikes or spike like racemes 44

\- Spikelets secund on a tough rachis of spikes (Chlorideae) 19

19 + Spikelets with one perfect and one or more sterile florets above them 28. Tetrapogon

\- Spikelets with one perfect floret and no sterile floret; spikelets awnless .. .. 27. Cynodon

20 + Spikelets with 2 or more fertile florets, if one the fertile floret below the sterile floret 21

\- Spikelets with 1 fertile floret, the reduced or barren florets, if any below it 36

21 + Glumes as long or longer than the lowest floret 22

\- Glumes shorter than the lowest floret 24

22 + Lemmas awnless or awned from the back; awn geniculate; ligule membranous (Aveneae) 23

\- Lemmas awned from the sinus between the 2 terminal lobes; ligule a hairy, rim (Danthonieae) .. .. 29. Schismus

23 + Spikelets longer than 8 mm; awn twisted at the base (annuals, spikelets nodding) 23. Avena

\- Spikelets shorter than 8 mm, awn not twisted at the base .. .. 24. Koeleria

24 + Lemmas usually 5-nerved, if awned, the awns not geniculate 25

\- Lemmas 1-3 nerved, spikelets borne in panicles or racemes 30

25 + Ovary with a hairy appendage at the apex 26

\- Ovary glabrous, if hairy then without any appendage (lemmas dull, membranous to coriaceous; glume shorter than the spikelet (Festuceae) 27

26 + Inflorescence a raceme; awn terminal (Brachypodieae) .. .. 25. Brachypodium

\- Inflorescence a raceme or panicle; awn inserted below the tip of the lemma (Bromeae) .. .. 26. Bromus

27 + Inflorescence a spike, (lower glume absent, upper glume well developed, spikes straight, simple or abnormally panicled, stout .. 36. Lolium

\- Inflorescence a true panicle .. 28

28 + Lemmas rounded on the back .. 38. Vulpia

\- Lemmas firmly keeled on the back 29

29 + Spikelets broadly ovate, pendulous; lemmas inflated, awnless cordate at the base, closely imbricate, boat shaped many nerved, horizontally spreading .. .. 35. Briza

\- Spikelets and lemmas not as above; spikelets born in loose or contracted panicles; lemmas not awned .... 37. Poa

30 + Inflorescence a panicle, if raceme or spike the spikelets not secund (Eragrosteae) 31

\- Inflorescence a raceme, the spikelets secund (Chloroideae) 35

31 + Lemmas usually emarginate or 2-4 lobed or toothed at the apex, rarely entire and then hairy along the nerves, frequently mucronate or awned (Racemes densely spiculate, conspicuously secund; spikelets oblong, laterally compress; lemmas keeled .. .. 34. Leptochloa

\- Lemmas usually entire at the apex, obtuse, acute or acuminate 32

32 +	Spikelets in open contracted or spike like panicles (Lemmas more or less actuly keeled, 3-nerved)		32. Eragrostis
-	Spikelets sessile or very short pedicelled, loosely to densely imbricate in digitate or racemosely arranged spikes or spike like racemes, very rarely in solitary spikes	33	
33 +	Axis of spikes terminating in a sharp point; upper glume mucronate or awned, spikes digitate, rarely racemose		30. Dactyloctenium
-	Axis and branches of inforescence ending in a spikelet	34	
34 +	Spikelets breaking up at maturity; spikes few to several (Spikes digitate or subdigitate, glumes 1-5 nerved)		33. Eleusine
-	Spikelets falling entire at maturity, many, glumes 1-nerved		31. Desmostachya
35 +	Spikelets with 1 perfect and one or more sterile florets above		28. Tetrapogon
-	Spikelets with 1 perfect floret and no sterile floret, spikelets awnless ..		27. Cynodon
36 +	Spikelets with 3 florets, the 2 lower barren (Phalarideae)		40. Phalaris
-	Spikelets with 1 floret	37	
37 +	Spikelets falling entire, lemma 1-2 nerved (Spikelets solitary or in groups, awnless) (Zoysieae).		43. Tragus
-	Spikelets rarely falling entire and then with awned and 5-nerved lemma	38	
38 +	Lemma hyaline or membranous at maturity, awnless or awned from the back, (Lemma 3-5 nerved, usually awned, (Agrostieae)	39	
-	Lemma rigid at maturity, awned from the tip	42	
39 +	Panicles cylindric, spiciform very dense, (Spikelets somewhat flattened, lemma awned).		18. Alopecurus
-	Panicles spreading, never cylindric and dense	40	

40	+	Glumes long awned; spikelets deciduous as a whole	20. Polypogon
	-	Glumes awnless or short awned; glumes persistent or spikelets deciduous as a whole	41
41	+	Glumes shorter than lemma; lemma long awned	19. Muhlenbergia
	-	Glumes much longer than the lemma	17. Agrostis
42	+	Awn simple (Stipeae)	41. Stipa
	-	Awn 3-fid (Aristideae)	43
43	+	Awns not plumose	21. Aristida
	-	Awns, at least the central plumose	22. Stipagrostis
44	+	Ovary glabrous	39. Parapholis
	-	Ovary hairy at the apex	42. Secale

1. A R I S T I D A L.

Annuals or perennials with narrow flat leaves, culms erect ascending, inflorescence a panicle of simple racemes or spikes; spikes in threes, enclosed in a spathe, one sessile 2 pedicelled; racemes deciduous as a whole together with its bulbous joint; sessile and lateral pedicelled spikelets similar in shape, both muticous or the former awned, 2-flowered, the lower male, upper bisexual or usually male in the laterally pedicelled spikelets; glumes equal, subcoriaceous at the base, lower convolute, upper keeled; lemmas hyaline, of the lower floret muticous, of the upper deeply 2-fid and awned from the sinus or entire and muticous; palea hyaline.

Aristida mutica L., Sp. Pl. 1:82. 1753., Cope in Nasir & Ali's Fl. Pak. 143: 318. 1982.(A. aristata L; A. geniculata Roxb.)
Perennial, rooting from the lower nodes, culms upto about 3 m long, attenuate at the tip; false panicle linear 3-40 cm long; spatheole

acuminate; sessile spikelets 2-6 mm long; lower glume narrowly elliptic lanceolate; upper lemma deeply bifid, awned or entire to emerginate and awnless; pedicelled spikelets broady lanceolate, the larger 2-5 mm long; pedicel narrowly oblong.

Distribution and habitat: Found in Maize fields throughout the Province - Pakistan, Arabia and Socotra; throughout tropical Asia and in Austrlia and New Caledonia - Fl. per July - November.

2. B O T H R I O C H L O A O.Ktze.

Perennial, aromatic; leaf blades flat; ligule membranous; inflorescence of digitate or subdigitate racemes, sometimes paniculate with long central axis; internodes and pedicels linear, with a hyaline median line; sessile spikelets dorsally compressed; callus very short; lower glumes broadly convex to slightly concave on the back, lower florets reduced to a hyaline lemma; upper lemma often entire, with a glabrous awn; caryopsis oblong; pedicelled spikelet much like the sessile or smaller.

Rothriochloa ischaemum (L) Keng in Contr-biol.
Lab. Sc. Soc. China, Bot. Ser. 10:201. 1936.
(Syn. Andropogon ischaemum L.)

Common Name: Pashto: Palwan.

Perennial with mostly basal leaves; culm erect or ascending, upto 80 cm high, leaf blade upto 15 cm long; inflorescence of 5-15 subdigitate racemes; racemes peduncled, the peduncles glabrous; sessile spikelets oblong-lancelate, lower glume chartaceous, hairy below the middle, not glossy, without a pit, acute; awn 12-15 mm long; pedicelled spikelet glabrous on the back without a pit.

Distribution and habitat: Maize fields of Ayun on way to Birir valley of Kafristan (Chitral) — Pakistan, S. Europe and N.Africa eastward to N.W. Himalayas and Tibet. Fl. per May - October.

3. DICHANTHIUM Willemet

Annuals or perennials with simple or branched culms; leaf blades flat or rolled; ligule membranous; panicle of 2-many, subdiditate or racemosely arranged racemes; sessile spikelets dorsally compressed; callus short rounded; lower glume broadly convex to slightly concave on the back; lower floret reduced to a hyaline lemma; upper lemma stipitiform, entire or bidentate, with a glabrous or puberulous awn; pedicelled spikelets 2-flowered, male, neuter or suppressed.

Dichanthium annulatum (Forssk.) Stapf in Prain, Fl. Trop. Africa. 9. 178. 1917; Cope in Nasir & Ali's Fl. Pak. 143; 280-282, fig. 30. 1982 (Syn. Andropogon annulatus Forssk., D. Nodosum Willemet).

Perennial, culms upto 1 m high, erect or geniculately ascending, simple or branched, nodes hairy, leaf blades glabrous and smooth on the lower surface, hairy margins scabrid; inflorescence composed of 1-15 subdigitate shortly peduncled racemes, the peduncles glabrous; the spikelets subimbricate with 0-6 smaller homogamous pairs at the base; internodes and pedicels solid; sessile spikelets narrowly oblong; lower glume firmly cartilaginous, slightly concave, pubescent to villous below the middle with long bulbous-based hairs on the margins above.

Distribution and habitat: Weed of wheat, maize and rice throughout the province —— Pakistan, Kenya, Tanzania and Senegal, through the Middle East to Indonesia; introduced in many countries. Fl. per March - November.

4. I M P E R A T A Cyr.

Perennials, culms erect; leaves mostly basel, ligule scarious; inflorescence a spici form panicle, its numerous primary branches bearing short secondary racemes; raceme rachis not fracturing at maturity, bearing paired similar spikelets; spikelets lanceolate-oblong; callus very short, truncate; glumes equal, as long as the spikelets, membranous; lower floret reduced to a lemma; upper floret bisexual; lower lemma awnless; palea broad, hyaline, enfolding the flower; stamens 1-2, caryopsis ellipsoid.

among

Imperata cylindrica (L) Raeuschel, Nom. Bot., ed. 3,10. 1797; Cope in Fl. Pak. 143: 252: 1982. (Syn. Lagurus cylindricus L., Saccharum cylindricum (L) Lam. I. arundinacea Cyr.)

Common name: Engl. Sword grass, Blady grass.

Rapidly spreading rhizomatous perennial, forming tufts of leaves from a scaly rhizome; culm upto 100 cm or more high, erect; leaf blades basal, erect, nearly as long as the culms or a bit smaller in size; inflorescence a spiciform panicle, obscured in copious silky white hairs; stamens 2.

(among st world worst weeds.)

Distribution and habitat: Found in wheat fields throughout the province —— It is a dangerous weed, as its rhizomes are tenacious and if a fragment of its rhizome is left, a new plant can regenerate — Pakistan, throughout the old world tropics, extending to the Mediterranean and the Middle East.

5. S O R G H U M Moench

Annuals or perennial, mostly rhizomatous, robust; leaf-blades linear; ligule membranous or scarious, rarely a line of hairs; inflorescence a large terminal panicle; internode and pedicels filiform; sessile spikelets dorsally compressed; callus obtuse; lower glume somewhat coriaceous, near the tip 2-keeled and narrowly winged; lower lemma reduced to hyaline lemma; upper lemma hyaline, bidentate, with a glabrous awn from the sinus; palea hyaline; caryopsis mostly obovoid, dorsally compressed; pedicelled spikelets male or barren, mostly linear-lanceolate to subulate.

Sorghum halepense (Linn) Persi, Syn. Pl. 1:101. 1805; Cope in Fl. Pak. 143: 295-97: 1982 (Syn. Holcus halepensis L. Andropogon halepensis (L) Bort; S. giganteum Edgew.)

Common names: Engl: Johnson's grass, Pushto: Didam. Perennial, rhizomatous with simple or branched culms; panicle loose when in flower; primary branches compound, bare at the base, ultimately bearing racemes of 1-5 spikelet pairs; sessile spikelets at first somewhat hairy and cream to buff yellow or lawny, at the length often tawny, mahony red, purplish to blackish brown or black; lower glume keeled above; upper lemma minutely mucronate or 2-lobed with awn; pedicelled spikelet at length deciduous, often purplish (Fig. 2).

Distribution and habitat: Weed in corn fields of Mardan and Peshawar —— Pakistan, Mediterranean region eastwards to Kashmir and Southwards to Madras.

Because of its tenaceous rhizomatous habit, it has earned a bad

reputation as a weed of cultivated fields. Worse than this, under certain circumstances its tissues contain hydrocyanic acid and are a positive danger to stock (Cope, 1982). Fl. per May - October.

6. B R A C H I A R I A (Trin) Griseb.

Annuals or perennials; ligule represented by a line of hairs; inflorescence composed of racemes borne upon a common axis; rachis triquetrous to ribbon-like, bearing single or sometimes paired spikelets; lower glume mostly shorter than the spikelet; upper glume as long as the spikelet, membranous or herbaceous; lower floret male or sterile; upper lemma coriaceous to crustaceous; upper palea obtuse to subacute; caryopsis elliptic, dorsally compressed.

Brachiaria eruciformis (Smith) Griseb. in Ledeb., Fl. Ross. 4: 469. 1853; Cope in Fl. Pak. 143: 203-5. 1982. (Syn. Panicum eruciforme J.E. Smith.)

Annual, culms upto 60 cm high, geniculately ascending; leaf-blades linear to narrowly lanceolate, glabrous or pubescent; inflorescence of 3-12 racemes; racemes secund, bearing single spikelet, imbricate on a triquetrous rachis; lower glume a minute scale; upper lemma readily deciduous, smooth.

Distribution and habitat: Found in corn fields of Balakot (Hazara) and Miandam (Swat) — Pakistan, S. Africa to the Mediterranean; eastwards to India. Fl. per July - October.

7. CENCHRUS L.

Annual or perennial grasses; leaf blades flate or involute; inflorescence a simple spike, spike like raceme or a panicle; spikelets 2-flowered, solitary or 2-3 enclosed in an involucre formed of bristles and spines united at the base and deciduous with the spikelets; glumes unequal, the lower smaller, the upper as long as the spikelet; lower floret male, neuter or entirely suppressed; lemma 3 to 5-nerved, paleate; palea narrowly lanceolate; upper floret bisexual; lemma rigid, 3-5-nerved; palea lanceolate; caryopsis dorsally compressed.

Cenchrus ciliaris., Mant. 2: 302. 1771., Cope in Fl. Pak. 145: 241-43. 1982. (Syn. Pennisetum cenchroides Rich; P. ciliare (L) Link C. longifolius Hochst.)

Perennial, upto 150 cm high; panicles cylindric to ovoid, grey, purple or straw-coloured; rachis angular and puberulous; involucre elongate, inner bristles exceeding the spikelets; outer bristles filiform; spikelets 2-4 per burr; glumes distinct, acute, the lower as long as the spiket.

Distribution and habitat: Found in wheat fields of Karak — Pakistan; throughout Africa, extending through Arabia and the Middle East to India. Fl. per February - March.

8. DIGITARIA Haller

Annuals or perennials with flat leaves; ligules short; racemes often in clusters, digitate or borne upon an elongated central axix; rachis flate or triquetrous, winged; spikelets

2-flowered, upper bisexual, lower represented by a lemma; lower glume of-ten small or absent, hyaline; upper membranous, 3-5 nerved, rarely nerveless; lower floret neuter; lemma often like the upper glume, 3-9 nerved; upper floret bisexual, lemma papyraceous, 1-3-5 nerved; palea 2-nerved; anther 3; stigma subacute.

1 + Culms with bulbous swelling at the base, the basal sheaths silky hairy (racemes loose, rachis winged) .. .. .. 1. D. nodosa

\- Culms not swollen at the base and without silky hairy basal sheaths 2

2 + Nerves of lemma smooth .. .. 2. D. ciliaris

\- Nerves of lemma with sparse to numerous minute siliceous spines or scabridities 3. D. sanguinalis

1. Digitaria nodosa Parl., J. Nov. 39. 1842; Hook. in Fl. Brit. 143: 227-28. 1982. (Syn. Panicum parlatorei Steud.)

A rhizomatous, caespitose perennial; culms upto 100 cm high, swollen at the base, the basal sheaths silky pubescent to tomentose; nodes glabrous; ligules membranous; racemes 4-20 or more, digitate or whorled on a common axis; the spikelets binate on a triquetrous rachis; lower glume an ovate scale; upper glume two-third to almost as long as the spikelets, 3-nerved; lower lemma 7-nerved, hairy; fruit ellipsoid, greyish-brown to high-brown.

Distribution and habitat: Found in Maize fields of Bannu and D.I.Khan — Pakistan, Kenya and Tanzania, N.Africa through Somalia and Eritaria to Afghanistan — Fl. per September - October.

2. Digitaria ciliaris (Retz) Koel, Descr. Gram. 27. 1802; Cope in Fl. Pak. 143: 228-231: 1982 (Syn. Panicum ciliare Retz., Digitaria biformis Willd., D. adscendens (Kunth) Henr.)

Annual with culms upto 100 cm high; leaf blades broadly linear; inflorescence digitate or subdigitate, composed of 2-12 racemes, the spikelets binate; pedicel triquetrous; lower glume distinct, triangular; upper glume at least half as long as the spikelet, 7-nerved; nerves smooth; caryopis ellipsoid, grey to light brown.

Distribution and habitat: A widespread weed found in cornfields of Peshawar and Mansehra — Pakistan, common in much of the topics. Fl. per. August - October.

3. Digitaria sanguinalis (L)Scop. Fl. Cam., ed. 2,1:52. 1772. Cope in Fl. Pak. 143: 231-32. 1982 (Syn. Panicum sanguinale L, Pospalum sanguinale (L) Lam.)

Annual, culms upto 60 cm on more high; leaf blades broadly linear to narrowly lanceolate; inflorescence digitate or subdigiate, composed of 2-16 racemes; lower glume a narrow, triangular, nerveless scale; upper glume half as long as the spikelet, 3-nerved; sterile lemma as long as the spikelet, 5-7 nerved; fertile lemma lead coloured at maturity, as long as the spikelet, fruit lanceolate, grey or light brown.

Distribution and habitat: A weed of warm temperate and sub-tropical parts, here found in Maize fields of Dir (Gujar Garhi) — Pakistan, warm temperate regions throughout the world penetrating into the tropics — Fl. per. July - September.

9. E C H I N O C H L O A P. Beauv.

Perennial or annual grasses with flat leaves; leaves without ligules or having a fringe of hairs; inflorescence a panicle formed of few-many spike like racemes; spikelets more or less dorsally compressed, crowded, in pairs of in cluster on one side of the rachis; glumes membranous, unequal; lower floret male or neuter; lemma resembling the upper glume, cuspidate or awned; palea reduced or as long as the lemma; upper floret bisexual; lemma coriaceous, smooth apiculate or obtuse, 5-nerved; palea as long as the lemma.

Key to the species (after [illegible] and [illegible] Stewart, 1958)

\+ Upper glume less cuspidate or awned than the lower lemma; racemes crowded, 4–8 mm broad, more or less spreading; axis and rachis with long bristles; glumes long-ciliate .. .. 1. E. crusgalli

\- Upper glume and the lower lemma equally acute or cuspidate; racemes distant 3–4 mm broad, more or less erect; axis and rachis not silky; glumes not ciliate 2. E. colona

In addition to these 2 species mentioned, Echinochloa frumentacea link. is found along the broaders of fields in this province and many become a weed of crop fields. E. oryzoides (Ard) Frit which has been reported from Hazara and according to Cope (1982) it is a rice mimic and can become a serious weed in rice fields. In parts of S. Russia the infestation has been so bad that the cultivation of rice had to be abondoned where upon the weed has taken over the rice fields.

1. Echinochloa crus-galli (L) P. Beauv., Ess. Agrost. 53, 161. 1812; Cope in Fl. Pak. 143: 193-95: 1983. (Syn. Panicum crus-galli Linn.).

Common names: Urdu-Bara Sanwak, Push:- Shamookha, Samaka., Eng. Cockspur or Barnyard grass.

Coarse annual; culms densely tufted, upto 1 m high, erect or spreading, rather stout, usually much branched from the base; leaf-blades linear-lanceolate; ligules absent; sheaths glabrous, rarely hairy, panicle erect or noding; recemes very dense, few to many, rachis bristly and scabrid; spikelets crowded, in pairs or clusters on one side of the rachis; lower glume broad, 3-nerved; upper glume as long as the spikelet, 5-nerved, the nerves bearing numerous short bristles; lower lemma similar to the upper glume but flat or depressed on the back; 5-7-nerved, pointed or cuspidate or awned; palea shorter than the lemma; upper lemma as long as the spikelet, cuspidate or awned; palea as long as the lemma (Fig. 3).

Distribution and habitat: One of the commonest weeds of rice-fields throughout the province — Pakistan, Warm temperate and subtropical regions of the world. Fl. per June - October.

2. Echinochloa colona (L) Link, Hort. Berol 2.209. 1833., Cope in Fl. Pak. 143: 196-197. 1982. (Syn. Panicum colonum L., P. brizoides L., Oplismenus colonum (L) H.B.K.).

Annual, culms densely tufted upto 80 cm high, erect or geniculately ascending, leaf blades occasionally marked with purple bars; ligules absent; sheath glabrous; inflorescence

typically linear, the racemes neatly 4-rowed, seldom over 3 cm long, simple; spikelets ovate elliptic to subglobose, pubescent; lower lemma acute to cuspidate; upper lemma. 2-3 mm long.

Distribution and habitat: Found in rice and maize fields of Swat and maize fields throughout the province — Pakistan, throughout the tropics and subtropics. Fl. per May - September.

10. E R I O C H L O A Kunth

Annuals or perennials, leaf-blades flat, tapering to a fine point; inflorescence composed of racemes; spikelets usually lanceolate, dorsally compressed, acute to aristate, supported upon a bead-like swelling formed from the lowest rachilla internode and adherent vestigial lower glume;upper glume as long as the spikelet, lower floret male or barren; upper lemma crustaceous, finely muricate, clasping only the edges of the palea, obtuse and mucronate, caryopsis dorsally compressed.

Eriochloa procera (Retz) C.E. Hubbard in Kew Bull.256. 1930., Cope in Fl. Pak. 143: 200: 1982. (Syn. Agrostis procera Retz., Eriochloa ramosa (Retz) O.Ktz).

Annual grass with erect or geniculately ascending 20-100 cm high culms; inflorescence 4-20 cm long; rachis of raceme puberulous, triquetrous, bearing paired spikelets; lower glume absent; upper glume acute to acuminate; lower floret represented only by a lemma; upper lemma mucronate.

Distribution and habitat: Weed of rice fields in Swat — Pakistan, tropical Africa; S.E. Asia, introduced in tropical America (First report from N-W.F.P.). Fl. per. August - November.

11. O P L I S M E N U S P. Beauv.

Annual or perennial, culms weak, often with arial roots from the nodes; spikelets solitary, secund; glumes similar in shape and texture, subequal, both or at least the lower awned; lower floret exceeding the glumes; lemma similar to the glumes, muticous or mucronate or very shortly awned; upper floret lemma muticous, chartaceous to sub-coriaceous; palea as long as the lemma and enclosed by it; caryopsis oblong.

Oplismenus undulatifolius (Ard) Roem and Schutt.,Sys. Veg. 2: 482. 1817; Cope in Fl. Pak. 143: 186-88: 1982. (Syn. Panicum udulatifolium Ard.)

Perennials with trailing culms, upto 60 cm long; nodes glabrous or softly hairy; inflorescence comprising of 5-11 cuneate fascicles of 2-6 spikelets, or rarely the lower most forming a short raceme; spikelets lanceolate, glabrous to sparsely pubescent; glumes with short visid awns;

Distribution and habitat: Found in corn fields of Mardan — Pakistan, warm temperate regions of the northern hemisphere, extending southwards on the uplands of Africa to S. Africa, India - Fl. per. August - September.

12. PANICUM L.

Annuals or perennials; leaf-blades rolled or flat; ligule present or absent; spikelets generally long pedicelled; glumes unequal, lower shorter than the upper, rarely equalling it; upper as long as the spikelet, rounded on the back, 5-many nerved; lower floret male or barren; lemma similar to the upper glume, usually paleate rarely epaldate, upper floret bisexual; lemma sub-coriaceous to coriaceous, faintly nerved; palea subequal, of a similar texture, enclosed by the involute margins of lemma; caryopsis somewhat ellipsoid, dorsally compressed.

Key to the species

\+ Lower glume a quarter to half the length of the spikelet; margins of the glumes herbaceous .. .. 1. P. psilopodium

\- Lower glume half to three quarters the length of the spikelet, margins of glumes broadly membranous .. .. .. 2. P. antidotale

1. Panicum psilopodium Trin., Gram. Pan. 217. 1826; Cope in Fl. Pak. 143: 170-171. 1982. (Syn. P.virgatum Roxb. ex Steud) P. flexuosum Retz, Var. glabrum Retz.)

Annual, culms often tufted, erect or ascending, upto 90 cm high; sheaths loose, compressed; ligule a lacerate, membranous ring; panicle ovate or oblong, spikelets oblong-elliptic; lower glume broadly ovate a third to half as long as the spikelet, 5-9 nerved, acute; upper glume 11-nerved, lower lemma 9 nerved, its palea almost as long; upper lemma pallid, smooth and shining.

Distribution and habitat: It is found in Maize fields of Bannu -- Pakistan, India, Burma, Ceylon and Malaysia (First report from this Province) Fl. per September.

2. Panicum antidotale Retz., Obs. Bot. 4: 17. 1785,
Cope in Fl. Pak. 143: 171-72, 1982. (Syn. P.miliare Lam.)

Tall perennial with creeping thick rootstock, culms woody upto 180 cm high, nodes thickened, lower nodes sometimes rooting, leaf-blades flat, linear, smooth and glabrous; ligules short, membranous ciliate; panicle narrowly pyramidal to broadly oblong or ovate; spikelets loosely crowded on the branches, ovoid-acute, glabrous; lower glume broadly ovate, 3-nerved; upper glume broadly ovate, acuminate, 7-9 nerved; lower lemma similar to the upper glume; palea as long as the lemma; upper lemma coriaceous; palea similar in texture, as long as the lemma.

Distribution and habitat: Common weed of wheat and Maize fields in Bannu and D.I.Khan -- Pakistan, tropical Africa, Arabia, through Iran and Afghanistan to India. Fl. per. March - October.

13. P A S P A L I D I U M Stapf.

Annuals or perennials, aquatic, semi-aquatic or terrestrial grasses; racemes sessile or subsessile and secund on the alternate nodes of a common axis of a false compound spike; spikelets secund and abaxial on the triquetrous rachis of slender, sessile, spiciform racemes; glumes unequal; lower reduced to a scale or about as long as the spikelet, upper glume as long as the spikelet, 5-7 nerved; lemma similar to the

upper glume (lower floret); upper floret bisexual; lemma crustaceous, 5-nerved, palea as long as the lemma and of the same texture; caryopsis elliptic, dorsally compressed.

Paspalidium flavidum (Retz) A. Camus in Lecomte, Fl. Gen. Indo-China 7: 419. 1922; Cope in Fl. Pak. 143: 190-91. 1982. (Syn. Panicum flavidum Retz., P. brizoides Jacq.)

Common name: Urdu: Kangna.

Tufted-perennials, culms upto 120 cm, decumbent at the base; leaf-blades linear - lanceolate flat or rolled, glabrous, sheaths longer than the internodes, ligule absent or represented by a row of hairs; racemes distant by 2-4 times their own length; spikelets 2-ranked, ovate oblong, acute, glabrous; lower glume 3-nerved, clasping at the base; upper glume 7-nerved lower floret male or neuter, 3-nerved, embracing the upper floret; upper floret bisexual, lemma strongly convex; palea similar in texture.

Distribution and habitat: Found in rice fields of Dir (Gujar Garhi and Sarai) — Pakistan and tropical Asia. Fl. per. July - October.

14. PASPALUM L.

Annuals or perennials; leaf blades flate; ligule short membranous; inflorescence composed of racemes; racemes 2-nate, digitate or panicled; spikelets secund and usually 2-nate on the flattened or triquetrous rachis of racemes; lower glume minute or absent; upper glume as long as the spikelet, usually 1-2 side nerves, rarely nerveless; lower floret barren; lemma similar to the upper glume, usually 3-5 nerved; upper floret

bisexual; lemma chartaceous to subcoriaceous, 5-7-nerved; palea subequal, 2-nerved; caryopsis plano-convex.

Paspalum paspaloides (Michx) Scribner in Mem. Torrey Bot. Club 5: 29. 1894 (as P. paspaloides): Cope in Fl. Pak. 143: 211-212. 1982 (Syn. Digitaria paspaloides Michx; Paspalidium distichum auct non L).

Creeping perennial with creeping rootstock; culms erect or ascending upto 60 cm high; leaf-blades flat, rounded and ciliate at the base; sheaths loose, keeled, ciliate on the margins above; ligules membranous; racemes 2-4 conjugate at the apex of the culm; one of the racemes not peduncled; spikelets single in 2 rows on a flattened rachis; lower glume occassionally developed; upper glume as long as the spikelet, 3-5-nerved; lower lemma similar to the upper glume; upper lemma brown, smooth, pallid at maturity.

Distribution and habitat: Found in rice fields of Swat and maize fields of Bannu — Pakistan, tropics and subtropics throughout the world. Fl. per. August - September.

15. P E N N I S E T U M Rich.

Annuals or perennials, caespitose or stoloniferous; culms simple or branched; leaf-blades flat or convolute; ligule a line of hairs or membranous; inflorescence a spike like raceme; spikelets 2-flowered, sessile or shortly pedicelled, solitary or clustered, involucral bristles few to many; glumes subequal, lower small or absent; upper glumes 5-nerved; palea 2-keeled; upper floret bisexual; lemma as long as or shorter than the

spikelet, 3-7-nerved; palea similar in texture, small or absent; caryopsis oblong and dorsally compressed to subglobose.

+ Bristles copiously ciliate or lanate .. 1. P. orientale
- Bristles not or sparingly ciliate .. 2. P. divisum

1. Pennisetum orientale Rich. in Pers., Syn. Pl. 1:72. 1805; Cope in Fl. Pak. 143: 236-237. 1982 (Syn. P. fasciculatum Trin.).

Rhizomatous perennial, culms erect or ascending up to 200 cm high, leafy, smooth and glabrous; leaf-blades flate or convolute; ligule a row of hairs; panicle cylindric, dense, pale or purple; involucre on long ciliate pedicels; spikelets 2-5 in each involucre; involuceral bristles many; lower glume ovate-oblong, hyaline, nerveless; upper glume as long as the spikelet, 3-nerved; lower floret male or neuter, lemma 5-nerved; palea often 2-fid; upper floret bisexual; lemma awned, 5 nerved; palea with involute margins; anthers apiculate, without a tuft of hairs at the tip.

Distribution and habitat: Found in Maize fields in Bannu and Hangu (Kohat) — Pakistan, N. Africa, through Arabia to Central and S.W. Asia, India and Nepal. Fl. per. April - October.

2. Penisetum divisum (Gmel.) Henr. in Blumea 3: 162. 1938; Cope in Fl. Pak. 143: 239-240. 1982; (Syn. Panicum divisum Gmel; P. dichotomum Forssk., Pennisetum dichotomum (Forssk) Delile).

Rhizomatous perennial, clothed with numerous leaf-sheaths; culms erect or ascending, upto 1 m high or more; leaf-blades involute or convolute after drying; sheaths shorter than the internodes; ligule a rim of hairs; panides cylindric, whitish; involucral bristles very numerous, unequal; spikelets solitary and sissile within the involucre; lower glume 1-3-nerved, hyaline; upper glume as long as the spikelet or shorter, 5-7-nerved, lower floret male, lemma as long as the upper glume, 5-nerved; palea as long as the lemma; upper floret bisexual; lemma as long as the lower lemma, membranous, 5-nerved; palea similar, slightly shorter; anther tip without a tuft of hairs.

Distribution and habitat: Found in wheat fields of Lakki (Bannu) — Pakistan, N. Africa, Middle East, India. Fl. per. January - June.

16. SETARIA Beauv.

Annuals or perennials; leaf-blades flat or folded; ligule a ciliate rim; panicle spiciform or open; spikelets subtended by 1-many bristles; glumes unequal, membranous, the lower smaller 3-5 nerved; upper as long as the spikelet or shorter, 5-nerved; lower floret male or neuter; lemma membranous, 5-7 nerved; upper floret bisexual; lemma convex on the back, more or less apiculate; palea as long as the lemma and similar in texture.

1 + Bristles retrorsely barbed (adhering tenaciously to clothing) ... 1. S. verticillata

\- Bristles antrorsely barbed 2

2 + Upper glume as long as the upper lemma, the later finely rugose ... 2. S. viridis

\- Upper glume shorter than the upper lemma, the later rugose to corrugate, rarely almost smooth .. .. 3. S. pumila

1. Setaria verticillata (L.) Beauv., Ess. Agrost. 51. 178. 1812; Cope in Fl. Pak. 143: 179. 1982 (Syn. Panicum verticillatum Linn).

Loosely tufted annual, culms geniculately ascending upto 100 cm; leaf-blades flat, finely hairy, margin and surface scabrid; sheaths compressed, glabrous to pubescent; ligules membranous; panicles spiciform, cylindric or oblong, coarsly bristly; bristles 1-few, provided with reversed barbs, tenaciously clinging; spikelets ovoid; lower glume hyaline, 3-nerved, one third to half as long as the spikelet; upper glume as long as the spikelet, 5-nerved; lower floret neuter, the palea minute; upper lemma finely rugose, coriaceous.

Distribution and habitat: Very common in corn fields of Peshawar and Mardan districts — Pakistan, tropical and warm-temperate regions. Fl. per. throughout the year.

2. Setaria viridis (L.) Beauv., Ess. Agrost. 51: 171, 178. 1812. Cope in Fl. Pak. 143: 179-181. 1982. (Syn. Panicum viride L., Setaria italica (L) Beauv. subsp. viridis (L) Thell).

Common names: Eng: Green bristle grass.

A loosely tufted annual, culms upto 130 cm high, erect or decumbent at the base, 3-5 noded; leaf blades linear, finely pointed; sheaths glabrous to pubescent; panicle spiciform, very bristly; bristles 1-3 beneath each spikelet, antrorsely scabrid; spikelets elliptic oblong; lower eglume one third the length of the spikelet, ovate, 1-3 nerved; upper glume 5-nerved as long as spikelet; lower lemma resembling the upper glume, 5-7 nerved;

lower floret neuter, lemma similar to the upper glume, palea small or absent; upper floret bisexual, lemma coriaceous. (Fig. 4).

Distribution and habitat: Found in rice and cornfields of Swat — Pakistan, in the cooler regions of old world; introduced to the new world. Fl. per. June - October.

3. Setaria pumila (Poir.) Roem and Schult., Syst. Veg. 2:891. 1817. Cope in Fl. Pak. 143. 181-183: 1982. (Syn. Panicum pumilum Poir, P. fuscum Schum; P. rubiginosum; S. glauca auct non (L) Beauv.)

Common names: Eng: Green bristle Grass, Urdu: Kangni.

Annual, culms loosely tufted or solitary, erect or ascending, 5-130 cm high; leaf blades linear; leaf sheaths compressed and keeled; ligule ciliate; panicle spiciform, cylindrical; spikelets ovate with 3-6 bristles beneath it; bristles rigid, antrorsely scabrid; both glumes one third to two third the length of the spikelet; lower floret male or sterile; its palea almost as long as the lemma; upper lemma rugose to corrugate, rarely almost smooth. (Fig. 5).

Distribution and habitat: It is a polymorphic species found in maize fields of Peshawar and Swat — Pakistan, tropical and warm temperate regions of the old world; introduced to N. America. Fl. per. June - October.

17. AGROSTIS L.

Annuals or perennials; leaf blades linear to subulate; panicles divided or spike like; spikelets linear-lanceolate to oblong, small; glumes usually persistent, membranous, 1-3 nerved; lemma shorter than the glume 3-5 nerved awnless or awned from the back; callus small, glabrous or pubescent; palea shorter than the lemma.

Agrostis viridis Gouan, Hort. Reg. Monsp. 546. 1762; Cope in Fl. Pak. 143: 473-75: 1982 (Syn. Phalaris semiverticillata Forssk., A. verticillata Vill, A. semiverticillata (Forssk) Christ).

Perennial, culms upto 100 cm high, erect or ascending; leaf blades flat, scabrid on both surfaces; ligule small; panicle lobed, the branches subverticillate; spikelets falling entire attached to the pedicel (like Polypogon), glumes awnless; lemma denticulate awnless; palea as long as the lemma or smaller.

Distribution and habitat: Common in wheat fields of Peshawar and Kohat -- Pakistan, Mediterranean region eastwards to Southern USSR and N-W. India. Fl. per. April - August.

18. ALOPECURUS L.

Annuals or perennials; leaf-blades flat; panicle ovoid, oblong or cylindrical, spike like; spikelets compressed, falling entire from short pedicels, rhachilla not prolonged; glumes 3-nerved, usually ciliate on the keels; lemma hyaline, 3-nerved, awned or awnless; palea, may or may not be present.

Alopecurus myosuroides Huds., Fl. Angl. 23: 1762; Cope in Fl. Pak. 143: 461-463. 1982. (Syn. A. agrestis L).

Common name: Eng: Slender Fox-tail.

Annual, culms upto 90 cm high, erect or geniculately ascending; leaf blades flat, glabrous; ligule obtuse; panicle tapering towards the tip; spikelets upto 3 mm long; glumes partly connate, minutely hairy; lemma equal to or longer than the glumes, margins partly connate, awned.

Distribution and habitat: Very common in wheat fields of Bannu, Karak, Kohat and Peshawar. Cope (1982) has pointed out that is serious pest of wheat and rye. It is difficult to eradicate, but may be considerably reduced by allowing fields to lie fallow for two years — Pakistan, Europe, introduced in N. America.

19. M U H L E N B E R G I A Schreb.

Annuals or perennials; leaf-blades flate or convolute; panicles open or the spikelets clustered on the branches; spikelets small; glumes persistent, the lower rarely obsolete, obtuse or acuminate or awned, membranous or hyaline, 1-nerved; lemma usuallylonger than the glume, awnless or awned, 3-nerved; callus short, palea as long as or slightly longer or shorter than lemma.

Muhlenbergia duthiana Hack. in Ost. Bot. Zeit. 52: 11. 1902., Cope in Fl. Pak. 143: 145. 1982. (Syn. M. sylvatica Hk. f.).

Loosely tufted perennial, culms upto 40 cm high, erect or geniculately ascending, knotty at the base; leaf-blades

scaberulous; ligule small, obtuse; panicle narrow, dense, spikelets clustered; glumes subequal, equal to or slightly smaller or longer than the spikelets lemma equal to, shorter or longer than the glumes, awned.

Distribution and habitat: Found in Maize fields of Nokote (Mansehra). — Pakistan, Humalayas. Fl. per. August - October.

20. P O L Y P O G O N Desf.

Annuals or perennials; leaf-blades flat; panicle contracted or spike like; spikelets falling entire together with the pedicel or part of it; rhachilla not prolonged, glumes narrow, 1-nerved, membranous, emarginate or 2-lobed at the tip; awned; lemma shorter than the glumes, 5-nerved, awned, awn deciduous; palea shorter than or equal to lemma.

Polypogon monspeliensis (L) Desf., Fl. Atlant.1: 67. 1798., Cope in Fl. Pak. 143: 467-68. 1982. (Syn. Alopecurus monspeliensis L.).

Annual, culms 6-80 cm high, erect or geniculately ascending; leaf blades rough; penicle very bristly and dense, pale green or yellowish; spikelets small, glumes slightly notched at the apex, with a fine straight awn; lemma about half the length of the glumes, awnless or with a small awn.

Distribution and habitat: One of the commonest weed of irrigated fields of wheat in Peshawar and Hazara — Pakistan, Africa, Mediterranean region northwards to the British Isles, India, China, introduced in other countries. Fl. per. March-July.

21. A R I S T I D A L.

Annuals or perennials, densely tufted, usually without a rootstock; leaf blades linear, in annual species borne mainly on the culms, in perennial species usually in a basal tuft; panicles effuse, contracted or spike like; spikelets 1-flowered with long scarious glumes; lemma cylindrical or laterally compressed, the margins convolute or involute, produced into a 3-branched awn; awn with or without a column, branches never plumose; callus well-developed, bifid or acuminate; palea less than half as long as lemma.

\+ Lemma (or column) not articulated at its summit .. .. 1. A. adscensionis

\- Lemma or column articulated at the summit and breaking cleanly across when mature .. .. 2. A. mutabilis

1. Aristida adscensionis L., Sp. pl. 1:82. 1753; Cope in Fl. Pak. 143: 41-44. 1982. (Syn. A. depressa Retz., A. caerulescense Desf.

Common names: Urdu: Lappa, Lamba., Eng: Six weeks Trriplawn.

Annual or short lived perennial, forming erect or sprawling tufts upto 100 cm high; leaf blades linear, expanded or folded; panicle upto 30 cm; spikelets pallid, green or purple; glumes unequal, never awned, upper longer than lower; lemma laterally compressed, convolute, awned without constriction or articulation; callus obtuse; central branch of awn 7-25 mm long, the laterals subequal or shorter.

Distribution and habitat: Found in wheat fields of Peshawar, corn and rice fields of Swat and Hazara — Pakistan, throughout

the tropics. Fl. and Fr. per. March - December.

2. Aristida mutabilis Trin & Rupr., Sp. Gram. Stip. 150. 1842; Cope in Fl. Pak. 143: 47-48. 1982 (Syn. A. articulata Edgew.).

Loosely tufted annual; culms upto 70 cm high; leaf-blades narrow or convolute; panicle upto 20 cm long, loose or more or less contracted, the spikelets in narrow spikes; spikelets grey or pallid; glumes typically subequal, upper acute or apiculate, less often with a short awn-point; lemma terete, scabrid upwards; callus linear, obtuse at the tip, column articulated just below the branching point of the awn.

Distribution and habitat: Found in wheat-fields of Mardan and Dargai (Malakand) — Pakistan, India.

22. S T I P O G R O S T I S Nees.

Delicate annuals or densely tufted perennials; leaf-blades narrow or terete, sometimes early deciduous leaving sheaths and chlorophyll-bearing culms as the main photosynthetic organ; panicle open or contracted; spikelets 1-flowered with scarious ♯ glumes; lemma cylindrical, produced into a 3-branched awn; awn with or without a column, articulated at the base of the colum or near the middle of the lemma, the branches or at least the middle one plumose; callus well-developed, usually oblique; palea shorter than the lemma.

1. Stipagrostis hirtigluma (St. ex Trin. and Rupr.). De winter in Kirkia 3: 136. 1963., Cope in Fl. Pak. 143: 51-53. 1982. (Syn. Aristida hirtigluma St. ex Trin. & Rupr.).

Densely caespitose annual or short lived perennial upto 30 cm high; leaf-blades setaceous; panicles contracted or sometimes effuse; spikelets pallid or purplish; glumes densely pilose or glabrous only on the top, upper longer; lemma tuberculate above, gradually passing into awn; callus acute; column of awn plumose in the upper half without a distinct tuft at the summit; central branch of awn plumose throughout, lateral branches naked.

Distribution and habitat: Found in wheat-fields of Bannu — Pakistan, tropical and S. Africa, Arabia and India.
Fl. per. April - September.

23. AVENA L.

Annuals, leaf-blades flat; inflorescence an open or contracted panicle with pendulous spikelets; spikelets 2-6 flowered; the lower 1-3 florets bisexual, others more or less reduced, the terminal barren or vestigeal; rhachilla disarticulating above the glume and sometimes between the florets; glumes scarious membranous or herbaceous membranous, 7-11-nerved; lemma shorter than or equalling the glumes, 5-9-nerved, awned, rarely awnless; palea shorter than the lemmas, 2-keeled; stamens 3; stigmas 2.

\+ Rachilla readily disarticulating between all the florets at maturity, all lemmas with a thickened callus at the base; spikelets upto 29 mm long, glumes 20-26 mm long, lemma upto 20 mm long .. .. 1. A. fatua

\- Rachilla continuous and tough between the florets; lowest lemma only with a thickened callus; spikelets 30-50 mm long; lowest floret 25-40 mm long .. .. 2. A. sterilis

1. Avena fatua L., Sp. pl. 1: 80. 1753; Cope in Fl. Pak. 143: 508-509: 1982 (Syn. A. sativa L. Var. sericea Hook f.)

Common name: Push: Kiranrra, Urdu: Jai.

Annual; culms erect or geniculately ascending, simple, upto 150 cm long; leaf-blades glabrous, rough; ligules upto 6 mm long; panicle nodding, loose; spikelets pendulous, 2-3 flowered, the rachilla articulated beneath each floret; glumes finety acute; lemmas densely beared, shortly 2-4 toothed at the apex, awn geniculate, the column dark brown. (Fig. 6).

Distribution and habitat: Found in wheat fields of Peshawar and Kohat — Pakistan, Mediterranean regions, N.E. Africa. Fl. per. March - August.

2. Avena sterilis L., Sp. pl. ed. 2, 1: 118. 1763; Stewart, Ann. Cat. Vasc. Pl. W. Pak. & Kashm. 136. 1972. Cope in Fl. Pak. 143: 509-510: 1983. (Syn. A. ludoviciana Dur.).

Annual, culms erect or ascending, upto 100 cm high; leaf-blades glabrous, rough; ligules upto 6 mm long; panicle subsecund; spikelets 2-3 flowered, the rhachilla articulated above the glumes but not between the florets; glumes acute; lemmas densely beared around the callus, acuminately 2-toothed; awn geniculate, the column dark brown to blackish.

Distribution and habitat: Found in wheat fields throughout the province — Pakistan, Mediterranean region and the N.E. eastwards to N-W. India. Fl. per. March - May.

24. K O E L E R I A Pers.

Short tufted perennial, with or without rhizome; leaf-blades narrow; inflorescence a spike like panicle; spikelets 1-13-flowered, all alike, the rhachilla produced and with or without a rudimentary lemma; glumes keeled, with hyaline margins; lemmas slightly longer than glumes, faintly 3-7 nerved, with hyaline margins, awned or awnless; stamens 3; stigmas 2.

Koeleria macrantha (Ledeb.) Schult., Mant. 2:345. 1824. Cope in Fl. Pak. 143: 511-513. 1982. (Syn. K.gracilis pers.).

Loosely tufted perennial, sometimes with creeping rhizome; culms simple, erect or ascending, leaf-blades flat or folded, glabrous or hairy; ligule small, panicle lobed or interrupted in the lower part, upto 10 cm long; spikelets 2-3-flowered; glumes glabrous or shortly hairy, lower 1-nerved, upper 3-nerved; lemmas 3-nerved, glabrous, acuminate or mucronate, awnless.

Distribution and habitat: Frequently found in wheat-fields surrounding Peshawar University Campus — Pakistan, throughout temperate regions of the northern hemisphere.
Fl. per. March - September.

25. B R A C H Y P O D I U M Beauv.

Perennials or rarely annuals, tufted or rhizomatous; leaf-blades flat or convolute; inforescence a raceme, pedicellate; spikelets 6-22 flowered; glumes 3-7 nerved; lemma usually awned, rarely acpiculate; palea a little shorter than the lemma, truncate.

D-18276

Brachypodium distachyon (L.) Beauv., Ess. Agrost. 101, 155. 1812., Cope in Fl. Pak. 143: 588-90. 1982. (Syn. Bromus distachyos L).

Tufted annual, culms upto 40 cm high, geniculately ascending or erect; leaf-blades flat, glaucous; spikelets 1-3 at the tip of peduncle, compressed, 10-16 flowered, glaucous; glumes unequal, 5-nerved; lemmas involute, awned.

Distribution and habitat: Weeds of wheat fields in Swat and Peshawar — Pakistan, Mediterranean region; southwest to Central Asia.

26. B R O M U S L.

Annuals or perennials; leaf blades flate, sometimes auriculate; ligules membranous; sheaths usually hairy; panicle large and open, rarely dense and contracted; spikelets large, the lemmas well exerted from the glumes and awned from the sinus of the 2-toothed tip or from just below it, rarely with just an awn-point or mucro; styles arising laterally from just below the hairy apex of the ovary.

Key to the species

+ Lemma hard, rhomboid, with incospicuous nerves and blunt teeth, awn bent .. .. 1. B. japonicus

- Lemma papery, not rhomboid, with conspicuous nerves & acuminate teeth, awn mostly straight .. .. 2. B. pectinatus

1. Bromus japonicus Thunb. ex Murr., Syst. Veg. 119. 1784; Cope in Fl. Pak. 143: 564-65. 1982 (Syn. B. patulus Mert and Koch.)

Annual, culms upto 90 cm high, erect or geneticulately ascending; leaf blades upto 20 cm long; sheaths pubescent; panicles lax and spreading; spikelets 7-15-flowered, the lemmas overlapping and concealing the internodes; glumes glabrous or hairy, lower 3-nerved, upper 7-nerved; lemmas coriaceous with hyaline margins, 7-nerved, the nerves indistinct, minutely 2-toothed at the tip, the teeth blunt, triangular; palea shorter than or as long as the lemma; ciliolate on the keels. (Fig. 7).

Distribution and habitat: Very common in the surrounding wheat fields of Peshawar University. This species grow along borders as well as inside the wheat fields of Malakander farm of Agricultural University, Peshawar — Pakistan, Central Europe, Japan, introduced in many other parts of the world.
Fl. per. April - August.

2. Bromus pectinatus Thunb., Prodr. Fl. Cap. 1:22. 1794;
Cope in Fl. Pak. 143: 566-67. 1982.
(Syn. Bromus vestitus Schrad. B. Japonicus Thumb.
Var. falconeri (Staps.) R.R. Stewart).

Annual with erect or geniculately ascending culms., culms upto 80 cm high; sheaths pubescent; panicles lax and nodding or erect with ascending branches; spikelets 4-10-flowered, laterally compressed; lower glume 1-3-nerved, acuminate; upper glume 3-7-nerved acute; lemmas herbaceous with hyaline margins, 5-7 nerved acutely 2-toothed; palea reaching to the base of the awn.

Distribution and habitat: Weed of wheat fields throughout the province — Pakistan, Sudan, through Ethiopia to Egypt, Sinai, Arabia, S. Africa, Iran and Afghanistan, India, China, Europe. Fl. per. March - August.

27. C Y N O D O N Rich.

Rhizomatous or stoloniferous perennials; leaf-blades linear and flat; ligule membranous, often ciliate on the upper edge; inflorescence of digitate 1-seeded spikes; spikelets narrowly ovate, 1-flowered, with or without rachilla extension, laterallycompressed, imbricate in 2 rows, awnless; glumes 2, subequal, shorter than the floret, 1-nerved; lemmas more or less ciliate on the keel; caryopsis ellipsoid, laterally compressed.

Cynodon dactylon (L.) Pers., Syn. Pl. 1:85. 1805
Cope in Fl. Pak. 143: 177-18. 1982. (Syn. Panicum dactylon L. C. occidentalis willd ex Steud., C. glabratus Steud).

Common name: Push: Khabal, Dub, Drab; Eng: Bermuda grass; Urdu: Doob.

Perennial, stoloniferous with underground rhizomes; culms upto 40 cm high, slender; leaf blades often short and narrow, glaucous, auricles and orifices bearded; ligule a short ciliolate rim; racemes upto 7 cm long, in a single whorl; spikelets 2-3 mm long; glumes 1-nerved; lemma silky pubescent on the keel; palea glabrous; anthers more than 1 mm long. (Fig. 8).

Distribution and habitat: Found as a weed in rice, wheat and maize throughout the province — Pakistan, tropical and warm temperate regions throughout the world.
Fl. & Fr. per. throughout the year.

28. TETRAPOGON Desf.

Tufted annuals or perennials; leaf-blades flat or folded; ligule membranous; sheaths glabrous, keeled; inflorescence terminal, solitary or a pair of dense spikes; spikelets 4–12 flowered, subsessile, alternate in 2 rows on a tough rachis; glume persistent, membranous, 1-nerved; lowest 1–7 florets fertile, lemmas coriaceous, laterally compressed and keeled, with a subapical awn; callus acute, ciliate; palea ciliolate on the keels, upper 1–6 florets sterile and reduced to clavate awned or awnless lemmas.

Tetrapogon villosus Desf., Fl. Atlant. 2:389. 1799.
Cope in Fl. Pak. 143: 128–29. 1982. (Syn. Chloris villosa (Desf.) Pers.).

Perennials with culms 40 cm high, culms 3–4-noded, nodes black and prominent; spikes exerted, paired, pallid or purple tinged; spikelets 4–6 flowered, all florets awned, the lowest 1–3-fertile; glumes dissimilar, the lower acuminate, the upper abruptly acute; lowest lemma with long spreading cilia on the lateral nerves and keel, awned; upper 2–3 florets sterile and reduced to glabrous lemmas.

Distribution and habitat: Weed of maize fields in Bannu and rice fields in Kurrum — Pakistan, tropical Africa, India, N. Africa and Canary Islands.
Fl. & Fr. per. March - September.

29. SCHISMUS Beau

Annuals or perennials; leaf-blades flate or involute; inflorescence a panicle; spikelets 4-10 flowered, rachilla disarticulating above the glumes between the florets; glumes subequal, nerved, longer than the lowest lemma; lemma membranous, hyaline on the margins, 9-nerved, awnless or awned; palea nearly as long as the lemma, 2-keeled; anthers 3.

Schismus arabicus Nees, Fl. Afri. Austr. 1: 422. 1841.
Cope in Fl. Pak. 143: 28-29. 1982.

Tufted annual with 2-15 cm high culms; leaf-blades linear, flate or involute; panicle contracted; spikelets 6-8 flowered; glumes lanceolate, acuminate, lower 5-7 nerved, upper 5-nerved; lowest lemma 9-nerved, deeply 2-lobed, palea spathulate, nearly obtuse.

Distribution and habitat: Found in wheat fields near B.I.S.E. Peshawar — Pakistan, from Greece and Libya eastwards through Arabia to Central Asia. Fl. per.

30. DACTYLOCTENIUM Willd.

Annuals or perennials; leaf blades flat or folded; ligule membranous, inflorescence digitate composed of secund spikes; upper most spikelets abortive; spikelets several

flowered, biseriate; glumes 1-nerved, keeled, shorter than the lemmas; lemmas 3-nerved, keeled, membranous; palea subequalling the lemma; grain angular.

Dactyloctenium aegyptium (L.) Willd., Enum. Hort. Berol. 1029., 1809; Cope in Fl. Pak. 143: 106-107. 1982. (Syn. Cynosurus aegyptius L., Eleusine aegyptia (L) Desf.).

Common names: Urdu: Madhana.

Annual; culms upto 100 cm high, geniculately ascending and rooting at the lower nodes; leaf blades flat; inflorescence composed of 1-9 spikes, spikelets 3-4-flowered; glumes subequal; lemma often extended into a stout cusp or mucro, palea keels winged or wingless; grains about 1 mm long, tranversely rugose.

Distribution and habitat: Found in cornfields of Kot Kashmir (Bannu) (First report of N-W.F.P). Pakistan; Widely distributed in tropical and warm temperate regions of old world, introduced in America.
Fl. per. October.

31. D E S M O S T A C H Y A Stapf.

Perennials; leaf-blades linear; ligule membranous; inforescence a panicle composed of spikes; spikelets several to many flowered, sessile or subsessile, falling entire; glumes unequal, 1-nerved, membranous; lemma glabrous, faintly 3-nerved; palea 2-keeled, shorter than the lemma; caryopsis obliquely ovoid, triquetrous in cross-section, pericarp adnate.

Desmostachya bipinnata (L.) Stapf. in Thiselt. Dyer, Fl. Cap. 7: 632. 1900; Cope in Fl. Pak. 143: 109-111. 1982. (Syn. Briza bipinnata Linn.,).

Common names: Urdu: Daab, Kusa, Pushto:- Drab, Sarmagha.

Rhizomatous perennial; culms stout, upto 1.5 meter high; leaf-blades flat, upto 65 cm long, rarely rolled; lower leaf-sheaths leathery; inflorescence upto 60 cm long; spikes clustered or spaced; spikelets 3-17-flowered; glumes unequal; lemmas straw coloured or purplish.

Distribution and habitat: It is very long and thich rooted obliquitous weed, found in wheat and maize fields of D.I.Khan, Bannu, Peshawar and Mardan. Once established it cannot be erradicated easily due to its rhizomatous nature — Pakistan, throughout the Middle East to Indo-China, N & tropical Africa. Fl. per. July - November.

32. E R A G R O S T I S Wolf.

Annuals or perennials, often glandular on leaf sheath and inflorescence; leaf-blades linear; ligule reduced to a ciliate rim or membranous; inflorescence an open, contracted or spike like panicle; spikelets laterally compressed, awnless; glumes subequal, shorter than the lower lemma, 1-nerved; lemmas glabrous, 3-nerved; palea shorter than the lemma; anthers 2-3; caryopsis usually globose to ellipsoid, pericarp adherent.

Eragrostis minor Host, Gram. Austr. 4: 15. 1809; Cope in Fl. Pak. 143: 95-97. (Syn. Poa eragrostis L., E. poaeoides Beauv.).

Loosely tufted annual with ascending culms, upto 60 cm long; leaf-blades flat, glabrous and with a row of warty glands along the margin; panicle dense to open, usually with glands on pedicels and branchlets; spikelets 6-40-flowered, yellowish green, grey, dirty white or purplish; glumes subequal, boat shaped 1-3-nerved; lemma 3-nerved, the lateral nerves distinct; palea more or less scabrid on the keels, persistent; caryopsis broadly oblong, dark brown.

Distribution and habitat: Found in cornfields of Peshawar and Swat -- Pakistan, warm temperate and subtropical regions of the old world, introduced in the New World. Fl. per. May - October.

33. ELEUSINE Gaertn.

Annuals or perennials; culms flattened; leaf-blades linear, usually folded; ligule membranous, often ciliate; leaf-sheaths keeled; inflorescence digitate or shortly racemose, composed of secund spikes; spikelets several flowered, laterally compressed, biseriate; glumes 1-several nerved, shorter than the lemmas; lemmas 3-nerved, membranous, the lateral nerves shorter than the lemma; caryopsis enclosed within a free hyaline pericarp, blackish, surface ornamented.

Eleusine indica (L.) Gaertn., Fruct. Sem. Pl. 1:8. 1788., Cope in Fl. Pak. 143: 103. 1982. (Syn. Cynosurus indicus L).

Common names: Eng. Crab or Crow fool grass.

Tufted annual, culms upto 85 cm high, erect or geniculately ascending; leaf-blades usually folded; inflorescence digitate, composed of 1-17 ascending spikes; spikelets 3-9 flowered, elliptic; glumes subequal; lemma lanceolate, acute to subacute.

Distribution and habitat: Found in cornfields of Bannu and Peshawar — Pakistan, tropical and subtropical regions throughout the world.

Fl. per. June - September.

34. L E P T O C H L O A Beauv.

Annuals or perennials, tufted or rhizomatous; leaf-blades usually flat; ligule membranous; inflorescence open, composed of secund racemes scattered along a central axis; spikelets 1-several flowered, biseriate; glumes 1-nerved, membranous, entire or emarginate, awnless.

Leptochloa panicea (Retz.) Ohwi in Bot. Mag., Tokyo 55: 311. 1941. Cope in Fl. Pak. 143: 74-75: 1982. (Syn. Poa panicea Retz.)

A tufted annual with culms upto 110 cm high; leaf-blades flat, leaf-sheets and blades papillate - pilose; inflorescence purplish, elliptic to oblong composed of many racemes; racemes upto 11 cm long; spikelets 2-5-flowered; glumes subequal, shorter than the lemmas; lower glume lanceolate, acute; upper glume oblong, obtuse and mucronate; lemmas minutly hairy on the back, bluntly 2-toothed; caryopris brown.

Distribution and habitat: Weed of cornfields in Dargai (Malakand) and Peshawar — Pakistan, Sudan, W. Africa and tropical Asia.

Fl. per. September - October.

35. B R I Z A L.

Tufted annuals or perennials; leaf blades flat or rolled; inflorescence a loose or contracted panicle; spikelets several to many flowered, laterally compressed; glumes persistent, subequal, 3-9 nerved; lemmas cordate at the base, papery with scarious margins, 7-9 nerved; palea shorter than lemma, 2-keeled.

Briza minor L., Sp. Pl. 1: 70. 1753; Cope in Fl. Pak. 143: 440-441. 1982.

Common name: Eng: Lesser Quaking-grass.

Loosely tufted annual; culms upto 60 cm high; leaf blades flat minutely rough above and on the margins; panicle loose, nodding; spikelet numerous, born on capillary pedicels, 4-8-flowered, green or tinged with purple; lemma very broad, deeply concave, with which membranous margins.

Distribution and habitat: This specimen was collected along the edge of wheat fields which are cultivated for experimental purposes in the N-W.F.P. Agricultural University, Peshawar. According to Cope (1982) it is an introduced weed and therefore can any time become as a weed (First report for N-W.F.P.) — Pakistan, Mediterranean region, naturilized in many warm temperate countries. Fl. per. April - September.

36. L O L I U M L.

Annuals or perennials; leaf-blades flat or rolled; inflorescence a stiff 2-sided spike, the spikelets alternate in opposite rows; spikelets 3-12-22-flowered, the upper most floret reduced, the lower glume suppressed in all except the

terminal spikelet; upper glume persistent, 5-9 nerved; lemmas rounded on the back, 5-9 nerved awnless or with a straight awn from near the tip; palea nearly as long as the lemma.

\+ Upper glume nearly equal or exceeding the uppermost lemma, more than half the length of the spikelet; lemma very turgid at maturity; caryopsis less than 3 times as long as wide. 1. L. temulentum

\- Upper glume usually much shorter than the spikelet; lemmas not turgid at maturity; caryopsis more than 3 times as long as wide. 2. L. multiflorum

1. Lolium temulentum L., Sp. Pl. 1: 83. 1753.

Cope in Fl. Pak. 143: 377-378. 1982.

Tufted or solitary annual with culms upto 120 cm high; leaf-blades 6-40 cm long and 3-12 mm wide, flat; spikes erect, upto 40 cm long, rigid; spikelets 8-28 mm long, 2-15 flowered; upper glume 7-9-11-nerved; lemmas elliptic to ovate, very turgid at maturity, awnless or awned.

Distribution and habitat: Found as a weed of wheat and barley fields throughout the province -- Pakistan, native of Mediterranean regions and S.W. Asia, introduced in other countries.
Fl. per. March - August.

2. Lolium multiflorum Lam., Fl. France 3: 621. 1778.

Cope in Fl. Pak. 143: 377. 1982.

Annual, biennial or short-lived perennial, tufted or solitary; culms upto 130 cm high; leaf blades upto 22 cm long, convolute when young; spikes straight or slightly curved; spikelets 11-22 flowered; upper glume 5-14 mm long, not much longer than the lowest floret, 3-7 nerved; lemmas 4-8 mm long, not turgid at maturity; awns rarely absent. (Fig. 9).

Distribution and habitat: Common weed of wheat fields in Peshawar, Mardan, Hazara, and Swat. It is not reported from the Southern district, however, it is likely to be found in those areas as well. Fl. per. March - August.

37. P O A L.

Annuals or perennials; leaf-blades usually flat, often with a blunt or hooded tip; inflorescence an open or contracted panicle, spikelets 2-several-flowered; glumes subequal or unequal, 1-3 nerved; lemmas deeply concave, membranous but with hyaline margins, 5-7-nerved, awnless; ovary glabrous.

+ Spikelets with rather distinct florets, upper florets markedly dissimilar to the lower; anthers 0.2 - 0.5 mm long, scarcely longer than wide .. .. 1. Poa infirma

- Spikelets with similar crowded florets; anthers 0.6 - 2 mm long, at least twice as long as wide .. .. 2. Poa annua

1. Poa infirma H.B.K., Nov. Gen. Sp. 1:158. 1816; Cope in Fl. Pak. 143: 395-397. 1982 (Syn. Catabrosa thomsoni H.f.

Annual with culms upto 25 cm high; loosely tufted, erect spreading or protrate, compressed; leaf-blades flat or folded, flaccid; lugule blunt; panicle upto 10 cm long, loose; branches paired, erecto-patent after anthesis, smooth; spikelets with 2-6 widely spaced florets, 2-4 mm long, green, glumes unequal, lower ovate, 1-nerved, upper elliptic-oblong, 1-3 nerved; lemmas 2-2.5 mm long, blunt; palea as long as lemmas, densely hairy along the keel and nerves; anthers 0.2 - 0.5 mm long, scarcely longer than wide.

Distribution and habitat: Common in irrigated wheat-fields of Peshawar and Mardan.

(Formerly once reported from N-W.F.P.) — Pakistan, S.America, S.Europe, Eastwards to Himalayas and Cent. Asia.

Fl. per. March - April.

2. Poe annua Linn; Sp. Pl. 1: 68. 1753; Cope in Fl. Pak. 143: 397-98. 1982. (Syn. P. royleana Stend.).

Annual or perennial, tufted; culms upto 30 cm high, erect, spreading or prostrate, rarely with a creeping base rooting from the nodes; leaf-blades flat or folded, upto 14 cm long, flaccid; ligule blunt; panicle loose or rather dense; spikelets with 3-5 closely spaced florets, pale or bright green, reddish or purplish; glumes unequal, lower 1-nerved, the upper 3-nerved; lemmas glabrous or sparsely to densely ciliate on the keel and nerves; palea nearly as long as the lemma; ciliate all along the keel. (Fig. 10).

Distribution and habitat: More common weed of wheat fields than the earlier one. It is found in Hazara, Swat and Mardan and Peshawar Cosmopolitan.

38. V U L P I A C.C. Gmel.

Annuals or perennials; leaf blades linear, flat, convolute or involute; inflorescence is more or less secund contracted or spike like panicle, or rarely raceme; spikelets 3-13-flowered; glume unequal, the lower 1-nerved or nerveless, upper 1-3 nerved, longer than the lowest lemmas finely 3-5-nerved, becoming rigid, awned; palea 2 keeled; stamens 1-3.

Vulpia myuros (L.) Gmel., Fl. Bad. 1:8. 1805.
Cope in Fl. Pak. 143: 382-83. 1982. (Syn. Festuca myuros L.).

Annual culms upto 65 cm high, erect; leaf blades rough on the margins, shortly hairy above; inflorescence a branched erect or slightly nodding panicle or a raceme, upto 35 cm long; spikelets breaking up at maturity below each fertile floret; most florets fertile, the upper 1-3 gradually reduced and male or sterile; glumes unequal, lower much shorter than the upper; fertile lemma awned, 5-nerved, glabrous or pubescent.

Distribution and habitat: Weed of wheat fields in Darosh (Chitral) — Pakistan, Mediterranean region eastwards through the Caucasus and the Middle East to Southern U.S.S.R. - Fl. per. April - July.

39. P A R A P H O L I S Hubbard

Annuals; culms erect or prostrate; leaf-blades flat or convolate when dry; ligule membranous; inflorescence a spike; the spikelets sessile, 1-flowered; glumes 2, more or less equal, 3-5 nerved, longer than the lemmas; lemmas 3-nerved, the central one distinct, awnless, hyaline, palea hyaline; ovary lobed at the apex.

Parapholis incurva (L) Hubbard in Blumea, Supp. 3:4. 1946.,
Cope in Fl. Pak. 143: 556-58. 1982. (Syn. Aegilops incurva L.)

Annual, culms 2.25 cm high, erect or prostrate or ascending; leaf-blades flate or convolute when dry; upper most sheath inflated; spikes solitary, curved or rarely straight, upto 10 cm long, spikelets 4-8 mm long; glumes equal, as long as the spikelet, keel not winged; lemmas shorter than glumes, with one side adjacent to the rachis.

Distribution and habitat: Wheat-fields weed of Mardan — Pakistan, Middle East and the Mediterranean region, coast of West Europe; introduced in North and South America and Australia.
Fl. per. April - May.

40. PHALARIS L.

Annuals or perennials; leaf-blades linear; ligule membranous; inflorescence a contracted or spike like panicle; spikelets usually all alike, 3-flowered, lower 2 florets reduced; glumes subequal, papery, boat shaped; sterile florets more or less half the length of fertile lemma; fertile lemma glabrous or pubescent, often shiny, awnless; stamens 3.

Phalaris minor Retz., Obs. Bot. 3: 8. 1783., Cope in Fl. Pak. 143: 494. 1982.

Common names: Eng. Lesser Canary Grass.

Annual; culms 15-100 cm high; panicle upto 6 cm long, ovate - oblong; glumes subequal, or equal, winged, the wing margin denticulate or rarely entire; sterile floret short from 0.2 - 1.8 mm long; fertile floret 2.7 - 4 mm long, grey brown and shiny at maturity.

Distribution and habitat: Found in irrigated wheat fields throughout the plains of the province — Native of Pakistan, Northwest Humalayas. Fl. per. February - May.

41. STIPA L.

Annuals or perennials; leaf-blade usually involute and setaceous, rarely flat; inflorescence paniculate; spikelets

1-fid; lemma terete, convolute, concealing the 2-nerved palea, awned, callus pungent, awn twisted or bent; styles short and distinct; stamens usually 3.

Stipa capensis Thunb., Prodr. Fl. Cap. 19. 1974.
Cope in Fl. Pak. 143: 538-40. 1982 (Syn. S. tortilis Desf.).

Tufted annual; leaf-blades flate or involute; ligule very small; panicle densely contracted, very untidy when mature, 3-15 cm long; glumes unequal, the lower slightly longer than the upper, lower 3-nerved, upper 1-nerved; lemma more or less terete, covered on the back with rows of hairs; callus acuminate, pungent; awns bigeniculate, conspicuously articulated at the base, becoming twisted at maturity.

Distribution and habitat: Wheat field weed ofrainfed areas of Bannu and Karak — Pakistan; Mediterranean regions eastward to Northwest India; S.Africa. Fl. per. March - May.

42. S E C A L E L.

Annuals, biennials or perennials; leaf-blades flat or rolled; inflorescence usually a simple, laterally compressed, dense spike; spikelets solitary at each nod of the tough and fragile rachis, sessile, dichotomously arranged with 2-3 bisexual florets, the rachilla produced and bearing a further rudimentary floret; glumes 1-nerved; lemma 5-nerved, awned; palea 2-keeled.

Secale segetale (Zhuk.) Rozhev. in Trud bot. inst. Akad. Nauk. USSR. 6: 143. 1947; Cope in Fl. Pak. 143: 602-3. 1982
(Syn. S. cereale L. ssp. segetale Zhuk).

Tufted annual, culms upto 100 cm high, erect or geniculately ascending; leaf-blades flate or rolled, scabrid; spikes 4-13 cm long; rachis fragile or sometimes tough below, ciliate along the margins spikelets 2-3-flowered; glumes 9-12 mm long; lemma awned, awn 2-7 cm long.

Distribution and habitat: Found in wheat fields of Sarai (Dir) — Pakistan, Middle East, USSR. Fl. per. April - August.

43. T R A G U S Haller

Small annuals or perennials; leaf-blades flate; ligule a line of hairs; inflorescence terminal, stiff, dense, spike like; the spikelets in sessile or peduncled deciduous clusters; each cluster composed of 2-5 spikelets; spikelets awnless, those of the cluster all alike or upper more or less reduced; glumes dissimilar, the lower a minute hyaline scale or suppressed, the upper as long as the spikelet; lemma nearly as long as the glume, membranous, 3-nerved; stamens 3; caryopsis dorsally compressed.

Tragus roxburghii Panigrahi in kew Bull. 29: 495. 1974; Cope in Fl. Pak. 143: 150-51. 1982 (Syn. T. biflorus Schult.).

Spreading annuals; culms prostrate to geniculately ascending, upto 20 cm long; leaf blades linear, upto 5 cm long, margins usually ciliate, ligule a ciliate rim; inflorescence 1-4 cm long, rachis pubescent, clusters consisting of 2 subequal and subopposite spikelets; upper glume 5-nerved, with prickles; prickles hooked at the tip and terete in the lower half.

Distribution and habitat: Found in corn fields of Swat. It seems to be under collected and is likely to be found in wheat and corn fields throughout the northern districts —Pakistan, S.E. Asia and E. Africa - Fl. per. throughout the year.

4. Family C Y P E R A C E A E

Tufted or rhizomatous, annual or perennial herbs, usually found in wet places; stem mostly triquetrous, solid or rarely hollow; leaves crowded at the base of the stem with a closed or open sheeth and with a grass like blade; flowers small and inconspicuous, bisexual or unisexual and monoceious or rarely dioceious, arranged in small spikelets and each usually solitary in the axil of a glume or bract; glumes distichously umbellate, paniculate or rarely spicately arranged; inflorescence subtended by 1 or more leafy involucral bracts; perianth reduced to scales, bristles or hairs or absent; stamens 3 or fewer; ovary superior, 1-locular; fruit an indehiscent nut. Respresented by 4 weedy genera covering 14 species.

1	+	Glumes distichous; spikelets in spikes or heads	1. Cyperus
	-	Glumes spirally arranged or the lower only distichous	2
2	+	Style base not thickened (rarely slightly swollen at the base)	2. Scirpus
	-	Style base swollen at the base	3
3	+	Hypogynous bristles present; culm naked, spikelet solitary, terminating the naked culm.	3. Eleocharis
	-	Hypogynous bristles absent; culms leafy at the base; spikelets in an involucrate umbel	4. Fimbristylis

1. CYPERUS L.

Annual or perennial herb; stem erect, simple, leafy near the base; spikelets in solitary, globose or umbellate heads or spikes; spikelets linear or oblong, compressed; rachilla persistent; glumes many, distichous, the 2 lowest empty, the succeeding bisexual and deciduous from below upwards; stamens 1-3; stigma 3; nut trigonous. 6 species are reported as weeds.

1	+	Rhizome somewhat thick creeping, stem rather robust at top subacutely trigonous, at base oblique or decumbent, not nodosely thickened nor contracted into a wiry rhizome.	1. *C.longus.*
	-	Otherwise	2
2	+	Stigmas 2 (glumes obtuse or acute) never mucronate	2. *C.globosus*
	-	Stigmas 3	3
3	+	Spikelets in a dense compact head (glumes rounded on the back)	4
	-	Spikelets subracemosely arranged	5
4	+	Spikelets oblong obtuse; achene nearly as long as the glume; glumes not keeled	3. *C.difformis*
	-	Spikelets linear acute; achenes 1/3 of the glume; glumes keeled	4. *C.haspan*
5	+	Rachilla not winged (annual)	5. *C. iria*
	-	Rachilla winged (leaves 1 more than ½ the length of stem)	6. *C.rotundus*

1. *Cyperus longus* Sp. Pl. 45. 1753., Stewart, Ann. Cat. Vas. Pl. Pak. & Kashm. 90. 1972.

Glabrous; rhizome clothed with triangular striated brown scales; stem rather robust at top subacutely trigonous, at base oblique or decumbent; umbell rays 3-10; spikelets 6-16 flowered; glumes 5-7 nerved, hardly keeled; stamens 3; wings of rachilla hyaline, not trigonous, black.

Distribution and habitat: Found in rice fields of Shalizan (Kurram) (after Stewart, 1972).

2. Cyperus globosus All., Fl. Pedem. Auct. 49. 1789; Stewart, Ann. Cat. Vas. Pl. Pak. & Kashm. 89. 1972.
(Syn. C. capillaris koening ex Roxb., Pycreus globosus (All) Reich. P. cappillaris (Roxb) Nees).

Erect Annual, densely tufted; leaves linear, slender, arising from near the base of the stem; sheaths closed, with truncate mouth; umbels simple or compound; bracts 2-3, leafy; spikelets many flowered, compressed; rachilla stout, persistent, not winged; glumes obtuse, keeled; keel greenish yellow with brownish red veins, side brown with hyaline margins; stamens 2; style shorter than nut; nut ellipsoid, laterally compressed, rounded and apiculate at the apex, dark brown, slightly pipillose;

Distribution and habitat: Weed of rice fields in Hazara (Attar Shishi, Naran & Kaghan).

3. Cyperus difformis L., Amoen. Acad. 4: 302. 1750; Stewart, Ann. Cat. Vas. Pl. Pak. & Kashm. 88. 1972.

Erect annual, glabrous; leaves shorter than the stem, smooth flat; sheath loose, covering the stem bases; spikelets in 3-6, globose, compact heads; primary bracts 3-4 leaflike; spikelets dusky or brownish oblong, obtuse, 10-30 flowered; rachilla slender, not winged; glumes distichous 3-nerved and rounded on the back, sides hyaline or red coloured; stamens 1-2; nut trigonous, ellipsoid, smooth, pale brown.

Distribution and habitat: Common in rice fields of Peshawar (Charsadda) and Mardan (Yar Hussain).

4. Cyperus haspan L. Sp. Pl. 45. 1753; Stewart, Ann. Cat. Vasc. Pl. Pak. Kash. 89. 1972.

Glabrous Annual, rhizomatous; stems often caespitose on a very short rhizome or with fibrous roots only; stem almost 3-winged at top, sometimes slender trigonous; leaves short or long and overtopping the stem, or zero; umbels small or large, compound or simple; bracts short or long; spikelets 10-40 flowered; glumes close-packed; nut trigonous, slightly compressed, style as long as nut.

Distribution and habitat: Very common in rice fields of Miran Shah (N. Waziristan) and Kurrum (Kirman).

5. Cyperus iria L. Sp. Pl. 45. 1753; Stewart, Ann. Cat. Vas. Pl. Pak. Kashm. 90. 1972.

Erect annual, tufted, glabrous, upto 45 cm tall, strongly triquetrous, striate; leaves arising from the base, as long as or shorter than the stem; inflorescence a simple or compound umbel; spikelets compressed, yellow or pale brown; rachilla not winged; glumes broadly boat shaped, blunt or shortly aculeate, 3-5-nerved; wings hyaline; stamens 2-3; style short or zeroñ nut trigonous, as long as glume.

Distribution and habitat: Common weed of rice fields in Swat (throughout), Mardan (Takht Bai) and Hazara (throughout).

6. Cyperus rotundus L.Sp. Pl. 45. 1753; Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 91. 1972.

Perennial, stem erect, variable in height, stoloniferous, bearing black tubers; leaves linear, flat; inflorescence an

umbel of more or less condensed spikes; primary rays 2-8, bearing short spikes of 3-10 slender, brown spikelets; bracts 3, variable in length, leafy; spikelets linear, subacute, reddish brown, 10-50 flowered, compressed; rachilla winged; glume many, distichous, boat-shaped, keeled, keel rounded, 3 to 7-neved; sides, margins and tip hyaline; stamens 3; stigmas 3; nut trigonous, brown or yellow.

Distribution and habitat: Very common weed throughout the province in all grain crops.

2. SCIRPUS L.

Annual or perennial, glabrous herbs with terete or triquetrous or transversely septate stem; spikelets in terminal or lateral cluster or umbel; glumes spirally imbricate, sometimes the lower subdistichous and empty; hypogynous bristles plumose or retrorsely scabrid, sometimes absent; stamens 1-3, style not swollen at the base, stigma 2-3; nut trigonous, smooth or marked with transverse wavy lines. 4 species are reported as weeds.

1	+	Stem leafy; inflorescence terminal	2
	-	Stem leafless; inflorescence lateral ..	3
2	+	Spikelets 1-3, ovoid glumes glabrous ..	1. *S. affinis*
	-	Spikelets several, glumes minutely pubescent	2. *S. maritimus*
3	+	Annual species, stem densely tufted, glumes concave	3. *S. juncoides*
	-	Perennial species, stem triquetrous, glumes notched at the apex	4. *S. triqueter*

1. Scirpus affinis Roth., in R. & S. Syst. Veg. 2: 140. 1817; Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 1972. (Syn. S. strobilinus Roxb; S. maritimus L. Var. affinis (Roth) Clard.

Perennial; stolon creeping; stem triquetrous, leafy throughout; spikelets capitate, usually 1-3; hypogynous bristles 4, as long as the nut; stamens 3, style 3-fid; stigms 2; nut abovoid, trigonous.

Distribution & habitat: Found in rice fields about Shahizan (Kurrum) (after Stewart, 1972).

2. Scirpus miritimus L., Sp. Pl. 51. 1753, Stewart Ann. Cat. Vas. Pl. Pak. & Kashmir, 102. 1972.

Perennial, stoloniferous, bearing black tubers; stem triquetrous, upto 60 cm tall, leafy throughout; spikelets 3-8, umbelled, the umbel usually reduced to a head of 3 spikelets; glumes spirally imbricate, strongly keeled, bifid, keel mucronate; bristles 3-6, unequal, shorter than the nut, retrorsely scabrid; stamens 3; style 3-fid; nut trigonous, smooth, yellow.

Distribution & habitat: Weed in rice fields of Kurrum (Gadda) and Peshawar (Badaber).

3. Scirpus juncoides Roxb., Fl. Ind. 1:216. 1820., Stewart, Ann. Cat. Vas. Pl. Pak. & Kashm. 101. 1972.

Annual having densely tufted terete stem; leaves short; spikelets terete, in a single lateral cluster; glumes ovate, concave, incurved; bristles 5-6 rarely 0; stamens 3; style 2-3 fid; nut broadly obovoid, planoconvex, black.

Distribution and habitat: Found in rice fields of Nokote (Hazara - near Mansehra).

4. Scirpus triqueter L. Mant. I: 29. 1767; Stewart. Ann. Cat. Vas. Pl. Pak. & Kash. 104. 1972.

Glabrous (except margins of glumes); rhizomatous; stem stout, triquetrous, leaves short; lowest bract triquetrous; rays of umbel with 2-8 clustered spikelets on each; spikelets rusty brown; glumes keeled, notched at the top and a short mucro in notch; bristles rigid, as long as nut; stamens 3; nut less than half the length of glume.

Distribution and habitat: Weed of rice fields in Mingora (Swat) after Stewart, 1972; and Hazara (Balakot).

3. E L E O C H A R I S R. Br.

Erect densely tufted herbs with leafless, erect stem; spikelets solitary, obovoid or cylindric; glumes spirally imbricate, the lowest usually empty, the succeeding ones bisexual, the uppermost imperfect; hypogynous bristles 5-8, rarely fewer or wanting; stamens 1-3; style base dilated, usually sharply constricted and apparently articulated on the nut but persistent; stigmas 2 or 3; nut obovoid, compressed or trigonous.

Eleocharis atropurpurea (Retz.) Presl., Rel. Haenk 1:96. 1828; Stewart, Ann. Vasc. Pl. Pak. & Kashm. 93. 1972.
(Syn. Scirpus atropurpureus Retz.).

Erect annual, upto 15 cm tall; spikelets terminal, solitary, ovoid, broader than the axis; glumes keeled; 3-nerved; bristles 4-7, as long as the nut, scabrid, glistening white; nut small, biconvex.

Distribution and habitat: Found in rice fields of Shalizan (Kurrum). (After Stewart, 1972 citing Ait. 603).

4. FIMBRISTYLIS Vahl.

Tufted herbs, annual or perennial; leaves linear to filiform, basal rarely reduced to sheaths; spikelets terete or angular, many flowered, solitary or in an umbellate or corymbose cluster; glumes spirally imbricate or the lower distichous; the lower 1-3 or in some the upper empty, deciduous; hypogynous bristles absent; style flattered, base more or less dilated, stigmas 3; nut obovoid, biconvex or trigonous with a more or less inconspicuous gynophore. Three species are found as weeds: [illegible].

1 + Glumes hairy .. .. 1. F. ferruginea

- Glumes glabrous 2

2 + Spikelets angular, glumes acutely keeled 2. F. bisumbellata

- Spikelets terete; glumes not acutely keeled .. .. 3. F. dichotoma

1. Fimbristylis ferruginea (L) Vahl., Enum. 2. 291. 1806, Stewart, Ann. Cat. Vas. Pl. Pak. & Kashm. 95. 1972. (Syn. Scirpus ferrugineus L.)

Erect perennial, striated longitudinally; leaves absent or few, short, glabrous or hairy; sheaths pubescent; umbels simple or compound; primary bracts 3, leaf like; spikelets ellipsoid; rachilla rough with large pits; glumes pubescent, strongly keeled; stamens 2-3; style flattened, villous; stigms 2, short; nut biconvex, minutely stipitate, smooth, pale straw coloured.

Distribution & habitat: Weed of rice fields in Bannu (Goorani) and Peshawar (Charsadda).

2. Fimbristylis bisumbellata (Forsak.) Bub. Dodec. 30. 1850. Stewart, Ann. Cat. Vas. Fl. Pak. & Kashm. 95. 1972. (Syn. F. dichotoma sensu Clark FBI 6:655 non Vahl)

Angled herb, tufted, leaves linear, as long as or shorter than the stem; spikelets in simple or compound umbels; bracts leaf-like, longer than the inflorescence; rachilla stout; glumes closely imbricate, concave, acute, keeled; keel green, obtuse, 3-nerved; style flattened, villous throughout; stigmas 2; nut broadly ovate, biconvex, many ribbed.

Distribution and habitat: Weed of rice field in Peshawar (Warsak Road, Mathra).

3. Fimbristylis dichotoma (L) Vahl, Enum. 2: 287, 1806; Stewart, Ann. Cat. Vas. Fl. Pak. & Kash. 95. 1972. (Scirpus dichotomus L)

Tufted annual, striate, smooth; leaves as long as or usually shorter than the stem; spikelets in a compound or decompound umbel; bracts leaf like; spikelets ellipsoid or subcylindric, somewhat angular from the acute keels of the glumes; rachilla stout; glumes spirally imbricate, boatshaped, 1-3 nerved; stamens 1-3; style flattened, villous, with a bulbous base; stigmas 2; nut biconvex.

Distribution and habitat: Common in rice fields of Chitral (Drosh) and Swat (Kalam, Khwaza Khela).

5. Family L E M N A C E A E

Minute or small, gregarious, floating herbs, rootles, or with a few simple roots, shoot (frond) not differentiated into stem and leaves, dorsiventral flowers monoecious, 1-3 together, perienth 0, male of 1 or 2 stamens with 1 or 2-celled anthers; female of a sessile, superior, 1-celled ovary and simple style and stigma and 1-7 ovules; seeds minute with or without endorperm.

1 + Fronds (thalli) with roots 2

- Frond (thalli) without roots .. .. 1. Wolfia

2 + Roots solitary on each segment, lower surface green or streaked with brown .. .. 2. Lemna

- Roots several from each thallus, lower surface reddish brown .. .. 3. Spirodela

1. W O L F F I A Horkel

Fronds minute like grains of sand, subglobose, flattened above, rootless, vegetative reproduction by proliferation of daughter shoots from the middle of the base; flowers bursting through the upper surface; spathe absent; male flower solitary, stamen 1; female flower having globose ovary with short style and depressed stigma. This is considered the smallest known genus of flowering plants in size.

Wolffia arrhiza (L) Wimm. Fl. Schles 140. 1857; Stewart Ann. Cat. Vas. Fl. W. Pak. & Kashm. 36. 1972. (Lemna arrhiza Linn) Mant 294

Thalli very small, oblong, convex above, globose beneath.

Distribution and habitat: Found in rice fields with algae in Bannu. It is also likely to be found elsewhere.

2. L E M N A L.

Fronds with solitary root, flowers in small pockets on the margins of the frond, usually 2 male and 1 female together; in male flower, stamen 1 or 2, anthers 2-celled; in female ovary with 1-7 ovules.

Lemna paucicostata Hegelm. Lemnac. 139t, 8, 1868; Stewart Ann. Cat. Vas. Pl. Pak. & Kashm. 36. 1972.

Fronds above 0.4 cm long, asymmetric, entire, nearly flat on both sides, branches soon detached, root 1; ovary in female flower with a single semi-anatropous ovule.

Distribution and habitat: Found in rice fields of Warsak (Peshawar).

3. SPIRODELA Schleid.

Many authers place it in Lemna Linn., however it differs from it by the presence of several roots and the daughter shoots of the frond bearing at their base a small lobe, which is considered to be a basal leaf.

Spirodela polyrhiza (L) Schleid in Linnaea, 13: 392. 1839. (Syn. Lemna polyrhiza L).

Fronds 0.8 cm long, green above and purplish beneath; daughter shoots with a small basal lobe; roots several; spathe 2-lipped; stamens in the male flower 2; ovary in the female flower usually with 2 anatropous ovules.

Distribution and habitat: Found in rice fields of Pir Baba (Swat). This species is undercollected and seems to be present in upper Swat and Hazara too.

6. Family ZANNICHELLIACEAE

Aquatic herbs, monoecious or dioecious, submerged in fresh, brackish or salt water; rhizome slender, creeping; leaves alternate, opposite or more or less whorled, linear base sheathing; flowers

solotary or in axillary cymes; perient absent; male flowers with 1-3 stamens; pollen globose; female flowers with 1-9 free carpels; carpels unilocular with solitary pendulous ovule; style short or long, simple or 2-4 lobed, capitate, peltate spathulate or ligulate; fruit sessile or stipitate, indehiscent; seed pendulous, without endorsperm.

Z A N N I C H E L L I A L.

Perennial, monoecious, rhizomatous, submerged herbs; stipules free or sheathing; flowers axillary, spathe hyaline, deciduous, cupshaped; one male and 2-5 female flowers, often in the same spathe; perienth absent; male flower of 1 stamen; female flower of 2-9 stalked curved achenes, entire or toothed along one or both margins.

Zannichellia palustris L., Sp. Pl. 969. 1753; Daudy in Rech. Fl. Iran. 85: 2. 1971; Aziz & Alijin Fl. W. Pak. 18: 1-2. 1972. Leaves linear, opposite or in whorls; male & female flowers subsessile; stigma peltate, wavy; achenes 2-5, stalked, back of the achene curved & dentate.

Distribution and habitat: Common aquatic weed throughout the province, found in rice field of Swat and Peshawar valley — Cosmopolitan species.

7. Family A L I S M A T A C E A E

Aquatic herbs with a stout rhizome and radical leaves; leaves with elongated petioles, sheathing at the base; flower bracteate, often whorled, in racemes or panicles, bisexual or unisexual, actinomorphic; perianth segments 2-seriate, the outer sepaloid and persistant, the inner white and deciduous; stamens 6, hypogynous,

free; carpels 6- many, free or only slightly connate at the base; ovules solitary or many, inserted on placentas or at the base or apex of carpels; style persistent; fruit a cluster of achenes or rarely of follicles.

Three species belonging to two genera are found as weeds of rice fields.

+	Flowers bisexual aerial leaves with rounded or cordate base.	1. Alisma
-	Flowers unisexual, aerial leaves with sagitate base	2. Sagittaria

1. A L I S M A L.

Aqutic herbs with acrid juice; leaves upright, linear lanceolate to ovate; inflorescence a pyramidal panicle with verticillate branches & flowers, flowers bisexual, white or pink, bracteate; sepals 3, persistent; petals 3; stamens twice as many as petals; carpels many; ovaries unilocular with single basal anatropous ovule; style ventral, erect or curved, stigma papillate; achenes laterally much compressed, ventral beaked near apex; seed erect.

Alisma plantago-aquatica L., Sp. Pl. 342. 1753; Ghafoor in Fl. W. Pak. 68: 4-6. 1974.

An upright emergent or submerged herb; leaves broadly lanceolate-ovate, rounded or shightly cordate at the base; panicles of 4-8 suberect branches; flowers white or pale pink; bracts linear-lanceolate; sepals, elliptic ovate; membranous margined; petals oblong, almost double the size of sepals, claw yellow, limb white or pale- pink; stamens with 1.5 to 2.5 mm long filaments, anthers

yellow, oblong, ovaries ovate, style longer than ovaries; achenes oblong-ovoid, with 1-2 grooves on back, pale brown. (Fig. 11).

Distribution and habitat: Very common weed of rice fields of Swat, Hazara and Kurrum valley— Pakistan, India, Burma, Russia, Europe, north & tropical Africa. Fl. per. June - August.

2. SAGITTARIA L.

Perennial, aquatic herbs; leaves petiolate polymorphic, aerial leaves lanceolate to elliptic-ovate with sagitate base, submerged leaves modified into ribbon like phyllodes, acute; inflorescence an erect raceme of 3-flowered verticils, each verticil having 3 bracts; flowers unisexual (plants mono-or dioecious) or polygamous; sepals recurved; petals white, occassionally pink or purple spotted at the base; stamens 6- many, staminodes mostly present in female flowers; carpels numerous; ovaries laterally compressed, 1 having 1 ovule; style erect, terminal or lateral, stigma papillate; achenes many, laterally compressed, winged & beaked. Two species are found as weeds of rice fields.

1 + Leaves floating, lobes & blade obtuse; stamens 6-15 .. .. .. S. guayanensis. ssp. lappula

\- Leaves emerged, lobes & blade acute; stamens 20 .. .. S. trifolia

Sagitteria guayanensis Kunth. ssp. Lappula (...on) Bo in in Mem. Ny. Bot. Gard. 9. 192. 1955; Ghafoor in Fl. W.Pak. 68: 7-8. 1974.

Aquatic or semiaquatic herb with fibrous root stock, having floating leaves; leaves broadly ovate, membranous,

indistinctly nerved, deeply cordate at the base, lobes & blade obtuse or rounded; flowers white; sepals appressed in the fruit; petal obovate-suborbicular, yellow spotted at the base larger than sepals; stamen 6-15; achenes plump or compressed, with shallowly or deeply crested farely smooth wings.

Distribution and habitat: Common weed of rice fields in Swat, Hazara & Kurrum valley — tropical Africa and tropical and subtropical Asia.

2. Sagittaria trifolia L. Sp. Pl. 993. 1753: Dandy in Fl. Iran. 78: 1. 1971; Ghafoor in Fl. W.Pak. 68: 8-10: 1974.

Aquatic herb, with thick stolons bearing tubers at tip; leaves merged, sagitate or some what hastate; inflorescence an unbranched scapose raceme; flowers in 2-6 whorls of 2-5 flowers each, unisexual, white; bracts triangular, ovate; sepals elliptic, keeled; petals white, without basal purple spot; stamens c. 20, anthers yellow; head of achenes subglobose; achenes triangularly obovate, with laterally bent beak. (Fig.12).

Distribution and habitat: Rice field weed of Hazara, Swat & Kurrum valley.

8. Family POTAMOGETONACEAE

Aquatic perennials; lower nodes of the stem root bearing and upper ones foliaceous, leaves sheathing basally, 2-ranked, blades submerged or floating; flowers bisexual or unisexual, 1-4 merous; perianth variable; stamens 1-4, anthers 1-2-celled; ovary unilocular and 1-ovuled; fruit a nutlet or drupelet; seeds exalbuminous.

1. POTAMOGETON L.

Perennials of mostly fresh water; leaves submerged or floating; alternate or imperfectly opposite, entire or toothed; flowers small, 4-merous, regular, spicate in dense or interrupted ovoid or cylindric spikes; perianth segments concave, smooth, obovate; stamens 4, sessile or subsessile; fruitlets drupaceous, coriaceous, more or less compressed one seeded, smooth or ornamental with warts, crest or short spines; embryo uniform or spirat.

+ Leaves dimorphic; floating leaves without a discoloured joint at the top of the petiole; submerged leaves narrower membranous .. .. 1. P. nodosus

\- Leaves all alike, submerged; leaves ovate-cordate, amplexicaul .. .. .. 2. P. perfoliatus

1. Potamogeton nodosus Poiret in Lam., Encycl. Meth. Bot. Suppl. 4: 535. 1816; Aziz & Jafri in Fl. W.Pak. 79: 3. 1975. (Syn: P. indicus auct. non Roth.).

Aquatic perennial, rhizohmatous; stem branched, leafy, terete, simple; leaves heterophyllous, submerged leaves veins 9 or more, thinktransluscent 6-11 cm long; floating leaves 4-16 cm long; stipules free, keeled; spikes cylindric; flowers in whorls, sessile, small; perienth segments small, obtuse, entire; stigma short; fruitlets 3-4 mm long, 2-4 mm broad, obliquely ovoid, spongy, shortly beaked.

Distribution and habitat: Weed of rice in Swat; found in fresh water throughout the province. It has been observed that the leaves of this species had covered the water surface of rice-fields in

Pir Rahman Deri (Swat). May be, this species occurs as a weed in Hazara, Chitral & Upper Dir Area, however there is no evidence from collected material - Warmer regions of Europe, N. & Central America, Africa and Asia. Fl. per. April - August.

2. Potamogeton perfoliatus L., Sp. Pl. 126. 1753;
Aziz & Jafri in Fl. W. Pak. 79: 5. 1975.

Leaves 2-6 cm long, mostly ovate with a cordate-clasping base, usually obtuse or crisped; stipules rarely developed, less than 1 cm long; peduncle 3-4 cm long; spike 2-2.5 cm long.

Distribution and habitat: Rare weed of wheat fields in Peshawar district, where water is abundant it grows along the edge of field at proximity with the water channel. Aquatic weed (of fresh water) throughout the province — Europe, Asia, Africa, N. America and Australia. Fl. per. November - March.

9. Family JUNCACEAE

Annual or perennial herbs, with erect or horizontal rhizomes; stem mostly leafy at the base; leaves mostly in a basal tuft, sheathing at the base or reduced to a sheath; sheath open or closed; flowers hisexual or unisexual, actinomorphic, hypogynous, in panicles, corymbs or heads; perianth segments 6, 2-seriate, usually green or reddish brown; stamens 3, pollen in tetrads; ovary 1 or 3-locular; ovules 1-many in each cell; styles 1-3; stigmas 3; fruit a capsule.

JUNCUS L.

Glabrous herbs; leaves usually basal, cauline, few or absent; inflorescence cymose, bracteate, often panicled, corymbose or capitate; flowers small, usually actinomorphic; perianth segments

6, biseriate; stamens 6 or 3; ovary 3 or 1-celled, carpels 3; stigmas 3; capsule often triangular. Represented by 5 weedy species.

1	+	Annuals, erect, basal leaves several, cauline leaf one	1. J. bufonius
	-	Characters not as above	2
2	+	Inflorescence usually of a single terminal head (cauline leaves present, capsules straight)	2. J. membranaceous
	-	Inflorescence composed of many, terminal heads of nearly equal sizes	3
3	+	Plant robust, with 1, sharply tipped cauline leaf; flowers 20-40 in each	3. J. punctorius
	-	Plant slender, 2-10 cauline leaves; flowers 4-12 in each head, stamens 6	4
4	+	Flowering heads semiglobose, smaller; capsule oblong-ovoid, abruptly beaked	5. J. Kotschyi

1. Juncus bufonius L., Sp. Pl. 328. 1753; Jafri in Nasir and Ali's Fl. Pak. 138: 4. 1981.

Erect, ascending to spreading annual herbs, with several basal leaves and one cauline leaf; stem branched; leaves setaceous or filiform; inflorescence a panicle; occupying greater part of the plant with distant flowers on each branch; flowers solitary or 2-3; stamens 6; capsule yellowish to brownish; seeds reddish brownish, mucilaginous.

Distribution and habitat: Jafri (1981) has recorded 3 varieties viz. var. bunfonius, var. congestus and var. rechingeri. However due to shortage of plant specimens and no field notes, the variety could not be recognised. This plant has been collected from rice fields of Garhi Habibullah (Hazara). — Cosmopolitan species.

2. Juncus membranaceous Royle ex Don.in Trans. Linn. Soc. 18 (3): 320. 1840; Jafri in Nasir and Ali's, Fl. Pak. 138: 10-11: 1981.

Stoloniferous tufted perennial; stem slender, 1-3 leaved; terminal flowering head simple, usually 8-20 flowered, whitish, flowers subsessile; stamens included; capsule ovoid-lanceolate, beaked, many seeded.

Distribution and habitat: Collected from rice fields of Qandil Garhi (Swat) and Nokote (near Mansehra). — Pakistan, Kashmir, N.W. Himalayas, Karakoram and Afghanistan.

3. Juncus punctorius L.f., suppl. 208. 1781; Jafri in Nasir and Ali's Fl. Pak. 138: 20. 1981. (Syn. J. exallatus Decne; J. schimperi Hoch.).

Stout perennial with creeping root-stock; basal leaves reduced to sheaths only, upper leaf as long as the stem; inflorescence umbellately decompound; flowers brownish; outer perianth segments oblong lanceolate, inner slightly broader; stamens 6; capsule 3-celled.

Distribution and habitat: Weed of rice fields in Swat (Pir Rehman Deri, Madyan) — Pakistan, Iran, Arabia, N and S.Africa. Fl. per July - September.

4. Juncus articulatus L., Sp. Pl. 327. 1753; Jafri in Nasir & Ali's Fl. Pak. 138: 15-17. 1981. (Syn. J. lamprocarpus Ehr. ex. Hoffm.).

Rhizomatous, green perennial herb; stem terete, faintly sulcate with 2-6 cauline leaves; leaves shorter than stem; inflorescence terminal, dichotomously branched with shortly stalked heads; flowers sessile, brownish to green; stamens 6, much shorter than perianth; capsule shortly beaked.

Distribution and habitat: Found in rice fields of Mansehra (Hazara) and Sarai (Dir) — Europe, N. Africa, Central and S.W. Asia to Pakistan and Himalayas.

5. Juncus kotschyi Boiss., Diagn. Ser. 1. 7: 101. 1846; Jafri in Nasir and Ali's Fl. Pak. 138: 17. 1981.

Differs from the previous species by globose heads on shorter peduncles, somewhat larger perianth segments and capsule more acute.

Distribution and habitat: Commonly found in rice fields of Chitral (Drosh), Dir (Patrak) and Hazara (Attar Shishi) — Pakistan, Afghanistan, Iran and Lebanon.

10. Family COMMELINACEAE

Annual or perennial herbs, often prostrate or suberect, glabrous to pubescent; leaves relatively broad, leaf base sheathing the stem; flowers bracteate, usually regular, rarely zygomorphic, bisexual, hypogynous, in axillary clusters or mostly in terminal cymes or panicles, arising from a spathe-like bract; perianth 2-seriate, the outer whorl sepaloid, the inner petaloid, free or rarely united; carpels 3; ovary superior, 3-locular, with axile placentation; ovules few to solitary in each

loculus; style simple; stigma capitate or rarely 3-fid; fruit a loculicidal capsule or rarely indehiscent.

C O M M E L I N A L.

Annual or perennial herbs, often procumbent & rooting at the lower nodes; leaves usually elliptic, sometimes subfleshy, sheathing at base, acute; flowers in usually 2-fid cymes, emerging one at a time from a terminal conduplicate spathe; flowers of the upper branch of cyme small, deciduous, of the lower fertile; fruiting pedicel and capsule retracted within the spathe; capsule hidden in the spathe, the posterior cell often indehiscent or 0, or the 2 anterior cells empty, connate, indehiscent and forming a persistent ligulate body, from which the posterior cell falls away.

+ Capsule 3-seeded. .. .. 1. C. paludosa.
- Capsule 5-seeded; 2 later cells 2-seeded each, the posterior 1-seeded, ... 2. C. benghalensis.

1. Commelina paludosa Blume, Enum. Pl. Jav. 1:2. 1827; Qaiser & Jafri in Fl. W. Pak. 87: 12, 1975 (Syn. C. obliqua auct. non Vahl).

Procumbent herb, pubescent to subglabrous or glabrous; leaves lanceolate, entire, acute, sessile, sheathing at base; spathes folded, solitary or crowded, obliquely funnel shaped, free or fused; flowers usually pale blue; capsule obovoid, 3-loculed with 1 seed in each locule; seeds ellipsoid, lead-coloured or whitish with marbled margins, minutely dotted.

Distribution and habitat: Common weed of sandy moist places, This plant has been collected from two places in paddy fields of Swat (Madyan & Pir Rahman Deri) from one locality each in Hazara (Attar Shishi) and Kurram Valley (Shalozan) - Pakistan, India, Serilanka, Bangla Desh to Malaysia, Indonesia, and Phillipenes. Fl. per. August - October.

2. Commelina benghalensis L., Sp. Pl. 41. 1753;
Qaiser & Jafri in Fl. W. Pak. 84: 10-1975.

Erect or procumbent perennial herb; dichotomously branched from the base, glabrous to pubescent, rooting below, whitish flowers on underground scapes; leaves ovate to ovate-oblong with sheathing base; upper cymes 2-3-flowered, lower 1-2-flowered, sometimes suppressed; aerial flowers blue, in short cymes subtended by spathes; seeds rugose or closely pitted.

Distribution and habitat: Common in moist and shaded places. Very common in rice fields of Swat & Hazara. Tropical and subtropical Asia and Africa — Fl. per. June - September.

11. Family ALLIACEAE

Bulbous herbs, with or without a rhizome; scapigerous; leaves basal or from the apex of the bulb, leaf base sheathing; inflorescence a cymose umbel, enclosed in a spathe when young; flowers hermaphrodite, regular; perianth brightly coloured, often withering and persistent, with or without a tube, 6, in 2 series, all equal and similar; stamens 6, opposite the perianth segments; filaments free or united at the base; carpels 3, united; ovary superior, 3-locular, with axile placentation; ovules numerous in

each loculus; style 1; stigmas 3; fruit a loculicidal capsule; seeds compressed to subglobose.

A L L I U M L.

Bulbous herbs; bulbs solitary or clustered; leaves sheathing, fistular or not; tepals 1-nerved, white - greenish, white, yellow, voilet, pink to reddish - purple or blue coloured; stamens included or exerted; filaments entire, toothed or cuspidate; anther elliptic to oblong; dorsifixed; seeds 6 or more; testa black.

1 + Outer coats of bulbs scaly, membranous, reddish brown .. .. 1. A. farctum

\- Outer coats of bulbs coriaceous, inner membranous 2

2 + Outer coats of bulbs fibrous, greyish-black; .. .. 2. A. griffithianum

\- Outer coats of bulbs striate, black-brown .. .. 3. A. jacquemontii

1. Allium farctum Wendelbo in Bytt. Arn. Bot. 14: 101. 1967. Nasir in Fl. W. Pak. 83: 16. 1975.

Perennial herbs with ovoid bulb; coats scaly, membranous, reddish brown; leaves 3-4, fistular upto 30 cm long, 2-6 mm broad; scape upto 70 cm tall, not fistular; umbels hemispherical, densely flowered; pedicels 0.5 - 1.5 cm long; tapals white, elliptic, obtuse; filaments as long as the tapals, connate at the base; capsule obcordate, c. 4 mm long.

Distribution and habitat: Commonly found as a weed of wheat fields in Hazara, Mardan and Bannu (not frequent) - Afghanistan and Pakistan. Fl. per. April - May.

2. Allium griffithianum Boiss., Diagn. Pl. Ser. 2, 4: 117. 1859; Nasir in Fl. W. Pak. 81: 20. 1975. (Syn. A. rubellum M. Bieb. Var. grandiflorum Boiss.).

Herbs, bulb ovoid, outer coats coriaceous, fibrous greyishish black, inner coats membranous; leaves 2-3, linear, fistular, glabrous; umbels hemispherical, dense flowered; pedicels unequal; tepals broadly lanceolate to oval, white to light pink or light purple, acute to obtuse, veins prominent; inner tepals shorter than the outer, distinctly gibbous at the base, filaments entire, about 2/3 of the filaments united.

Distribution and habitat: A very variable species, reported as a weed of wheat fields in D.I.Khan, Bannu, Kohat, Peshawar, Swat, Chitral and Afghanistan, India and Pakistan. Fl. per. March - April.

This is a very variable species, Stewart (1972) says that this needs further study to see if more than one unit is involved.

3. Allium jacquemontii Kunth., Enum. Pl. 4: 399. 1843; Nasir in Fl. W. Pak. 81: 20. 1975 (Syn. A. rubellum auct. non Bieb).

Herbs, 15-35 cm tall; bulb ovoid; outer coats coriaceous, striate, black brown; inner membranous; scapes slender, glabrous; leaves 2-3, linear, fistular, glabrous; umbels dense flowered; pedicels filiform; tepals rose coloured; filaments about 2/3 the length of the tepals; anthers dark voilet coloured; style included; stigma capitate.

Distribution and habitat: Collected from wheat fields of Swat, Hazara, Mardan and Peshawar, likely to be present throughout the province Central Asia, Afghanistan, Pakistan and India. Fl. per. March - April.

12. Family PONTEDERIACEAE

Aquatic, free floating or rooting perrenial herbs; roots adventitious; leaves submerged or floating, sheating at the base; flowers bisexual, regular, arranged in racemes or spikes, subtended by a spathe-like leaf sheath; perianth segments 6, free or united; stamens 6 or 3 or rarely, epipetalous; carpels 3, united, ovary superior, 3-lobed, with axile placentation or 1-many; fruit a 3-valved capsule or nut. Represented by 2 genera and 2 species.

\+ Perianth segments free, peliol not bulbous 1. Monocharia

\- Perianth segments partly united, petiole bulbous .. .. 2. Eichornia

1. MONOCHORIA Presl

Perennial herbs, erect, glabrous; with creeping roots stock; leaves alternate or solitary at top of stem, petioled; inflorescence racemose or subumbelliform, arising from a leaf sheath, perianth segments 6: (3+3), free; stamens 6, subequal; ovary 3-locular, ovules numerous; stigma lobed; fruit a loculicidal capsule, dehiscing explosively.

Monocharia vaginalis (Burm. f.) Presl, Rel. Haenk. 1: 128. 1827; Ghazanfar in Fl. W. Pak. 114: 1. 1977. (Syn. Pontederia vaginalis Burm. f; - P. planaginea Roxb; M. plantaginea Knuth.).

Erect or suberect herbs having small roots stock with adventitious roots; leaves petiolate (pitiole 4.21 cm long), ovate to lanceolate, base rounded to cordate, nerves convergent; inflorescence soon deflexed; flower bud lilac-blue; perianth blue, spotted red; stamens half as long as the perianth; ovary ovoid, stigma 3-lobed; capsule ovoid; seeds 1 mm long, transversely striated.

Distribution and habitat: Found in rice fields and marshy places. Reported from NOKOTE (Hazara) and Sadda (Kurram) in rice field. It is likely to be found in Swat as well. S.E. Asia to China, Japan and the throughout Malaya. Fl. per. July - November.

2. E I C H O R N I A Knuth

Aqutic herbs, free floating or rooting with stolons; stem short; leaves rosulate or alternate, petiolate; inflorescence terminal, panicle or spike; perianth gamophyllous, 6 partite; stamens unequal; ovary 3-locular; style filiform; capsule ovoid to linear.

Eichornia crassipes (Mart.) Solma in DC., Phan. 4: 527. 1883; Ghazanfar in Fl. W. Pak. 114: 3. 1977. (Syn. Pontederia crassipes Mart; E. speciosa knuth.

Herbs with short stem and long fibrous roots, floating when water is abundant and rooting when water becomes scarce; leaves glabrous, peliolate; petioles spongy with a fusiform bulbous portion above the middle; inflorescence from 3- many flowered; flowers lilac, tinged blue., perianth tube green, glandular; anthers purple blue; ovary ovoid, glabrous; style glandular; stigma 3-lobed.

Distribution and habitat: The "water Hyacinth" is common in Marshy areas. Collected from Peshawar (Tehkal and Charsadda). Though it is not a strong weed here, yet it is very dangerous and can become a very troublesome weed as has happened in the Punjab as reported by Ghazanfar (1977) -- Brazil, naturalized in many tropical countries.

13. LILIACEAE

Usually herbs, with (usually) or without rhizomes, corms, bulbs or tubers; stem erect or climbing, leafy or scapose; leaves alternate or whorled or very rarely opposite, rarely all basal; flowers regular, hermaphrodites never in umbels, perianth segments 6 in 2 series, petaloid with or without a tube; stamens usually 6; carpels 3, united; ovary superior, mostly 3-locular with axile placentation; ovules 2-many in each loculus; fruit a capsule or sometimes a berry. 2 genera are found as weeds.

Key to the Genera

\+ Plant bulbous, flowers solitary .. .. .. 1. Tulipa

\- Plants not bulbous, flowers arranged in racemose inflorescence .. .. 2. Asphodelus

1. TULIPA L.

Annual with tunicated bulb; stem simple, sometimes branched, scape like but leaf bearing; leaves largely radical; flowers mostly erect, bell shaped to saucer-shaped; segments of perianth 6; stamens 6; stigma usually 3-lobed; fruit a loculicidal capsule, many seeded.

Tulipa stellata Hk. f., Bot. Mag. t. 2762. 1827; Stewart Ann. Cat. Vas. Pl. W. Pak. & Kashmir. 59. 1972.
(Syn. T. clusiana Dc. Var. Stellata Regel.).

Common names: Urdu: Jangli lala, Pashto, Ghantole.

Bulbous annual; stem simple; leaves few to many, somewhat glaucous, sometimes red on the edges; flowers solilary, at first campanulate, later almost a flat star, pink, white or yellow; stamens half as long as the perianth segments; fruit a many seeded capsule.

Distribution and habitat: Common weed of wheat fields in Peshawar and Hazara. It prefer sandy loamy soil — Pakistan and Afghanistan.

2. ASPHODELUS L.

Annual or perennial herbs with fibrous roots; leaves radical, sheathing at the base; flowers bracteate, racemosely arranged on a usually much branched leafless scape; perianth white, 6-partite, withering without falling down; stamens 6; ovary 3-celled; ovules 2 in each cell; capsule a loculicidal capsule; seed one in each cell.

Asphodelus tenuifolius Cav. in Cienc. Nat. 3:46. t. 27. 1801. R.R. Stewart, Ann. Cat. Vas. Pl. W. Pak. & Kashmir 50. 1972.

Common names: Urdu and Push: Piazi, Piazakai.

Annual; leaves finely puberulous; scapes several; flowers white, laxly racemose; bracts broadly ovate; perianth segments oblong, obtuse with brownish midrib; stamens black; fruit a globose capsule.

Distribution and habitat: Spring weed of wheat fields throughout the province.

B. DICOTYLEDONS

Key to families

1	+	Flowers with both calyx and corolla; petals free ..	2
	-	Otherwise	26
2	+	Gynaecium apocarpous (Carpels numerous on an elongated receptacle) ..	1. RANUNCULACEAE
	-	Gynaecium syncarpous or carpel 1.	3
3	+	Flowers hypogynous	4
	-	Flowers perigynous or epigynous	22
4	+	Placentation parietal or ovules along the ventral suture	5
	-	Placentation axile, basal or apical	14
5	+	Stamens numerous (more than 10)	6
	-	Stamens less than 10	9
6	+	Ovary having a long gynophore	2. CAPPARIDACEAE
	-	Ovary not borne on a gynophore	7
7	+	Carpels open at the top, the ovary usually on a conspicuous disk; stipules glandular	3. RESEDACEAE
	-	Carpels closed at the top; disk absent; stipules absent	8
8	+	Fruit a capsule	4. PAPAVERACEAE
	-	Fruit a berry or follicle ..	1. RANUNCULACEAE
9	+	Flowers zygomorphic (leaves alternate, pinnatly divided, exstipulate, stamens 6, united into 2 tripartite groups)	5. FUMARIACEAE
	-	Flowers actinomorphic	10

10 + Stamens 6, tetradynamous; sepals 4; petals 4; ovary 2-locular by false septum .. .. 6. CRUCIFERAE

- Otherwise 11

11 + Ovary open at the top; (calyx 4-partite; petals 2; ovary 4-lobed 3. RESEDACEAE

- Ovary closed at top 12

12 + Flowers sessile (leaves small, connate at the base .. .. .. 7. FRANKENIACEAE

- Flowers pedicelled 13

13 + Sepals 2, petals 4; stemens 4, free .. .. 4. PAPAVERACEAE

- Sepals 4; petals 4; stamens 6, ovary on a gynophore .. .. 2. CAPPARIDACEAE

14 + Stamens more than twice the petals 15

- Stamens equal or twice the number of petals 17

15 + Sepals imbricate in bud; leaves exstipulate (stamens free, ovary deeply 2-3 lobed) .. .. .. 8. ZYGOPHYLLACEAE

- Sepals valvate; leaves stipulate 16

16 + Stamens monadelphous; epipetalous (anthers 1-celled, pollengrains spiny) .. .. 9. MALVACEAE

- Stamens free or connate at the base only, free from the petals; anthers 2-celled .. .. 10. TILIACEAE

17 + Placentation basal or free central, bearing 2-many ovules; ovary 1-locular 18

- Placentation axile, ovary 2-many celled. 19

18 + Sepals 4-5; stamens hypogynous 11. CARYOPHYLLACEAE

- Sepals 2, connate into a tube 12. PORTULACACEAE

19 + Flowers without hypogynous disk, all bisexual 20

- Flowers with a hypogynous disk, unisexual or bisexual .. .. .. 13. EUPHORBIACEAE

20 +	Stipules present	8. ZYGOPHYLLACEAE
-	Stipules absent	21
21 +	Leaves digitate with 3 obcordate leaflets; stamens 10, united at the base	14. OXALIDACEAE
-	Leaves simple, entire, fertile stamens united at the base ..	15. LINACEAE
22 +	Flowers perigynous, ovary superior	23
-	Flowers epigynous, ovary inferior or semi-inferior	16. UMBELLIFERAE
23 +	Gynoecium apocarpous or carpel 1, (fruit a legume; upper petals outside the adjacent lateral petals)	17. PAPILIONACEAE
-	Gynoecium syncarpous, fruit a capsule (leaves exstipulate) ..	24
24 +	Ovary 2-5 celled, (Ovary free in the bottom of the calyx tube; leaves (Cauline) alternate) ..	18. LYTHRACEAE
-	Ovary 1-locular	25
25 +	Leaves fleshy; stamens many; sepals 2	11. PORTULACACEAE
-	Leaves not fleshy, all radical or with one cauline; stamens & sepals 5 each	19. PARNASSIACEAE
26 +	Flowers with one floral envelope (calyx)	27
-	Flowers with both calyx & corolla; petals united	46
27 +	Ovary inferior (flowers typically 4-merous)	20. ONAGRACEAE
-	Ovary superior	28
28 +	Flowers unisexual	29
-	Flowers bisexual	36

29 +	Inflorescence a cyathium	13. EUPHORBIACEAE
-	Inflorescence not a cyathium	30
30 +	Leaves opposite (flowers in axillary clusters; ovary 1-locular; stamens 5)	21. AMARANTACEAE
-	Leaves alternate	31
31 +	Ovary 3-locular; fruit capsule ..	13. EUPHORBIACEAE
-	Ovary 1-locular; fruit an achene or nut	32
32 +	Stipules united to form an ochrea	22. POLYGONACEAE
-	Stipules absent, if present, not forming an ochrea	33
33 +	Sepals scarious, mixed with scarious bracts	21. AMARANTHACEAE
-	Sepals & bracts herbaceous	34
34 +	Styles 2 or 3; cystoliths absent ..	23. CHENOPODIACEAE
-	Otherwise	35
35 +	Style 1, simple epidermal cells with cystoliths	24. URTICACEAE
-	Style 2-partite	25. CANNABACEAE
36 +	Ovaries many in each flower (leaves alternate)	1. RANUNCULACEAE
-	Ovary 1 in each flower	37
37 +	Stamens inserted on the calyx tube (Perigynous)	38
-	Stamens inserted below the ovary (hypogynous)	40
38 +	Ovary 1-celled, 1-ovuled; stamens 8, in 2 whorls; fruit a drupe	26. THYMELAEACEAE
-	Ovary 2 or more celled	39
39 +	Stamens many; fruit a woody capsule	27. AIZOACEAE
-	Stamens 2-8; fruit a membranous capsule	18. LYTHRACEAE

40 + Ovary more than one-celled, (leaves 3-foliate, opposite) .. .. 8. ZYGOPHYLACEAE

- Otherwise 41

41 + Ovary 1-celled, 1-ovuled 42

- Ovary 1-celled, many ovuled 45

42 + Stipules ochreate .. .. 22. POLYGONACEAE

- Stipules absent or if present, not ochreate 43

43 + Leaves opposite, connate at the base 28. ILLECEBRACEAE

- Leaves alternate or opposite, but not connate at the base 44

44 + Flowers with scarious bracts; calyx scarious .. .. 21. AMARANTHACEAE

- Flowers without scarious bracts; calyx herbaceous or fleshy .. .. 23. CHENOPODIACEAE

45 + Ovary open at the top; placentation parietal .. .. 3. RESEDACEAE

- Ovary closed at the top; placentation free central .. .. .. 11. CARYOPHYLLACEAE

46 + Ovary superior 47

- Ovary inferior 62

47 + Corolla regular 48

- Corolla irregular 56

48 + Stamens as many as the corolla lobes 49

- Stamens fewer than the corolla lobes 54

49 + Stamens opposite the corolla lobes (Calyx not bracteate, style 1; fruit a many-seeded capsule) .. .. .. 29. PRIMULACEAE

- Stamen alternate with corolla lobes (Carpels united to form a single ovary) 50

50 + Ovary deeply 4-lobed; style gynobasic; (flowers in helicoid cymes) 30. BORAGINACEAE

- Ovary not deeply 4-lobed; style terminal 51

51 + Acaulescent herbs or rarely with leafy stems; corolla scarious; capsule circumsciss .. .. .. 31. PLANTAGINACEAE

- Caulescent herbs; petals coloured 52

52 + Fruit drupe or berry; leaves opposite; corolla more or less zygomorphic .. .. 32. VERBENACEAE

- Not as above 53

53 + Sepals united to form a cup or a tube, the tips alone free; style 1; ovules numerous .. .. 33. SOLANACEAE

- Sepals free or united at the base, the free portion always longer than the cup; style more than 1, if 1 then branched; ovules 1-2 in each cell .. .. 34. CONVOLVULACEAE

54 + Stamens 2 .. .. 35. SCROPHULARIACEAE

- Stamens 4 55

55 + Corolla convolute in bud; capsule elastically or explosively dehiscent .. .. 36. ACANTHACEAE

- Corolla imbricate in bud; fruit of 2 or more bony nutlets or drupaceous 32. VERBENACEAE

56 + Stamens 5 57

- Stamens less than 5 58

57 + Calyx 5-partite; some of the filaments wooly .. .. 35. SCROPHULARIACEAE

- Calyx tubular-urceolate, filaments not wooly .. .. 33. SOLANACEAE

58 + Ovule 1 in each of the 1-4 locules 59

- Ovules 2-many in each loculus .. 60

59 + Ovary not lobed; style terminal, entire (Ovary 2-4 locular) .. .. 32. VERBENACEAE

- Ovary lobed with a gynobasic style; fruit of 4-nutlets .. .. 37. LABIATAE

60 +	Ovary diffinitely 1-locular (without chlorophyll or true leaves)	39. OROBANCHACEAE
-	Ovary 2-locular	61
61 +	Corolla lobes rolled up lengthwise in bud; capsule springing open elastically; often borne on a stalk	36. ACANTHACEAE
-	Corolla lobes not rolled up lengthwise in the bud;capsule not springing open elastically, not stalked (seed not winged)	35. SCROPHULARIACEAE
62 +	Stamens united to form a tube around the style (flowers crowded on a common raceptacle,surrounded by an involcre; inflorescence a capitulum)	39. COMPOSITAE
-	Stamens free, inserted on the corolla tube	63
63 +	Leaves alternate	40. SPHENOCLEACEAE
-	Leaves opposite or whorled	64
64 +	Stamens 1-3; limb or calyx obsolete or setiform and developing into pappus	41. VALERIANACEAE
-	Stamens 4 or 5 (leaves either opposite and stipulate or whorled and exstipulate) ..	42. RUBIACEAE

1. Family RANUNCULACEAE

Annual or perennial herbs or climbing shrubs; leaves radical or alternate, rarely opposite, simple or compound; stipules 0 or adnate to the petiole; flower regular or irregular, usually bisexual, hypogynous; sepals 5, free; petals 0, or 3-5 or more, imbricate; stamens numerous, free; carpels many, free, 1-celled; stigma simple; ovules 1 or more on the ventral suture; fruit of numerous 1-seeded achenes or many seeded follicles, rarely acapsule or berry.

1. RANUNCULUS L.

Annual or perennial herbs; leaves entire, lobed or dissected; stipules membranous or 0; flowers panicled, yellow; sepals 3-5, green; petals 5 with pocket like nectaries at the bose on the upper surface, rarely 0; stamens many, carpels many with short style and a solitary ascending ovule; fruit a head or spike of beaked or apiculate achenes.

Three species are found as weeds.

1 + Leaves deeply divided, achenes flattened, smooth .. .. 1. R. laetus

\- Leaves wedge shaped, not lobed or 3-fid achenes spiny or tubercled 2

2 + Achenes spiny .. .. 2. R. arvensis

\- Achenes tubercled .. .. 3. R. muricatus

1. Ranunculus laetus Wall. ex H & T., Fl. Ind. 36. 1855.

Stewart, Ann. Cat. Vas. Pl. W.Pak. & Kash. 271. 1972.

Branched perennial, upto 60 cm high, covered with long and closely appressed white hairs; root stock woody; radical leaves long stalked, 3-lobed; cauline sessile, smaller; flowers bright yellow; achenes flattened; smooth. (Fig. 13).

Distribution and habitat: Collected from rice field in Shalozan (Kurrum).

2. Ranunculus arvensis L., Sp. Pl. 555. 1753; Stewart Ann. Cat. Vas. Fl. Pak. & Kashm. 269. 1972.

Much branched annual; radical leaves wedge-shaped, stalked, cuneate or obovate, 3-5 toothed at the tip, otherwise entire; cauline short, stalked, divided into 2 or 3 linear segments; flowers yellow in axillary and terminal cymes; sepals appressed to the petals and half as long; achenes spiny, 5-10, style straight or hooked. (Fig. 14).

Distribution and habitat: Commonly found in wheat fields of Mardan and Peshawar districts.

3. Ranunculus muricatus L. Sp. Pl. 555. 1753., Stewart, Ann. Cat. Vas. Pl. Pak. & Kashm. 271. 1972.

Erect or diffuse annual, glabrous, rarely hairy, radicle leaves long stalked, shortly lobed, base rounded or cuneate; upper wedge-shaped, base cuneate; sepals reflexed, shorter than petals; achenes in large globose heads, flat, beak hooked, tubercles scattered over the flattened sides or confined to near the intramarginal rib. (Fig. 15).

Distribution and habitat: Very common weed of wheat fields in irrigated area of Bannu, Kohat, Peshawar, Mardan.

2. Family CAPPARIDACEAE

Herbs or shrubs, rarely trees; leaves alternate, rarely opposite, simple or digitately 3-7-folitate; flowers bisexual, actinomorphic, rarely zygomorphic, hypogynous; sepals free or partially united, 4; petals 4-many or absent; stamens few to many, sometimes a few reduced to staminodes; carpels 2, united, ovary 1-locular with parietal placentation, rarely 2-locular due to false septum, ovules few to many; fruit a capsule or berry.

CLEOME L.

Herbs or undershrubs, sometimes bushy & woody below, generally glandular-hairy; leaves alternate, petiolate, simple or palmately 3-5(-9) foliate; inflorescence racemose, bracteate or ebracteate; flowers mostly small or mediocre, yellow, white or pinkish; sepals 4, free or shortly united at the bare; petals 4; androphore absent or inconspicuous; stamens free, generally 4-12; gynophore present or absent; ovary 1-locular with many ovules on two parietal placentas; capsule usually elongated with 2 dehiscing values; seeds many, reniform or discoid, glabrous or asperous, smooth, rugulose or ridged. Four species are found as weeds of cereals.

1 + Leaves digitately 3-7-foliate, 2

\- Leaves simple 3

2 + Leaflets of lower leaves large, usually more than 5 cm long; flowers large, more than 1 cm across .. .. 1. C. viscosa

\- Leaflets small, usually less than 4 cm long; flowers small, less than 1 cm across .. .. 2. C. brachycarpa

3 + Fruits covered with short stalked glands, linear-cylindrical; petals appendiculate at the junction of limb and claw .. .. 3. C. fimbriata

\- Fruits glabrous, sparsely papillose, glandular; oblong-linear-compressed; petals not appendiculate .. .. .. 4. C. rupicola

1. Cleome viscosa L., Sp. Pl. 672. 1753; Jafri in Fl. W. Pak. 34:23. 1973. (Syn. C. icosandra, Polanisia viscosa (L) D.C.; P. icosandra (L) Wight & Arn.).

Annual herbs with glandular or eglandular hairs; leaves 3-5 foliate; leaflets obovate, variable in size, middle one largest; racemes elongated with corymbose flowers at the top and elongated mature fruits below, bracteate; flowers whitish or yellow, bracts foliaceous; sepals oblong lanceolate, glandular-pubescent; petals oblong-obovate; stamens 10-12-many, not exceeding the petals; gynophore absent; fruit linear-oblong, erect, obliguely striated, glandular pubescent; seed many 1-1.4 mm in diam; glabrous with longitudinal striations & transverse ridges; dark brown.

Distribution and habitat: Common weed of corn fields in Swat, Dir, Chitral and Hazara — Found throughout tropical regions of the world. Fl. per. July - November.

2. Cleome brachycarpa Vahl. & D.C., Prodr., 1: 240. 1824; Jafri in Fl. W. Pak. 34:23-24. 1973.

Perennial or annual (rarely), much branched, coarse, viscid-pubescent herb; leaves 3-5 foliate petioled, upper ternate to simple; leaflets upto 2 cm long, onlong-obovate; flowers in lax bracteate racemes, 6-8 mm across, yellow, pedicelled; stamens 6;

fruit capsular, 8-10 mm long, 2-3 mm broad, oblong, densely glandular and rough; seeds many 0.5 - 0.8 mm in diam., finely ruguloso, maroon- brown, glabrous.

Distribution and habitat: Found throughout the dry & sandy areas of Pakistan. Common weed of wheat field in rain fed areas of Bannu, D.I.Khan, Karak & Kohat Districts — Trop. & N. Africa, Egypt, Arabia, Iran, Afghanistan & India. Fl. Per. April - May.

3. Cleome fimbriata Vicary in J. Asiat. Soc. Beng., 16: 1158. 1847; Jafri in Fl. W. Pak. 34: 29-30. 1973.

Annual herb, branched from below, hairy with thin glandular & eglandular hairs; leaves simple, ovate, petiole long, densely hairy; flowers bracteate or ebracteate, yellow; sepals ovate, acute, sparsely glandular; petals dimorphic, 2 linear lanceolate and 2 broader with triangular limb; stamens 4; fruit conspicuously linear, apex acute and often very tapering; seeds many about 1 mm in diam., glabrous, minutely granulate, brownish.

Distribution and habitat: Rarely found as a weed of wheat fields of Peshawar, Mardan, Swat and Chitral — Iran, Iraq, Afghanistan and Turcomania.

4. Cleome rupicola Vicary in J. As. Soc. Bengal., 16: 1158. 1847. (Syn. C. stocksiana Boiss.).

Perennial (or annual) herb, branched from below, dansely glandular all over; leaves simple, petiolate, entire; inflorescence 20-30 flowered, bracteate below; flowers deeply yellowish-brown; sepals more or less triangular, densely papillose or glandular;

petals broadly ovate or suborbicular; stamens 6; fruit oblong linear, pendulous compressed; seeds many, 2 mm in diam; silvery, densely hairy.

Distribution and habitate: Weed of wheat fields in Bannu & D.I.Khan — Pakistan. Fl. per. March - May.

3. Family R E S E D A C E A E

Herbs or shrubs; leaves simple, stipulate; flowers asymmetrical, in spike or raceme, zygomorphic; petals ofter lobed; stamens 3-many; carpels 2-6, rarely free; ovary 1-locular, placentation parietal with many ovules; fruit a 1-celled capsule or berry; seeds albuminous; kidney-shaped, many.

O L I G O M E R I S Camb.

Erect to ascending herbs; leaves simple, linear, entire; flowers arranged in spike, bisexual, white to pale-yellow; petals 2; stamens 3-8, free or united at the base; disc not present; capsule ovoid, 3-4- cuspidate; seeds many, glossy & ovoid.

Oligomeris linifolia (Vahl) Macbride in contr. Gray. Heb. n. s. 53. 13. 1918; Nasir in Fl. W. Pak. 90: 1. 1975. (Reseda linifolia Vahl)

Annual herb; stem ribbed, leaves in clusters, with 1-2 minute basal lobes; flowers bisexual, in dense spikes, bracteate, sepals 4, connate at the base; petals 2, united or free stamens 3-4, rarely abortive; capsule erect, subglobose; teeth acute, membranous; seeds glaucous, black (greenish).

Distribution and habitat: A very common weed of sandy, saline & rainfed areas, found in wheat fields of D.I.Khan, Bannu, Kohat and Peshawar districts — U.S.A., N.Africa, Syria, Iran, India, Pakistan & Spain. Fl. per. January - April.

4. Family PAPAVERACEAE

Herbs, annual or perennial, often laticiferous; leaves exstipulate, alternate, often much divided; flowers generally large, showy, with the parts in twos. or fours & caducous; polyandrous; ovary 1- celled (2- many carpellary) usually with many ovules on each placenta (parietel); fruit mostly a capsule dehiscing by pores or valvea, seeds minute.

Five species distributed where three genera are found as weeds.

1 + Stamens 4; carpels 2 .. .. 1. Hypecoum

- Stamens & carpels indefinite 2

2 + Capsule opening by pores under the stigmatic disc .. .. 2. Papaver

- Capsule dehiscing at the top by short valves; leaves spiny toothed 3. Argemone

1. HYPECOUM L.

Annual herbs, glabrous, glaucous; erect or prostrate; leaves 2-4-pinnatisect or parted, radical leaves more divided than cauline; inflorescence a dichasial cyme; flowers yellow, white or purplish; sepals 2; petals 4 in two series; stamens 4, free; ovary linear, unilocular, style short, stigma 2; fruit linear, many seeded, lomentoid; seeds compressed, without aril.

Hypecoum pendulum L., Sp. Pl. 124. 1753., Jafri & Qaiser in Fl. W. Pak. 61: 27-29. 1974 (Syn. H. caucasicum Koch ex. led., H. procumbens auct. non. Linn.).

Annual; leaves radical, 2-3-pinnatisect; inflorescence (1-) 2-4 flowered, flowers yellow; sepals ovate, entire or shallowly incised at the margin, petals 4; stamens opposite the petals; ovary

cylindrical, brownish; stigmas 2, some-what yellow; fruit lomentoid; seeds small brownish, planoconvex to reniform, C. 2 mm long, 1.5 mm broad.

Jafri & Qaiser in Fl. W.Pak. 61: 1-32. 1974 have described two varieties viz. var. pendulum and Var. parviflorum.

Distribution and habitat: Weed of wheat fields in Swat, Mardan, Peshawar, Kohat & Bannu (rare). — Russian, Turkestan, Turkey, Iran, Afghanistan, Pakistan, Fl. per. March - April.

2. P A P A V E R L.

Annual or perennial herbs; leaves toothed or pinnatly lobed, hairy or hispid or bristly; inflorescence often solitary, terminal or axillary, often on long penduncles; flowers large; sepals 2 (-3) free, often hispid; petals 4 (-6) crumped in bud, red, pink, yellow or white; stamens indefinite; atigmas 4-20, born on a disc, seesile; ovules many on parietal placentae; fruit many seeded capsule, dehiscing by pores just beneath the persistent stigmatic disc; seeds small or minute, kidney-shaped, and pitted or very finely reticulated.

Three species are found as weeds.

1	+ Capsule glabrous	1. P. dubium
	- Capsule hispid or setulose	2
2	+ Capsule 1-2 cm long; flower bud without horns	2. P. hybridum
	- Capsule 6-8 mm long; flower bud with two horns	3. P. pavoninum

1. Papaver dubium L., Sp. Pl. 1196. 1753; Hk. f., Fl. Brit. Ind. 1. 117. 1872; Jafri & Qaiser in Fl. W. Pak. 61:13-15. 1974.

Annual, glabrous to hispid or bristly; latex usually milky; leaves pinnatifid; flower bud ovoid; sepals 2, caducous, glabrous glabrous or bristly, ovoid; petals reddish, pinkish or pale scarlet with basal dark blotch or spots, caducous; stamens as long as the ovary; capsule glabrous, ribbed; seeds very small, kidney shaped, bluish black or brownish.

Distribution and habitat: Weed of wheat fields in Hazara, Peshawar & Kohat districts, probably it has been escaped from cultivation as an ornamental herb — Europe & Asia, Fl. per. March - June.

2. Papaver hybridum L. Sp. Pl. 506. 1753; Jafri & Qaiser in Fl. W. Pak. 61: 10-12. 1974.

Erect annual, sparsely branched, with stiff hairs; latex white; leaves 2-3 pinnatisect; flowers on terminal or axillary hairy pedunclen; petals pink-red to crismon or scarlet with blackish violet spot at the base; stamens as long or slightly longer than the ovary; capsule densely covered with the yellowish bristles; seeds very small grey-brown or black with many, minute somewhat rectangular alveoli.

Distribution and habitat: Weed of wheat fields in Peshawar and Mardan district — Europe, N. Africa; S.W. & C. Asia, Afghanistan & Pakistan.

3. Papaver pavoninum Schrenk, Enum. Pl. Nov. 2: 64. 1942. (Syn. P. pavoninum Fish & Mey; P. conigerum Stocks).

Annual herb, branched, hispid or often setose below; leaves more or less similar to the above species; flowers often in groups of 3, scarlet or deep red with black blotch at the base; calyx

hispid or bristly; petals bright red with black basal blotch; stamens as long or slightly longer than the ovary; capsule broadly ovoid to suborbicular, densely setose with ascending yellowish bristles; seeds very small.

Distribution and habitat: Common weed of wheat fields of Chitral, Swat, Mardan, Hazara, Peshawar, Kohat & Bannu district — Turcomania, Iran, Afghanistan, Atlal & Pakistan.

3. A R G E M O N E Linn

Spiny erect herbs with yellowish juice; sepals generally 3; petals 6, both caducous; stamens many; capsule prickly, dehiscing by short valves at the top, seeds many, crested.

Argemone mexicana Linn., Sp. Pl. 508, 1753; Hk. f. & Thom. in f. Fl. Brit. Ind: 1: 117. 1874: Jafri & Kaiser in Fl. W. Pak. 61: 21. 1974.

Common name: Urdu: Pila Dhatura.

A spiny glaucescent annual, 40-100 cm tall, erect with yellowish juice; leaves sessile, semiamplexicaul, sinuate-pinnatifid, spiny on the margins, variegated with white, very variable in size, upto 20 cm long; flowers yellow, about 2.5 cm across; capsule oblong, prickly, 2.5 - 3.5 cm long, 1.5 - 2 cm broad.

Distribution and habitat: Though this specimen has not been reported from this province by Fl. W. Pakistan however, this specimen has been collected from cereal research institute (C.R.I) Pir Sabak (Nowshera), Peshawar from wheat fields.

Native of West Indies & Mexico, but naturalized in most of the warm countries of the world as weed. Fl. per. March - May.

5. Family FUMARIACEAE

Very closely allied to Papaveraceae, and often included in it, but distinguished from it by its zygomorphic corolla with often coherent petals, 2 caducous sepals & characteristic 6 stamens with somewhat winged and coherent filaments and dimorphic anthers (4 monothecus and 2 dithecus).

FUMARIA L.

Annual herb; stem leafy; leaves compound, finely dissected; flowers small, zygomorphic in dense racemes; corolla spurred; fruit small, indehiscent, globular, nutlet, 1-seeded, seed crestless.

Fumaria indica (Hskn.) Pugsley in Jour. Linn. Soc. Bot. 44. 313. 1919; Jafri in Fl. W. Pak. 73: 39. 1974.

Spring annual of cultivated fields, with lax leafy stem upto 45 cm long, ascending; leaves much divided; racemes lax, 2.5-5 cm long; flowers white or pinkish, 5-6 mm long; fruits globose, rugose when dry, about 2.5 mm in diam., rounded at the top & with 2 pits, fruit 1-seeded; seed 1-1.5 mm in diameter, brownish.

Distribution and habitat: One of the commonest weed of wheat fields found throughout the province in irrigated fields — India, Pakistan, Afghanistan & C. Asia, Fl. per. February - May.

6. Family BRASSICACEAE (CRUCIFERAE)

Herbs (rarely shrubs), pubescent or hairy; rarely glandular; leaves exstipulate, alternate or rarely opposite; flowers hermaphrodite, regular, hypogynous, arranged in racemose or

corymbose manner; sepals 4, in 2 decussate pairs; petals 4, cruciform; stamens 6, tetradynamous, free or connate in pairs, carpels 2, united; ovary 1-celled, sometimes 2-celled due to false septum; placentation parietal, ovules usually many; style one, stigma 2 or connate; fruit siliqua or silicula, 2-valved or indehiscent, rarely transversely jointed.

16 genera and 19 species are found as weeds of various crop fields.

1	+ Fruit a silicula	2	
	- Fruit a siliqua	9	
2	+ Fruit dehiscent	3	
	- Fruit indehiscent	5	
3	+ Hairs stellate		1. Alyssum
	- Hairs not stellate	4	
4	+ Valves one seeded		2. Lepiduim
	- Valves more than one seeded		3. Capsella
5	+ Stem leaves divided		4. Coronopus
	Stem leaves not divided	6	
6	+ Ovary unilocular		5. Isatis
	- Ovary bilocular	7	
7	+ Fruit laterally compressed at right angle to the septum; narrowly septate		6. Cardaria
	- Fruit compressed parallel to the septum	8	
8	+ Cauline leaves cuneate at base, not amplexicaul; ovary 2 - ovuled; beak conspicuous		7. Euclidium
	- Cauline leaves auricled at base, amplexicaul, ovary 4 - ovuled; beak indestinct		8. Neslia

9	+ Radicle accumbent	10	
	- Radicle incumbent	11	
10	+ Pod with horn like processes, pod small, stigma capitate		9. Notoceras
	- Pod without horn like processes, pods broad		10. Nasturtium
11	+ Cotyledons folded or bent round, (beak seedless, stigima deeply bilobed), petal veins violet		11. Eruca
	- Cotyledons not folded or bent round, petal veins not violet	12	
12	+ Leaves finely pinnatisect		12. Descurainia
	- Leaves not finely pinnatisect ..	13	
13	+ Pod & stalk with stellate or branched hairs		13. Malcolmia
	- Otherwise	14	
14	+ Pod 4 - angled		14. Coldbachia
	- Otherwise	15	
15	+ Petals yellow, fruit erect or spreading		15. Sisymbrium
	- Petals white or pinkish, fruit subcylindrical, torulose, often curved or coiled at the apex		16. Torularia

1. A L Y S S U M L.

Annual or perennial herbs, clothed with stellate hairs; leaves linear, simple; flowers small, yellow or whitish; sepals short, erect or spreading; petals short clawed, entire or bifid; filaments often winged or appendaged; silicula lens shaped, orbicular, opening parallel to the flat sides; seeds 2-10, on lateral or nearly apical placenta, narrowly winged; cotyledons accumbent.

Alyssum linifolium Steph. ex willd; Sp. pl. 3 (1): 467. 1800; Jafri, in Fl. W. Pak. 55: 115. 1973. (Syn. A. linifolium var. tehranicum Bornm; A. Cupreum Frehn & Sint.).

Annual herb, branched from the base, having appressed, stellate hairs; leaves oblanceolate — linear oblong, upto 25 mm long and 3 mm broad, sessile and entire; flowers whitish yellowish arranged in 10-25 flowered racemes; siliculae broadly eliptic, upto 7 mm long & 4 mm broad, membranous, having distinct midvein, glabrous; seeds 4-8 in each locule, brown.

Distribution and habitat: This a very variable species, sometimes it is erect, sometimes suberect and may be prostrate at another time. It is a weed of rainfed wheat fields of Kohat and Bannu districts. I have collected this species from Darra Adam Khel as well, may be it is found as a weed in Peshawar too. Jafri (1973) has reported it from Kurrum Agency without any mention of its weediness — C., S.East Europe; N. Africa, S.-. Asia — Pakistan. Flowering Period. March - June.

2. L E P I D I U M L.

Annual or perennial herbs, sometimes woody below, glabrous or hairy, apparently dichotomously branched; leaves toothed or pinnatifid, lower stalked and upper sessile or subsessile; flowers white or nearly so, arranged in ebracleate corymbose racemes; sepals 4, often green with white margins; petals 4, small, rarely absent or rudimentary; stamens 2-4, 6 or wanting; fruit laterally much compressed, tip notched or entire valves boat shaped; seeds solitary in each locule, brown; cotyledon incumbent or obliquely so.

Three species are found as weeds.

Key to the species

1	+ Cauline leaves auriculate or clasping	1. L. perfoliatum
	- Cauline leaves not auriculate or clasping	2
2	+ Fruit winged; style longer than the notch	2. L. sativum
	- Fruit not winged; style shorter than the notch	3. L. pinnatifidum

1. Lepiduim perfoliatum L., Sp. Pl. 643. 1753; Jafri in Fl. W. Pak. 55: 59. 1973.

Annual or biennial, suberect or erect; 15-33 cm tall, branched mostly above, more or less pilose; leaves dimorphic; radical leaves bipinnatifid, cauline leaves entire, cordate or reniform, clasping; flowers yellow; racemes 30-70 flowered, ebracteate; siliculae suborbicular or broadly elliptic, slightly winged and notched; seeds ovate - oblong, reddish - brown.

Distribution and habitat: Found as weed of wheat fields in Peshawar, abundant in the University Campus — C. & S. Europe, eastward — Pakistan Fl. per. March - June.

2. Lepidium sativum L., Sp. Pl. 644. 1753; Jafri in Fl. W. Pak. 55: 55. 1973 (Syn. L. spinescens Dc; L. sativum subsp. spinescens (DC) Thell.

Common name: Garden Cress, Push: Ubashta.

Annual herb, branched, glabrous or pilose; lower leaves pinnatisect or lyrate-pinnate, stalked to sub-sessile; upper most leaves sessile, racemes much branched; flowers small, white or pinkish; sepals oblong, obtuse; petals narrowed below, apex rounded; stamens 6; anthers minute; siliculae 4-6 mm long, 3-5 mm broad, glabrous and distinctly notched at the apex; seeds 3 mm long, 1 mm broad, brown.

Distribution and habitat: A very common weed of Peshawar district, Swat and Chitral; Jafri (1973) also consider it as a weed of cultivated fields in Baluchistan and N-W.F.P. — Native of Europe and W. Asia, naturalised throughout the world. Fl. per. April - June.

3. Lepidium pinnatifidum Ledeb., Fl. Russ., 1:206. 1842., Jafri in Fl. W. Pak. 55: 56. 1973.

Annual herb, stem branched from above, glabrous or pubescent; basal leaves much divided, drying early; cauline leaves irregularly dentate, generally 3-5 cm long; appear almost entire or sparsely toothed; flowers yellowish green; petals 1 mm long; pod orbicular, destinctly notched. (Fig. 17).

Distribution and habitat: Collected from wheat fields of Abbottabad, it is likely to be found in wheat fields of Swat, Dir and Chitral. Fl. Per. April - June.

3. C A P S E L L A Medik.

Annual herbs, branched from below, week; basal leaves pinnate to entire stalked, upper leaves sessile; inflorescence corymbose racemes; flowers small, white; sepals suberect,

oblong; petals short, white, or pinkish, apex rounded; stamens 6; pod obtriangular or obcordate triangular, compressed, bilocular, dehiscent, not winged; seeds 6-12 in each locule, brown; radicle incumbent.

Capsella bursa-pastoris (L) Medik., Pflanzengatt. 1: 85. 1792. Jafri, in Fl. W. Pak. 55: 90. 1973. (Syn. Thlaspi bursa-pastoris L.).

Common name: Eng. Shepherds purse; urdu: Chambaraka.

Annual or biennial, erect, glabrous or hairy; hairs simple or branched; basal leaves variable, usually pinnatifid, stalked, upto 8 cm long; cauline leaves small, sessile; racemes many flowered; flowers white; sepals oblong, obtuse petals lanceolate, white, longer than sepals; siliculae obcordate - triangular, apical notch wide, v-shaped; seeds 6-12 in each locule, oblong-elliptic, pale brown. (Fig. 18).

Distribution and habitat: This is a cosmopolitan species, found as a weed of wheat-fields throughout the province -- cosmopolitan. Fl. per. March - July.

4. C O R O N O P U S J.G. Zinn

Annual or biennial, procumbent or sub-erect, glabrous or hairy; leaves pinnatisect or deeply dissected; flowers inconspicuous; sepals half spreading; petals whitish often small or absent; stamens 6, 4 or 2; ovary 2-ovuled; stigma somewhat bilobed; pod minute, wrinkled or tubercled, indehiscent or splitting into 1-seeded halves.

Coronopus didymus (L.) Smith, Fl. Brit. 2.691. 1804. Fl. W. Pak. 55. 62. 1973. (Syn. Lepiduim didymum L., Senebiera didyma (L) Perse; S. pinnatifida DC)

Common names: Urdu: Gandi booti, Push: Ganda bootai, Sarghundoi.

Annual or biennial, hairy glabrescent herb, diffuse or procumbent, foetid, branched from below, basal leaves rosulate, pinnatisect, stalked; upper leaves similar or pinnatifid, sessile or sub-sessile; racemes 30-60 flowered; petals white shorter than the sepels, or absent; stamens 6, or only 4 but 2 fertile; siliculae short, with 2 hemispherical lobes containing 1-seed each; septum narrow, radicle incumbent.

Distribution and habitat: It is a very common weed of wheat and other cultivated fields throughout the planes of this province -- probably it is native of S. America, introduced throughout the world. Fl. per. March - June.

Note:- Milk of cattle has a very upleasant odour and taste due to its foetid nature.

5. ISATIS L.

Annual, biennial or perennial herb, branched; stem, leaves and branches glabrous and glaucous; basal leaves stalked to sessile; cauline leaves sessile, cordate or sigittate to ovate oblong; inflorescence racemose, branched or panicled, ebracteate; flowers small, yellow to whitish or lilac white; sepals suberect; petals longer than sepals with rounded apex; stamens 6; lateral nectar glands almost annular; middle narrow, joining the laterals;

ovary unilocular, with 1-2 pedulous ovules; siliculae indehiscent, laterally flattened, unilocular, glabrous or minutly hairy, rarely papillose; seed usually 1, brown; radicle accumbent or incumbent.

Isatis stocksii Boiss; Fl. Or. 1: 376. 1867. Jafri in Fl. W. Pak. 55: 71. 1973.

Annual herbs; basal leaves sessile or subsessile, entire or sub-entire; upper leaves oblong lanceolate, entire or subentire; racemes ebracteate, 20-30 flowered; flowers yellow; sepals oblong, obtuse; petals ovate-oblong; silicula 2.5 - 3 mm broad, hairy; wing narrow; seeds 2 mm long and 1 mm broad, oblong -ellipsoid, brown.

Distribution and habitat: Collected from the field of wheat fields in Tajazai, Lakki Marwat (Bannu). It is a first report for the flora of W. Pak from N-W.F.Province - Afghanistan and Pakistan. Flower Per. April - August.

6. C A R D A R I A Desv.

Perennial herbs, branched from below; pubescent with simple or forked, appressed hairs; basal leaves stalked; cauline leaves sessile; racemes and flowers similar to Lepiduim but nectar gland different; ovary 2-4 ovaled, elliptic to sub-orbicular, bilocular, glabrous or minutely pubescent; siliculae bilocular, indehiscent; seeds usually 1, pendulous, reddish-brown; redicle incumbent.

Cardaria chalepense (L) Hand - Mazz. in Ann. Nat. Hofmus. Wien. 27:55. 1913; Jafri in Fl. W. Pak. 55: 68. 1973 (Syn. Lepidum challepense (Sch) Boiss.)

Common name: Urdu: Garbust, Buskah, Halia, Pushto: Buski.

Perennial herb, pubescent, simple or branched; leaves oblong repand toothed; lower petioled, deciduous; upper sessile, with converging auricles; flowers small, white in branched panicles; petals twice as many as sepals, white; siliculae ovate to suborbicular (even on the same plant), with entire tip, constricted between the valves of which one is often imperfect; valves wingless, turgid.

Distribution and habitat: Found as a weed of wheat field in Kohat, Peshawar, Mardan, Hazara (Division) Swat and Chitral. It is native of Central and W. Asia, now extended to Europe. Flowers per. April - August.

7. E U C L I D I U M Br.

Annual herb, apparently dichotomously branched, with forked or branched pubescence; leaves entire, toothed or pinnatifid; inforescence raceme, ebracteate, terminal or lateral; flowers small, white; sepals spreading, equal at the base; petals slightly longer than sepals; stamens 6; ovary globose, 2 - ovuled; siliculae globose or subglobose, bilocular, indehiscent; seeds 1 in each locule, brownish, radicle accumbent inmature state.

Euclidium syriacum (L) R. Br. in Aiton, Hort. Kew., ed. 2 4: 1812; Jafri in Fl. W. Pak. 55: 103. 1973 (Syn. Anastatica syriaca L; Bunias syriaca (L) M.Bieb).

Annual herb, much branched from below; hairs 2-3 furcate; leaves variable sinuate toothed to subentire, lower stalked, upper subsessile or sessicle; spikes or racemes 15-30 flowered; flowers white, subsessileñ ovary 2-ovuled; stigma bilobed; fruit 2-celled, hairy, with 1-seed in each locule; seeds ovoid, dark brown.

Distribution and habitat: Found as a weed of wheat-fields in Peshawar and Mardan districts, and in seedling of rice in Chitral — S. Russia, S.W. Asia, Hamalaya, Afghanistan and Pakistan.

Flowering period: April - June.

8. N E S L I A Desv.

Annual herbs, hairy (simple andbranched); leaves entire or sinuate - toothed; cauline leaves sagitate and amplexicaul; flowers in ebracteate panicled racemes, small, yellow; sepals not saceate at base, spreading; petaps longer than sepals, entire; stamens 6; fruit a siliculae, bilocular, indehiscent, 1-seeded; seed 1, brown; radicle incumbent.

Neslia apiculata Fisch., C.A. Mey & Ave. Lall in Ind. Sem. Hort. Petrop. 8: 68. 1842; Jafri in Fl. W. Pak. 55: 105. 1973.

Annual, 20-60 cm tall, erect, branched; basal leaves stalked; cauline leaves sessile, amplexicaul; racemes 30-50 flowered; flowers yellow; sepals erect, yellowish green; petals golden yellow; ovary 4 ovuled; siliculae lentiform sub-spherical, glabrous, reticulately veined; seeds brown.

Distribution and habitat: Weed of wheat-field in Chitral, Swat and Peshawar and Maize fields of Abbottabad (after Barrett 100 (kew) cited by Jafri 1973) — S. Europe, N-W. Africa, S.W. & C. Asia, N.W. Hamalaya and Pakistan.

Flowering period. March - April.

9. NOTOCERAS R. Br.

Annual herb, stiff, depressed, branched, hoary with bipartite appressed hairs; leaves oblanceolate to linear, entire or subsessile; flowers, white, pale yellow in leaf opposed racemes; sepals equal at the base; petals small, linear oblong; pods rigid, - 4 angled with 2 apical horns, bilocular; seeds 1-seriate, ovate, not winged.

Notoceras bicorne (Aitn) Amo., Fl. Iber. 6: 636. 1873. Jafri in Fl. W. Pak. 55: 1934. 1973. (Syn. Erysimum bicorne Ait; N. Canarionse R. Por; N. hispanicum DC.).

Spreading or ascending annual herbs; branched mostly from below; hairy with 2-partite appressed hairs; leaves oblanceolate to linear - oblong; racemes 15-30 flowered, lax in fruit; flowers white; sepals 1-2 mm long, covered with appressed hairs; petals equal to or slightly longer than sepals; siliquae bilocular, 4-8 mm long, 1-2 mm broad, hairy; valves with a prominent keel prolonged at tip into a horn; stigma capitate; seeds 2-8 in each locule.

Distribution and habitat: Found as a weed of wheat fields in Kohat and Peshawar (It is not so common). — Pakistan, Westwards to the Mediterranean region. Flowers per April - June.

10. NASTURTIUM R. Br.

Perennial herbs, spreading or ascending, leafy shoots rooting at the base; glabrous or hairy; leaves pinnate; racemes ebracteate; flowers white; sepals short, spreading, equal at the base; petals short, narrowed at the base, scarcely clawed, or 0; stamens 2, 4 or 6; siliquae long or short, almost

cylindric; valves fainthy 1-nerved; seeds 1-2 seriate, each with numerous polygonal depressions; cotyledons accumbent.

Nasturtium officinale R. Br. in Aiton, Hort. Kew. ed. 2, 4: 1140. 1812; Jafri in Fl. W. Pak. 55: 185. 1973 (Syn. Sisymbrium nasturtium - aquaticum L., Rorippa nasturtium - aquaticum (L) Hyek.)

Perennial, rhizomatous herb; stem creeping, much branched; leaves pinnate; the upper with 3-7 pinnules and a terminal one; the lower cut into 3 repand segments; flowers white, small, in short racemes; siliquae oblong, subcylindrical, often slightly upcurved, glabrous, faintty veined; seeds many, 2-seriate.

Distribution and habitat: Weed of maize fields in Dir and Peshawar — Europe and Temperate Asia, widely introduced. Flowers per. April - July.

11. E R U C A Mill.

Annual or perennial, erect, branching herbs; hairy, sometimes glabrous; leaves pinnatifid, lower stalked, upper subsessile or sessile; flowers large, whitish yellow or lilac, vein violet, in elongating terminal racemes; sepals erect, oblong, obtuse; petals abovt twice as long as the sepals; ovary cylindrical, 13-50 ovuled, beak prominent; siliquae 4-angled with a seedless beak; seeds many, globose in 2 rows, wingless; cotyledons conduplicate.

Eruca sativa Mill; Gard. Dict; ed; 8, 1: 1768; Jafri in Fl. W. Pak. 55: 33: 1973. (Syn. E. eruca L; E. cappadocica Reut; E. vesicaria (L) Cav. Var. sativa (Mill) Thel.

Common name: Eng. Taramira; Pushto: Jamso, Taramira.

Annual, branching, foetid herbs with scattered hairs, leaves irregularly pinnathy lobed; lower long petioled; upper sessile; flowers large, pale yellow or whitish with darker veins; fruit may be erect or appressed with the stem, dehiscing longiludinally; beak flat, prominent; seed biseriate pale brown.

Distribution and habitat: It is cultivated throughout the province, however, now commonly found in waste places. It is common weed of wheat fields in rainfed areas of Lakki Tehsil (Bannu) through escape, edge effect or otherwise. For the Flora of Pakistan this is a new record from Bannu district — Europe, N. Africa, S.W. Asia, Pakistan.
Flowering period. April - June.

12. D E S C U R A I N I A Webb and Barth

Annual, biennial or perennial hairy herbs; leaves finely pinnatisect; inflorescence ebracteate; flowers small; petals yellow, shorter than sepals; stamens not appendaged, often exceeding the petals; style short, stigma capitate; siliquae dehiscent to the top without long indehiscent beak, spreading or erect; seeds 1-2 seriate, small, mucilaginous when wet; radicle incumbent.

Descurainia sophia (L) Webb and Berth. in Engl. & Prantl, Natur. Pflanzenf. 3,2: 192. 1891; Jafri in Fl. W. Pak. 55: 281: 1973 (Syn. Sisymbrium sophia L.).

Annual or biennial, erect, glabrous or pubescent; leaves pinnatisect with stellate hairs; flowers small, pale yellow-yellow, arranged in 40-80 flowered racemes; sepals 2-3 mm long;

petal equal to or a bit longer than sepals; siliquae linear, upcurved, glabrous; stigma depressed-capitate, sessile; seeds many, reddish brown; septum veined. (Fig. 19).

Distribution and habitat: Common weed of wheat fields in Peshawar valley; Mansehra and Swat frequently found in Malakander farm (Agricultural University, Peshawar) and adjacent areas, Jafri (1973) has reported it from Chitral village (Toppin, 36 (K). However, I have not come across this specimen in that areas — Europe, Asia and Africa.

Flowering period. April - July.

13. M A L C O L M I A R. Br.

Annual or biennial herbs, branched, pubescent; leaves entire or pinnatifid; flowers white, pink or purple in lax racemes; sepals erect, inner saccate at the base; petals much longer than sepals; stamens 6; ovary linear or oblong-linear, many ovuled; siliquae bilocular, dehiscenth; seeds 2-seriate at the base of the pod and 1-seriate above, not winged.

Key to species

\+ Siliquae 4–10 cm long, linear .. .. .. 1. M. africana

\- Siliquae 2–3 cm long, subulate .. .. .. 2. M. strigosa

1. Malcolmia africana (L) R. Br. in Aiton, Hort. Kew. ed. 2,4: 121. 1812; Jafri in Fl. W. Pak: 55: 218-19: 1973.

Common names: Pushto: Khatol.

Stout leafy annual, upto 25 cm high, with forked and simple hairs, branches many; leaves stalked to sessile, entire to sinuate dentate, variable; flowers near the end of the branches,

arranged in 20-30 flowered lax racemes; petals longer than sepals, pinkish white; siliquae 4-10 cm long, hairy rarely glabrous; seed many, oblong.

Distribution and habitat: Weed of wheat fields of Bannu and Peshawar — S. Europe, N. Africa, Asia, China.
Flowers. Per. March - June.

2. Malcolmia strigosa Boiss. in Ann. Sc. Not. Ser. 2, 17: 70. 1842; Jafri in Fl. W. Pak: 55: 220: 1973.

Annual herbs, spreading or sub erect, hairy; branched from the base; radical leaves long petided; cauline shorter and more entire; flowers, numerous, sessile, in racemes; petals linear, pinkish purple; pods terete, stout, thickened at the base; seeds sub-2 seriate at the base of the base 1-seriate.

Distribution and habitat: It was collected from wheat fields of Serai Naurang and Gambila (Bannu), providing first report for Fl. W. Pak. from the settled areas of N-W.F.P. — Iran, Afghanistan and Pakistan.
Flowers per. April - June.

Note: Malcolmia cabulica (Boiss) HK. f. & Thom. is frequently found as a weed of waste places in Peshawar. It is likely to be found in the wheat fields, however through collection is needed in this respect.

14. G O L D B A C H I A DC.

Annual or biennial herbs, branched, usually glabrous; lower leaves petioled; upper auricled; racemes long, ebracteate; sepals erect, equal at the base; fruit coriaceous, indehiscent, tetragonal,

curved, beaked, cells 2 or 3, superimposed in one row, each 1-seeded; cotyledons incumbent.

Goldbachia laevigata (M. Bieb) DC; Syst. Nat 2:55. 1821; Jafri in Fl. W. Pak. 55: 229: 1973. (Syn. Raphanus laevigatus M.Bieb; G. torulosa DC; G. tetragona Ledeb; G. reticulata (O.Kt) Vass).

Common names: Urdu: Khulef.

Annual, 10-55 cm tall, glabrous, rarely hispid below and on the margins of the leaves; radical leaves many, rosulate, sessile, cauline leaves often amplexicaul, sessile; flowers white or pink arranged in 15-30 flowered lax racemes; sepals 2 mm long; petals longer than sepals; silequae pendulous, quadrangular, slightly upcurved; seeds usually 3, pale brown. (Fig. 20).

Distribution and habitat: Very common weed of wheat fields of Peshawar district — Asia, Turkey.

Flowers per. March - June.

15. S I S Y M B R I U M L.

Annual, biennial or perennial herbs, glabrous rarely pubescent; leaves pinnilifid or pinnatipartile, lower petiolate, upper sessile; racemes many flowered; flowers yellow; petals longer than sepals; stamens 6; ovary linear- cylindrical, sessile, many-ovuled; silliquae bilocular, dehiscent; seeds 1-seriate, brown, not mucilagenous when wet; radicle mostly incumbent.

Only one species Sisymbrium irio L. has been found as weed of wheat fields. In addition S. brassiciforme C.A. Mey and S. Loeselii L. are also found as weeds of waste places and quite

likely that these 2 species are also found as weeds of wheat fields in this area. For this reason, key has been provided for their identification.

Key to species (After Jafri, 1973)

1	+ Petals (2-) 2.5 - 4 (4.5) mm long, (less than 5 mm long)	1. Sisymbrium irio
	- Petals (5-) 6-9 mm long (more than 5 mm long)	2
2	+ Siliquae 20-40 mm long, ascending	2. Sisymbrium loeselii
	- Siliquae (50-) 60-80 mm long, usually spreading horizontally	3. S. brassiciforme

1. Sisymbrium irio L., Sp. Pl. 659. 1753; Jafri in Fl. West. Pak. 55:250: 1973 (Syn. Descurainia irio (L) Webb & Berth;).

Annual herb, glabrous or hairy near the base; leaves, petioled, pinnalipartite; segments remote, spreading toothed, terminal large; flowers yellow; petals longer than sepals; siliquae curved and ascending on slender stalks; valves 3-nerved; seeds 20-40 in each locule, oblong-ellipsoid, yellowish brown.

Distribution and habitat: Common weed of wheat-fields in Peshawar, Kohat and Bannu districts — Europe, Asia and N. Africa.

Flowers per. March - May.

16. TORULARIA

Annual, biennial or perennial, clothed with small, simple or branched hairs; leaves small, entire or pinnatifid; flowers small, white or pink, arranged in lax racemes; sepals equal, soon deciduous; petals spathulate, obovate, twice longer than sepals; stamens 6, filaments not appendaged; ovary linear - cylindrical,

sessile, 5-many ovuled; sliquae biloculer, dehiscent; seeds 1-seriate, many, not mucilagenous when wet; radicle incumbent.

Torularia torulosa (Desf.) Schulz in Engler, Pflanzer. 86 (IV. 105): 214. 1924; Jafri in Fl. W. Pak. 55: (265-66): 1973 (Syn: Sisymbrium torulosuni Desf; S. scorpiuroides Boiss; S. rigidum M. Bieb; Malcolmia torulosa (Desf) Boiss).

Annual pubescent herb, branching from the base, basal leaves rosulate, shortly stalked to sessile, pinnatifid to dentate; cauline leaves many, sessile; flowers, white, subsessile arranged in ebracteate racemes; petals short, linear, oblong, white, siliquae torulose, usually hispid or scabrous with short hairs; seeds 15-30 in each locule, ovoid.

Distribution and habitat: Rare weed of wheat-fields of Bannu and Kohat, Common in Peshawar — N. Africa, S.W. Asia, Eastwards to Pakistan.

Flowers per. March - May.

7. Family F R A N K E N I A C E A E

Perennial herbs or undershrubs, stem jointed, often with deposition of calcium carbonate; leaves simple, opposite, exetipulate; flowers axillary, solitary or in dichasial cymes, hermaphrodite, regular; calyx tubular, 4-6 lobed presistant; petals 4-7, clawed, free; stamens 3-24; carpels usually 3, syncarpous; ovary unilocular; placentation parietal with indefinite ovules; capsule loculicidal, enclosed within the persistant calyx; seeds many, small.

F R A N K E N I A L.

See description of family. Represented in Pakistan by single species.

Frankenia pulverulenta L., Sp. Pl. 332, 1753; Edgew. in Hk. f., Fl. Brit. Ind. 1: 212. 1874; Bamber, Fl. Panjab. 528. 1916. Nasir in Fl. W. Pak. 7: 1-2. 1971.

Procumbent annual herb, stem diffuse, puberulous; leaves spathulate to obovate, 3-7 mm long, 1-3 mm broad, retuse, pubescent beneath subsessile, petoile base sheathing, ciliate; flowers sessile, axillary, solitary or in dichasial cymes; calyx tubular, costate, 5-fid, puberulous, lobes acute; petals 5, pink; stamens 6, free; ovary ovoid, stigma 2-3 forked; capsule splitting by 3-valves; seed ovoid.

Distribution and habitat: Very common in sandy and saline fields of wheat in Tehsil Lakki (Bannu) and D.I.Khan District. Found in Yar Hussain (Mardan) and Badaber (Peshawar); Panjab, Sind, Baluchistan — Sind S.E. Europe, Africa, Turkey, Iran, Syria, Arabia, Egypt.

8. Family Z Y G O P H Y L L I A C E A E

Herbs or shrubs, rarely trees; leaves mostly opposite, usually pinnate or 2-3 foliate, stipulate; flowers mostly bisexual, regular, mostly 5-merous (petals rarely-0), stamens 5-15, free, often with basal scales; ovary 4-5-rarely more celled terminated by 1 style; 2 or more axile ovules in each cell; fruit usually short & capsular, rarely a drupaceous barry.

Two species belonging to 2 genera are found as weeds of crop fields.

1 + Erect herbs; leaves simple, fruit a capsule. 1. Peganum

\- Prostrate herbs; leaves pinnatly compound; fruit schizocarpic winged or spiny .. .. 2. Tribulus

1. P E G A N U M Linn.

Perennial herb; leaves alternate, multifid and solitary; flowers white on short leaf opposed peduncles; sepals and petals 4-5 each; stamens 12-15, free, few of these sterile; fruit globose, 3-4 celled with many seeds in each cell.

Peganum harmalé Linn; Sp. Pl. 444. 1753; Hk. f., Fl. Brit. Ind. 1. 486. 1872 (in Rutaceae); Ghafoor, in Fl. W. Pak. 76; 7, 1974.

Common names: Pushto: Spanda, Harmal: Urdu; Harmal. Persian. Ispand; Perennial, branched herbs, glabrous, densely leafy; leaves multifid with narrow linear segrents, flowers 12-20 mm across, white; sepals narrow exceeding the petal, persistent; capsule globose, about 8 mm in diameter; Seeds blackish known, triangular, C. 2 mm long.

Distributionand habitat: Common weed of sandy (road sides & waste lands in the whole of the province; occurs as weed (rarely) in wheat fields of Peshawar & Kohat districts — India, Tibet, Pakistan, Westwards to N. Africa, Europe and Russia.

Fl. per. April - October.

2. TRIBULUS L.

Prostrate herbs, usually silky; leaves opposite, paripinnate; flowers solitary, in or near the axils, 5-merous; stamens 10 (may be few due to abortion) fruit 5-angled, usually spiny or winged, 2 or more seeds in each cocci, usually densely villous.

Tribulus terrestris L., Sp. Pl. 387. 1753: Edgew & Hook. f. in Hk. f., Fl. Brit Ind. 1. 423. 1874; Ghafoor in Fl. W.Pak.76;26. 1974.

Common names: Pushto: — Urdu: Tirkundi, Gokhos, Eng: Puncture weed.

Annual, or binnial, prostrate herb, hirsute or silky; very variable; leaves opposite in subequal pairs, leaflets 5-7 pairs, oblong ovate; flowers small 8-20 mm across, pale. yellow, short peduncled; mature cocci crested and armed with armed with 2 long and 2 short spines, coarsely hairy. (Fig. 21).

Distribution and habitat: Found as a weed of road sides and waste lands, throughout the province in sandy soils rarely occurs as weed of maize crops in Chitral, Dir, Peshawar and Kohat districts — Tropical and sub-tropical countries in Asia, Africa, S. Europe, N. Australia.
Fl. per. Almost throughout the year.
Note: As present Tribulus longipetalous Viv, and Tribulus pentandrus Forssk. are found frequently in the N-W.F.Province but not weeds of grain crops, however they are more likely to become weeds of grain crops (specially Maize) in the near future as they are spreading fast.

9. Family MALVACEAE

Usually herbs or shrubs, often with fibrous stems; leaves alternate, palmately nerved, entire or lobed, stipulate; flowers regular, hermaphrodite; sepals 3-5, united, rarely subtended by an involucre of bracteoles (epicalyx); petals 5, free; stamens many, monoadelphous, anthers 1-celled, often epipetalous, carpels 5-many, united; ovary 2-many locular; style branched above; ovule 1 or more from the inner angle of each loculus; fruit a capsule opening by halves or schizocarpic breaking into 1-many-seeded mericarps. Three species are distributed among 3 genera which are found as weeds.

1 + Fruit a capsule .. .. 1. Hibiscus

\- Fruit schizocarpic 2

2 + Stigma capitate (bracteoles 3) 2. Malvastrum

\- Stigma linear (bracteoles 3, torus short). .. .. 3. Malva

1. HIBISCUS Linn.

Usually herbs, rarely shrubs or trees, pubescent stellately; leaves entire or lobed; flowers axillary, solitary or fasciculate or in racemes or panicles; epicalyx present or absent; calyx 5; petals 5, of various colours; stamens many; carpels 5, united; ovary 5-loculed, 3-many ovuled; style 5- branched, fruit capsule, usually 5-celled; seeds 3-many in each cell.

Hibiscus trionum L., Sp. Pl. 697. 1753; Abedin in Nasir & Ali's Fl. Pak. 130: 11. 1979 (Syn. H. africanus Mill).

Weak, hispid annual herb; leaves 3-7 partite, stipulate; stipules 2-7 mm long, stiff hairy; petiole stellate pubescent; flowers axillary solitary; epicalyx segments 7-12; calyx twice the length of epicalyx; corolla white-pale yellow with a purple mouth; staminal column 3-4 mm long, purplish; capsule oblong, obtuse, hispid; seeds many, black, tuberculate.

Distribution and habitat: Weed of cornfields in Kaghan (Hazara) — S. Europe to S. Africa, Madagascar, Asia and Australia.

2. MALVASTRUM Gray.

Usually herbs; leaves entire or lobed; inflorescence terminal spike or axillary fascicles, or flowers solitary; flowers bracteate; bracts 3, persistent; calyx campanulate; petals 5, yellow; 5-many; ovary 5-many loculed; 1 ovule in each loculus; style branches as many as carpels; stigma capitate; mericarps indehiscent, strigose.

Malvastrum coromendelianum (L) Garcke in Bonplandia 5: 297. 1867; Abedin in Nasir and Ali's Fl. Pak. 130: 89-90. 1979.
(Syn: Malva coromendelianum L.).

Annual herb; branches with appressed hairs; leaves 3-5-nerved, coarsely serrate, stellate hairy; stipules entire or denticulate; flowers axillary, solitary or in fascicles; epicalyx segments strigose hairy; calyx fused below the middle, lobes deltoid or triangular; petals obliquely obovate, hairy at base; fruit globular; mericarps deeply curved with a short apicalawn; seed 1 in each mericarp. (Fig. 22).

Distribution and habitat: Common weed along the roadside in Peshawar. Found as a weed of maize fields near Peshawar University Campus — Tropical regions of old and new world.

3. M A L V A L.

Annual or perennial herbs or under shrubs; leaves petiolate, stipulate; flowers axillary, solitary or fascicled, rarely in terminal racemes; epicalyx segments 3, free; calyx 5-lobed; petals 5, notched; staminal column included; carpels 8-15; ovary as many loculed as the number of carpels; style free; fruit small, discoid; mericarps reticulately veined or smooth, 1-seeded; seeds glabrous; embryo curved.

Malva neglecta Wallr. in Syll. Ratisb. 1: 140. 1824; Abedin in Nasir and Ali's Fl. Pak. 130: 38-40. 1979.

Hooly herb, prostrate or decumbent; leaves orbicular, deeply cordate at base; stipules scarious, margins ciliate; flowers axillary, generally 3 or 4 in fascicles, or solitary; epicalyx segments stellate pubescent; calyx free to the middle, stellate pubescent; deltoid or triangular; petals white, purplish or pinkish; fruit depressed, mericarp pubescent. (Fig. 23).

Distribution and habitat: Weed along borders of wheat fields in Sufed Deri (Peshawar) — Worldwide but of old world origon.

10. T I L I A C E A E

Trees, shrubs, or herbs; leaves alternate, simple, stipulate; flowers cymose, actinomorphic, bisexual; sepals 5, valvate; petals 5, free, contorted, imbricate or valvate;

stamens mostly numerous, free or in 5-10 bundles; anthers 2-locular; ovary superior, 2-10 loculap; ovules on axile placentas; style simple & divided at the apex, rarely the stigmas sessile; fruit indehiscent or capsular, or a berry; seeds solitary or many in each loculus. Four species distributed among single genus are found as weeds.

C O R C H O R U S L.

Herbs or under shrubs, more or less covered with stellate hairs; leaves simple; flowers small yellows, in 1-5 fid axillary, leaf opposed peduncle stamens many, from a short torus; capsule usually elongated, 2-5 valved many seeded, 2-5-celled.

1 + Capsule 6-angled, 3 of the angles of the valves winged, apex with 3 spreading appendages .. .. 1. C. aestuans.

\- Capsule without wings on the valves; more or less cylindric 2

2 + Beak of capsule 3-fid .. .. 2. C. tridens.

\- Beak of capsule entire straight .. 3

3 + Capsule 4-5 mm broad, cylindric beak about 1/3 as broad .. .. 3. C. olitorius

\- Capsule 3 mm broad, somewhat 3-angled, beak about 1/2 as broad .. .. 4. C. tricularis

1. Corchus aestuans L; syst. Nat. ed. 10. 1: 1079, 1758. Ghafoor in Fl. W. Pak: 75. 23: 1974; (Syn. C. acutangulus auct. non Forsk; C. oppositiflorus Hassk).

Common names: Urdu, Chonch.

Annual, erect or sub-erect or spreading, branches upto 60 cm long; leaves ovate to oblong-ovate, serrate, with or without basal processes, stipules linear-subulate; flowers

small, 2-3 on short peduncles capsule 3-winged, apex with 3 spreading appendages. (Fig. 24).

Distribution and habitat: A common annual in waste lands from sea level to 2,000 mm; found as weed of maize fields in Swat, Mardan, Peshawar and Kohat districts. Pakistan, India, Srilanka, Bangladesh, Burma, Indochina, Australia tropical Africa, West Indies and Central America — Fl. Per. August - October.

2. Corchorus tridens Linn; Mant. 566. 1767, HK.S: Fl. Brit. Ind. 1: 398. 1878. Syn. C. tricularis auct. non linn; non linn; C. burmanio D.C; C. senegalensis Juss ex. std.

Apparently glabrous annual; leaves linear oblong or lanceolate; serrat, withor without basal appendages, shortly petioled, apex subrounded; peduncles flowers yellow, stamens about 10, capsule cylndric, terminated by 3 spreading distinct teath or short appendages; valves without partitions between the seeds and waster lands. (Fig. 25).

Distribution and habitat: Weed of cornfields in D.I.Khan, Bannu, Kohat, Peshawar, Mardan and Swat widespread in tropical and sub-tropical countries of Africa, Asia and in North Australia.

3. Corchorus olitorius Linn; Sp. Pl. 529. 1753; Ghafoor in Fl. W. Pak. 75: 30, 1974. (Syn. C. quinquelocularis Moench; E. decemangularis Roxb).

An erect annual (or perennial), glabrous, stout; leaves about half as more as broad, elliptic, serriate, shortly petioled, bases rounded bot usually with the two lowest serratures produced into filiform deflexed tails; capsules elongated, broad cylindric, 3-6-valved, many seeded, valves with transverrs partitions between the seeds.

Distribution and habitat: Weed of corn field of Peshawar, Kohat, Swat, and Hazara; ascending upto 1500 m as a weed of cultivated ground. A native of Indo-Pakistan subcontinent, now widespread throughout the world in tropical countries either by cultivation or as escape.

4. Corchorus tricularis L. Mantissa App., 77. 1767, Masters in Hk. f. Fl. Brit. Ind. 1: 397-1874; Ghafoor in Fl. W.Pak. 76: 27. 1974.

Common name: Urdu; Kaunti; Kedu, Chinch, Kagroti, Island, Raja-zira.

Erect or suberect annual; leaves ovate oblong to oblong - lanceolate, crennate - serrate, the 2 basal serrations usually produced into a thin linear hair like processes, petioles upto 8 mm long; stipule setaceous; flowers small, 1-3 on a leaf opposed short peduncle; capsule usually 3-valved, scabrous, valves with transverse partitions between the seeds.

Distribution and habitat: Weed of maize fields in Swat, Hazara, Peshawar and Kohat districts - Common throughout Pakistan in

plains and low hills in moist shady places and sandy to silty clay loam soils of barren lands and cultivated fields as a weed — Pakistan, Afghanistan, India, tropical and north Africa.

Fl. per. June - October.

11. Family CARYOPHYLLACEAE

Annual or perenial herbs; leaves simple, opposite, entire; stipules absent or if present, often scarious; flowers regular, bisexual, solitary or in cymes; sepals free or united in a tube, often with membranous margins; petals as many as the sepals, often small or absent; stamens 10, filaments free; ovary superior, 1-locular with a free central placentation; styles free or variously connate; ovules numerous; fruit a capsule, opening by valves or by apical teeth.

1	+	Leaves stipulate	2
	-	Leaves exstipulate	3
2	+	Stipules connate; styles 3	3. Spergularia
	-	Stipules free; styles 5	2. Spergula
3	+	Sepals free to the base	4
	-	Sepals united, forming a distinct calyx tube	5
4	+	Petal bifid to half way or more	3. Stellaria
	-	Petal bifid to less than half way ..	4. Cerastium
5	+	Calyx with commissural veins	5. Silene
	-	Calyx without commissural veins	6. Vaccaria

1. SPERGULARIA (DC) Presl.

Herbs with erect or ascending stem; leaves linear, decussate, fleshy, with pale scarious stipules united to surround the node;

leaf fascicles born on one side only at each node; flowers arranged in cymes; sepals 5, free, green with membranous margins; petals 5, entire; stamens 2-10; ovary 1-locular, many ovuled; style 3; capsule dehiscing with 3 valves; seeds globose-reniform or laterally compressed, winged. Represented by two species as weeds.

+ Stamens 2-3; inforescence ebracteate above 1. S. diandra
- Stamens 5-10; inflorescence bracteate .. 2. S. rubra

1. Spergularia diandra (Guss) Heldr. & Start. in Herb. Graec. Norm. 492. 1124. 1855. Stewart, Ann. Cat. Vas. Pl. Pak. & Kashm. 253. 1972. (Syn. Arenaria diandra Guss)

Annual or biennial herb with slender stem; leaves slightly fasciculate, mucronate, not fleshy; stipulate; inflorescence much branched; stamens 2-3; capsule subglobose dehiscing by valves; seeds dark brown to black, unwinged.

Distribution and habitat: Weed of early spring in wheat fields of saline area of Bannu (Kot Kashmir, Ghoriwala) and Peshawar (Muhib Banda). S. Europe, N. Africa, S.W. & C. Asia.

2. Spergularia rubra (L) J. & C. Presl. Fl. Cechica. 94. 1819. Stewart, Ann. Cat. Vas. Pl. Pak. & Kashm. 253. 1972. (Syn. Arenaria rubra L.)

Annual or perennial herb; stem diffuse, leaves linear, not fleshy, very fasciculate, stipulate; bracts as long as the leaves; flowers pedicellate, subglobose; petals pink, ovate, shorter than the sepals; stamens 5-10; capsule as long as the sepals; seeds dark brown.

Distribution and habitat: Found in wheat fields of Bannu (Kot Kashmir, Baistkhel) — N. & W. Asia, Europe, Widespread in N. Hemisphere.

2. SPERGULA L.

Annual herb, much branched; leaves linear - subulate; decussate; leaf fascicle born on both sides at each node; stipules scarious; free; flowers in cymes; sepals 5, free; petals 5, white; stamens 5-10; ovary 1-locular, many ovuled; styles 5, alternating with the sepals; capsule ovoid to subglobose, dehiscing by 3-5 valves; seeds laterally compressed, often winged.

Spergula arvensis Linn., Sp. Pl. 440. 1753.
Stewart, Ann. Cat. Vasc. Pl. Pak. & Kashm. 253. 1972.

Pubescent or glandular - hairy herb; leaves linear, fleshy, in false whorls, channelled beneath; flowers pedicellate, sub-umbellate; sepals ovate, obtuse; petals white, obovate, obtuse; stamens 5-10; styles 5; capsule subglobose; shining, opening by 5-valves; seeds grey black, subglobose, granulate or papillose, keeled or with a narrow wing. (Fig. 26).

Distribution and habitat: Weed of wheat fields in Mardan (Yar Hussain) and Peshawar (Fabbi) — Northern Hemisphere, Europe.

3. STELLARIA L.

Annual or perennial herbs with slender stem; leaves exstipulate, simple; flowers in terminal dichasial cymes, rarely solitary, bracteate; sepals 5 rarely 4; petals 5, white, deeply 5-fid; stamens 10 (5+5) or fewer; ovary 1-locular, many or 3 ovuled; styles 3,

rarely 2 or 4 or 5; capsule globose or ovoid, dehiscing by 3 or 6 valves; seeds reniform; globose or laterally compressed.

Stellaria media (L) Cyrill. Ess. Pl. Char. 36. 1784. Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 254. 1972. (Syn. Alsine media L).

Annual herb; stem terete, hairy; leaves ovate-elliptic, lower petiolate, upper sessile; inflorescence with condensed dichasial branches, rarely lax and much branched; bracts herbaceous; flowers white; sepals glabrous or hairy; petals deeply bifid, sometimes very small or absent; stamens 3-10; ovary 1-celled; style 3; capsule ovoid; seeds ovoid, reddish brown, papillate. (Fig. 27).

Distribution and habitat: Introduced, found as a spring weed in wheat fields throughout the province.

4. C E R A S T I U M L.

Annual or perennial herbs, pubescent or glandular hairy; leaves exstipulate, flowers arranged in terminal dichotomously branched cymes; sepals 5, rarely 4, free; petals 4 or 5, white; stamens 5 or 10; ovary 1-locular, many ovuled; styles 3, 5, 4 or 3; capsule cylindrical; seeds sub-reniform to globose, laterally compressed.

Cerastium fontanum Baumg; Enum. Stirp. Transs. 1. 425. 1816; Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 240. 1972. (Syn. C. vulgatum L).

Herb, stem erect and green; upper leaves sessile, lower petiolate; inflorescence many-flowered, dense; flowers pedicellate, braceteate; bracts herbaceous; sppals lanceolate with scarious margins; petals bifid; capsule cylindric, opening by teeth; seed flattened, brown. (Fig. 28).

Distribution and habitat: Found in wheat fields of irrigated fields throughout the province — Temperate North Europe and Asia.

5. V A C C A R I A Medik.

Annual glabrous herb; inflorescence in dichasial panicles; sepals 5, united, without commissural veins but with 5 broad green wings; petals 5, without coronal scales, long clawed; stamens 5; ovary unilocular, styles 2; capsule ovoid, dehiscing by 4 teeth; seeds large subglobose.

Vaccaria pyramidata Medik., Philos. Bot. 1: 96.
Stewart, Ann. Cat. Vas. Pl. Pak. & Kashm. 256. 1972.

Annual herb, branched; leaves opposite, entire; inflorescence many flowered; much branched, lax or spreading dichasium; flowers bracteate, pedicellate; petals pink, bidfid; capsule subglobose; seeds numerous, subglobose.

Distribution and habitat: Found in wheat fields of Peshawar (Mathra, Warsak Road) — Europe, N. Africa, S.W. Asia.

6. S I L E N E Linn.

Annual or perennial herbs; flowers solitary or in cymes, 5-merous; calyx campanulate or elongate tubular, 5-dentate, 5-fid; petals 5, with 2 basal scales; stamens 10; ovary 1-locular or

divided by the presence of basal septa; ovules numerous ; style 3; capsule dehiscing by 6 teeth or rarely by 3; seeds variable.

Silene conoidea L. Sp. Pl. 418. 1753, Stewart, Ann. Cat. Vas. Pl. Pak. & Kashm. 251. 1972.

Common name: Urdu: Takla.

Pubescent, erect annual herb, upper parts glandular hairy; leaves sessile, acute, entire; inflorescence 3-20 flowered dichasia; flowers pedicellate; calyx 20 or more nerved, covered with short glandular hairs, 5-parted; petals pink, the limb bidentate or emarginate; stamens 5; styles and stigmas 3; capsule ovoid, contracted above, included ih the calyx:

Distribution and habitat: Weed of wheat fields in Peshawar (Tehkal) and Mardan (Yar Hussain) — Mediterranean (Coastal) areas, S.W. Asia.

12. Family PORTULACACEAE

Annual or perennial; leaves oppostie or alternate, simple entire, fleshy; inflorescence usually a terminal cyme or raceme sometimes flowers solitary; flowers bisexual, actinomorphic, usually hypogynous; sepals 2, rarely more; petals 4-6 (rarely 2-3): stamens 3-many; ovary 2-8-carpelled, syncarpous, unilocular; placentation basal or free cantral; ovules 2-many, style, 2-8, united, rarely free; stigmas 2-8; fruit a membranous or crustaceous, dehiscent capsule, rarely an indehiscent nut and enclosed by more or less coiled embryo.

PORTULACA L.

Annual or perennial, usually succulent, diffuse herbs; flowers terminal, solitary or clustered; calyx partly adnate to ovary; petals 4-6; stamens 7-20, perigynous; ovary half inferior, many ovuled and 3-8 fid styles; capsule crustaceous; dehiscing transversely.

Portulaca oleracea L., Sp. Pl. 445. 1753; Thiselton Dyer in Hk. f., Fl. Brit. Ind. 1: 246. 1872; Ghafoor. A., in Fl. W.Pak. 51: 3-4. 1973.

Common names: Urdu: Qulfa, Khurfa; Pashto: Warkhari.

Annual (or perennial), prostrate or erect, succulent, glabrous, green or purplish green herb, usually ascending, 15-30 cm long; leaves usually spathulate upto 3.5 cm long, and about half as broad, often truncate; flowers sessile in terminal clusters, bright yellow. (Fig. 29).

A cosmopolitan weed; found as a weed of corn fields throughout the year.

13. Family EUPHORBIACEAE

Herbs, shrubs or trees, sometimes with milky juice; leaves simple or compound, alternate or rarely opposite; flowers unisexual, monoceious, or dioecious, regular, arranged in cymose manner, sometimes in cyathium, 5-merous (but stamens 1-10); pistillodes frequently present in males; ovary superior, 3-locular, plancentation axile, the ovules collateral, pendulous; fruit usually breaking into 3-seeded cocci but dehisce ventrally; seeds capiously albuminous.

Key to genera

1	+	Inflorescence a cyathium	1. Euphorbia
	-	Inflorescence not cyathium	2
2	+	Leaves distichous, entire, simple	2. Phyllanthus
	-	Leaves not distichous, toothed or lobed or wavy or plaited	2. Chrozophora

1. EUPHORBIA L.

Usually herb or shrubs, sometimes three with copious milky juice; leaves alternate or opposite; flowers monoceious; inflorescence a cyathium of many male and one female flowers in a small 4-5 lobed perianth like involucre, lobes with thick glands at the sinuses; male flowers a pedicelled stamen without any perienth; anthers cells usually globose; female flowers a solitary pedicelled, 3-celled ovary in the center of the involucre, also without perianth; ovule one in each cell, styles 3 free or connate, simple of 2 fid; fruit a capsule of three 2-valved cocci, seeds albuminous; embryo with broad and flat cotyledons.

Key to species

1	+	Leaves alternate, rarely the upper opposite or whorled, plants erect (annuals, capsule smooth)	1. E.helioscopia
	-	Leaves opposite	2
2	+	Leaves more than 1 cm long	2. E. hirta
	-	Leave less than 1 cm long	3
3	+	Cocci rounded at the back, hirsute; seeds faintly pitted	3. E. granulata
	-	Cocci keeled, keels ciliate; seeds with deep wrinkles (leaves with 3 proininent nerves)	4. E. prostrata

1. Euphorbia helioscopia L., Sp. Pl. 259. 1753; Stewart, Ann. Cat. Vas. Pl. W. Pak. & Kashm. 449. 1972.

Common names: Pushto: Mandano, Parparai, Urdu: Dastari-Qazi.

Erect annual, glabrous, upto 60 cm tall, stem little or unbranched below; branches umbellate, divaricate, leaves alternate on the main stem, in whorls of 5, 3 or 2 above, stalked, spathulate or obovate, round at the apex, finely toothed, involucres in umbellate cymes, 4-toothed; glands 4, yellow, reniform, entire; styles free to the base; capsule globose, smooth; cocci rounded at the back; seeds turbidly oblong or subglobose, deeply reticulately pitted.

Distribution and habitat: Frequently found in wheat fields of plains in Peshawar, lower Hazara Swat and D.I.Khan Divisions.

2. Euphorbia hirta L. Sp. Pl. 454. 1753; Stewart, Ann. Cat. Vas. Pl. W. Pak. & Kashm. 449. 1972. (Syn: E. pilulifera auct. var. hirta Thel non L.).

Annual, ascending of spreding, usually hispid with long often yellowish or brownish crisped hairs, shortly peduncled or subsessile axillary clusters of very minute; hairy cyathia; fruits about 1 mm across.

Distribution and habitat: Common weed of late spring in Peshawar, found in wheat fieldsof Peshawar University) Dargai (Malakand). — Most tropical and sub-tropical countries.

3. Euphorbia granulata Forsak., Fl. Aegypt - Arab 94. 1775. Stewart, Ann. Cat. Vas. Fl. W. Pak. & Kashm. 449. 1972. (Syn. E. turcomanica Boiss.)

A small, hispidly villous prostrate plant herb with perennial short rootstock; branches many upto 25 cm long; leaves opposite, obliquely oblong or obovate- oblong or sub round, often retuse, minutely petioled; cyathia minute, axillary and on short leafy branchlets; capsules about 1 mm across, cocci rounded at the back and hirsute.

Distribution and habitat: Common in wheat fields of Peshawar (Agr. University, Charsadda). Abundant in lawns of the Peshawar University Campus — India, Pakistan, Afghanistan, Arabia, Egypt, Canary Islands.

4. Euphorbia prostrata Ait., Hort. Kew. ed. 1, 2: 139. 1789.
Stewart, Ann. Cat. Vas. Pl. W. Pak. & Kashm. 452. 1972.

Annual prostrate herbs with dark green leaves and more or less glabrous pinkish stem, under surface of the leaves pinkish and district 3 basal nerves; cyathia sub-solitary axillary, pinkish; capsules 1 mm across, cocci prominently keeled and citiate on the keels only; seed 4-angled, deeply 4-6 transversely wrinkled.

Distribution and habitate Common in lawns of Peshawar University, found as weed in wheat fields in Peshawar, Mardan, more common than the previous one — Most warm countries.

2. PHYLLANTHUS L.

Usually herbs, rarely shrubs or trees; leaves alternate entire, distichous, stipulate bearing axillary minute flowers; flowers monoecious, apetalous; sepals 4-6, in 2 series; male flowers with 3-5 stamens, pistillodes 0; females with sepals as in males, ovary 3-celled with 2 ovules in each cell, staminodes 0; fruit usually a 3, two-valued cocci.

Phyllanthus niruri L., Sp. Pl. 981. 1753; Stewart, Ann. Cat. Vas. Pl. W. Pak. & Kash. 456. 1972.

Glabrous annual, erect or ascending, upto 30 cm tall; leaf bearing branches spreading and seeingly like pinnate compound leaf; leaves small, very variable in shape; flowers axillary; males solitary or 2-3 together with 3 stamens on a basal column, females solitary pedicellate; capsules about 2.5 mm across, depressed-globose, smooth.

Distribution and habitat: Rare weed of wheat fields in Peshawar (Malakander) — India, Pakistan and Tropical Africa.

3. C H R O Z O P H O R A

Herbs or undershrubs, stellately tomentose usually; leaves alternate, sinute toothed or lobed, having 2 glands at the base; flowers small, monoceious in sessile bracteate axillary bracteate racemes, males crowded in the upper part of the racemes; females solitary, pedicelled; calyx 5-segmented; petals 5, short, absent in females; stamens 5-15 in males; in females ovary 3-celled with 1 ovule in each cell; capsules of 3 hispid, tomentose or scaly, almost fleshy, 2 valved cocci; seeds without a strophiole.

Chrozophora plicata (Vahl.) A. Juss., Syst. Veg. 3: 850. 1826. Stewart, Ann. Cal. Vas. Pl. Pak. & Kashm. 446. 1972.
(Syn. C. prostrata Dalz. & Gibs., Croton plicata Vahl.)

Common name: Pushto: Shinshobai.

Erect herb, hoary to wooly, upto 2 ft. high, lower part without branches, upper part sparingly branched; leaves ovate to

orbicular, entire or sinuate-toothed, often 3 lobed, pale green, stellately hairy on both surfaces; petiole nearly equalling the blade; racemes many flowered; stamens about 15 in 2 whorls; sepals of female flowers triangular; capsules densely stallate hairy, but without silivery scales; fruiting pedicels upto 9 cm long.

Distribution and habitat: It is evidently seen when the spring crop is harvested; found in wheat fields of Bannu distt. (Kot Kashmir, Naurang). — Pakistan, India, Iraq.

Note: It has been observed that young boys and girls crush the fruits in pieces of cloth and as a result a green-blue spot is left on it.

14. Family O X A L I D A C E A E

Commonly herbs with 3-foliate leaves; flowers solitary or subumbellate; bisexual, pentamerous, hypogynous; calyx 5, free; corolla 5, contorted; androecium 10, obdiplostemonous, connate at the base; ovary quinquilocular, placentation axile; styles 5, persistent, free; fruit a loculicida; capsule; seeds usually many.

Tropical and subtropical family represented in Pakistan by a single genus.

O X A L I S L.

Bulbous (mostly) herbs; aerial stem reduced, creeping or rhizomatous; leaves digitately compound; flowers regular; stamens monoadelphous at the base; filaments 5 long and 5 short alternating with one another; ovary 5-locular; fruit capsular; seed with a elastic testa.

Only 3 species are found in this province as weeds:

1 + Plants creeping above the ground, leaves radical. Bulbils absent; .. .. 1. O. corniculata

\- Stem not a creeper, reduced, leaves basal; bulbils present; 2

2 + Flowers yellow, longer filaments glabrous .. .. 2. O. pes-caprae

\- Flowers pink, longer filaments strigose, leaflets triangular .. ... 3. O. latifolia

1. Oxalis corniculata Linn., Sp. Pl. 1. 433. 1753; Edgew. and Hok. f. in Hk. f. Fl. Brit. Ind. 436. 1874; Nasir in Fl. W. Pak. 4: 2-4. 19 1971.

Common name: Urdu. Khatti Booti.

Annual or perennial, creeping, rooting at the nodes; leaflets broader than long, obcordate-tomentose; flowers single or in 2-5 flowered axillary umbels, pedicel upto 15 mm long, deflexed in fruit; bracts 3-5, linear; calyx 5, linear-lanceolate, pilose; corolla 5, yellow; fillaments glabrous; gynoecium 5, pubescent; styles longer than the shorter stamens; capsule 1-2.5 cm long, subcylindric, pubescent; seeds 1.5 mm long, brown transversely ribbed. (Fig. 30,B).

Distribution and habitat: A consmopolitan weed. Fl. Per. March - December, leaves can be used as vegetable and the juice of plant mixed with onion is used to remove warts (Nasir, 1971). Injurious for health.

2. Oxalis pes-caprae L., Pl. 434. 1753; Nasir in Fl. W. Pak. 4:4-5. 1971.

Common name: Eng: yellow sorrel, Bermuda buttercup.

Perennial 12-24 cm tall, stem underground, bulbiferous; leaflets 5-15 mm long, 10-30 mm broad, after mottled purplish red; margin & lower surface pilose; flowers 2-12, subumbellate; sepals 5-7 mm long, lanceolate, tip with a reddish brown callus; petals 15-20 mm long, lanceolate, tip with a reddish brown callus; petals 15-20 mm long, yellow; filaments glabrous; fruiting rare. (Fig. 30,A).

Distribution and habitat: Native of S. Africa, found in maize fields of Peshawar.

Oxalis latifolia; Kunth in Humb. Borpl. and Kunth, Nov. Gen. Sp. 5: 237. 1822; Nasir in Fl. W. Pak. 4: 6-7. 1971.

Perennial, bulbiferous, glabrous or sparsely pubescent; leaflets triangular in outline; scape (1-4) upto 30 cm long, slender; flowers many, subumbilate; sepals 3.5 mm long, lanceolate, lip with a reddish brown callus; petals pink; both long and short fillament strigose; shorter filaments equal in length to the styles.

Distribution and habitat: A native of south and central America, found in maize and wheat fields of Peshawar.

15. Family L I N A C E A E

Herbs, rarely undershrubs or shrubs; leaves simple, alternate or opposite; stipules may or may not present, sometimes glandular; flowers bisexual, actinomorphic; sepals 4-5, free or partially united; petals 5, free; stamens the same number as the petals & alternate with them; ovary superior, 2-3-5 locular, ovules 2 in each loculus; styles 3-5; fruit a capsule or a drupe; seeds compressed and shiny.

L I N U M L.

Usually herbs; leaves simple, sessile, alternate, linear to lanceolate; flowers ebracteate, 5-merous, in cymes or racemes; sepals entire; petals linear to lanceolate or obovate glands 5, adnate to the staminal tube, opposite the petale; stamens 5, staminodes present or absent; carpels 5; ovary 10-locular due to secondary septa; styles 5, free or connate at the base; fruit a capsule.

Two species are found as weeds in wheat fields.

1 + Plants perennial, flowers blue .. 1. L. perenne

\- Plants annual, flowers yellow .. 2. L. corymbulosum

1. Linum perenne Linn; Sp. P. 227. 1753; Hook. F. Fl. Brit. Ind. 1. 411. 1875; Abdullah. P. in Fl. W. Pak. 21: 3. 1972.

Perennial herb, stem glabrous with ascending branches; leaves alternate; flowers pedicellate, in 3-5 flowered cymes; sepals oblong-ovate, acute, 3-nerved; petals free contorted obovate, blue; stamens 5; ovary ovoid, 10 locular with one ovule in each locule, stigma sub-capitate; capsule subglobose, splitting into 10 cocci; seeds compressed, shining dark brown.

Distribution and habitat: It is common in wheat fields of Chitral and Dir (probably found in Hazara) - Central & E. Europe, Russia, W.N. America, India., Fl. Per. April - June.

2. Linum corymbulosum Reichenb; Fl. Germ. Exc. 843 (1830-32) (Syn. L. strictum ssp. corymbulosum (Reich) Rouy; L. strictum var. corymbulosum Planch).

Annual herb, stem glabrous to sligltly hispid, erect, branched, leaves alternate, margin scabrid flowers in lax, spreading corymbose cymes; sepals free, persistent; margin scabrid, glandular, petals obovate, yellow; stamens 5; staminodes 5, slender, alterting with the stamens; ovary ovoid, style free, stigma subcapitate; fruit a capsule, subglobose; seed oblong, reddish brow, shiny.

Distribution and habitat: It is more common than the former species; found as a spring weed of wheat fields with yellow flowers in Kohat, Karak, Bannu and D.I.Khan districts — S.Europe Mediterranean region, Canarry Islands, E. Africa, Afghanistan & India. Fl. Per. March & June.

16. Family U M B E L L I F E R A E

Annual, biennial or perennial herbs, rarely shrubs with yellow stem; leaves alternate often basal, compound, very rarely simple, petiole usually sheathing; inflorescence a racemose umbel, sometimes simple or more commonly compound, the primary rays subtended by an involucre of bracts and the secondary rays by involucre of bractlets; flowers bisexual, regular; calyx adnate to ovary and only the lobes or teeth distinct; petals 5, apically inflexed, stamens 5, arising from an epigynous disk; ovary bicarpellary, bilocular, inferior, plancetation axile, ovule 1 in each cell, styles 2; fruit schizocarpic, compound of 2 mericarp, coherent and dehiscing by their faces (Commissure), flattened dorsally or laterally, or the fruit terete, each mericarp with typically 5 primary ribs, one dorsal, 2 lateral and

2 inter mediate; oil tubes (Vittae) present or obsolete in the intercostal spaces or under the ribs, and on the commisural surface, each mericarp 1-seeded and usually suspended after dehiscence by a slender stalk or carpophore.

Key to genera

1	+	Lateral ridges broadly to narrowly winged (of fruit)	1. Anethum
	-	Lateral ridges prominent (of fruit) not winged (spiny, setose, pilose or glabrous)	2
2	+	Fruit secondary ridges well developed	3
	-	Fruit secondary ridges not developed	5
3	+	Plants annual, fruit pilose to hispid	2. Psammogeton
	-	Plants perennial, fruit spiny to bristly	4
4	+	Involucral bracts divided	3. Daucus
	-	Involucral bracts not divided ..	4. Trolis
5	+	Fruit 1-4 cm long, beaked	5. Scandix
	-	Fruit less than 1 cm long	6
6	+	Fruit oblong, 3-4 mm long, fruit pedicels very unequal	6. Carum
	-	Fruit oblong to ovate, 1-3 mm long; fruit pedicels equal	7. Ammi

1. [illegible] L.

A glaucous annual; leaves petioled, 3-4 pinnate; ultimate segments filform; leaf bases sheathing; bracts and bracteoles absent; petals yellow; carpophore divided; fruit ovoid, dorsally flattened; lateral ridges broader and narrowly winged; furrows

1- vittate; commissure 2-4 vittate; inner seed face plane to concave.

Anethum graveolens Linn., Sp. Pl. 263. 1753; Nasir, E. in Nasir and Ali's Fl. W. Pak. 20: 111. 1972. (Syn: Anethum sowa Roxb. ex. Flem., Peucedanum graveolens (L) Ben. and H.f.

Common name: Eng: Dil; Push. and Urdu: Sowa, Soe.

Strongly scented annual, 50-150 cm tall herb; upper leaves shorter and reduced; rays 8- numerous; fruits 2-5 to 4.5 mm long; dorsal and intermediate ridges distinct, lateral winged.

Distribution and habitat: Collected from wheat fields in Malakander farm (Peshawar) probably it has been escaped from cultivation — Asia, Europe, USA.

2. P S A M O G E T O N

Annual herbs; leaves 1-2 pinnate; bracts and bracteoles scarious, whittish; rays 5-15; calyx teeth obsolete; petals white to rose coloured, bilobed; fruit ovoid, densely hairy to hispid; primary and secondary ridges distinct; vittae solitary under the secondary ridges; commissure 2-vittate; inner seed face plane to concave.

Psamogeton biternatum Edgew in Trans. Linn. Soc. 2:57. 1847; Nasir, E in Nasir & Ali's Fl. W. Pak. 20: 101. 1972.

Annual herb, upto 40 cm tall; stem glabrous; lower branches decumbent; leaves pinnatisect; segments cuneate; involucre of 5-7 lanceolate to oval, broadly white margined bractlet, surface glabrous, margin ciliate, apex acute to acuminate; petals white-

rose coloured; fruit-ovoid, densely hairy; hairs white, glochidiate; 1 vitta under each secondary ridge.

Distribution and habitat: Weed of wheat fields in Mardan (Yar Hussain) and Peshawar (Nowshera).

3. DAUCUS L.

Leaves petiolate, 2-3 - pinnate; segments linear to oval; rays numerous, compact; involucre of pinnate bracts or sometimes lacking, involucel of entire or divided bractlets; calyx teeth evident or obsolete; petals white to purplish or yellow; fruit-ellipsoid to ovoid, dorsally compressed; primary ridges thin, secondary winged with bristles or spines; furrows 1-vittate; commissure 2-vittate; inner seed face plane to slightly concave.

Daucus carota L., Sp. Pl. 242. 1753;

Nasir in Nasir and Ali's Fl. W. Pak. 20: 103-105, 1972.

Biennial with thick tap root; stem glabrous to pilose; hairs white; leaves compound, 2-3 pinnate, hispid; segments linear to oval; margin deeply toothed; tips mucronate; peduncles upto 30 cm long; involucre of pinnatly divided bracts, upto 5 cm long; segments filiform to linear, rays numerous, the outer longer, incurved involucel of undivided of divided bractlets, margins entire of ciliate; calyx teeth minute; petals white to yellowish or light-purple, the outer radiate; the petals of the central flower of an umbel sometimes red; ovary hispid; fruit ovoid; primary ridges not prominent, slightly bristly; secondary ridges winged, spiny; spines white; one vitta under each secondary ridge; commissure 2-vittate.

Distribution and habitat: Weed of early spring found in wheat fields of Haripur and Mansehra (Hazara) cosmopolitin.

4. T O R I L I S Adans

Annual hispid herbs, with 1-2 pinnate leaves; segments linear to lanceolate or aval; umbels terminaly and lateral; involucre of linear bractor lacking; flowers white to light purple; fruit prickly, primary ridges pitiform; secondary ridges hidden by the spines which occupy the whole interval between the primary ridges; vittae solitary under the secondary ridges; commissure 2-vittate; inner seed face concave to sulcate.

Torilis nodosa (L) Gaertn., De. Fruct. 1:82. 1788., Nasir in Nasir and Ali's Fl. W. Pak. 20: 106-107, 1972. (Syn. Tordylium nodosum L., Caucalis nodosa Grantz).

Hispid annual, upto 70 cm tall; leaves bipinnate; segments lanceolate, pinnatisect; peduncles sessile or very short; umbels leaf opposed, involucral bracts lacking; rays 2-6, 1-2 cm long; involucel of linear bractlets; calyx teeth triangular; fruit ovoid, setulose; bristles on onter mericarps straight, scabrid, glochidiate, the inner mericarps with tubercles, styles erect, as long or slightly longer than the stylopodium.

Distribution and habitat: Weed of wheat fields in Peshawar Division — Europe, Africa, Central and Southern Asia — introduced in U.S.A.

5. SCANDIX L.

Annual herbs; leaves 1-3 pinnate; segments filiform to linear; inflorescence terminal and lateral; involucre of a few bracts or lacking; involucel of several entire or divided bractlets; calyx teeth obsolete; petals white; stylopodium depressed, style short; stylopodium longer than the seed; ridges distinct, obtuse; furrow 1-vittate; vittae minute or obscure; inner seed face sulcate.

Scandix pecten - veneris L. Sp. Pl. 256. 1753; Nasir, E in Nasir and Ali's Fl. W. Pak. 20: 94. 1972.
(Syn. S. pecten-veneris L., Var. brevirostris Boiss., S. persica Mart.

Common name: Eng. Venus's comb.

Pubescent or glabrescent herbs; 5-25 cm tall; leaves tripinnatisect; segments linear; leaf bases sheathing; sheath margin ciliate or entire; umbels terminal and lateral; involucre of 1 linear bract or lacking; involuceal of several lanceolate, ciliate bractlets; fruit shortly pedicellate, margin bristly; beak 2-3 times as long as the seed; style twice as long as the stylodium; furrows 1-vittate; commissure 2-vittate; vittae minute; inner seed face deeply sulcate.

Distribution and habitat: Commonly found in wheat fields of Peshawar, Hazara and Malakand Division.

6. C A R U M L.

Perennial herbs with elongted tap root; leaves 2-3 pinnatisect; segments filiform to oval; flowers white to rose coloured; calyx teeth 5, minute or obsolete; stylopodwin short, conical; fruit elliptic or oblong to ovoid; ridges conspicuous; furrows 1- (3) - Vittate; commissure 2-4-vittate; inner seed face plane.

Carum Carvi L., Sp. Pl. 263. 1753; Nasir in Nasir & Ali's Fl. W. Pak. 20: 86. 1972. (Syn: C. gracile Lindle).

Branched perennial, upto 70 cm tall, glabrous; root fusiform, elongated; leaves bipinnatisect, lowers leaves petiolate, upper sessile, bases sheathing; sheath margin white, membranous; involucre of 1-5 linear bracts or lacking; rays 5-9, unequal; involucel of minute bractlets or lacking; flowers white or rose coloured; calyx teeth obscure; fruit pedicels very unequal; fruit ovoid to oblong, yellowish oblong brown, ridges prominent; furrows 1-Vittate; commissure 2-vittate.

Distribution and habitat: Found in Maize fields of Birir. (Chitral) — Europe, N. Africa, M. East, C. Asia, Afghanistan, Himalaya in India and Pakistan.

7. A M M I L.

Annual or perennials; leaves peticlate pinnatly dissected; segments filiform to lanceolate or oval; leaf bases sheathing; involucre of many entire or divided bracts; rays many, involucel of many bractlets; calyx teeth minute or obsolete; petals white

of yellowish white; stylopodium depressed to shortly conical; styles slender; fruit oblong to ovate; ridges thin; furrows 1-vittate; commissure 2-vittati; inner seed face plane.

Ammi visnage (L) Lam., Fl. France. 3: 462. 1778; Nasir, E. in Nasir and Ali's Fl. W. Pak. 20: 31. 1972. (Daucus visnaga Linn Sp pl. 242 1753

Branched herb, glabrous, 1-2 m tall; nodes swollen; leaves pinnately to ternately dissected; segments filiform to linear; peduncles 5-15 cm long; involucre of divided bracts, deflexed; segments filiform; umbel receptacle enlarged; rays upto 50, contracted in fruit, stout; involved of linear bractlets.

Distribution and habitat: One of the commonest weed in wheat fields of Peshawar district, specially in the University area — N & S. America, N. Africa, Europe, Asia. This plant was imported from Egypt in 1940, being a medicinal plant, and it escaped to become a weed.

17. Family PAPILIONACEAE

Trees, shrubs, climbers or herbs; leaves compound, rarely simple, inflorescence solitary, racemose; flowers zygomorphic; calyx gamosepalous; corolla polypetalous, rarely united, differentiated into the upper bigger outermost petal or vexillum, the two lateral wings, and the 2 innermost, sometimes united along the margin, forming the carina or keel; stamens 10, mono or diadelphous; ovary unicarpillary, unilocular, many to 1 ovulid, fruit dehiscent or indehiscent or jointed; seeds sometimes arillate, endospermic or nonendospermic. Twenty species distributed among 11 genera are found as weeds.

1	+	Leaves simple	1. Alhagi
	-	Leaves otherwise	2
2	+	Leaves 3-foliate	3
	-	Leaves neither simple nor 3-foliate	7
3	+	Leaves digitately 3 foliate	6
	-	Leaves pinnately 3 foliate	4
4	+	Recemes long, pod short, globose or ovoid	2. Melilotus
	-	Recemes short, pods otherwise	5
5	+	Pods spirally coiled or coleate	3. Medicago
	-	Pods elongate, straight or curved	4. Trigonella
6	+	Stamens diadelphous (9+1)	5. Trifolium
	-	Stamens monoadelphous	6. Argyrolobium
7	+	Leaf rachis not ending in a bristle or tendril	8
	-	Leaf rachis ending in a bristle or tendril	10
8	+	Leaflets 5	7. Lotus
	-	Leaflets more than 5	9
9	+	Fruit more than 10 cm long	8. Sesbania
	-	Fruit less than 5 cm long	9. Astragalus
10	+	Leaflets 0, or 2	10. Lathyrus
	-	Leaflets more than 2	11
11	+	Leaves ~~in the~~ twisted tendrills	11. Vicia
	-	Leaves without twisted tendrills	12
12	+	Pod less than 5 cm long	9. Astragalus
	-	Pod more than 10 cm long	8. Sesbania

1. A L H A G I Adans.

Armed, small shrubs, leaves simple; inflorescence an axillary raceme, rachis spinescent at the tip, bracts small; calyx campanulate, teeth distinct, minute; corolla red or pink, vexillum and keel longer than the wings; stamens diadelphous; ovary sessile, 6-8 ovulate; fruit 1-9 seeded, often constricted between the seeds.

Alhagi maurorum Medic in Vorles, Churpf. Phys. Oek. Ges. 2: 397, 1787; Ali in Fl. W. Pak. 100: 319-20. 1977. (Syn. Hedysarum alhagi L, H. speudalhagi M.B; A. pseudalhagi (M.B) Desv; A. camelorum Fisch. ex. DC.

Common names: Eng. Persian manna, Camel thorn.
Urdu: Jhawansa., Thuranjabeen; Pushto: Thandah,
Afghan: Turanjabin; Panjab: Jawan.

Small shrubs, upto 100 cm tall; roots very deep; stem woody; leaves simple, small, apiculate; stipules minute; racemes axillary, ending in spine; calyx glabrous; corolla longer than calyx, pink or reddish-violet; pods glabrous, curved or straight, constricted between the seeds; seed 1-several (9).

Distribution and habitat: Found as a weed in wheat and maize fields of Nar area of District Bannu — Pakistan, Iran, Afghanistan, Russia, Turkey, Iraq, Syria, Palestine, Cyprus, N. Africa.
Fl. per. April - October.

2. M E L I L O T U S Juss.

Annual or biennial herbs, leaves pinnately 3-foliate, leaflets toothed, racemes long; calyx campanulate, teeth 5; corolla free from the staminal tube; standard and wings narrow, keel straight; stamens diadelphous; ovary sessile or stipitate, few ovuled; pod indehiscent.

1	+	Corolla white (wing equalling the keel).	1. M. alba
	-	Corolla yellow	2
2	+	Stipules entire, corolla 3.5 - 7 mm long, (wing longer than keel) pods not turgid	2. M. Officinalis
	-	Stipules denate or if entire then corolla less than 3.5 mm long, pod turgid.	3. M. indica

1. Melilotus alba Wes. in Lam., Encycl. Meth. 4: 63. 1796. Ali in Fl. W. Pak. 100: 310. 1977.

Erect annual, upto 150 cm tall; leaflets serrate stipules entire; racemes peduncled; flowers recurved; corolla white, vexillum exceeding wings and keel; pods reticulately veined, glabrous, usually 2-seeded.

Distribution and habitat: Common weed of corn and wheat fields of Peshawar, frequent in Malakander farm near Agri: University — Pakistan, India, Tibet, Afghanistan, C. Asia, Turkey, Arabia, Europe, Introduced elsewhere. Fl. per. March - September.

2. Melilotus officinalis (L) Pall; Reise 537. 1776; Ali in Fl. W. Pak. 100: 309-10. 1977 (Syn. Trifolium officinalis Lm).

Annual to biennial herb, glabrous or slightly pubescent above; leaflets serrate, rounded at the apex; flowers in dense racemes, yellow; wing and vaxillum equal, longer than the keel; pods glabrous, transversely striated, usually 1-seeded.

Distribution and habitat: A weed of cultivated fields and waste places, commonly found in corn and wheat fields of Peshawar and Bannu.

Flowering period: Winter.

3. Melilotus indica (L) All, Fl. Pedem 1:308. 1785.
Ali in Fl. W. Pak. 100: 308-90. 1977 (Syn. (M. Indica L., M. Parviflorus Desf.)

A glabrous annual; stipules linear, acuminate; racemes dense flowered, flowers ascending or spreading; calyx teeth deltoid, corolla yellow; standard exceeding the wings and keel; ped with prominent veins, 1-seeded, glabrous.

Distribution and habitat: Found as a weed in wheat fields of Peshawar and Mardan — Pakistan, India, Europe, Introduced in warm temperate regions. Fl. per. March - August.

3. M E D I C A G O L.

Annual or biennial herbs; leaves pinnately 3-foliate, leaflets toothed; stipules adnate, flowers in long racemes; calyx tube campenulate, teeth 5; corolla usually yellow, rarely purplish, free from the staminal tube; stamens diadelphour, anthers uniform; Ovary sessile, many ovuled, stigma oblique; pod spiral or much curved, indehiscent, smooth or spiny, 1-many seeded.

1	+	Pods prickly	2	
	-	Pods smooth	4	
2	+	Pods of 2-6 spirals		1. M. polymorpha
	-	Pods rounded	3	
3	+	Leaflets cuneate, usually pubescent on the lower surface only, stipules lacinate, spines of the fruit inserted very near the dersal suture		2. M. lacinata
	-	Leaflets obovate, rarely oblanceolate, pubescent on both surfaces, spines of the fruit inserted very near the dorsal suture		3. M. minima
4	+	Pod 1-seeded, 2 mm broad, falcate		4. M. lupulina
	-	Pod more than 1-seeded, broader, 4-5 spiraled		5. M. orbicularis

1. Medicago polymorpha Linn, Sp. Pl. 779. 1753; Ali in Fl. W. Pak. 100: 302. 1977. (Syn. Midenticulate Wild).

A glabrous or subglabrous spreading annual, upto 30 cm high; stipules lacinate; leaflets obovate to cuneate, faintly toothed; flowers yellow, arranged in 2-3 flowered, poduncled racemes; calyx teeth lanceolate, as long as the tube; corolla twice as long as the calyc; pod with 2-6 spirals, glabrous; margin with 2 rows of hooked spines.

Distribution and habitat: Found as a weed of wheat fields in Peshawar — Pakistan, almost widely distributed throughout the world. Fl. per. March - May.

2. Medicago lacinata (L) Mill., Gard. Dict. ed. 8, No. 5. 1768; Ali in Fl. W. Pak. 100: 303. 1977. (Syn. Medicago polymorpha var lacinata L).

Hairy or glabrous, spreading annual; stipules lacinate, petiole equal to or exceeding leaflets; leaflets obovate to cuneate, usually sharply toothed; racemes 1-2 flowered, peduncled; calyx narrowly turbinate; teeth setaceous; pod globose with sharply spinous coils. Ali (1977) has reported 2 varieties viz. Var. lacinata and var. brachycantha and the specimen at my disposal are related with farmer one.

Distribution and habitat: Found as a weed of wheat fields in Peshawar and Kohat — Pakistan, Morocco, Algeria, Tunisia, Kenya, Somali Republic, South Europe. Fl. per. March - April.

3. Medicago minima (L) Gr. in L. Amoen. 4: 105. 1759; Ali in Fl. W. Pak. 100: 302-3. 1977. (Syn. Medicago polymorpha var. minima L.).

Pubescent annual; stipules sub-entire to entire; petiole as long as the leaflets; leaflets obovate, distinctly toothed; inflorescence 2-6 flowered, peduncled raceme, peduncle longer than petiole; calyx finely downy; corolla distinctly exerted; pods of 3-5 close spirals. Fl. per. April - August.

Distribution and habitat: Found in wheat fields of Dargai (Malakand) and Peshawar — Pakistan; N. Africa, Asia, Introduced, introduced in N. and S. America.

4. Medicago lupulina L., Sp. Pl. 779. 1753; Ali in Fl. W. Pak. 100: 306-7. 1977.

Downy, procumbent, annual or biennial herbs; stipules entire or faintly toothed with long acuminate tips; leaflets obovate, apiculate; flowers yellow, 12-20, densely capitate; peduncles longer than leaves, calyx teeth setaceous, as long as the tube; corolla slightly exserted; pods glabrous or downy, indehiscent, black, falcate, 1-seeded. (Fig. 32).

Distribution and habitat: Found in wheat and corn fields of Peshawar and Mardan — Pakistan, India, Russia, Afghanistan, Iran, Syria, Turkey, Europe and Africa — Fl. per March - August.

5. Medicago orbicularis (L) Bart., Cat. Piante Siena 61. 1776; Ali in Fl. W. Pak. 100: 305. 1977. (Syn. Medicago polymorpha var. orbicularis L.).

An annual, subglabrous, 10-50 cm high; stipules short, deeply lacinate; leaflets obovate-cuneate, slightly dentate; inflorescence a 1-5-flowered peduncled racemo, peduncle long, longer than the petiole; calyx teeth linear setaceous; corolla much exserted yellow fruit with 3-7 flattened spirals, transversely veined.

Distribution and habitat: Weed of wheat fields in Madyan (Swat) — Pakistan, Iran, Iraq, Palestine, Lebanon, Syria; Egypt, Turkey, Greece, Russia (Caucasus), S. Europe, Tunisia, Algeria, Morocco — Fl. per. March - April.

4. T R I G O N E L L A Linn

Annual herbs, seldom perennial; leaves pinnatty 3-foliate, usually denticulate; stipules adnate to the petiole; flowers solitary or in axillary racemes, head or spike, calyx tube campanulate; teeth distinct; corolla yellow, blue or purplish,

free from the staminal tube; standard and wings narrow; ~~free~~ keel shorter; stamens diadelphous; filaments not dilated, anthers uniform; ovary sessile, ovules many; pod usually indehiscent, beaked; seeds 1-many.

Trigonella monantha C.A. Mayer. ssp. incisa (Benth) Ali comb. and stat. nov. Fl. W. Pak. 100: 293-94. 1977. (Syn. T. incisa Benth, T. polycerata auct non Linn., T. brahuica Boiss.).

Annual, branched and diffused plants, puberulous, stipule semisagittate at base, dentate, leaflets sharply inciso-dentate or even pinnatifid, obovate; racemes 1-3 flowered, peduncled; calyx subcylindrical, teeth setenceous, shorter than tube; corolla slightly exerted, yellow; pods falcate, wrinkled transversely, many seeded.

Distribution and habitat: Found as a weed in wheat fields of Peshawar, Mansehra, and Dargai (Malakand) — Pakistan, India, Afghanistan.

5. TRIFOLIUM L.

Annual or perennial herbs; leaves 3-foliate; flowers copious in dense axillary heads or spikes; calyx 5- toothed, subequal; corolla adnate to the staminal tube; standard and wings narrow; keel straight, obtuse; stamens diadelphous; the odd one rarely not free; anthers uniform; ovary sessile or stalked; ovules few; stigma more or less oblique; pod small, usually indehiscent; seeds 1 or few.

Many specimens are at my disposal, however, non of these provide proof for the weediness of any species in cereals. It is likely that this genus is under-collected and possibly Trifolium repens T. pratense L. and T. resupinatum L. which are common in waste places, are also found in Maize fields of this province.

6. A R G Y R O L O B I U M Eckl. & Zeyh.

Herbs or shrubs; leaves 3-foliate; stipules free; flowers in terminal or leaf-opposed racemes or umbels; calyx deeply 2-lipped, split nearly to the base, 5-toothed; corolla scarcely exserted; stamens monadelphous; ovary linear, sessile, many ovuled; pod linear, compressed, silky or villous, sub-torulose.

Argyrolebium stenophyllum Boiss. Fl. Or. 2. 32. 1872; Ali in Fl. W. Pak. 100: 35-36. 1977.

Perennial pilose herb, stem branched; leaves stipulate; leaflets lanceolate, entire, acute; inflorescence racemose, peduncled, 1-4 flowered; calyx bilabiate; stamens monadelphous; ovary sessile; fruit 5-8 seeded, dehiscent along both sutures, pilose, brown.

Distribution and habitat: Found in wheat fields of Hangu (Kohat) — Pakistan, Afghanistan. Fl. per. March - May.

7. L O T U S L.

Annual or perennial herbs; leaves 5-foliate; calyx tube campanulate, teeth subequal; corolla caducous, free from the

staminal tube; standard obovate, clawed exceeding the wings; keel incurved, shortly beaked; stamens diadelphous, anthers uniform; ovary sessile; ovules many; pod linear, turgid, septate between the seeds, dehiscent, many seeded.

Lotus corniculatus var. tenuifolcú L. sp. Pl. 775. 1753.

Variable perennial herb, prostrate, glabrous or obscurely silky, hairy perennial; leaflets 5; flowers 4-8, in a terminal close umbel, subtended by a reduced trifoliate leaf, peduncled; calyx teeth lanceolate -cuspidate, corolla showy, 2-3 times as long as calyx; pod cylindrical, straight, glabrous.

Distribution and habitat: Found as weed of wheat field in Miran Shah (North Waziristan) — Pakistan, India, Afghanistan, Iran, Syria, Lebanon, Iraq, Turkey, Palestine, Egypt, Russia, Europe, Japan, China, Australia. Fl. per. April.

8. S E S B A N I A Adanson

Soft wooded trees, shrubs or herbs; leaves narrow, paripinnate, leaflets entire; stipules caducous; inflorescence an axillary raceme; bracts and bracleoles mostly caducous; calye campanulate, shallowly 2-lipped or 5-toothed; corolla much exserted, glabrous; stamens diadelphous, anthers uniform; ovary stalked, ovules many; pod long, septate, many seeded.

Sesbania bispinosa (Jacq). W.F. Wight in U.S. Deptt. Bur. Pl. Ind. Bull. No. 135: 15, 1909., Ali in Fl. W. Pak. 100: 90-91. 1977. (Syn. Aeschynomene aculeata Schreb., A. bispinosa Jacq; Coronilla aculeata Willd., S. aculeata (Willd) Poir).

Annual, stem, glabrous or sparsely pubescent when young; leaves paripinnate, aculeate; leaflets oblong, obtuse, mucronate, stipulate; inflorescence 3-12 flowered racemes; calyx toothed, pubescent; corolla yellow; stamens diadelphous; fruit long, glabrous, 35-40 seeded.

Distribution and habitat: It is commonly cultivated throughout irrigated plains of this province, found as an escape in corn-fields of Mardan and Peshawar and fairly common in rice-fields of Swat — Pakistan, India, China, Kenya etc.
Fl. per June - November.

9. ASTRAGALUS L.

Herbs, shrubs or under shrubs; leaves pinnately compound, rarely digitate or reduced to 1-leaflet, slipulate; inflorescence various; calyx tubular or campanulate, equal or gibbous on the back, toothed; corolla exserted; stamens diadelphous, anthers uniform; ovary sessile or stalked; pod linear, unilocular or bilocular by an intrusive membrane; seeds usually uniform.

1 + Erect annual, with appressed hairs stigma penicillate, pod sickle shaped. 1. A. baldschuanicus

\- Procumbent annual, stigma not penicillate, upper parts having ascending white hairs pod linear oblong, little recurved. 2. A. tribuloides

1. Astragalus bakaliensis Bunge in Herb. Naturf.

Vir. Riga 1: 249. 1847; Ali in Fl. W. Pak. 100: 127-128. 1977.

Common names: Pushto: Oozhai.

Erect annual covered with appressed hairs; leaflets elliptic obtuse; flowers 3-7, pedunculate, pinkish, peduncle exceeding the leaves; teeth of calyx equalling tube; standard broadly oval, keel longer than wings; pod erect, sickle shaped, pubescent; seeds 20-30.

Distribution and habitat: It is one of thecommonest spring weed in Lakki Marwat area (Bannu), rarely found in wheat fields, more common in gram fields — Pakistan, Afgjanistan, Persia, U.S.S.R. Fl. per. March - May.

2. Astragalus tribuloides Delil, Fl. Aegypt. Illustr. 70. 1813., Ali in Fl. W. Pak. 100: 146-147. 1977.

A small annual, procumbent, branched from the base, caespitose; upper parts densely covered with ascending hairs; leaves distinctly petioled; leaflets 13-15, stipulate; flowers 2-8 in dense sessile heads; calyx tubular; corolla pale yellow, white or voilet; little exerted; stigma glabrous; fruit sessile, arranged stellately, pubescent.
Ali (1977) has reported 2 varieties viz. var. tribuloides and var. leiocarpus, former one is found in our area.

Distribution and habitat: Weed of wheat fields of Lakki Marwat area (Bannu), found in waste places throughout the Province — Pakistan, India, Russia.

10. L A T H Y R U S L.

Annual or perennial herbs, stem winged, climbing by tendrils; leaves paripinnate, rachis ending in a tendril,

leaflets 2-many, rarely absent, stipulate; inflorescence an axillary raceme or solitary; calyx regular to irregular, stamens diadelphous; pod often flat, sometimes terete, dehiscent, several to many seeded.

\+ Stem not winged, leaflets absent (stipules foliaceous), corolla bright to pale yellow 1. L. aphaca

\- Stem winged. leaflets present, corolla red, blue or white .. .. .. 2. L. sativus

1. Lathyrus aphaca L., Sp. Pl. 729. 1753; Ali in Fl. W. Pak. 100: 276: 1977.

Common names: Urdu: Bepatta matar.

Annual herb; stem not winged, glabrous; leaflets abortive; stipules foliaceous, in pairs, appressed to the stem, hastate, truncate, entire, flowers yellow, 1-2, peduncled; calyx teeth equal, exceeding the tube; corolla twice the calyx; pod glabrous, wingless, 4-6 seeded.

Distribution and habitat: Found in wheat fields throughout the province — Pakistan, Kashmir, India, Europe, N. Africa, S.W. & C. Asia. Fl.per. February - April.

2. Lathyrus sativus L. Sp. Pl. 730. 1753. Ali in Fl. W. Pak. 100: 280. 1977.

An annual with glabrous winged stems, nearly erect or so; leaflets 2; stipules lanceolate, semisagitate; flowers long pedicelled, solitary; calyx tube much longer than teeth; corolla white, red or blue; pod flat, glabrous, 3-5 seeded.

Distribution and habitat: Found in wheat-fields of Peshawar — Pakistan, Kashmir, India, Europe, N. Africa, S.W. Asia, Russia. Fl. per. March - August.

11. V I C I A L.

Annual or perennial herbs, mostly climbing by tendrils; leaves pinnate; leaflets 4 to many, rachis ending in a tendril or bristle, rarely leaf imparipinnate; stepules semisagittate, toothed; inforescence axillary racemes or flowers solitary or few in leaf axil; bracts deciduous; calyx tube oblique; wings adherent to keel; stamens diadelphous, ovary subsessile or stipitate, 2-many ovuled; fruit oblong to linear 2-valved, seed 1-2, globose.

1	+	Style finely downy all round near the tip	1. Vicia hirsuta
	-	Style conspicuously beared on the lower side of the tip	2
2	+	Peduncle 7 mm or more	2. Vicia monantha
	-	Peduncle less than 7 mm long	3. Vicia sativa

1. Vicia hirsuta (L.) [illegible], Brit. Fl. 2:614. 1821. Ali in Fl. W. Pak. 100: 271. 1977 (Syn. Ervum hirsutum L).

Annual herbs, trailing or climbing with pubes to glabrescent stem; leaves pinnatly compound, leaflets mucronate, sparsely pubescent when young; stipules semisagittate to lanceolate, the lower toothed or lacinate, tendrils mostly branched; inflorescence 2-7 flowered, axillary, peduncled racemes, pubescent; corolla rose or pale blue; fruit pubescent to subglabrous; seed 1-2.

Distribution and habitat: Found in wheat-fields of Haripur (Hazara) and Saidu Sharif (Swat) — Pakistan, India, Middle and Far East, N. Africa, Europe - introduced in many other countries.

2. Vicia monantha Retz., Obs. Bot. 3:39. 1783., Ali in Fl. W.Pak. 100: 267. 1977 (Syn. V. monantha ssp. cinerea (M.B) Maire, V. griffithii Baker).

Erect to procumbent annual, stem pubescent, hairs appressed; leaves pinnately compound, leaflets obtuse, minutely pubescent; stipules subhastate, bipartite to sparsely dentate; tendrill simple or branched; inflorescence an axillary peduncled raceme, 1-5 flowered; calyx pubescent, mouth oblique, teeth unequal, shorter than the tube; corolla violet to blue; pod oblong-linear, glabrous, 4-6 seeded.

Distribution and habitat: Found in wheat fields throughout the province — Pakistan, Afghanistan, Persia, Arabia, Iraq, Caucasus, Cyprus, Morocco, Turkey.

3. Vicia sativa L., Sp. Pl. 736. 1753., Ali in Fl. W. Pak. 100:269. 1977.

Annual pubescent herb, climbing by tendrill; leaves pinnately compound, leaflets 4-18, obtuse or emarginate, the terminal leaflet represented by tendrill; stipules semisagitate, dentate, tendril generally branched; flower 1-3, axillary, subsessile or shortly pedicellate; calyx pubescent, toothed; corolla pale pink, crimson, purplish violet, rarely white; fruit oblong, pubescent, glabrous when mature, 6-12- seeded.

Distribution and habitat: Found in wheat fields throughout the Province, more common than the previous ones; sometimes cultivated for fodder - Cosmopolitan in distribution.

18. Family L Y T H R A C E A E

Herbs, shrubs or trees; leaves usually opposite or whorled, simple, entire (mostly); stipule minute or absent; flowers bisexual, regular, perigynous; hypathium usually campanulate or tubular, persistent; sepals 4, 6, 8, valvate; petals inserted on the top of the hypanthium, as many as, twice as sepals or numerous; ovary 1-4-locular; placentation free central or axile; ovules numerous; style filiform; stigma often capitate; fruit a capsule; seeds numerous.

Three genera are found as weeds of wheat fields.

1	+	Inflorescence a terminal spike or spicate; flowers 6 - merous	1. Lathyrum
	-	Inflorescence exillary cymose, spicate or solitary; flowers 4-5 merous	2
2	+	Inflorescence cymose; bracts scale like; bractecles shorter than flower; capsule irregularly circumscissile	2. Ammannia
	-	Inflorescence spicate or solitary; bracts leaf like; bractecles equalling the flower; capsule valvular	3. Rotala

1. L Y T H R U M L.

Perennial or annual herbs, hygrophilous, glabrescent to tomentose; upper leaves alternate; inflorescence a terminal spike or spicate; flowers usually trimorphically heterostylous, usually 6-merous; hypanthium tubular, ribbed; epicalyx present; petals deep purple; stamens 12, diplostaminous, inserted near the base

of hypanthium, some or all exerted, ovary bilocular; stigma capitate-subglobose, papillose; capsule included in the hypanthium, 2-valved, spindle shaped; seeds triangular.

Lythrum salicaria L; Sp. Pl. 446. 1753; M.I. Dar in Fl. W. Pak. 78: 7. 1975. (Syn. L. tomentosum Mill; L. intermedium Ledeb.).

Perennial (or annual) with ovate- lanceolate, elliptic or lanceolate leaves, base cordate amplexicaul 6-60 mm long; spikes 9-45 cm long; hypanthium 12 - ribbed; epicalyx longer than or equalling the calyx; petals 5-9 mm long, obovate spathulate or obovate-oblanceolate; ovary subsessile, 2-5 mm long; capsule 4 x 1.5 mm, narrowed, seeds obovate, tip membranous.

Distribution and habitat: Weed of paddy fields and wet places, ascending from plains upto 1500 m. I have collected this specimen from rice fields of Kohat (Hangu), lower and upper Kurram valley, N. Waziristan (Miran Shah). It is most likely present in Swat, Hazara, Chitral and Northern Areas-Europe, S.E. & Central Asia, Siberia, N. Africa, N. America and Australia. Fl. per. July - September.

2. A M M A N N I A L.

Annual herbs, glabrous, leaves opposite or whorled (rarely alternate); flowers minute or small, in 3- many-flowered axillary cymes, often dimorphic; bracteoles usually 2; sepals 4-toothed; globular or bell shaped, often with little horn shaped intermediate teath; petals as many as sepals or zero; stamens 2-8; ovary 1-5 celled, enclosed in the hypathium; capsules globular, bursting

irregular, many seeded 4 species are found as weeds of paddy fields.

1	+	Leaves scabrid above; hypanthium quadrangular, capsule shorter than calyx	1. A. verticillate
	-	Leaves glabrous, hypanthium campanulate; capsule as long as calyx	2
2	+	Leaves not auriculate; cymes sessile, dense; flowers sessile, hypanthium not ribbed	2. A. baccifera
	-	Leaves auriculate; cymes pendunculate, lax; flowers pedicellate; hypanthium ribbed	3
3	+	Calyx erectin fruit, petals 2 mm long; capsule 2-3 mm in diameter	3. A. auriculata
	-	Calyx deflexed in fruit; petal 1 mm long, capsule 1-5 mm in diameter	4. A. multiflora

1. Ammania verticillata (Ard.) Lam., Encycl. Meth. Bot. 1: 131. 1783; M.I.Dar in Fl. W. Pak. 78: 1. 1975. (Syn. Cornelia verticillata Ard; A. salicifolia Monti; A. Capsica M. Bieb.)

Annual herb (or suffruticose); leaves scabrid, elliptic lanceolate or linear, base attenuate, upper leaves usually rounded at the base; cyme lax, sessile or subsessile; hypanthium quadrangular; sepals scabrid, acute; petals absent, capsule enclosed within the hypanthium.

Distribution and habitat: Common is moist places. I have collected this specimen from rice fields of Bannu (Ghoriwala), however, it is likely to be found in the paddy fields of plains and probably it has been over looked during collections - South East Asia, South East Russia. Fl. Per. July - October.

2. Ammannia baccifera L., Sp. Pl. 120. 1753; Dar in Fl. W. Pak. 78: 9. 1975. (Syn. A. vesicatoria Roxb; A. aegyptica willd;).

Common name: Urdu; Dadmari.

Plants upto 32 cm tall, rarely suffruticose; leaves horizontal or drooping, obovate, obovate - lanceolate, or ovate oblong, base usually attenuate, some-times cuneate or rounded, 1-47 mm x 0.5 - 9 mm; cymes sessile, glomerular; flowers sessile or subsessile; hypanthuim 1-1.75 mm x 1.5 - 2.5 mm; epicalyx obscure; petals absent; capsule slightly exceeding the hypanthuim.

Distribution and habitat: A variable species of rice fields and wet places in our area upto 1200 m.

I have collected this specimen from rice fields of Kohat (Hangu) and Charsadda; likely to be found in Dir, Chitral, Swat and Hazara - Africa, Afghanistan, Pakistan, India, China, Australia. Fl. Per. March - August.

3. Ammannia auriculata Willd., Enum Pl. Hort. Berol. 1: 7. 1803, Dar in Fl. W. Pak. 78: 8. 1975.

Common name: Urdu: Jangli Mehndi.

Plant upto 40 cm tall, erect or suberect; stem unbranched; leaves linear lanceolate, auriculate; cymes 1- or 2-3-13 flowered; hypanthium 8-10 green ribbed (vertically), ribs obscure in fruit epicalyx minute; petals obovate-cuneate or absent; stamens inserted above the middle of hypanthium; capsule slightly exceeding the hypanthium, seeds discoid.

Distribution and habitat: Weed of paddy fields in Swat, Hazara, Peshawar and Kohat districts. Found throughout tropical and warm temperate regions. Fl. Per. August - September.

4. Ammannia multiflora Roxb., Fl. Ind. 1: 447. 1820. Dar in Fl. W. Pak. 78: 9. 1975.

Erect plants upto 43 cm tall; stem branched; leaves 3-40 mm x 1-6 mm, auriculate - cuneate at the base; cymes 3 (-15) flowered; hypanthium 8-ribbed, ribs obscure in fruit; epicalyx folds horn like minute or obscure; sepals small, reflexed in the fruit; petals minute, cuneate, obtuse; capsule slightly exceeding the hypanthium.

Distribution and habitat: Found as weed of paddy fields in Kurram valley, Kohat, Peshawar and Hazara districts upto 1800 m - Asia, tropical and subtropical Africa, Australia, Fl. Per. September.

4. ROTALIA L.

Annual herbs, hygrophilous, glabrous; stem quadrangulur; inflorescence axillary, solitary, or spicate; flowers 4-5 merous, sessile; 2- bracteolate; hypanthium campanulate or tubular - campanulate, membranous in fruit; epicalyx present or absent; petals persistent; ovary oblong or 3- angled, 2-3-4 locular; capsule equalling the hypanthium; seeds elongated or roundish.

\+ Leafmargin cartilaginous; inflorescence an axillary spike; flowers 4-merous; epicalyx absent .. .. 1. R. indica

\- Leafmargin not cartilaginous; inflorescence axillary solitary; flowers 5-merous; epicalyx present .. .. .. 2. R. densiflora

1. Rotalia indica (willd.) Koehne, Engler's Bot. Jahrb. 1: 172. 1881; Dar in Fl. W. Pak. 78: 12: 1975. (Syn. Peplis indica Willd; Ammannia peploides Spreng., Ammania nana Roxb.)

An erect, annual herb, glabrous; leaves obovate, obtuse, attenuate at the base, margin prominently cartilagenous; spikes axillary, in ever axil; bracts leaf like; bracteoles subulate; flowers 4-merous; hypanthium tubular, campanulate, membranous in fruit; sepals very acute; petals minute, ovary oblong; capsule equalling the hypanthium; much shorter than the calyx; seeds longer than broad.

Distribution and habitat: Found as weed of rice fields in Hazara and Swat (not common) Russia, Iran, Afghanistan, Pakistan, India, Malaya, China and Japan — Fl. Per. August - September.

2. Rotalia densiflora (Roth) Koehne, Engler's Bot. Jahrb. 1: 164. 1881; Dar. in Fl. W. Pak. 78: 13. 1975. (Syn. Ammannia densiflora Roxb.).

Annual herbs, erect, glabrous; leaves ovate-lanceolate or linear-lanceolate, rounded at the base; inflorescence solitary, axillary, in every axil; flowers 5-merous; bracteoles subulate equalling the flower; hypanthium campanulate membranous in fruit; epicalyx subulate-filiform; petals ovate-oblong, or elliptic, acute, obtuse or retuse; ovary 3 angled; capsule 3-4 valved, seeds plano-convex or obovate.

Distribution and habitat: Weed of rice fields in Hazara, Swat and Kurram upto 2000 meter - E. Africa, tropical and subtropical Asia, Australia, Fl. Per. August - September.

19. Family PARNASSIACEAE

Perennial herbs; radicle leaves petiolate, ovate to oblong, often cordate; flowering stem often with a single leaf about the middle, 1-flowered; calyx 5-lobed, imbricate; petals 5, spreading, persistent; stamens 5, multifid glandtipped staminodes; ovary superior 1-locular; placentation parietal or sub-basal; ovules numerous; style one; stigma 3-4; fruit a capsule, opening by 3-4 valves.

PARNASIA L.

Character same as that of family.

Parnasia laxmannii Pallas ex Schultes, Syst. Veg. 6.696. 1820; C.B. Clark in Hk. f., Fl. Brit. Ind. 2. 401, 1878., Siddigi, M.A., in Fl. W. Pak. 31: 3-4. 1973.

Annual herb, upto 20 cm tall; leaves ovate or ovate- oblong, with cordate base; scape monophyllous in the lower half portion; calyx lobed; petals spathulate, 5-nerved; staminodes 3-lobed; capsule obconic below, subhemispheric above.

Distribution and habitat: Weed of rice fields in Daddar (Hazara) — N-E. Afghanistan, C. Asia, Himalayas and W.China.

20. Family ONAGRACEAE

Usually perennial or annual herbs; leaves simple, opposite or spirally arranged; stipules may or may not be present; flowers actinomorphic or zygomorphic, solitary or in axil of leaves or in racemes, 2-7-merous; sepals 2-7, petals 0-7, free; stamens as many as or twice as many as the sepals; ovary inferior, 1-5-locular; fruit a capsule, berry or nut, loculicidal or indehiscent.

Key to Genera

\+ Seeds bearded .. .. 1. Epilobium

\- Seeds not bearded .. .. 2. Oenothera

1. E P I L O B I U M Linn.

Perennial or annual herbs, erect or prostrate, densely pubescencent to glabrous; leaves simple denticulate to serrulate or rarely entire, sometimes pubescent; flowers in axillary racemes; sepals 4, free or fused, petals 4, free or fused; stamens 8, the episepalous ones larger; stigma 4-lobed; capsule elongate, 4-locular, loculicidal.

1. Epillobium angustifolium L., Sp. Pl. 347. 1757; Hoch & Raven in Nasir & Ali's Fl. Pak. 139: 11-13. 1981 (Syn. E. spicatum Lam.).

Erect perennial, having spreading horizontal roots; stem simple; leaves spirally arranged; inflorescence a lax raceme; sepals acute; canescent; petals entires deep pink or magenta or rarely white; stigma 4-lobed; seeds surface irregularly foveolate. Distribution and habitat: Rare weed of Maize fields in Chitral (Madaglasht and Birir Valley). — N. America, throughout Europe to N. Africa; Asia to Turkey, Iran, Pakistan and Himalayas to S. China. Fl. per. July - September.

2. O E N O T H E R A L.

Annual, biennial or perennial herbs, caulescent or acaulescent with a tap root or spreading underground parts; leaves alternate, stipules absent; flowers 4-merous, actinomorphic, in axils of upper leaves; floral tube well developed; petals yellow,

purplish, or white; stamens 8; stigma deeply 4-lobed; capsule many seeded, sessile or pedicillate, loculicidally dehiscent or indehiscent.

1. Oenothera rosea L. Her. ex. Ait., Hort. Kew ed. 1.2:3. 1789. Hoch & Raven in Nasir & Ali's Fl. Pak. 139: 41-43. 1981.

A branched perennial herb; stems ascending, densely strigillose; leaves sub-entire or sinuate-pinnatifid; mature buds erect; petals rose to rose-purple, obovate; capsule elevate, tapering to a sterile stipe like portion; seed surface finely granular, with a dark spot at each end.

Distribution and habitat: Weed of wheat (Peshawar, Bannu, D.I.Khan) and corn fields (Nokote-Mansehra, Balakote) — Native from central and southern texas, USA, throughout Mexico and central America to El. Salvador, and throughout S. America — Fl. per. April - September.

21. Family AMARANTHACEAE

Annual or perennial herb, rarely undershrubs or chimbers; leaves alternate or opposite, simple, exstipulate; flowers actinomorphic, usually bisexual, in spikes or racemes, with scarious bracts & bracteles; sepals 3-6, free or nearly so, more or less dry and membranous; petals absent; stamens mostly 5, opposite the sepals, united as the base into a short tube, often with staminodes between; ovary superior, 1-locular; ovules solitary or rarely several; style short of long; stigma capitate or 2-3 fid; fruit indehiscent or dehiscing by a lid.

1	+	Fertile flowers subtended by modified sterile flowers	2
	-	Fertile flowers not subtended by modified sterile flower	3
2	+	Leaves alternate; sterile flowers modified to form anther like scales	1. Digera
	-	Leaves opposite, sterile flowers modified into hooked spines	2. Pupalia
3	+	Ovary with one ovules	4
	-	Ovary with many ovules, flowers in deuse silvery spikes	3. Celosia
4	+	Staminodes absent, flowers bisexual, stigmas 2-3	4. Amaranthus
	-	Staminodes present	5
5	+	Bracteoles spinescent	5. Achyranthus
	-	Bracteoles aristate or mucronate ..	6. Aerva

1. [illegible] Forssk

Annual herbs; leaves alternate, entire; flowers in **exillary**, spike-like, bracteate, long-pedunculate racemes; each bract subtending a central fertile flower and 2 sterile lateral flowers; bracteales with crested scales in their axils; perianth segment 4-5, oblong, stamens 4-5 free; ovary with a single ovule; style filiform; stigmas 2, divergent; fruit a hard, in dehiscent nutlet enclosed by a persistent perianth; seeds globose; endosperm copious.

Digeria muricata (L) Mart. in Nov. Act. Acad. Caes. Leop.-carol. 13 (1): 285. 1826; Townsend in Fl. W. Pak. 71: 21-23-1973. (Syn. D. arvensis Forssk;). (Syn. Achyranthes muricata L.)

Glabrous or very sparsely hairy annual herb; stem 20-50 cm with ascending branches; leaves 1.5-5 x 0.7-2.5 cm, very variable in shape; lamina linear to broadly ovate; flowers in axillary, long pedunculate racemes; pinkish, bracteate; bracts persistent deltoid lanceolate; perianth segments 3-4.5 mm long; stigmas 2, recurved; ovule 1; fruit sub-globose. (Fig. 33).

Distribution andhabitat: A common weed of cornfields and waste places throughout the province and ascending upto 1500 m -- widespread in South Asia from tropical Arabia and the Yemen to Afghanistan, India, Ceylon and Malaysia and Indonesia.
Fl. Per. May - August.

2. P U P A L I A Juss.

Perennial herbs or undershrubs; leavesopposite, entire; flowers in small, globose or subglobose clusters bearing hooked spines, the latter becoming accrescent infruit and aiding in its dispersal; bracts persistent, becoming deflexed; perianth segments 5, falling with thefruit; stamens 5; stigmacapitate; ovary ovoid with 1 ovule; utricle ovoid; seed slightly compressed; endosperm copious.

Pupalia lappacea (L) Juss; Ann. Mus. Hist. Nat. Paris 2: 132. 1803; Townsend in Fl. W. Pak. 71: 24-25. 1974. (Syn. Achyranthes lappacea L)

Perennial, erect or sprawling-scramblingherb; stem 4-angled to almost terete, sparsely pilose or pubescent; spikes terminal, considerably elongating in fruit; flowers in almost sessile clusters; bracts lanceolate, persistent; sterile flowers reduced to 4-7, stellately spreading, hooked awns; style slender; capsule ovoid, seeds 2 mm long, ellipsoid, shining black.

Distribution and habitat: Found as a weed of corn fields & waste places throughout the province, prefers dry sandy or stony waste places -- in tropics and subtropics of old world; Arabia to India, Malaya, Indonesia, Africa, Australia. Fl. Per. Almost throughout the year.

3. C E L O S I A L.

Annual erect herbs, glabrous or pilose; leaves linear-oblong-ovate or obovate, sometimes ovate elliptic, entire or lobed; flowers in bracteate, dense silvery or reddish, terminal spikes, hermphrodite; perianth segments 5, oblong or lanceolate; stamens 5; filaments connate below into a tube; ovary ovoid subglobose; style absent or small to elongate; stigmas 2-3; ovules 2; utricle ovoid or globose, included in the perianth or exerted, many seeded, seeds black.

Celosia argentea L., Sp. Pl. ed. 1: 205. 1753; Townsend in Fl. Pak. 71:5. 1974.

Annual erect herb; stem and branches ridged, glabrous; leaves shortly petioled, lanceolate to linear, sometimes ovate-elliptic; inflorescence elongate, cylindric spike, white rarely pink; bracts & bracteoles lanceolate; perianth segements narrowly elliptic oblong; ovary 4-8-ovulate; capsule ovoid; seeds 1.25 - 1.50 mm, lenticular, black shining; (Fig. 34).

Distribution and habitat: Weed of rice (specially in Swat) and Maize in Peshawar, Hazara and Swat districts -- Tropical Asia, Africa, America.

4. A M A R A N T H U S L.

Annual or rarely perennial, erect herb, glabrous or pubescent; leaves alternate; often long petiolate, ovate lanceolate

or linear entire or sinute; flowers arranged indense spikes or panicles or axillary cymose clusters, bracteate, unisexual, dioecious or monoecious; perianth segments 5, rarely 2-3, membranous; stamens 5, rarely 2-3, free, ovary ovoid-compressed; style short or absent; stigmas 2-3; ovule 1, erect; capsule indehiscent or more commonly dehiscing by a circumscissile lid; seeds black and shining, embryo annual, endosperm absent. It is a weedy genus, only 4 species are found as we do in this section.

1	+	Leaf axils bearing spines	1. A. spinosus
	-	Leaf axils not bearing spines	2
2	+	Flowers in axillary cymes; perianth segments 3, sepals shorter than the capsule	A. graecizans
	-	Flowers in axillary & terminal spikes or panicles	3
3	+	Calyx segments as long as the capsule	3. A. viridis
	-	Calyx segments shorter than the capsule	4. A. hybridus

1. Amaranthus spinosus L., Sp. Pl. ed. 1. 991. 1753; Townsend in Fl.Pak. No.71: 9 - 10.1974.

Annual herb; stem often much branched, angular, glabrous or hairy; leaf-axils with paired spines; leaves long petiolate; flowers in axillary clusters in the lower part of the plant and in long dense spikes towards the end of branches; lowers of the spike female, upper male; bracts & bracteoles deltoid-ovate; perianth segments 5; stigmas 2-3; capsule ovoid, rugose; seeds 0.75- 1 mm, black shining.

Distribution and habitat: A common weed of cultivation and waste places in the plains of lower Hazara, Mardan and Peshawar ascending to at least 121 cm. Presumably originated from America, Now cosmopolitan weed in the warmer regions of the world; occassionaly occourring in temperate region.

2. Amarathus graecizans L., Sp. Pl. ed. 1; 990. 1753; Townsend in Fl. W. Pak. 71: 17. 1974.

Annual erect herb; stem simple or branched, glabrous or covered with multicellular hairs; leaves long petioled; flower clustes all exillary and sessile; male & female flowers intermixed. bracts & bracteoles narrowly lanceolate oblong; perianth segments 3; stiginas 3; capsule sub-globose to ovoid, exceeding the perianth, weed 1-1.25 mm, compressed, black, shining. (Fig. 35).

Townsend (1974) has classified this species into three subspecies viz., ssp. graecizans; ssp. thellungianus & ssp. silvestris And the most common one in the second one.

Distribution and habitat: Weed of grain field & waste places in Hazara, Dir & probably in Swat districts. Also reported by I.K. Wazir from Bannu district in the fields of wheat.

3. Amaranthus viridis L., Sp. Pl. ed. 2: 1405. 1763; Hk. f., Fl. Brit. Ind. 4: 720. 1885; Townsend in Fl. W. Pak. 71: 14-17. 1974.

Common name: Pushto: Sarma.

Annual; stem glabrous or hairy; leaves long petioled flowers arranged in dense axillary clusters of terminal leafless

spikes; male & female flowers intermixed; perianth segments, memberanous; stigmas 2-3; capsule subglobose ,indchiscent, irregularly rupturing, scarcely exceeding the perianth; seeds 1-1.25 mm, dark brown to black. (Fig. 36).

Distribution and habitat: Perhaps the most widely distributed and common species of the genus found in grain crops and waste places -- Found throughouthe tropical and subtropical.regions of the world, and penetrating further into the temperate regions -- ascending to at least 1220 m.

4. Amaranthus hybridus L., Sp. Pl. ed. 1: 990. 1753; Townsend in Fl. W. Pak. 71: 11-12. 1974. (Syn. A. chlorostachys willd)

Common names: Eng: Prince of wales;

Erect., annual herb; stem freely branched; leaves long petiolate; flowers in axilary and terminal, green or red spikes; male and female flowers intermixed;perianth segments 5; stigimas 3; capsule 2-3 mm, subglobose to ovoid; seeds 0.75 to 1.25 mm, back & shining.

Distribution and habitat: Weed of cornfields throughout the province; less represented in the southern districts -- A spontaneous naturalized weed in the warmer regions of the world; frequent in temperate regions as well.

5. ACHYRANTHUS L.

Tall herbs or undershrub with usually opposite leaves and elongated terminal spikes having deflexed, spinescent flowers; bracts & bracteoles rigid spinescent; sepals 5, subulate-lanceolate, aristate shining, at length hardened and strongly ribbed; stamens 5, filaments connat at the base, with alternating staminodes; anther

2-celled; ovary oblong, style filiform with capitellate stigma; 1-ovuled; utricle oblong or ovoid; seeds oblong.

Achyranthus aspera L. Sp. Pl. ed. 1: 204-1753; Townsend in Fl. W. Pak. 71: 33. 1974.

Perennial herb; hairy; often woody below, stem usually much-branched from the base; leaves obovate or sub-orbicular the young often tomentose, older glabrous; spikes rigid, rapidly increasing in length, in fruit upto 60 cm long; flowers many, greenish-white; perianth segments 5, ovate-oblong, acuminate, glaucous, stamens 5; style long, reddish; stigma rounded; utricle oblong; seeds brown.

Distribution and habitat: Weed of grain fields & waste places throughout the province; occurs in most of the tropical regions of the world.

6. AERVA FORSSK

Woodly herbs or undershrubs; leaves apparently mostly fasicipled (actually alternate); flowers small, bisexual or polygamous), in whitish solitary or branched spikes; sepals 4-5; stamens 4-5 with interposed staminodes; anthers 2-celled; ovary ovoid or subglobose, 1 ovuled, style 1 with capitate or 2- fid stigma; utricle indehiscent or opening transversely.

Two species are found as weeds.

1 + Flowers dioecious; outer sepals not mucronate .. .. 1. A. javanica

\- Flowers bisexual; outer sepals mucronate .. .. 2. A. sanguinolenta

1. Aerva javanica (Burm. f.) Juss. ex. Schultes, Syst. Veg. ed. 15, 5: 565. 1819: Hk. f. Fl. Brit. Ind. 4: 727. 1885; Townsend in Fl. W. Pak. 71: 26: 1974 (Syn. A. persica (burn.f.) Merrit. (Gyrsine persica Burm.f.)

Common name: Pashto: Shorakai (Marwat).

Wooly undershrub; 40-90 cm tall, sparsely branched; leaves 2.5 - 10 cm long; linear, oblong or oblanceolate, sessile or shortly petioled, entire; spikes slender, elongate, often branched, upto 15 cm long, white softly pubescent; flowers dioecious, about 2.5 mm long, wooly. (Fig. 37).

Distribution and habitat: A very variable species Townsend (1974) has described two varieties viz., var. Javanica & var. bovei. common weed in the dry regions of the province, specially Bannu, D.I.Khan, Kohat this species is fairly grown well in saline areas — from India deserts west ward through Iran & Afghanistan to Palestine, Egypt, and the Sahara, and south to Niger the Sudan Somalia Arabia.

2. Aerva sanguinolenta (L) Blume, Bydr. Fl. nederl. Ind. 547, 1826, Townsend in Fl. W. Pak. 71: 29. 1974.
(Syn. Achyranthes sangvinolenta L.)

Perennial herbs, often wooly below, prostrate to erect or scrambling; polygamous; stem branched particularly from the base, densely tomentose; leaves ovate elliptic; spikes sessile, forming a terminal panicle or a lax raceme, often cylindrical, silky; bracts membranous, persistent; flowers hermaphrodite, with the 2 outer perianth segments elliptic-oblong; stamens 5; style 1; stigmas 2; capsule rounded or rotund, compressed; seeds reniform, black, shining.

Distribution and habitat: Weed of wasteland, & along the edgs of grain fields throughout the province — India extending to China, Thailand, Malya, Indo-China, the Philippines & the Malaya islands.

Note: Nothosaerva brachiata (L) wight; Achyranthes Bidentata Blume: & Alternanthera pungens Kunth: are not found as weeds in this province, but may possibly occur in some of the area and more collection is needed in this regard.

Comphrena celosioides Mart a native of south America which has spread rapidly in the present century and is rapidly becoming a widely distributed tropical and sub-tropical weed. It will certainly spread in Pakistan to become much more common than it appear to be at the moment (Townsed, 1974) (Fig. 38).

22. Family P O L Y G O N A C E A E

Herbs, shrubs or climbers; leaves alternate, stipules ochreate; flowers polygamous or unisexual, actinomorphic; sepals 3-6, imbricate, often enlarged and becoming membranous or hardened in fruit; stamens 6-10, rarely more, filaments free or united at the base; ovary 1-locular, superior, ovule solitary, basal; style 2-4, usually free; fruit trigonous or 2-sided nut.

Key to genera

\+ Perianth of 4-5 segments; stamens 5-8 .. 1. Polygonum

\- Perianth segments 6, in whorl of 3 each; stamens 6 .. .. 2. Rumex

1. P O L Y G O N U M L.

Herbs with alternate leaves, stipules ochreate, membranous; flowers hermaphrodite, small, clustered; clusters axillary and sessile or in spiciform, capitate or panicled racemes; bracts and bracteoles membranous; disk glandular or 0; sepals petaloid, usually 5; stamens 5-8 perigynous; ovary biconvex or 3-gonous; styles 2 or 3; nut biconvex or trigonous; seed albuminous. Represented by 4 species.

Key to the species :/

1	+	Flowers borne in small axillary clusters	2
	-	Flowers borne in terminal racemes	3
2	+	Nerves of stipules prominent	1. P. aviculare
	-	Nerves of stipules faint or absent ..	2. P. corrigioloides
3	+	Nut biconvex (2 sided), styles 2, mouth of ochrea ciliate	3. P. glabrum
	-	Nut 3-sided, style, 3-5, mouth of ochrea with cilia exceeding the length of the tube	4. P. barbatum

1. Polygonum aviculare L. Sp. Pl. 362. 1753. Stewart, Ann. Cat. Vasc. Pl. W. Pak. and Kashmir 203. 1972.

Annual, rarely biennial; stem erect or ascending with spreading branches; ochrea membranous, shorter than the internodes; leaves shortly petioled, margin entire; flowers arranged in the axil of leaves; perianth obovoid; stamens 5; styles 3; fruit a 3-gonous nut.

Distribution and habitat: Found throughout wheat fields of the irrigated lands of the province. Frequent in Europe and Asia — Fl. per. February - September.

2. Polygonum corrigioloides Jaub. & Spach, III. Pl. Or. 2: 34. 1845. R.R. Stewart, Ann. Cat. Vas. Pl. W. Pak. & Kashm.205. 1972. (Syn. P. plebeyum R. Br.).

Annual, biennial or perennial herb; stem branched and spreading, ochreae membranous, white or brown; leaves sessile, mostly obtuse; flowers axillary, pink; perienth tube much shorter than th

than the lobes; stamens 5, ovary ovoid; styles 3, nut 3 gonous, enclosed by perianth.

Distribution and habitat: Common weed of cultivated fields throughout the province — Asia, S.A. Africa, Australia. Fl. per. throughout the year.

3. Polygonum glabrum Willd. Sp. Pl. 2. 447. 1799; R.R.Stewart. Ann. Cat. Vasc. Pl. W. Pak. and Kashm. 206.1972.

Annual herb, erect, stem stout, not much branched; leaves lanceolate, usually gland dotted; ochrea truncate ciliate at the mouth; flowers white or rosy in terminal racemes; perianth segment 5; stamens 5-6-8; styles 2; nut 3-gonous.

Distribution in habitat: Found as a weed of rice fields in Swat — S. Asia and Africa. Fl. per. May - September.

4. Polygonum barbatum L., Sp. Pl. 362. 1753; R.R.Stewart, Ann., Cat. Vasc. Pl. W. Pak. and Kashmir, 204. 1972.

Annual herb, branched, stem erect or decumbent; leaves sessile or subsessile; ochrea with cilia at the mouth exceeding the length of the tube; flowers white perianth segments 5; stamens 5, styles 3; nut 3-gonous.

Distribution and habitat: Weed of rice fields in Hazara (Kaghan) — Asia and Africa.

2. R U M E X L.

Annual or perennial herbs; leaves radical and alternate; flowers polygamous arranged in glomerules or fascicles; perianth segments 6, in 2 whorls, stamens 6, in three pairs; ovary trigonous, styles 3; nut triquetrous.

Key to the species :

1	+	Leaves hastate or deltoid; flowers dioecious	1. R. alhastatus
	-	Leaves not hastate; flowers polygamous	2
2	+	Inflorescence leafy throughout, leaf base truncate, fruiting perianth 6-3 dentate	2. R. dentatus
	-	Inflorescence leafy at the base, leaf base cordate, fruiting perianth 6-20 dentate	3. R. nepalensis

1. Rumex hastatus D. Don., Prodr. Fl. Nep. 74. 1825. R.R. Stewart, An. Ann. Cat. Vas. Fl. W. Pak. and Kashmir, 214. 1972.

Erect herb, woody at the base (sometimes under shrub); leaves petioled, lamina hastately trilobed; inflorescence a panicle; flowers unisexual, bracts ovate.

Distribution and habitat: Weed of maize fields at higher altitudes. It has been seen it growing along the borders of fields. Collected once from maize fields at Miadam (Swat) — Nepal, India, Pakistan and Afghanistan.

2. Rumex dentatus L. ssp. Klotzschianus (Meissn), Rech. f. in Beih. Bot. Cent. 49 (2): 19. 1932. R.R. Stewart, Ann. Cat. Vas. Fl. Pak. & Kash. 214. 1972. (syn. R. klotzschianus Meissn.)

Annual herb, stem grooved, glabrous; leaves radical and alternate, upper smaller, all oblong, obtuse, rounded or cordate at the base, margins often crisped; flowers arranged in simple or panicled racemes, bisexual; fruit sharply trigonous.

Distribution and habitat: Common weed of wheat fields and waste places in irrigated areas — S.E. Europe, S.W. Asia and Egypt. Fl. per. Spring.

3. Rumex nepalensis Spr. Syst. Veg. 2: 159. 1825.
R.R. Stewart, op. cit. 214. 1972.

Erect, glabrous, perennial herb; leaves petioled, base cordate, margin sinuate; lower glomerules remote and leafy, upper contiguous and leafless; flowers polygamous nut triquetrous.

Distribution and habitat: Spring weed of higher altitude, found as weed in wheat fields of Peshawar, Mardan and Nokote (Mansehra) — Temperate himalayas and S.W. Asia, Nepal, India, Pakistan, Afghanistan, Iran and Turkey.

23. Family CHENOPODIACEAE

Annual or perennial herbs, sometimes shrubs, stem sometimes jointed; leaves alternate or rarely opposite, simple, exstipulate; flowers minute, unisexual or bisexual, actinomorphic, often bracteate; calyx lobed (3-5), rarely absent in female flowers; petals absent; stamens equal to calyx lobes; ovary superior or immersed in the base of the calyx, 1- locular, ovules solitary; fruit a nut, indehiscent, rarely circumscissile.

1. CHENOPODIUM

Erect or prostrate herbs; leaves alternate, entire, lobed or toothed; flowers minute, 2-sexual, in cymose clusters; perient usually 5-lobed; stamens 5 or fewer; disk 0; ovary free, depressed or compressed; styles 2-3; urticle membranous, included in the

perienth; seeds horizontal or vertical; testa crustaceous; albumen floury; embryo annular.

+	Scentless herb; seeds smoth and shining; perienth segments without a green swelling on the back near the apex	1. C. album
-	Foetid herb; seeds wrinkled, dull black; perienth segments with a green swelling on the back near the apex	2. C. murale

1. Chenopodium album L. Sp. Pl. 219. 1753, Stewart, Ann. Cat. Vas. Pl. Pak. and Kashmir. 220. 1972.

Common name: Urdu Bathva, Pushto: Bathu.

Erect annual, greenish or nealy white; stem angled; leaves variable in shape, lower ovate or oblong, toothed or entire; upper mostly narrow, entire; flowers in cymose clusters, forming exillary spikes or long terminal panicles; sepals keeled at the back, completely enclosing the thin membranous utricle; stigmas 2; seeds rounded, compressed, with an acute margin, smooth, black, shining.

Distribution & habitat: Spring weed found in wheat fields throughout the irrigated lands of province. In rainfed area, it occurs in fields near the population — cosmopolitin weed.

2. Chenopodium murale L. Sp. Pl. 219. 1753; Stewart, Ann. Cat. Vas. Pl. Pak. & Kashm. 221. 1972.

Common name: Vern. Bathu, Sarma.

Annual herb, foetid, sub-glabrous; branches erect or somewhat diffuse; leaves bright green, rhombic or deltoid ovate, acute, base cuneate, sides irregularly lobed and more or less shaply

toothed; petiole long or short; flower clusters in lax or dense axillary divaricate cymes, sepals obensely keeled; incurved and closing over the fruit, stigmas 2; seeds rounded, compressed, sharply keeled, dull black, wrinkled.

Distribution and habitat: Weed of wheat field throughout the province — consmopolitin weed.

24. Family URTICACEAE

Herbs or shrubs, with or without stinging hairs; leaves simple, alternate or opposite, often with cystoliths; inflorescence axillary, cymose or fasciculate, rarely flowers solitary; flowers unisexual, hypogynous; calyx 3-5 lobed; petals absent; stamens 3-5, rarely 1; ovary monocarpellary free or adnate to calyx, 1-celled having 1 ovule; style simple; fruit achene or fleshy drup.

1. URTICA L.

Monoecious or dioceious herbs, covered with stinging hairs; stem ridged or angular; leaves petiolate, opposite, inflorescence of dichasial cymose clusters arranged in axillary uni-or bisexual racemes, spikes or panicles; flowers green, minute; calyx of 4, free sepals; stamens 4; ovary ovoid; style absent or very short, stigma capitate-penicillate; achene ovoid-elliptic or ablong.

Urtica pilulifers L., Sp. Pl. 983. 1753., A. Ghafoor in Nasir and Ali's Fl. Pak. 137: 4. 1981.

Common names: Urdu. Bicho Booti, Pushto: Chichona.

Annual or biennial herb, with sparse stinging hairs; stem quadrangular; leaf margin seriate, apex acuminate; stipules free; racemes bisexual; achenes broadly ovate.

Distribution and habitat: I have collected this specimen once from wheat fields in Charsadda near river — Pakistan eastwards to Sikkim and W. China. Fl. per. March - August.

25. Family C A N N A B A C E A E

Herbs, leaves alternate or opposite, simple, usually palmately divided; stipules present; flowers dioecious, axillary, male paniculate, female sessile, crowded, the female with large persistent bracts; male flower having 5-lobed calyx, stamens 6; in female flower, calyx closely overlaping the ovary, membranous, entire; ovary sessile, 1. locular; style 2. partite; ovules solitary, pendulous; fruit an achene, covered by the persistent bract; seed endospermic.

1. C A N N A B I S L.

Erect, odorous annual herbs; leaves long petioled, upper alternate, lower opposite, palmately dissected, 3-11 foliate; stipules 2, free, lateral, filiform; plants dioecious; male inflorescence fasciculate, shorter than the leaves, sub-sessile; achene crustaceous; seeds with unilateral endosperm, embryo large, curved; dicotyledons thick & fleshy.

Cannabis sativa L., Sp. Pl. 1027. 1753; Hk. f., Fl. Brit. Ind. 5: 486. 1872; Qaisar in Fl. W. Pak. 44: 3-4. 1973.

Common name: Urdu: Hashis, Bhang; Pashto: Bangey, Bang.

Annual; stem & branches slightly angular with appressed hairs; leaves palmately 3-9-11 foliate; male flowers 4-6 mm across, greenish, filiform; tepals alliptic or oblong, pubescent;

stamens 4-5 mm long; female flowers as large as the perigonium; bracts foliaceous, covered with small glandular hairs; ovary sessile, subglobose, styles 2-4 mm long, brown; achene shining, yellowishbbrown, minutely pilose to glabrous, ovate; seeds only with fleshy unilateral endosperm.

Distribution and habitat: Common weed of wheat fields in Swat, Dir, Chitral and Hazara; rarely found in Peshawar and Mardan districts. It is a very adoptive species and is found from plains upto 10,000 ft — Russia, China, India, Pakistan, Iran — Fl. Per. April - October.

26. Family THYMELAEACEAE

Perennial or annual herbs or shrublets; leaves simple, entire, numerous (usually), alternate or opposite, exstipulate; flowers in racemes spikes or fascicles, rarely solitary, hermaphrodiate; regular; calyx 4-5 lobed; petals very small or absent; stamens as many as or double the number of calx lobes, episepalous; carpels 1-2, rarely more, syncarpous; ovary uniloular, with one pendulous ovule, style simple; fruit berry or drupe, seeds solitary.

Out of seven genera and five species found in Pakistan only two genera and two species are found as weeds.

Key to the species of Thymelacaceae

1 + Flowers ebracteate, in lax terminal racemes, calyx tube constricted in fruit ..1. Diarthron

\- Flowers bracteate, axillary, solitary, in calyx tube not canstricled in fruit .. 2. Thymelaea

1. DIARTHRON Turoz.

Herbs; leaves linear, scattered; flowers bisexual in terminal recomes or on lateral branches; calyx urceolate to slender; disc absent; stamens 8, 2-seriate, rarely exerted; ovary unilocular,

subsessile, glabrous; fruit dry, enclosed by persistant base of the calyx. One species is found as a weed of wheat fields.

Diarthron Vesiculosum G.A. Mey. in Bull. Phys. Math. Acad. petersb. 1:3559. 1843; Nasir in F.W. Pak. 12: 5-6. (Syn. Passerina vesiculosa F&M., D. carinatum Jaub & Spach).

Small annual herbs with ascending branches upto 45 cm tall; stem glabrous, woody below, dichotomous; leaves scatered linear to lanceolate; flowers minute, greenish yellow, in short terminal and extra axillary racemes; calyx tubular, urceolate, constricted into a narrow tube above, ovary 4-lobed, lobes acute; upper 4 stamens antisepalous; fruit 2 mm long, ovoid, shiny black. (Fig. 40, A).

Distribution and habitat: Very common, spring weed of wheat fields throughout N-W.F.P. and Punjab-E. Europe, Turkey, Iran, Afghanistan, Pakistan and Central Asia (Sangaria) Fl. Per. March - June.

2. T H Y M E L A E A Mill

Perennial or annual herbs or shrubs, leaves scattered, linear; flowers small, bisexual or polygamnus, sessile, in clusters or solitary axillary, bracts, small; calyx urceolate with 4 spreading lobes; stamens 6, 2-seriate, included; ovary subsessile; unilocular; style short, stigma capitate; fruit dry, enclosed by the persistant calyx. Represented by a single species.

Thymelaea Passerina (L). Cosson and Germain, syrope. Analit. 360. 1859; Nasir in Fl. W. Pak. 12: 6-8. 1971 (Syn: Stellera passerina L).

Common name: Pashto: Dard Bootai.

Erect, glabrous annual, stem woody below; leaves commonly alternate, rarely opposite, linear to lanceolate, glabrous, sessile; flowers greenish yellow, base with dense white hairs; bracts 2, ovate, calyx tubular, pubescent, 4 lobed, ovate; stamens 8, upper 4 antisepalous; ovary ovoid, pubescent above, style less than 1 mm long, stigma capitate; fruit ovoid, black, enclosed, in persistent calyx. (Fig. 40, B).

Distribution and habitat: Found as spring weed in wheat fields throughout the province, very frequent in Peshawar, Mardan and Bannu districts — Europe, Caucasus, Iraq, Turkey, N. Africa, W. Asia, Afghanistan, Iran, China & Kashmir. Fl. Per. March - June.

27. Family AIZOACEAE

Herbs or low shrubs, erect or prostrate, often fleshy; leaves alternate or opposite; flowers bisexual, actinomorphic; calyx tube free or adnate to the ovary, lobes 5-8, imbricate or rarely valvate, herbaceous; petals numerous or absent, inserted in the calyx tube; staments perigynous, several in many series of few, free or united at the base into bundles; ovary superior or inferior, 1-several locular; ovules solitary to many, basal, apical or axile; fruit a capsule or nut like drup, often clasped by the persistent calyx.

Three genera and four species are found in weeds.

1 + Capsule dehiscence operculate 2

\- Capsule fissile dorsally, capsule more or less papery .. .. 1. Corbichonia

2 + Styles 2, free; pyxidium 4-Seeded, dehiscing by a bivlved lid longitudinally 2. Aizoya

\- Style usually 1, pyxidium 2-many seeded, dehiscing by a circumscissile lid .. .. 3. Trianthema

1. C O R B I C H O N I A Scop.

Glabrous annual or perennial herbs; leaves entire, fiesly, exstipulate; flowers in lax terminal cymes; sepals 5, free; stamens 12-20, outer ones petaloid staminodes; ovary 5 locular, 5-lobed; ovules many, placentation axile; style 5, free; capsule globose; seed many.

Corbichonia decumbens (Forsk) Exell. in journ. Bot. 73: 80. 1935. (Syn. Cryxia decumbens Forsk; Glinus trianthemoides Heyne; Portulaca decumbens (Forssk) Vahl.

Branches rigid, often reddish; leaves attenuate, elliptic ovate or obovate, mucronate, fleshy; cymes upto 10 cm long; bricts lanceolate membranous; sepals 4 mm long, margins white; petaloid staminodes c. 2.5 mm long, adnate; ovary glose, style 5, as long as or longer than the ovary; capsule papery dehiscing by 5 valves; seeds c.1.1. mm long, copressed, rugose, shining black, stropliolate.

Distribution and habitat: Found as a weed of maize fields throughout the N-W.F.Province — Africa, W. Asia, India and Pakistan. Fl. per. October - January.

2. Z A L E Y A Burm. f.

Prostrate annual or perennial herbs with opposite and exstipulate leaves; flowers; flowers bisexual, in axillary globose clusters, sub-sessile regular; calyx tube 5-lobed; lobes with membranous margin, mucronate; stamens 5-15, free; ovary bilocular; styles 2, free; capsule seeded, dehiscence operculate.

Represented by a single weedy species.

Zaleya pentandra (L) Jeffery in Kew Bull. 14(2): 238. 1960. Nasir in Fl. W. Pak. 41: 2-3: 1973. (Syn. Z. govindia (G.Don.) Nair T. pentandra L.). (Syn. Trianthema pentandra L)

Diffuse prostrate perennial; stem papillose to glabrous; leaves oblong to obovate, papillose, petiole with a sheathing base; flowers axillary, solitary or 2-5, sessile; bracts solitary, ovate to lanceolate; bracteoles 2-3, unequal, scarious; calyx persistant, papillose, sepals oblong ovate, margin white; stamens 5 alternating with the sepals; ovary ob-pyramidal, pipillose; pyxiduim 4-seeded, splitting longitudinaily, amphore 2-seeded; seeds 1.5 mm long, black, rugose.

Distribution and habitat: A common weed of semi-irrigated fields of D.I.Khan, Bannu and Peshawar districts. This weed has been collected from maize fields but is being a perennial weed is probably found due to edge effect or it may not be killed by ploughing before sowing the maize crop — Africa, India, Iran & Pakistan.

Note:- It can be used for stomach complaints, snake bite and as a fodder for cattle (Nasir, 1973).

3. T R I A N T H E M A L.

Prostrate, deffused branched, glabrous or papillose herbs; leaves opposite, unequal, ex-stipulate; flowers small, axillary, solitary or in cymes of clusters; calyx 5-lobed; petals absent; stamens 5-10 or more , episepalous; ovary 1-2 locular, with 1-many basal ovules, style 1-2; capsule membranous or coriaceous; seeds few, reniform.

Two species are found as weeds.

\+ Stamens 10-20, ca[illegible] ... . [illegible] [illegible]

\- Stamens 5, lower half of the [illegible]
2-seeded .. .. [illegible]

1. Trianthema portulacastrum .. [illegible] 1753; [illegible]
Fl. W. Pak. 41: 3. 1973. ([illegible] obcordata Roxb.).

Common name: Urdu: Isak;

Prostrate, annual herb; stem glabrous to sparsely pubescent; leaves sub-orbiculate to obovate, obtuse or acute; petiole papillose to glabrous, base dilated, clasping, calyculate, with 2 lateral stipular appendages; flowers axillary solitary, sessile, calyx tube closely sheathed by the leaf base; sepals 5, oblong, shortly aristate; stamens 10-15-20, unequal; ovary more or less conical, style 1, linear, persistant; pyxidium c. 4 mm long; amphora 4-5 seeded; seeds c. 2 mm broad, black, rugose.

Distribution and habitat: Common weed of maize fields in Hazara, Swat, very common in the surroundings of Peshawar city as a weed of maize & vegetable fields - Tropical America, Africa, W. Asia, Ceylon, India and Pakistan. Fl. Per. May - November.

2. Trianthema triquetra Rottl. & Willd in Ges. Naturf. Fr. Neue. Sche. 4: 131. 1803. Nasir in Fl. W. Pak. 41: 6. 1973;
(Syn. T. crystallina).

Common name: Urdu, Alettie.

Annual herb having long and slender roots; stem prostrate, papillose; leaves 0.2-1.2 cm x 1.5 - 3.5 mm, elliptic ovate to oblanceolate, leaf base sheating, membranous; flowers solitary or 2-3, sessile; bracts ovate, acuminate; bracteoles 2; Calyx tube campanulate, persistant; stamens 5; ovary turbinate, style 1,

persistent; pyxidium 2 mm long, flat, depressed in the center; amphora 1 seeded; seed 1.1 mm broad, rugose, black.

Distribution and habitat: Common weed of corn fields in saline areas of Bannu & D.I.Khan districts - Africa, Arabia, India and Pakistan.

28. Family ILLECEBRACEAE

Herbs with small, simple, alternate or opposite leaves; stipules scarious free or connate or even absent; flowers small, bisexual, actinomorphic; calyx herbaceous or leathery, 4-5 lobed; petals absent; stamens as many as and opposite the sepals; ovary free, sessile, 1- locular; ovule 1, rarely 2, erect or pendulous from a basal funicle; style one, terminal or style 2-3; fruit a 1-seeded indehiscent nut or utricle.

HERNIARIA L.

Annual or perennial; leaves opposite, the upper ones often alternate through abortion of one member of a pair, small, sessile or sub-sessile entire, obovate to oblanceolate or narrowly elliptic; stipules interpetiolar, small; inflorescence dense leaf opposed or pseudoaxillary, rarely terminal in cymose sessile fascicles or clusters; flowers sessile or subsessile, tetra or pentamerous, bracteate; sepals 4-5; petals 4-5; stamens 2-5; carpels 2, syncarpous; ovary ovoid to subglobose, 1-locular, ovule one basal; fruit 1-seeded indehiscent utricle enclosed by the persistent calyx; seed shining dark brown or black, crustaceous, lenticular to ovate- obovate, smooth.

Single species is found as a weed.

Herniaria cachemeriana J. Gay in Duchartore, Rev. Bot. 2: 370. 1847: Ghafoor in Fl. W. Pak. 47: 3. 1973. (Syn. H. afghana F. Hermann).

Perennial, prostrate, spreading herb; stem beset with short spreading or deflexed hairs; leaves opposite, sessile; stipules minute, membranous, ovate-triangular with ciliate margins, white, inflorescence in dense leaf opposed cymose clusters of 5-8 flowers; flowers green pentamerous; sepals 5, free; petals 5, white; stamens 5, filaments minute; ovary ovoid, papillose in the upper half; style distinct, bifid to bifurcate, stigma 2; fruit ovoid, almost equal to and enclosed by persistent calyx; seed lenticular.

Distribution and habitat: Found in cornfields of Swat, Dir, Chitral and Hazara; rarely found in Peshawar, Mardan and Kohat districts. — Iran, Afghanistan Peshawar. Fl. per. June - October.

29. Family. P R I M U L A C E A E

Annual or perennial herbs; leaves all radical or sometimes cauline, alternate, opposite or whorled, exstipulate; flowers axillary or in umbels and panicles, actinomorphic or rarely zygomorphic; sepals, petals and stamens 5 each; ovary 1-celled, superior with many ovules; fruit a many seeded capsule.

A N A G A L L I S Tour.

Annual or perennial herbs; leaves opposite, entire, flowers axillary, solitary, peduncled, red or blue, rarely white; calyx 5-partite; corolla rotate, 5-partite; stamens 5; ovary globose, ovules many amphitropous; capsule globose, opening by

transverse cut; seeds many, peltate, plano-convex.

Anagallis arvensis L. Sp. pl. 148. 1753; Stewart, An. Ann. Cat. Vas. Pl. W. Pak. & Kash. 532. 1972.

Common names: Eng: Pinpernal, Push: Sheen stargai.

A glabrous procumbent herb; stem branching from the base; leaves sessile, ovate or lanceolate, acute, gland-dotted; puduncles erect in flower, decurved in fruit; flowers blue; sepals narrowly lanceolate, equalling the corolla; style persistant; seeds trigonous.

Distribution and habitate: A cosmopolitan weed, found in wheat fields throughout the province — Europe and W. Asia.
Fl. per. Spring.

30. Family B O R A G I N A C E A E

Scabrid or hispid herbs or shrubs; leaves usually alternate, rarely opposite; stipiles absent; inforescence a scorpioid cyme usually; flowers usually regular, rarely oblique, mostly bisexual; calyx and corolla each 5-lobed; stamens as many as corolla lobes, inserted on the corolla; gynaecium 2-carpellary, syncarpous; ovary superior, 2-locular or 4-locular by false septum, entire or deeply 4-lobed; style simple; placentation axile; fruit of 4-nutlets.

Key to the genera

1 + Ovary notlobed, surmounted by a style .. .. 1. Heliotropium

\- Ovary 4 lobed 2

2 +	Nutlets on a [illegible]	2. Arnebia
-	Nutlets attached to a convex or conical carpophore	3
3 +	Fruiting calyx greatly enlarged in the fruit	3. Trichodesma
-	Fruiting calyx not enlarged in fruit	4. Cynoglossum

1. H E L I O T R O P I U M L.

Commonly herbs, with alternate leaves; flowers white or nearly so, in cymes and scorpioid; bracts absent or leafy; calyx 5-pariite or lobed; corolla 5-lobed, tubular; ovary 4-celled and 4 ovuled; fruit dry, of 4 nutlets.

Heliotropuim europaeum L. Sp. Pl. 130. 1753., Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 590. 1972.

Erect annual, upto 75 cm tall, hairy; leaves entire with bulbous based hairs on both the surfaces; flowers white; usually 2-ranked in dense branched spike-like inflorescence; nutlets 4, about 2 mm long, minutly verrucose and finely puberulous.

Distribution and habitat: Found in wheat fields, of Bannu and D.I.Khan, however it flourishes after the crop is harvested — India, Pakistan, W. & C. Asia, Australia, Europe, America.

2. A R N E B I A Forsk.

Herbs, hispidly hairy; leaves alternate; flowers in terminal elongate bracteate spicate racemes; corolla tube slender longer than the calyx, throat naked, limbs short spreading, often yellow; stamens 5; ovary deeply 4-lobed; style gynobasic.

Arnebia griffithii Boiss. Diagn. Pl. Or. Nov. ser. 2, 3: 135. 1856; Stewart, Ann. Cat. Vas. Pl. W. Pak. & Kash. 582. 1972.

Common names: Pushto: Peghambri Boota.

Densely hispid hairy herb, sweet scented; leaves alternate; racemes bracteate, flowers yellow, corolla tube 2-3 cm long, longer than calyx; yellow corolla is dotted with dark spots; nutlets tuberculate, 2-3 mm long.

Distribution and habitat: Very common in wheat fields of rainfed sandy area of Bannu and D.I.Khan — India, Pakistan and Egypt.

3. T R I C H O D E S M A R.Br.

Erect hispid herbs, with subopposite or alternate quite entire leaves; inflorescence bracteate short cymes; calyx large, deeply 5-lobed; auricled or winged at the base; corolla tube broadly cylindric or 5-gonous, throat narrowed, lobes distinct; stamens 5; anthers conical; ovary 4-lobed, style subterminal, stigma small; fruit pyramidal, nutlets 4; seeds suborbicular or obovoid.

Trichodesma indicum (L) R.Br. Prodr. Fl. N.Holl. 496. 1810. Stewart, Ann. Cat. Vasc. Pl. W. Pak. and Kash. 604. 1972. (Syn. Borago indica L.)

Erect hispid herbs; leaves sessile, variable strigose on the nerves beneath; flowers pale violet; auricles of calyx base turned upwards; ovary 4-lobed, style sub-terminal, stigma small; fruit pyramidal, nutlets 4, unmargined, the outer surface smooth.

Distribution and habitat: Spring annual found in wheat fields of Malakander (Peshawar) — Pakistan, India and Iran.

4. C Y N O G L O S S U M L.

Erect herbs, hairy; leaves radical and alternate, radical petioled; flowers in long, simple or forked, one sided racemes, sessile or lower shortly pedicellate, ebracteate; calyx deeply 5-lobed; corolla tube as long as the calyx, with 5 scales in the throat, 5-lobed, stamens 5; ovary 4-lobed; style short gynobasic, nutlets 4, ovoid; raceptacle convex; carpophore shortly conical at the base.

Cynoglossum lanceolatum Forsk. Fl. Aegypt - Arab. 41, 1775., Stewart, An. Cat. Vas. Pl. W. Pak. & Kashmir: 584. 1972. (Syn. C. micranthum Desf.).

Erect herb with white bulbous based hairs; radical leaves often absent at the time of flowering, larger than the cauline leaves, racemes not copiously divaricate; flowers pedicellate, white with blue black scales in the throat of the corolla; nutlets bristly.

Distribution and habitat: Found in wheat fields of Sarai (Dir). Fl. per. throughout with the exception of June, July and August.

31. Family P L A N T A G I N A C E A E

Herbs; leaves usually all radical, alternate or opposite, simple, often sheathing at the base; flowers often bisexual, in spikes, actinomorphic; calyx herbaceous, 4-lobed; corolla gamopetalou scarious 3-4 lobed, lobes imbricate; stamens 5, inserted on the corolla tube & alternating with the lobes or hypogynous; ovary superior, 1-4 locular; style simple; ovula 1 or more in each loculus, exile or basal; fruit a circumscissile capsule or bony

nut; seeds peltately attached.

PLANTAGO L.

Annual or perennial or mostly acaulescent herbs, sometimes an undershrub; leaves usually all radical, sometimes cauline, flowers hermaphrodite, dimorphic, polygamous, usually in many flowered cylindrical spikes, rarely capitate; calyx lobes subequal or 2 large and 2 small; corolla tube cylindrical, sometimes contracted at the throat, usually equalling the calyx, sometimes exerted, lobes 4, equal patent; stamens 4, inserted at or above the middle of the corolla tube, often exerted; ovary 2-locular or 3-4 locular with false free septa; locules with 1 to many ovules; capsule membranous, circumscissile; seeds usually peltate, testa thin, mucilagenous, albumen fleshy.

2 species are found in Swat.

+ Bracts having keel leaves ovate .. 1. P. major

- Bracts without keel leaves lanceolate to 2. P. lanceolata

1. Plantago major L., Sp. Pl. 112. 1753., Nazmi in Fl. of Pak. 62: 4-6. 1974.

Common names: Pushto: Ispaghole, Pub: Gaz Pipal: Baluch: Bartung; Eng: Niplegrass, Waybread, Great plantain. Urd: Ispaghale.

Perennial acaulescent herbs; leaves in rosettes, spirally arranged, petiolate, sometimes not clearly distinguished into petiole and lamine; scapes many, 13-15 (-70) cm long arched, erect, glabrous to slightly pilose; spikes dense or lax, slender, bracts equalling or shorter than the calyx, brownish with a brown keel; sepals broadly elliptic; corolla greenish or yellowish white,

glabrous; anthers at first lilac, later whitish or yellowish; capsule 2-3 mm long, globose or subconic, glabrous; seeds minute, 6-10 (-34), angulate, dull black, rugulose, 1-1.7 mm long, 0.8 mm broad. (Fig. 41).

Distribution and habitat: Found a weed of cornfields throughout himalayas Swat, Hazara, Murree-Hazara hill; rarely found in the plain - Throughout Europe, northern and central Asia, introduced all over the world. Fl. Per. August - September.

2. Plantago lanceolate Linn., Sp. Pl. 113. 1753; Kazmi in Fl. W. Pak. 62: 12-13. 1974. (Syn. P. orientalis stapf).

Perennial herbs, acaulescent, leaves membraneous, narrow lanceolate to narrow elliptic, glabrous, slightly pilose, or attenuated, acute, nerves 5; scapes erect, sulcate, sparsely covered with white hairs; spikes dense, conic-cylindrical, subglobose to globose; bracts broad ovate; sepals 3-3. 5 mm long, glabrous or at the margin villose, anterior sepals connate, onovate, bilobed, corolla lobes narrow ovate to ovate; seeds 2, smooth. (Fig. 42).

Distribution and habitat: It is the commonest spacies and a very variable species, found in D.I.Khan, Bannu, Kohat, Peshawar, Mardan, Swat, Chitral & Hazara as a weed of wheat fields. Flowers throughout the year. Europe, N. Africa, S. Asia to monntains of Tien Shah & Pamir Alaj; introduced all over the world.

32. Family V E R B E N A C E A E

Woody or herbaceous, often with quadrangular branches; leaves usually opposite or whorled, simple or compound, exstipulate;

flowers bisexual, more or less zygomorphic; calyx 4–5 lobed or toothed, persistent; corolla gamopetalous, tubular, 4–5 lobed, imbricate; stamens on the corolla tube, 4 or rarely 2, anthers often divergent; ovary superior; 2–3- locular, often 4-locular; ovules solitary or paired, erect or rarely pedulous; stylo terminal; fruit a drupe or berry.

1 + Erect herbs; corolla 5-lobed; [illegible] slender, elongate at maturity .. .. 1. Verbena

\- A prostrate herb; corolla 4-lobed; spikes globose to cylindric .. .. 2. Phyla

1. V[illegible] B[illegible] A[illegible] L.

Herbs; leaves opposite, decussate (rarely whorled); inflorescence spicate, rarely pseudumbellate or fascicled; flowers bisexual, bracteate; calyx tubular, 5-ribbed; corola 5- lobed, somewhat bilabiate; stamens usually 4, didynamous, not exerted, anthers ovate; carpels 2, syncarpous; ovary entire to 4 - lobed, 4 loculed with 1 ovule in each locule; style reaching the level of stamens; fruit schizocarpic, separating into 4, 1 seeded nutlets; seeds oblong, angular.

Verbena officinalis L., Sp. Pl. 20. 1753; Jafri & Ghafoor in Fl. W. Pak. 77: 4. 1974. (Syn. V. tenuispicata Stapf).

Common names: Urdu: Karenta, Pamukh.

Erect perennial, somewhat woody at the base, branched above, branches 4-angled with scabrous angles; leaves deeply serrate, lyrately pinnatifid to subentire narrowed at the base, hispid, lower petiolate & upper ones sessile; spikes terminal, paniculate; flowers pale pink or purplish, bracteate; calyx tube longer than bracts, minutely 5-toothed; corolla tube unequally

5-lobed; stamens 4, all fertile occassionally half sterile; ovary 4-lobed, short style; fruit of four, 1-seeded nutlets.

Distribution and habitat: Very common weed of wheat and other cultivated fields, and near water in waste lands, found upto 2000 m height. Most of Europe and Asia, N. Africa; introduced in N. America & S. Africa. Fl. per. May - December.

2. P H Y L A Lour.

Usually creeping herbs of wet places, with opposite leaves; flowers small sessile in axillary peduncled dense heads or spikes; bracts exceeding the calyx, which is 2 parted; corolla tubular with bilipped limb; stamens 4, didynamous; ovary 2-celled with 1 ovule in each locule; stigma obliquely capitate; fruit separating into 2, 1-seeded pyrenes.

Phyla nodiflora (L) Greene in Pittonia 4: 46. 1899; Jafri & Ghafoor in Fl. W. Pak. 76: 11. 1974. (Syn. Lippia nodiflora - (L) Rich., Verbena nodiflora L.).

Common names: Urdu: Makna, Wakan, Jal-nim.

A widely creeping perennial, rooting at nodes, globrous or pubescent; leaves opposite, spathulate, subsessile, toothed towards the rounded apex; peduncles with 1-3 cm long flowering heads; flowers white or pinkish, 2-lipped; fruit globose-oblong, glabrous, splitting into 2, 1-seeded pyrenes.

Distribution and habitat: Weed of maize and rice fields and wet places throughout the province - throughout tropical and subtropical regionof the world. Fl. per. throughout the year.

33. Family S O L A N A C E A E

Herbs, shrubs or small trees; leaves alternate, simple,

exstipulate; flowers bisexual, mostly aclinomorphic, hypogynous; calyx 4–6, united, persistent, corolla 5-lobed, gamopetalous, lobes folded, contorted or valvate; stamens inserted on the corolla tube and alternate with the lobes; ovary 2-locular, the loculi sometimes again divided by false septum; ovules numerous, on axile placentation; style terminal; fruit a capsule or berry.

1 + Fruit a large spiny capsule .. .. 1. Datura

\- Fruit a small berry 2

2 + Corolla valvate (wheel shaped) ... 2. Solanum

\- Corolla tubular .. .. 3. Physalis

1. D A T U R A

Annual or biennial herbs, with large alternate leaves and large tubular flowers on short peduncles in the forks of the branching stem; calyx 5-toothed, separating transuersely above the base in the fruit, upper part falling away; corolla funnel shaped with a long tube; style long with 2-lobed stigma; stamens 5; capsule rounded, prickly, 4-called, many seeded.

Datura metal L. Sp. Pl. 179. 1753; Stewart, Ann. Cat. Vasc. Pl. Pak. & Kashm. 640. 1972. (Syn. D. alba Nees).

Herb (herbaceous or woody below), finely pubescent; leaves 8–25 cm long, ovate, acute or acuminate, entire or sinuate, pebescent; petiole long or short; calyx deeply 5-toothed; corolla white; capsule globose, spiny.

Distribution and habitat: Weed (not common) of maize fields Mansehra (Hazara).

2. S O L A N U M L.

Shrubs or herbs, unarmed or armed; leaves alternate, or subopposite, entire or pinnatifid, petiolate; cymes mostly lateral and extra axillary; flowers with wheel-shaped (valvate) corolla and connivent apically dehiscing anthers distinctive; fruit a globose berry, naked, usually 2-celled, many seeded, with the persistent and somewhat enlarged calyx at the base. Two species are found as weeds.

+ Leaves smooth, flowers white .. .. 1. S. miniatum

- Leaves prickly, flowers bluish purple 2. S. surattense

1. Solanum miniatum Ber. ex. Willd., Enum. Hort. Berol. 236. 1909. Stewart, Ann. Cat. Vasc. Pl. Pak. & Kashmir. 644. 1972. (Syn. S. nigrum L).

Common names: Urdu: Makoh, Pushto: Mamana.

Annual herb, branched, glabrous or pubescent; leaves ovatelanceolate, entire or sinuate toothed, petiole 2 cm long; flowers, small, white, in extra-axillary subumbellate cymes; berry yellow, red or black, when ripe. (Fig. 43).

Distribution and habitat: Found in Maize fields of Bannu, Peshawar, and Mardan — cosmopolitan.

2. Solanum surattense Burm. f., Fl. Ind. 57. 1768; Stewart, Ann. Cat. Vas. Pl. Pak. & Kashm. 644. 1972.

A prostrate perennial herb, beset with yellow prickles all over, young parts with stellate hairs; leaves 5-12 cm long, pinnatifid, flowers bluish-purple or rose violet in extra-axillary few flowered cymes; berry yellow or white, streaked with green.

Distribution and habitat: Weed of late spring, found in wheat fields of rainfed sandy areas of Bannu — India, Pakistan, Malaya, Australia.

3. PHYSALIS L.

Annual herbs, with alternate leaves and usually axillary solitary small flowers; calyx and corolla bell shaped, small, the former becoming much enlarged and inflated in the frot. one species is found as weed.

Physalis minima L. Sp. Pl. 183. 1753; Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 642. 1972. (Syn. P. divaricata D. Don.).

Erect or somewhat prostrate pubescent herb, much branched; leaves ovate, acute, shallowly toothed or lobed, petiole slightly less than as long as the blade; pedical slender, nodding; corolla yellowish, shortly 5-lobed; berry enclosed within membranous, 5-10 ribbed calyx, yellow.

Distribution and habitat: Found in Maize fields of Uch (Dir), Qandeel (Swat) and Nokote (Hazara). - Tropical Africa, India, Pakistan, Ceylon, Australia.

34. Family CONVOLVULACEAE

Annual or perennial herbs or shrubs, the stems often twining, with usually milky juice, leaves alternate, simple, exstipulate; flowers bisexual, actinomorphic, hypogynous; bracts often forming an involucre; sepals usually free, imbricate, persistent; corolla gamopetalous, 5-lobed, plicate-contorted or rarely imbricate; stamens 5, inserted towards the base of the corolla tube and alternate with the lobes; ovary

surrounded by a disk, 1-4-locular; ovules solitary or paired, erect; style terminal; fruit a capsule or fleshy and indahiscent.

Key to genera

+ Style unbranched, stigma capitate ... 1. Ipomoea

- Style branched, stigmas 2 .. .. 2. Convolvulus

1. [illegible]

Climbers, shrubs or trees, usually twining but sometimes prostrate or floating; leaves variable in shape and size, entire, lobed or divided or rarely compound; flowers mostly in axillary, 1 - to many flowered dichasia, rarely paniculate; sepals herbaceous to subcoriaceous, glabrous or pubescent; corolla regular on slightly zygormorphic, mostly funnel-shaped or campanulate; fruit globose or ovoid, capsules mostly 4-valved; seeds glabrous to pubescent.

Ipomoeaeriocarpa R. Br., Prodr. 484. 1810; Austin and Ghazanfar in Nasir and Ali's F. Pak. 126: 41-43. 1979. (Syn. Convolvulus hispidus Vahl., I. hispida (Vahl) Roem. & Schultes).

A pilose twining or prostrate herb; leaves cordate at the base, attenuate to acuminate apically, pubescent on both surfaces; flowers axillary, in sessile or short-pedunculate cymes or almost heads; sepals foliose; corolla tubular or slightly longer than sepals, pink or purple; fruit capsular, broadly ovoid to globular, pubescent; seeds glabrous, minutely reticulate.

Distribution and habitat: Found as weed of maize fields in Peshawar and Mardan - from tropical Africa and Madagascar through Indo-Pak to N. Australia. Fl. per. August - October.

2. C O N V O L V U L U S L.

Herbs or shrubs, erect prostrate or twining, spinous or not; leaves simple, alternate, entire or lobed, often pubescent; flowers bracteate, in terminal or axillary cymes; heads or solitary; sepals free; corolla campanulate, filaments epipetalous; ovary 2-4 -locular; style single; stigma 2, filiform, linear or cylindrical; fruit a capsule, glabrous or pubescent; seeds 1-4, smooth or tuberculate, glabrous or pubescent.

Convolvulus arvensis L., Sp. Pl. 153. 1753; Austin and S. Ghazanfar in Nasir and Ali's. Fl. Pak. 126: 28-29: 1979.

Common name: Urdu: Hirankhard, Hiranpadi., Eng. Bindweed; Pushto; Per Khatoon, Perwatei, Panyat, Karar, Bakarbel.

A glabrous or somewhat a pubescent annual or perennial herb, with many trailing or twining stems; leaves stalked, ovate or lanccolate; auriculate or hastate at the base; peduncle long bearing 2-4 flowers; sepals unequal; corolla widely funnel-shaped, white or various shades of pink with a yellowish center, glabrous.

Distribution and habitat: Found as a weeds of wheat, barley and maize fields throughout the year — Throughout temperate and tropical regions of the world. Fl. per. throughout the year.

35. Family S C R O P H U L A R I A C E A E

Herbs or under shrubs; leaves opposite, alternate or whorled; stipules 0; inflorescence racemose or cymose, often spikate; flowers bisexual, zygomorphic hypogynous; sepals 5,

rarely 4; corolla 4-5 lobed, more or less 2-lipped or spreading; stamens usually 4, sometimes 5 or 2, inserted on the corollatube and alternate with its lobes; carpels 2, connate; ovary superior, 2-celled, rarely unilocular; ovules numerous; style simple; stigma capitate, 2-lobed; fruit mostly a capsule, opening by 2 or 4 valves, or pores; seeds numerous.

1. V E R O N I C A L.

Herbs; lower leaves opposite, upper often alternate, passing into bracts; flowers axillary solitary or in terminal or axillary racemes, bracteate; bracteoles 0; calyx 4-partite, segments unequal; corolla tube very short, lobes 4, spreading; stamens 2, exerted; ovules few in each cell; style simple, linear; stigma subcapitate; capsule notched, opening by 2 valves; seeds ovate or globose. 2 species are recorded as weeds:

+ Pedicel shorter than the leaves, not deflexed in fruit	1. V. didyma
- Pedicel longer than the leaves, deflexed in fruit	2. V. biloba

1. Veronica didyma Tenore, Prodr. Fl. Neap. 6. 1811; Stewart, Ann. Cat. Vasc. Pl. Pak. & Kash. 664. 1972.

A prostrate, pubescent, much branched annual herb; lower leaves opposite, upper alternate, passing into floral leaves, shortly petioled, ovate or broadly so; flowers in terminal racemes, bracts leafy; pedicel slender, drooping, shorter than the leaves; corolla white, bluish or pinkish, capsule notched, halves globose.

Distribution and habitat: Common weed of wheat fields in Peshawar and Mardan districts.

2. Veronica biloba L. Mant. 172. 1772; Stewart, Ann. Cat. Vasc. Pl. Pak. & Kashm. 664. 1972.

A procumbent, branched annual herb, resembling the former one, differs in pedicel which is longer than the leaves, deflexed in the fruit; and in sepals which are connate in pairs at the base.

Distribution and habitat: Found in wheat fields of Swat (Saidu sharif, Barikot).

36. Family A C A N T H A C E A E

Herbs or shrubs; leaves opposite, usually with distinct cytoliths, stipules absent, flowers bisexual, zygomorphic; calyx lobes 4-5; corolla gamopetalous, 1-lipped, 2-lipped, or of subequal lobes; imbricate or contorted; stamens 4, didynamous, or 2, inserted on the corolla tube; disk present, ovary superior, sessile, 2-locular; ovules axile, or more in loculus; style simple; fruit a capsule.

+ Corolla 2-lipped (anther cells muticous) ovules 2 in each cell) .. .. 1. Dicliptera
- Corolla of nearly equal 5 lobes, ovules 3-10 in each cell .. .. 2. Ruellia

1. D I C L I P T E R A Juss.

Herbs; leaves entire or undulate; inflorescence cymoses, panicle or clustered; flowers sessile or subsessile, clasped by 2, opposite bracts; bracts usually larger than clayx; calyx deeply 5-partite; corolla tube slender, widening into the bilabiate limb; stamens 2, anthers 2-celled, muticous; ovary 2-celled, having 2 ovules in each cell; style filiform; stigma

shortly bifid; capsule stalked or subsessile, ellipsoid, ovoid or obovoid, placenta elastically separating from the base, 4-seeded, seeded, seeds often tuberculate, ovoid or suborbicular. Single species is found as weed.

Dicliptera roxburghiana Nees in Wall. Pl. As. Rar. 3: 111.1932., Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 675. 1972.

Herb, upto 50 cm high, hexagonal; leaves entire, acuminate; inflorescence axillary or terminal cyme; bracts larger than calyx, variable in shape, ciliate, white; flowers sessile or connate; corolla purplish or pink, lobes pubescent outside; stamens exerted; fruit a subsessile capsule, glabrous or puberulous.

Distribution and habitat: Very common weed of Maize fields in Swat, Dir, Chitral and Hazara --Iran, Afghanistan, Pakistan, India and Bangla Desh.

2. R U E L L I A L.

Herbs or undershrubs; sessile or subsessile; bractholes large; calyx 5-partite; corolla not bilabiate, limb 5-lobed; stamens 4, anther 2-celled; ovary elongated; ovules 3-10 in each cell; capsule clavate, base solid, seed bearing upward; seed large, thinly discoid, margined on large retinaculae.

Ruellia tuberosa L. Sp. Pl. 635. 1753., Stewart, Ann. Cat. Vas. Pl. Pak. & Kashm. 678. 1972.

Common names: Urdu: Patakhar.

Erect or suberect annual, branched from the base; leaves petioled, margins wavy and irregularly toothed, base acute, apex acute or acuminate; inflorescence a panicle of axillary dichasial cymes passing into monochasia; corolla bluish pink, tube funnel shaped, curved; capsule pointed at the apex.

Distribution and habitat: Weed in maize fields in Bannu, Peshawar. Dispersel of seed take place explosively when the mature capsule is moistened.

37. Family L A B I A T A E

Herbs or undershrubs; stem usually quadrangular, leaves opposite or whorled, simple, exstipulate; flowers bisexual, zygomorphic, axillary or whorled, calyx persistent, of variously united sepals, often 2-lipped; corolla gamopetalous, hypogynous, tubular; lobes 4-5, often forming 2 or 1-lipped mouth; stamens 4, didynamous epipetalous; gynaecium 2-carpellary, syncarpous; ovary superior, deeply 4-lobed; stigma usually 2-fid; ovules 4 in each ovary, erect; fruit of 4 calyx-like nutlets, free or cohering in pairs.

1 +	Stamens 2 (Corolla distinctly 2-lipped)..	2. Salvia
-	Stamens 4	2
2 +	Nutlets laterally attached, style terminal	1. Ajuga
-	Nutlets basally attached; style gynobasic	3
3 +	Anther cells hairy	3. Lamium
-	Anther cells glabrous	4. Stachys

1. A J U G A L.

Annual or perennial herbs; leaves coarsely toothed or incised or rarely entire, the floral leaves similar or reduced to bracts; spikes terminal, consisting of 2 to many-fid whorls; flowers blue white or rose, 2-many, sessile, in the axils of the floral leaves; the corolla withering and often persistent in fruit; upper lip obsolete and reduced to 3 minute usually tooth like lobes; stamens 4.

Ajuga bracteosa Wall. ex Bth. in Wall. Pl. As Rar 1:59. 1830; Stewart Ann. Cat. Vas. Pl. Pak. & Kashmir. 609. 1972.

Annual herb, with 2 lipped corolla, lower 4-lobed; nutlets laterally attached; style terminal.

Distribution and habitat: Found in Maize fields of Swat (Miandam).

2. S A L V I A L.

Annual or perennial herbs; flowers in small whorls forming erect panicled racemes; calyx bell-shaped, 2-lipped; corolla 2-lipped, upper erect, lower 3-lobed; stamens 2, perfect, anther cells widely separated; style bifid; nutlets triquetrous, smooth.

Salvia plebei R. Br. Prodr. 501. 1810; Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 631. 1972.

A roughly pubescent erect herb, fastigiately branched; leaves petioled, broadly lanceolate or ovate, obtuse or sub-acute,

crenate, base round, or acute, often decurrent; racemes spikate, slender; lower bracts leaf-like while upper small and lanceolate; flowers bluish; corolla tube with a ring of hairs inside; nutlets brown when ripe.

Distribution and habitat: Found in wheat fields of Kohat (Lachi).

3. L A M I U M L.

Low annual or perennial herbs, commonly diffuse or decumbent at base, leaves mostly crenate-dentate and petiolate; flowers in axillary or terminal whorls; bracts short; calyx awl toothed; corolla 2-lipped, the tube somewhat longer than calyx, upper lip ascending and concave; lower one 3 lobed; stamens 4 in 2 pairs, ascending under the upper lip.

Lamium amplexicaule L. Sp. Pl. 579. 1753; Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 614. 1972.

A diffuse or decumbent annual herb; leaves orbicular, 1-2 cm long; flowers in whorls, bracts short; calyx 5-nerved; pollen sacs conspicuously constricted at the base. (Fig. 44).

Distribution and habitat: Found as a weed of maize in Swat (Madyan).

4. S T A C H Y S L.

Herbs or rarely shrubs; leaves entire, crenate or dentate, the floral leaves similar or reduced to bracts; florals whorls 2-many fid; axillary or in-terminal spikes; flowers sessile or shortly pedicelled, purplish, scarlet, yellow or white; calyx tubular-campanulate, 5-10 nerved; 5-toothed, seldom 2-lipped,

corolla tube cylindric, included or exerted, bilabiate, the expanded lower lip 3-lobed; stamens 4; nutlets ovoid or oblong.

Stachys floccosa Bth. Lab. Gen. & Sp. 739. 1835. ?
Stewart, Ann. Cat. Vas. Pl. Pak. & Kashm. 635. 1972.
Herb with entire leaves; lower surface of leaves and stem surface wooly; flowers in axillary or terminal worls; bracts short; calyx tubular- campanulate; 5-10 nerved; corolla tube cylindric, bilabiate;stamens 4; nutlets ovoid-oblong.

Distribution andhabitat:Weed of wheat fields in Peshawar University Campus and it surroundings; it remains in the fields even after the crop is harvested.

38. Family OROBANCHACEAE

Root parasitic herbs, covered with scales; never green; leaves reduced to scales; flowers solitary, bracteate, often crowded, zygomorphic; calyx 4-5 lobed, 2 -lipped; stamens 4, didynamous, 5th one reduced to staminode - or absent; ovary superior, unilocular; placentatcoin parietal, ovules numerous; fruit ovoid to oblong capsule.

CISTANCHE Hoffmg. & Link

Erect herbs, fleshy, parasites, swollen at the base; flowers large, bracte & bracteolate (2); calyx tubular, 4-5 lobed; corolla tubular, 5-lobed; stamens sub-exserted; ovary 1-celled, many ovuled on 4 placenta; seeds small, subglobose.

Cistanche tubulosa (Schrenk) Hook. f., Hk. f., Fl. Brit - Ind. 4: 325. 1885: Jafri in Fl. W. Pak. 98: 5.1976. (Syn. Phelipaea tubulosa Schenk)

Yellowish, glabrous (rarely pubescent) herbs, densely covered with trinagular scale-like leaves; stem simple, underground portion swollen and attached to the root of host plant; flowers many, densely spicate, yellow; bracts longer than the calyx; bracteoles shorter & linear; corolla 2-3 times as long as the calyx; capsule ovoid-oblong beaked, laterally deeply pitted; seed many.

Distribution and habitat: Collected from roadside sandy wheat fields near Lakki Marwat (Bannu).

39. Family COMPOSITAE

Herbs or shrubs, rarely arborescent or climber, leaves alternate or opposite, simple or variously divided, stipules absent; flowers crowded into heads (capitula), surrounded by an involucre of one or more series of free or connate bracts, sometimes the head compound and the partial heads heads reduced to a single flower; receptacle bracteate amongst the flowers, honey combed or naked, usually convex, rarely elongated and hollowed out; flowers bisexual or unisexual, rarely dioecious, the outer ones often ligulate (rayed), the inner ones tubular, or all tubular or ligulate; calyx much modified and thread like, rarely dry and chaffy, epigynous; corolla gamopetalous, 4-5 fid, valvate, actionmorphic or zygomorphic, rarely 2-lipped; stamens 5, epipetalous, filaments free from each other, anthers connate into a tube; ovary inferior 1-locular, 1-ovuled; ovule erect from the base; fruit a sessile achene.

Thirty species distributed among 24 genera are found as weeds of different cereals.

1 +	Disk florets tubular, ray florets ligulate	2	
-	All florets in one head tubular or ligulate	8	
2 +	Receptacle paleaceous	3	
-	Receptacle naked or pitted ..	4	
3 +	Achenes dorsally compressed ..	1.	Eclipta
-	Achenes not or laterally compressed	2.	Bidens
4 +	Pappus absent, or of scales, never hairy	3.	Matricaria
-	Pappus of fine hairs	5	
5 +	Ray florets lilac or purple; disk florets yellow	4.	Erigeron
-	Ray and disk florets both yellow	6	
6 +	Pappus present	5.	Calendula
-	Pappus present	7	
7 +	Leaves sessile	6.	Pulicaria
-	Leaves petioled (rarely subsessile)	7.	Conyza
8 +	All the florets in one head tubular	9	
-	All the florets in one head ligulate	20	
9 +	Receptacle densely bristly ..	10	
-	Receptacle paleaceous or naked ..	15	
10 +	Achenes with a horizontal areole	11	
-	Achenes with oblique or lateral areoles	14	
11 +	Leaves mottled or having white streakes	8.	Silybum
-	Leaves neither motted nor having white streakes	12	

12	+	Filaments papillose hairy, ...	9. Cirsium
	-	Filaments glabrous	13
13	+	Leaves unarmed	10. Saussurea
	-	Leaves spinescent	11. Cousinia
14	+	Involucre bracteate at the base by spinous leaves; pappus absent	12. Carthamus
	-	Involuere not bracteate at the base; pappus present	13. Centaurea
15	+	Receptacle paleaceous	16
	-	Receptacle naked	17
16	+	Heads bisexual	14. Ifloga
	-	Heads unisexual	15. Xanthium
17	+	Heads homogamous	18
	-	Heads heterogamous; disk florets bisexual, ray female	19
18	+	Leaves alternate	16. Vernonia
	-	Leave opposite	17. Ageratum
19	+	Leaves quite entire, involucral bracts not scarious	18. Blumea
	-	Leaves toothed or lobed, involucral bracts scarious, hoary or wooly herbs	19. Gnaphalium
20	+	Pappus absent	20. Cichorium
	-	Pappus present (hairs simple)	21
21	+	Achenes beaked	22
	-	Achenes not beaked	23
22	+	Beak of achenes dilated at the tip	21. Lactuca
	-	Beak of achenes not dilated at the top	22. Taraxacum
23	+	Juice yellow	23. Launea
	-	Juice white	24. Sonchus

1. E C L I P T A L.

Strigose or hirsute herbs; leaves opposite; heads small, peduncled, heterogamous, rayed; involucre campanulate; bracts sub- 2-seriate, green; receptacle flat; ray florets sub-2-seriate, female, fertile or sterile; disk-florets bisexual, fertile, tubular; achenes from ray-florets triquetrous often empty; the disk florets stouter; pappus absent or of 2 short awns or teeth.

Eclipta prostrata (L) Mant. 2: 286. 1771., Stewart, Ann. Cat. Vasc. Pl. W. Pak. and Kashmir., 743. 1972. (Syn. Verbesina alba L., E. albs (L) Hassk.).

Annual herb, erect or prostrate, strigose or hirsute, frequently rooting from the lower nodes; leaves opposite, sessile, variable in width and form, toothed or nearly entire; heads small; involucral bracts ovate, obtuse or acute, outer larger and leaflike.

Distribution and habitat: Common weed of maize field throughout this province.

2. B I D E N S L.

Herb; leaves opposite, entire, toothed or pinnatfid; heads corymbose or subsolitary, heterogamous and rayed or homogamous and discoid; involucre campanulate or hemispheric; bracts sub-2-seriate, connate at the base; receptacle flat or convex; ray florets 1-seriate, pistillate or neuter; ligule spreading, 2-3 toothed, yellow or white; disk florets

hermaphrodite, fertile; achenes tetragonous or dorsally compressed; pappus of 2-4, erect.

Bidens Cernua L. Sp. Pl. 832, 1753., Stewart, Ann. Cat. Vasc. Fl. W. Pak. & Kash. 724. 1972.

Common names: Eng. Nodding Bur Marigold.

Branched annual with opposite leaves; leaves simple, lanceolate, simple, sub-connate, toothed; flower heads 18-20 mm. sub-solitary, nodding; outer phyllaries long, inner ovate, striate; florets all tubular, yellow; achenes compressed, obovoid, trigonous, with 4-6 bristles.

Distribution and habitat: weed of rice fields in Hazara (Abbottabad -Sheikhul Bandi, Mansehra) and Swat (Khwazakhela).

3. MATRICARIA L.

Herbs; leaves alternate, pinnatisect, heads terminal, peduncled, solitary or corymbose, heterogamous, rayed, rarely discoid; involucre hemispheric; ray florets pistillate, fertile or sterile; ligule white elongate; disk-florets hermaphrodite, fertile; achenes oblong, often incurved; pappus very short or zero.

Matricaria chamomilla L., Sp. Pl. 891. 1753, Stewart, Ann. Cat. Vas. Fl. Pak. & Kash. 766. 1972. (Syn. Chrysanthemum indorum L).

Glabrous herb, aromatic, branched; leaves 1-2 pinnatisect; heads corymbose; involucral bracts with white margins; ligule white, much longer than the bracts; achenes small, grey, white ribbed on the ventral surface only; pappus absent.

Distribution and habitat: Found as a weed in Bannu and Kohat. Stewart (1972) consider it as field weed, from Plains to 1500 m. Matricaria parviflora Poir is likely to be found as a weed of crop fields, as it is abundant in waste place in Peshawar and Khyber.

4. ERIGERON L.

Mostly herbs; leaves linear; heads small arranged terminally in corymbos manner, ray florets usually in many rows with very slender short or long ligules; involucral bracts narrow, equal; achenes narrower, usually pubescent, flattened and 2-nerved; pappus a single row of capillary bristles or chaffy scales.

Erigeron alpinus L. Sp. Pl. 864. 1753. Sp. agg., Stewart, Ann. Cat. Vas. Pl. W. Pak. & Kash. 743. 1972.

Biennial or perennial herbs, hispidly hairy or glabrate; radicle leaves petioled spreading obovate or oblong-obovate; cauline usually sessile obovate or oblong; heads solitary or corymbose; involucral bracts pubescent tomentose or woodly; ligules rarely exceeding the length of the reddish pappus; achenes sub-silky.

Distribution and habitat: Widespread in wheat fields throughout the province.

5. CALENDULA L.

Annual or perennial herbs, with simple, alternate leaves; heads large with yellow or orange rays; involucre broad, the usually scarious - margined bracts in 1-2 rows; receptacle naked, plane, ray-achenes glabrous, incurved, disk florets infertile, pappus none.

Calendula arvensis L., Sp. Pl. ed. 2,1303. 1762. Stewart, Ann. Cat. Vas. Pl. W. Pak. & Kash. 726. 1972.

Small herb, dichotomously branched; leaves acute, hairy on both the sides; heads terminal; involucral bracts incurved and appressed to the ripe achenes; ligules many, sulphor-yellow; achenes beaked, outer ones prickly.

Distribution and habitat: A spring annual abundantly found in wheat-fields of the plains of this province.

6. P U L I C A R I A Gaertn.

Woolly or villous herbs; leaves alternate, sessile heads single, heterogamous and radiate or homogamous and disciform, yellow; involucre hemispheric or obconic; bracts few-seriate; receptacle pitted; ray flolets, if present, 1-2-seriate, pistillate; disk-florets bisexual, fertile slender; limb elongate, shortly 5-fid; achenes terete or ribbed; pappus double.

Pulicaria crispa (Forssk) Benth. in Gen. Pl. 2:336. 1873; Stewart, Ann. Cat. Vas. Pl. W. Pak. & Kashm. 770. 1972.
(Syn. Aster crispa Forssk; Francoeuria crispa (Forssk) Cass).

Perennial, branches cottony; leaves linear or linear-oblong; heads yellow; involucral bracts linear; pubescent outside; ligules shorter than the bracts, sometimes absent; achenes glabrous; pappus hairs three times longer than achenes.

Distribution and habitat: Found in rice fields of Kaghan (Hazara).

7. CONYZA Less.

Herbs; leaves alternate; heads heterogamous, discoid, corymbose or panicled; involucre campanulate; bracts 2-many seriate; receptacle flat or convex, naked or pitted and fimbriate; outer florets female, 2-3 toothed, fertile; inner hermaphrodite all or mostly fertile, yellow, tubular, limb 5-toothed; achenes minute, compressed; pappus slender, 1-seriate.

Key to species :

1 + Pappus dirty white, achenes pale brown .. C. bonariensis
  - Otherwise 2

2 + Pappus white, becoming reddish, achenes smooth .. .. C. canadensis
  - Pappus redish, achenes hairy .. C. aegyptica

1. Conyza bonariensis (L.) Cronquist in Bull. Torr. Bot. Club, 70(6): 632. 1943; Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 734. 1972. (Syn. E. linifolius Willd; Conyza crispus Pourr; Conyza ambigua DC., E. bonariensis L.).

Herb; greyish green, 30 - 75 cm tall; stems several from the base, rarely one, erect, leafy, appressed hairy or villous; leaves sessile, 3 - 7 cm long —, linear, entire or distantly serrate, hairy; heads about 2.5 cm in length and diameter involucral bracts many; outer florets many, with filiform 2-3 toothed pale corolla; inner florets pale yellow; anthers some what appendiculate; achenes pale brown; 0.1 cm long, margins sparsely silky; pappus dirty white, 0.4 cm long.

Distribution and habitat: Weed of wheat field from plains to 1800 m throughout the province.

2. Conyza canadensis (L) Cronquist in Bull. Torr. Bot. Club 70(6); 632. 1943., Stewart, Ann. Cat. Vas. Pl. W. Pak. & Kash. 734. 1972. (Syn. Erigeron canadensis L).

Annual herbs, much branched, leafy, hairy or nearly smooth; leaves 3-10 cm, long pointed, sometimes remotely toothed; inner flowers yellow, outer pink or purplish in stalked heads, in long branched recemes; bracts of the heads narrow, pointed; inner corollas tubular 5-toohed, outer ligulate; anther bases blunt, pappus hairs white, becoming reddish, achenes small, narrow, flate, smooth.

Distribution and habitat: Common weed of wheat fields from plains upto 2,000 m throughout the province.

3. Conyza aegyptica Ait. Hort, New, ed. 1,3: 183. 1789. Stewart, Ann. Cat. Vas. Pl. W. Pak. & Kash. 734. 1972.
(Syn. Erigeron asteroides Roxb.)

Erect herbs, hirsute; leaves pinnatifidly lobed; heads crowded; involucral bracts lanceolate; edges scarious; achenes very small, sparingly hairy; pappus reddish.

Distribution and habitat: A tropical weed found in wheat fields of D.I.Khan and Peshawar.

8. S I L Y B U M Gaertn.

Annual herbs, glabrous; leaves alternate, sinuate-lobed, spinescent; heads large, solitary, terminal, nodding, flowers all bisexual, similar and fertile, purple; limb 5-fid; achenes glabrous, ovoid-oblong, compressed; pappus many seriate.

Silybum marianum Gaertn., Fruct & Sem. 2: 378., 1802. t. 168 Stewart, Ann. Cat. Vas. Pl. W. Pak. & Kash. 784. 1972.

Common names: Eng: Milk Thistle.

Annual herb, 30-150 cm tall; stem stout, smooth, grooved, leafy throughout; leaves 10-40 cm by 3-15 cm, margins spiny, lower surface distinctly white; upper surface white streaked heads 3-7 cm in diam; spines of involucral bracts 1-3 cm long; flowers rose purple or white; achenes black or grey, transversely wrinkled; pappus white.

Distribution and habitat: One of the commonest weeds of wheat fields in Peshawar, specially around the University Campus. I have noticed that the population of this species is increasing and in the near future it can become a very troublesome weed.

9. C I R S I U M Hk. f & Thom.

Armed herbs; leaves alternate, serrate, toothed or pinnatifid, spinescent; heads solitary, scattered or crowded, bisexual or dioecious; raceptacle flat, densely bristly, flowers white, pale yellow or red; limb 5-fid; anthers sagitate, achenes glabrous, obtusely 4-angled, smooth or 5-10-ribbed; pappus copious; hairs many seriate.

Cirsium arvensis (L) Scop., Fl. Carn. ed. 2,2:126. 1772., Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 733. 1972. (Syn. Cnicus arvensis L.).

Common names: Eng: Canadian thistle; Push: Kazzbirai.

Annual or perennial herbs; stem solitary or tufted; leaves sinuate-pinnatifid, pale-green above, more or less woolly-tomentose beneath, spinous; heads unisexual, male and female on different plants; solitary, custered or corymbose; male globose; female longer, more campanulate; corolla limb 5-partite; achenes linear-oblong, compressed, smooth, pappus brownish.

Distribution and habitat: Common weed of wheat fields and waste places throughout the province, more common in plains.

10. S A U S S U R E A DC.

Unarmed herb; leaves radical and alternate, entire, toothed, pinnatifid or pinnatisect; heads solitary cormbose or panicled; receptacle flat or convex, densely bristly; flowers purple or bluish, all bisexual and similar; limb 5-fid; filaments free; anthers sagittate; achenes glabrous; pappus white.

Saussurea heteromala (D. Don) Hand. Mazz., Symb. Sin. Pt. 7, 1152. 1936., Stewart. Ann. Cat. Vas. Pl. Pak. & Kash. 775. 1972. (Syn. Carduus heteromalla D.Don; S. candicans Clarke; S. brahuica Boiss; S. brassicifolia (Brnm) Rech. f.)

Herbs, 40-100 cm tall; stem cottony, corymbosely branched above; leaves oblong or obovate oblong, entire, sinuate-toothed or lobed at the base or lyrate-pinnatifid, upper more dissected than the lower; heads numerous corymbose; pale-red; involucral bracts cottony or pubescent; bristles on the receptacle long; corolla 2 cm or more long; achenes dark brown, 5-angled; pappus white.

Distribution and habitat: Found in wheat fields throughout the plains. Saussurea gnaphaloides (Wolyle) Sch. Bip. has been seen growing commonly in waste places in Balakot and Kaghan area (Hazara). It may occur as a weed also.

11. C O U S I N I A Cass.

Herbs; leaves alternate, toothed, lobed or pinnatisect; heads, homogamous, solitary or clustered; involucre globose; bracts many-seriate; outer appressed, inner erect, receptacle flat, densely bristly; flowers all similar, usually bisexual, tubular, yellowish; limb 5-fid; anthers sagittate; achenes flabrous, 5-many ribbed; pappus hairs 1-seriate.

Cousinia minuta Boiss; Diagn. Ser. 1,6: 117. 1845., Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 737. 1972.

Annual herb, rigid, sub-dichotomously branched; stem yellowish or whitish; leaves sessile, sinuate-pinnatifid, sparingly spinescent; heads terminal and in the forks; bristtes on the receptacle smooth; flowers yellow; achenes ovoid, compressed, 5-7 ribbed; pappus caducous; hairs scabrid.

Distribution and habitat: Common weed of wheat fields throughout the planes.

12. C A R T H A M U S L.

Herbs with alternate, spinescent leaves; heads homogamous; involucre ovoid or subglobose; bracts many-seriate; flowers all tubular, hermaphrodite, fertile, yellow to orange red; limb 5-cleft or 0 (in pistillate flowers); anther bases sagittate; achenes glabrous ovoid, 4-angled or compressed; pappus absent or chaffy.

Carthamus oxycantha M.B., Fl. Taur. Cauc. 2: 283. 1808., Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 728. 1972.

Common names: Urdu: Pohli, Pushto: Konzala, Kareza.

Armed herb; stem and branches white; leaves sessile; lower often pinnatifid, shortly spinulose toothed, very spinous; heads 2-4 cm in diameter; outer involucral bracts exceeding the head, with yellow spines; flowers yellow.

Distribution and habitat: Very common in wheat fields of Bannu, Peshawar and Mardan after the crop is harvested. It is a very troublesome weed, specially while harvesting the crop. Flowering period. April - June.

Note: Carthamus lanatus L. is also common however no report or collection explains its weediness.

13. C E N T A U R E A L.

Usually annual or biennial herbs; leaves radicle and alternate, entire toothed or pinnatifid; heads solitary; flowers all tubular but heterogamous, involucre globose; receptacle flat, densely bristly; outer florets 1-seriate, neuter; inner florets hermaphrodite, fertile; anthers sagitate, basal lobes connote; achenes oblong, compressed, 4-angled; pappus variable.

Centaurea cyanus L., Sp. Pl. 911. 1753; Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 729. 1972.

Common names: Eng. Corn cockle or corn blue bottle.

Annual or biennialherb; leaves entire or toothed, heads blue showy, involucral bracts oblong, obtuse, cottony, with toothed margins; achenes grey, silkey.

Distribution and habitat: Collected from wheatfields of Tank (D.I.Khan), very common along the edges of fields.

C. irberica Trev. ex. Spreng is fairly common and may be it is a weed of wheat fields. Oligochaeta remosa (Roxb). Wagen a Centaurea like, thistle is commonly found in Thal (sandy deserts' area of Bannu and it is likely to be found as weed in wheat fields of that area.

14. I F L O G A Cass.

Herbs, leaves alternate, small, often clustered; heads discoid, solitary or clustered, sessile, heterogamous; involucral bracts few; outer florets female, 1-many seriate, fertile; corolla obscurely toothed; anther base sagitate; achenes glabrous; outer florets small, without pappus; inner florets with pappus of a few feathery hairs.

Ifloga spicata (Forssk). SCH. Bip. in Webb. & Berth. Phyt. Canar. 2: 310. 1836-50., Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 752. 1972. (Syn. Ifloga fontanesic Cass; Gnaphalium spicatum Forssk.

Annual herbs, glabrous or hairy; stems usually many arising from root, ascending, densely covered with leaves and heads; leaves linear, acute; heads reddish, glistening, glabrous; involucral bracts red, scarious, aristat; pappus red.

15. X A N T H I U M L.

Annual herbs, leaves alternate; heads monoecious, female and hermaphrodite (male) axillary; hermaphrodite

many flowered, sterile; female 2-flowered, fertile; involucre of hermaphrodite heads short; involucre of female heads united into an ovoid 2-beaked utricle; filaments monadelphous, style of hermaphrodite florets slender, undivided; of female florets with free arms; achenes ovoid, without pappus.

Xanthium strumarium L. Sp. Pl. 987. 1753; Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 801, 1972.

Erect annual, leaves long stalked, lobed and toothed; heads in terminal or axillary racemes; female involucres 1.2 - 2.5 cm long, covered with hooked spines, with erect or diverging beak. (Fig. 46).

Distribution: From plains upto 8000 ft in the northern parts of the province. In Abbottabad, this is becoming very dangerous and it may spread in other areas too. In Sheikhul Bandi and Nawashahr area of Abbottabad, it covers the fields in such a way that no plant can compete with it.

16. V E R N O N I A Schreb.

Herbs (rarely shrubs); leaves alternate; heads homogamous, discoid in corymbose cymes or panicled, pink or purple; involucre equal or shorter than the flowers, globose; bracts multiseriate, inner longest, receptacle naked or pitted; rarely hairy; corolla tubuler, 5-lobed; anther base obtuse; achenes ribbed or lerete; pappus of many hairs.

Vernonia cinerea (L) Less. in Linnaea 4: 291. 1829; Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 799. 1972. (Syn. Conyza cinerea L. Sp: Pl. 862. 1753.

Annual herb, erect or suberect; leaves petiolate, ovate or lanceolate, obtuse or acute, toothed; leaves membranous or sub-coriaceous, hairy on both the side; heads on slender bracteate peduncles, corymbose; involucral bracts linear lanceolate, sharply pointed; corolla lobes pubescent, pink or lilac; achenes terete, not ribbed; clothed with appressed white hairs; peppus white or dirty white, outer hairs very short.

Distribution: A very variable species, in different localities it differs in size and leaves. Found as a weed of wheat fields in Peshawar and Mardan — Tropics of the old world.

17. A G E R A T U M L.

Herbs; leaves opposite or the upper alternate; heads homogamous, discoid, corymbose; involucre campanulate; bract 2-3 seriate, linear subequal; receptacle flate or nearly so; corolla tubular, regular; limb 5-cleft; anthers appendaged; style arms elongate, obtuse; achenes 5-angled; pappus of 5 short scales.

Ageratum houstonianum Mill., Gard. Dict. ed. 8, No. 2. 1768., Stewart, Ann. Cat. Vas. Fl. Pak. & Kash. 712. 1972.

Annual herbs, branched, hairy; leaves 5-11 cm long, base wedge-shaped to sub-cordate; heads in dense terminal corymbs, pale blue or white; involucral bracts linear, acute, striate; achenes black; pappus scales owned, often serrate below.

Distribution: Weed in rice fields of Peshawar (Mathra) and Swat (Mandil), Bahrain).

18. B L U M E A Dc.

Pubescent or woolly herbs; leaves alternate, toothed or lobed; heads discoid, corymbose panicled or fascicled; rarely racemed, heterogamous, purple, rosy or yellow; involucre ovoid or campanulate; bracts many seriate; receptacle flat, naked; outer florets many seriate, female, fertile with 2-3 toothed corolla; central florets hermaphrodite, few, fertile; corolla tubular, limb 5-toothed; anthers sagitate; achenes small, sub-terete or angled; pappus 1-seriate.

Blumea mollis (D.Don) Merrill in Phil. Jour. Sci. Bot. 5: 395. 1910., Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 725. 1972. (Syn. Erigeron molle D. Don., B. Wightii Dc. Aromatic, erect herb, usually villous, rarely hairy or glandular; stems leafy, 1-few from the root; leaves petioled, at the base of the stem 5-10 cm long, cauline 2.5 - 5 cm long; heads arranged into terminal spiciform dense cymes or panicles; receptacle glabrous; involucral bracts linear acuminate; corolla purple or pale purple; lobes in bisexual florets glandular; achenes pale-brown, terete or 4-5 angled, not ribbed, hairy.

Distribution and habitat: Reported from wheat fields of Warsak (Peshawar).

19. G N A P H A L I U M L.

Woolly or hoary herbs; leaves alternate, quite entire, heads heterogamous in corymbs or fasciles; involucre ovoid or campamulate; bracts many seriate; receptacle flate, naked; florets all fertile; onter femate, 2 or more seriate, filiform 3-4 toothed; disk florets bisexual, 5-toothed; anther bases sagitate; achenes oblong or obovoid not ribbed; pappus caducous;

hairs 1-seriate.

Key to the species

1 + Leaves less than 2.5 cm long .... G. pulvinatum

\- Leaves more than 2.5 cm long 2

2 + Heads in corymbose leafless clusters G. luteo-album

\- Heads in leafy spikes .. .. .. G. indicum

1. Gnaphaduim pulvinatum L., Sp. Pl. 852. 1753; Stewart., Ann. Cat. Vas. Pl. Pak. & Kash. 749. 1972.

Woolly herb; stems many, spreading from the roots, neary prostrate; leaves spathulate; heads hidden amongst the bases of the crowded spreading terminal leaves; involucral bracts linear, green; achenes slender papillose.

Distribution and habitat: Common weed of maize in Peshawar — Egypt & India.

2. Gnaphalium luteo-album L; Sp. Pl. 851. 1753., Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 749. 1972.

White tementose herb; leaves sessile, lower obtuse, upper acute; heads whitish, yellow or brownish, in dense corybose clusters; involucral bracts oblong; achenes muricate or minutly bristl bristly.

Distribution and habitat: Weed of maize fields in Dir and Chitral (Garam Chasma).

3. Gnaphalium indicum L., Sp. Pl. 852. 1753: Stewart, Ann. Cat. Vas. Pl. Pak. & Kash: 749, 1972.

White wooly herbs; stems several from the roots; leaves obovate or spathulate, woolly on both the surfaces; heads in

leafy spikes, pale yellow or pale brownish; involucral bracts linear - oblong, acute; achenes papillose.

Distribution and habitat: Weed of maize fields in Hazara (Battal).

20. C I C H O R I U M L.

Annual, biennial or perennial herbs; branching and diffuse when in bloom; mostly with deep hard roots; leaves alternate, usually towards the base; heads mostly axillary, and sessile, some terminal; involucral bracts in 2 - series, at least the apical one-half herbaceous; flowers all ligulate, blue, purple or white, several to many in a head; rays truncate, 5-toothed at apex; achene long-beaked, crowned by a pappus of blunt paleae or scales.

Cichorium intybus(L)., Sp. Pl. 813. 1753., Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 732. 1972.

Common name: Eng: Wild Chichory; Pushto & Urdu: Kashi.

Small to medium sized perennial herbs; branches rigid and spreading; root tapering and fleshy; stem angled and grooved; stem leaves clasping; leaves alternate exstipulate, lobed; radical leaves pinnatly divided, upper leaves small, entire; flowers minute in heads, all ligulate and sympetalous; flowers blue in colour; corolla with 5-toothed ligules; achenes angled. (Fig. 47).

Distribution and habitat: It is specific weed of Trifolium, however it has been collected from rice fields (Pir Rahman Deri Swat) and wheat fields (Sarai Naurang Bannu).

21. L A C T U C A L.

Milky herbs, glabrous or hispid; leaves radical and alternate, entire, toothed, pinnatifid or pinnate; cauline often stem-clasping and auricled; head sessile or peduncled, yellow, purple or blue, ligulate; involucre narrow; bracts few seriate; ligule 3-5 toothed; achenes compressed or flattened, beaked; pappus copious, soft and white [illegible] persistent or rarely as [illegible].

\+ Flowers blue .. .. 1. Lactuca dissecta

\- Flowers yellow .. .. 2. Lactuca serriola

1. Lactuca dissecta D. Don; Hook. Fl. Bep. 164. 1825., Stewart, Ann. Cat. Vas. Fl. Pak. & Kash. 759. 1972.

Annual herb, glabrous or pubescent; stem dichotomously branched from the base and leafy; sometimes nearly naked; leaves variable; radical leaves sessile or petiolate; cauline leaves semi-amplexicaul, lobed at the base; heads corymbose; flower blue or pale blue; achenes compressed, beaked.

Distribution and habitat: Common weed of wheat fields throughout the province.

Flowering period. March - April.

2. Lactuca serriola L. Cent. Pl. 2: 29. 1756., Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 760, 1972. (Syn. L. scariola L.)

Annual or bienniel, erect herbs, glabrous, leafy; stem prickly in the lower part; leaves sessile, runcinate or pinnatifid, teeth spinulose; cauline semiamplexicaul, prickly on lower surface; heads arranged in corymbose or lax panicles; flowers yellow; achenes brown, beaked.

Distribution and habitat: weed of wheat fields throughout the province.

Flowering period. March - April.

22. T A R A X A C U M Haller.

Herbs; leaves basal, runcinate-pinnatifid or lyrate or sometimes nearly entire; flowers all ligulate, yellow in many-flowered heads terminating a naked hollow scape; involucral bracts in 2 series, the inner erect and narrow, the outer smaller and spreading or reflexed; receptacle naked; achenes angled, fusiform, alternated into a slender beak; pappus simple and capillary.

1. Taraxacum officinale Weber in Wigg., Prim. Fl. Holsat. 56. 1780 Sp. agg., Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 788. 1972.

Common names: Eng: Common dandelion, Urdu: Rahria.

Small, milky herb; glabrous or pubescent; leaves radical, pinnathy divided, sessile; flowers sessile, minute in heads; floor of the head naked, pappus simple; legules long; ribbed, narrowed to the base. (Fig. 48).

Distribution and habitat: Common weed found in wheat fields and waste places throughout the province. Stewart (1972) has mentioned about 88 apomictic species of Taraxacum from Pakistan, however, many of the would come under T. officinale Weber. s.l. agg.

23. L A U N E A Cass.

Perennial herbs, glabrous, with yellow juice; leaves sinuate lobed or pinnatifid, margins often spinulose-toothed;

heads peduncled or sessile, solitary or fascicled, yellow; flowers all ligulate; involucre campanulate or cylindric; bracts many seriate; receptacle flat, naked; ligules 5-toothed; anther bases sagitate, auricles setaceous; achenes truncate at both ends; ribs 4-5; pappus copious, hairs white.

Launea procumbens (Roxb.) Ramayya & Rajagopal, Kew Bull. 23 (3): 463. 1969., Stewart, Ann. Cat. Vas. Fl. Pak. & Kash. 762. 1972. (Syn. L. nudicaulis Hk. f.).

Stems few to many, tufted, decumbent, naked or with a few small leaves; radical leaves sessile; lobes entire or coarsely toothed obtuse or acute, margins having sharp, white, cartilagenous teeth; heads 1-2.5 cm long; achenes pale, compressed; pappus soft, white.

Distribution and habitat: Found in wheat and corn fields of Bannu, Kohat and Peshawar districts - From the Atlantic eastwards to India and Pakistan. Flowering period: Throughout the year.

24. S O N C H U S L.

Milky herbs with fistular, grooved or angled stem; leaves radical or alternate, the former stalked, later stem-clasping, toothed or pinnatifid; heads terminal, yellow; flowers many, ligulate; bracts many-seriate; receptacle flat, naked; ligules 5-toothed; achenes not beaked, 3-5 ribbed on each face; pappus copious, white.

Key to the species

+ Basal lobes of cauline leaves obtuse .. 1. Sonchus asper

- Basal lobes of cauline leaves acute .. 2. Sonchus oleraceus

1. Sonchus asper (L) Hilly, Herbar. Brit. 1: 47: 1769., Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 784. 1972. (Syn. S. oleraceus L. var. asper L).

Common names: Urdu: Dudhi.

Annual herbs, glabrous or sparsely glandular in the upper parts; stem branched; leaves semi-amplexicaul, with rounded basal lobes; teeth numerous and spinous; heads crowded; involucral bracts glabrous; achenes flattened.

Distribution and habitat: Wheat-fields weed throughout the province. Salim and Khan (1965) have reported it along edge of corn fields from Peshawar. Flowering period: February - April.

2. Sonchus oleraceus L. Sp. Pl. 764. 1753., Stewart, Ann. Cat. Vas. Pl/ Pak. & Kash. 785. 1972.

Common names: Eng: Sow thistle; Urdu: Dodak.

Annual herbs, glabrous or sparsely glandular - hispid, branched above; lanceolate to semi-amplexicaul; heads crowded; achenes compressed, faces 3-ribbed and distinctly muricate between the ribs. (Fig. 49).

Distribution and habitat: It is an ubiquitous weed of wheat fields and waste places throughout the province -- All temperate and many tropical countries.

Flowering period: March - May.

40. Family SPHENOCLEACEAE

Aquatic herbs, glabrous, somewhat succulent with spongy tissue; leaves simple, exstipulate, alternate, lanceolate or elliptic, entire; inflorescence a dense cylindric spike; flowers small, sessile bracteate, regular, complete; bract 1, bracteoles 2; calyx 5-lobed; corolla perigynous; stamens 5, alternating with the petals, inserted on the corolla tube; ovary semi-inferior, bilocular; placentation axile, ovules numerous; capsule (pyxidium) short, 2 locular, seeds numerous, minute, oblong, exalbuminous (almost), embryo straight, subterete.

SPHENOCLEA Gaertin.

Characters same as that of family.

Represented by 1 species in Pakistan.

Sphenoclea zeylanica Gaertn., Fruct., 1: 113. t. 24, f. 5. 1788; Jafri in F.W. Pak. 25: 1-3. 1972.

Common names: Urdu: Aiker.

Glabrous herb with numerous thread -like roots, leaves lanceolate elliptic; spikes acute; bracts & bracteoles short more or less spathulate; flowers minute, white or greenish yellow; calyx 5-lobed; corolla connate at the base, usually white; stamens 5; ovary obovoid, apex truncate; capsule 4-5 mm in diam., calyx segments falling with the lid, leaving the basal portion attached & persistent on the rachis; seeds numerous, slightly rough with plicate-costate testa, yellowish brown.

Distribution and habitat: Common weed of rice fields throughout Pakistan, fairly abundant in Swat, Hazara and Kurrum — Tropical Africa, Asia & America. Fl. per. July - October.

41. Family V A L E R I A N A C E A E

Annual or perennial herbs, often with strong smelling rhizomes, rarely shrubs; leaves exstipulate, opposite or in basal rossettes; inflorescence a dichasial cyme, often changing to monochasium, rarely paniculate; flowers bisexual or unisexual, small & zygomorphic (often); calyx epigynous; corolla gamopetalous, tubular, tube often saccate or spurred at the base; stamens 1-4, on the corolla tube; ovary inferior, 3-locular, with only one fertile locule; fruit a dry indehiscent, 1-seeded achene.

Four genera belong to this family in our area. Key to the genera.

+ Perennial, rhizome swelling; fruiting calyx pappose .. .. 1. *Valeriana*

- Annuals, rhizome portion not swelling; fruiting calyx never so .. .. 2. *Valerianella*

1. V A L E R I A N A L.

Perennial herbs, underground parts aromatic; leaves entire or divided; flowers white or pink in corymbose cymes, panicles or heads; calyx unrolled in fruit; corolla 5-lobed; stamens 3; stigma 2-3 fid or simple; ovary 3-locular (only one locule fertile); fruit an achene.

+ All radical leaves (or at least offsets) undivided, achenes shorter than upper bracts .. .. 1. *V. himalayana*

- All or at least some radical leaves divided, achenes longer than upper bracts .. .. 2. *V. stracheyi*

1. *Valeriana himalayana* Grub. in Not. Syst. Herb. Inst. Bot. Acad. Sci. USSR. 19: 344. 1959., Nasir in Fl. Pak. 101: x 7. 1976. (Syn. *V. dioica* Clarke; *V. musilla* Royle).

Herb, 11-38 cm tall; rootstock with slender roots; scape glabrous, striate, solitary or 2-3; nodes pilose; radical leaves entire or not; nerves prominent, petiolate; lower capline leaves pinnati-partite with 1-3 lateral lobes; the upper most cauline leaves with narrower segments; flowers pink or white; ovary glabrous; achenes glabrous and shorter than the upper bracts.

Distribution and habitat: Common in marshy places upto 5000 meter. Found as a weed in maize-fields of Birir (Chitral) and Garhi Habibullah (Hazara) - N-W. Asia, Kashmir and the Karakorums. Fl. per. June - August.

2. Valeriana stracheyi C.B. Clarke in Hk. f., Fl. Brit. Ind. 3: 212. 1881; Nasir in Fl. W. Pak. 101: 9. 1976. (Syn: V. clarkei. auct. non, Briq.).

Herbs, upto 45 cm tall; rhizome with fibrous roots; stem single or 3-5; radical leaves fall off at fruiting time; often lyrately pinnatisect than entire; the entire leaves ovate-oblong; cauline leaves similar but smaller; flowers in lax, slender dichotomous spikes, bracteate; achenes pilose-pubescent, longer than the bracts.

Distribution and habitat: Collected from border of rice field in Bahrain (Swat) — Afghanistan and the Himalayas in India and Pakistan. Fl. per. July - August.

2. V A L E R I A N E L L A Miller

Annual herbs; stem dichotomous, glabrous to sparsely pubescent; leaves entire or lobed, opposite; bracts free; flowers small, in cymose heads or corymbs or solitary, white,

lilac or pinkish-blue; calyx limb small, persistent; corolla 5. lobed; stamens 3, rarely less; stigma 3-fid; fruit 3. locular; 2 locules sterile, the third 1. seeded.

1. + Calyx limb obliquely truncate, lobes absent .. .. 1. V. muricata.

– Calyx variously lobed .. .. 2. V. szovitsiana.

1. Valerianella muricata (Stev.) Betke in Walpers, Repert. Crit. supp. 3: 654. 1839; Nasir in Fl. W. Pak. 101: 17. 1976. (Syn. Fedia muricata Stev., V. truncata Betcke.).

Annual herb, upto 17 cm tall; leaves simple lanceolate to oblong - lanceolate, base often toothed; bracts ovate - lanceolate; calyx obliquely truncate; achenes ovoid, pubescent.

Distribution and habitat: Spring weed found upto 1500 meter altitude, weed of wheat fields in Kohistan (Dir), Swat and Hazara - Iran, Turkey, Palestine, USSR & Pakistan.
Fl. per. March - April.

2. Valerianella szovitsiana F. & M., Ind. Sem. Horti. Petrop. 3: 48. 1837., Nasir in Fl. W. Pak. 101: 19. 1976.

Annual herb upto 25 cm tall; leaves linear to lanceolate, often toothed at the base; bracts ovate to lanceolate, pubescent; calyx with one linear extension; achenes 3-8 mm long, ovate to oblong or urn shaped, glandular pubescent, and hispid; sterile pair of locule longer than the fertile.

Distribution and habitat: Found as a weed in cultivated fields. Reported as a weed of wheat fields in Kurram (Sadda). This

species is frequently found in Chitral, Dir, Swat, Hazara and Khyber Agency, however no evidence of it, weediness in cultivated fields has been reported, however there is a possibility that this species may become a weed if it is not today in the above mentioned areas. It occurs upto 1600 m - C. Asia, USSR, Syria, Turkey, Arabia, Iran, Afghanistan, Pakistan & India. Fl. per. April - May.

42. Family RUBIACEAE

Usually trees or shrubs, rarely herbs; leaves simple, opposite or whorled; stipules free or connate, sometimes leafy and indistinguishable from the leaves; flowers mostly bisexual, rarely zygomorphic, solitary to capitate; calyx adnate to ovary; corolla epigynous, more or less tubular, lobes 4-10 contorted, imbricate or valvlate; stamens as many as the corolla lobes and alternate with them, inserted in the tube and at its mouth; ovary inferior, 2 or more locular, with axile, apical or basal placentation, rarely 1-locular with parietal placenta; ovules 1-many; fruit a capsule, berry or drup.

GALIUM L.

Erect or scandent, weak herbs, glabrous, hispid, scabrid or prickly; leaves 3 or more in a whorl; flowers minute, in axillary and terminal cymes, white yellow or greenish, pedicel jointed with the ovary; calyx limb 0; corolla rotate or shortly funnel shaped; lobes 4, rarely 3 or 5, valvate; stamens 4, rarely 3 or 5, inserted in the corolla tube; ovary 2-celled; styles 2, ovules 1 in each cell, attached to the middle of the septum, erect; fruit small, 2-lobed, dry, smooth or bristly.

Galium aparine L; Sp. Pl. 108. 1753; Stewart, Ann. Cat. Vas. Pl. Pak. & Kash. 684. 1972.

Annual weak herb, scrambling, very rough; leaves mostly in whorls of 6 or 8, usually hispid all over; flowers in 3-9 flowered cymes, white, tinged with green; fruit purplish, covered with hooked bristles.

Distribution and habitat: Weed of wheat fields throughout the province.

DISCUSSION AND CONCLUSIONS

As shown in Table 1, a total of two hundred eighty four species belonging to one hundred ninety six genera distributed among fifty five families of angiosperous are recorded as weeds of cereal crops of North West Frontier Province of Pakistan. Out of the total two hundred and eighty four species and one hundred and ninety six genera, sixty four genera and ninety five species belong to thirteen monocotyledonous families while one hundred and thirty two genera and one hundred eighty nine species belong to forty two dicotyledonous families.

Maximum genera and species were recorded in case of Gramineae i.e. forty five genera being 22% of the total and fifty five species 20% of the total species. Gramineae is followed by Compositae having twenty four genera (8.7%) and thirty species (11%), in turn followed by Brassicaceae comprising of sixteen genera (8%) and 21 species (7.7%) and Papilionaceae consisting of eleven genera (5.6%) and twenty species 7.3%).

In monocotyledons, the 2nd largest family after Gramineae as per present investigations, is Cyperaceae having 4 genera and fourteen species while in dicotyledons Umbeliferae (7 genera and 7 species), Amaranthaceae (6 genera and 7 species) are the other larger families out of forty three families.

In Monocot, Iridaceae, and Zenicheliaceae while in Dicot, Resedaceae, Fumariaceae Portulacaceae, Parnassiaceae, Urticaceae, Cannabaceae, Illecebraceae, Primulaceae, Orobanchaceae and Rubiac are represented by single species and single genus.

Fig.I. shows the distribution of species in various families, Iridaceae, Zenicheliaceae, Resedaceae, Fumariaceae, Frankeniaceae, Portulacaceae, Parnassiaceae, Urticaceae, Cannabaceae, Illecebraceae Orobanchaceae, Sphenocleaceae and Rubiaceae are represented by single species each; Hydrocharitaceae, Potamogetonaceae, Commelinaceae, Pontederiaceae, Liliaceae, Zygophyllaceae, Linaceae, Onagraceae, Chenodiaceae, Thymelaeaceae, Plantaginaceae, Verbenaceae, Convolvulaceae, Scrophulariaceae and Acanthaceae are represented by 2 species each; Lemnaceae, Alismataceae, Alliaceae, Ranunculaceae, Malvaceae and Oxalidaceae are having 3 species each; Capparidaceae, Tiliaceae, Aizoaceae, Boraginaceae, Solanaceae, Labiatae and Valerianaceae consists of 4 species; Juncaceae and Papaveraceae represented by 5 species; Euphorbiaceae having 6 species; Caryophyllaceae, Umbelliferae, Lythraceae and Polygonaceae having 7 species each; Amaranthaceae having 10 species, Cyperaceae fourteen species, Papilionaceae twenty species, Brassicaceae twenty one species, Compositae thirty species and Poaceae fifty five species.

From the survey of the weeds of various fields of Cereal Crops, useful additions and informations have been gathered for the Flora of Pakistan. Many plants, which are not reported before from this Province, are being weeds of cereal crops in this area. Moreover, this study is helpful for those who are working for regional floras. Majority of specimens are deposited in Herbarium, P.C.S.I.R. Laboratries Peshawar, a part of it in National Herbarium Islamabad; Herbarium, Department of Botany, University of Karachi, and Kew. A good collection of specimens is lying in the Herbarium, N.W.F.P. Agricultural University under the supervision of the auther. And in this way many workers will find way to study these specimens,

noting informations regarding flora of disturbed habitats, and of course, certain intensive taxonomic details will be reported which are not reported so for.

Many weeds behave & compete in different ways in different habitats, however the following weeds aremore frequent, regarding their density and frequency, in the places where they are reported. In monocotyledons, Iris aitchinsonii, Sorghum halepense, Avena fatua, Cynodon dactylon, Koeleria macrantha, Desmostachya bipinnata, Polypogon monspeliensis, Phalaris minor, Echinochloa cruss-galli, E.colona, Lolium temulentum, Eichornia crassipes, Cyperus rotundus, Potamogeton nodosus, Asphodelus tenuifolius and Tulipa stellata, while in dicotyledons, Coronopus didymus, Sisymbrium irio, Portulaca oleracea Trianthema portulacastrum, Euphorbia helioscopia, E. hirta, Ammi visnaga, Alhagi maurorum, Lathyrus aphaca, Ammannia auriculata, Convolvulus arvensis, Erigeron alpinus, Conyza canadensis, Calendula arvensis, Silybum mariamum, Circium arvensis, Carthamus oxycantha, Xanthium strumarium, and Galium aparine are the dominent weeds and are a serious threat to our cereals and therefore, immediate attention is required for the study of their allelopathic effects if any, and range of their weediness and competition with the crops and to suggest their control mearsures.

Table-1. Distribution of genera and species in various families

MONOCOTYLEDONS

S.No.	Family	Genus/Genera Present	% of total	Species Present	% of total
1.	Hydrocharitaceae	2	1	2	0.7
2.	Iridaceae	1	0.5	1	0.4
3.	Gramineae(Poaceae)	43	22.00	55	20
4.	Cyperaceae	4	2	14	5
5.	Lemnaceae	3	1.5	3	1
6.	Zenicholiaceae	1	0.5	1	0.4
7.	Alismataceae	2	1	3	1
8.	Potamogetonaceae	1	0.5	2	0.7
9.	Juncaceae	1	0.5	5	1.8
10.	Commeliaceae	1	0.5	2	0.7
11.	Alliaceae	1	0.5	3	1
12.	Pontederiaceae	2	1	2	0.7
13.	Liliaceae	2	1	2	0.7

DICOTYLEDONS

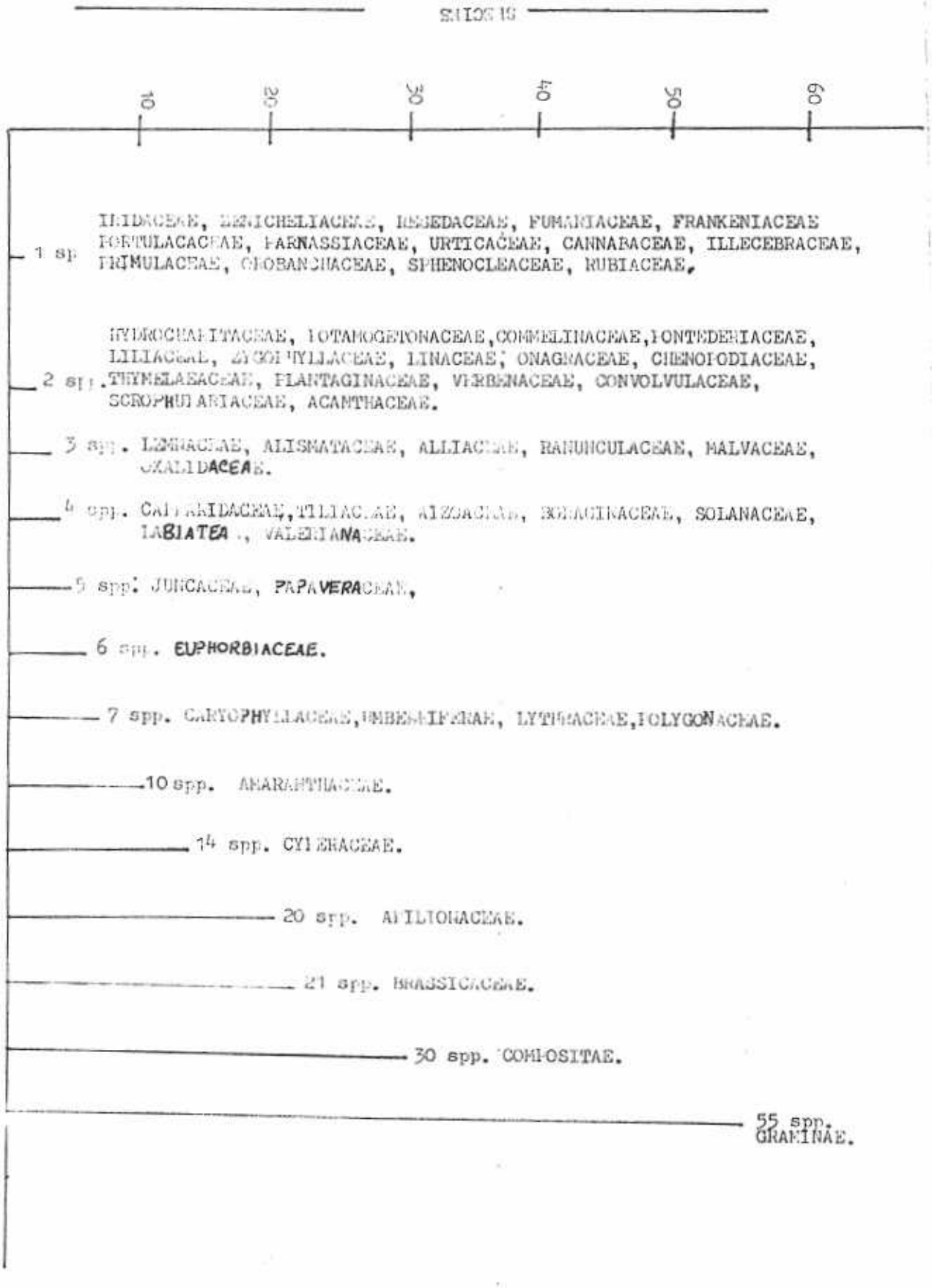
1.	Ranunculaceae	1	0.5	3	1
2.	Capparidaceae	1	0.5	4	1.4
33.	Resedaceae	1	0.5	1	0.4
4.	Papaveraceae	3	1.5	5	1.8
5.	Fumariaceae	1	0.5	1	0.4
6.	Brassicaceae (Cruciferae)	16	8	21	7.7
7.	Frankeniaceae	1	0.5	1	0.4
8.	Zygophyllaceae	2	1	2	0.7
9.	Malvaceae	3	1.5	3	1

10.	Liliaceae	1	0.5	4	1.4
11.	Caryophyllaceae	6	3	7	2.6
12.	Portulacaceae	1	0.5	1	0.4
13.	Euphorbiaceae	3	1.5	6	2.2
14.	Oxalidaceae	1	0.5	3	1
15.	Linaceae	1	0.5	2	0.7
16.	Umbelliferae	7	3.6	7	2.6
17.	Papilionaceae	11	5.6	20	7.3
18.	Lythraceae	3	1.5	7	2.6
19.	Parnassiaceae	1	0.5	1	0.4
20.	Onagraceae	2	1	2	0.7
21.	Amaranthaceae	6	3	10	3.7
22.	Polygonaceae	2	1	7	2.6
23.	Chenopodiaceae	1	0.5	2	0.7
24.	Urticaceae	1	0.5	1	0.4
25.	Cannabaceae	1	0.5	1	0.4
26.	Thymelaeaceae	2	1	2	0.7
27.	Aizoaceae	3	1.5	4	1.4
28.	Illecebraceae	1	0.5	1	0.4
29.	Primulaceae	1	0.5	1	0.4
30.	Boraginaceae	4	2	4	1.4
31.	Plantaginaceae	1	0.5	2	0.7
32.	Verbenaceae	2	1	2	0.7
33.	Solanaceae	3	1.5	4	1.4
34.	Convolvulaceae	2	1	2	0.7
35.	Scrophulariaceae	1	0.5	2	0.7
36.	Acanthaceae	2	1	2	0.7
37.	Labiatae	4	2	4	1.4
38.	Orobanchaceae	1	0.5	1	0.4

39.	Compositae	24	8.7	30	11
40.	Sphenocleaceae	1	0.5	1	0.4
41.	Valerianaceae	2	1	4	1.4
42.	Rubiaceae	1	0.5	1	0.4

Total genera = Monocot (64) + Dicot (132) = 196

Total Species=Monocot= (95) + Dicot (189) = 284


SPECIES
10
20
30
40
50
60
1 sp
IRIDACEAE, PAPAVERACEAE, RESEDACEAE, FUMARIACEAE, FRANKENIACEAE
PORTULACACEAE, PARNASSIACEAE, URTICACEAE, CANNABACEAE, ILLECEBRACEAE,
PRIMULACEAE, OROBANCHACEAE, SPHENOCLEACEAE, RUBIACEAE,
2 spp.
HYDROCHARITACEAE, POTAMOGETONACEAE, COMMELINACEAE, PONTEDERIACEAE,
LILIACEAE, ZYGOPHYLLACEAE, LINACEAE, ONAGRACEAE, CHENOPODIACEAE,
THYMELAEACEAE, PLANTAGINACEAE, VERBENACEAE, CONVOLVULACEAE,
SCROPHULARIACEAE, ACANTHACEAE.
3 spp. LEMNACEAE, ALISMATACEAE, ALLIACEAE, RANUNCULACEAE, MALVACEAE,
OXALIDACEAE.
4 spp. CARYOPHYLLACEAE, TILIACEAE, AIZOACEAE, BORAGINACEAE, SOLANACEAE,
LABIATEAE, VALERIANACEAE.
5 spp. JUNCACEAE, PAPAVERACEAE,
6 spp. EUPHORBIACEAE.
7 spp. CARYOPHYLLACEAE, UMBELLIFERAE, LYTHRACEAE, POLYGONACEAE.
10 spp. AMARANTHACEAE.
14 spp. CYPERACEAE.
20 spp. ASPHODELACEAE.
21 spp. BRASSICACEAE.
30 spp. COMPOSITAE.
55 spp.
GRAMINAE.
Fig. 1. Number of species belonging to each family.
FAMILIES

SUMMARY

Studies on the weeds flora of Cereal Crops of N.W.F.P. revealed two hundred and eighty four species belonging to one hundred and ninty six genera and fifty five families.

Out of fifty five families thirteen families are monocotyledonous, consisting of sixty four genera and ninety five species, viz., HYDROCHARITACEAE (Hydrilla- 1 sp., Vallisnaria- 1 sp.). IRIDACEAE (Iris-1 sp.) POACEAE (Apluda- 1sp., Imperata- 1 sp., Sorghum- 1 sp., Bothrichloa- 1 sp., Diacanthium- 1 sp., Setaria- 3 spp., Cenchrus- 1 sp., Pennisetum- 2 spp., Digitria- 3 spp. Eriochloa- 1 sp., Panicum- 2 spp., Brachiaria- 1 sp., Paspalum- 1 sp. Paspalidium- 1 sp., Echinochloa- 2 spp., Oplismenus- 1 sp., Secale- 1 sp. Tetrapogon- 1 sp., Cynodon- 1 sp., Schismus- 1 sp., Avena- 2 spp., Koeleria- 1 sp., Brachypodium- 1 sp., Bromus- 2 spp., Lolium- 2 spp., Vulpia- 1 sp., Briza- 1 sp., Poa- 2 spp., Leptochloa- 1 sp., Eragrostis- 1 sp., Dactyloctenium- 1 sp., Eleusine- 1 sp., Desmostachya- 1 sp., Parapholis- 1 sp., Phalaris- 1 sp., Tragus- 1 sp. Alopecurus- 1 sp., Polypogon- 1 sp., Muhlenbergia- 1 sp., Agrostis- 1 sp. Stipa- 1 sp., Aristida- 2 spp., Stipagrostis- 1 sp.), CYPERACEAE (Cyperus- 6 spp., Scirpus- 4 spp., Eleocharis- 1 sp., Fimbristylis- 3 spp) LEMNACEAE (Lemna- 1 sp., Wolfia- 1 sp., Spirodela- 1 sp. ZENNICHELLIACEAE (Zannichellia- 1 sp), ALLISMATACEAE (Alisma- 1 sp., Sagittaria- 2 spp.), POTAMOGETONACEAE (Potamogeton- 2 spp.), JUNCACEAEAE (Juncus- 5 spp.), COMELLINACEAE (Comellina- 2 spp.), ALLIACEAE (Allium- 3 spp.), PONTEDERIACEAE (Monocharia- 1 sp., Eichornia- 1 sp), LILIACEAE (Tulipa- 1 sp., Asphodelus- 1 sp.

Rest of the forty two families are dicotyledonous have 132 genera and 189 ~~genera~~, viz., RANUNCULACEAE (Ranunculus-3spp.) CAPPARIDACEAE (Cleome-4spp), RESEDACEAE (Oligomeris-1sp.), PAPAVERACEAE (Hypecoum-1sp., Papaver-3spp., Argemone-1sp.), FUMARIACEAE (Fumaria-1sp.), BRASSICACEAE (Alyssum-1sp, Lepidium-3spp, Capsella-1sp., Coronopis-1sp., Istis-1sp., Cardaria-1sp., Euclidium-1sp., Neslia-1sp., Notoceras-1sp, Nasturtium-1sp., Eruca-1sp., Descurainia-1sp., Malcomia-2spp., Goldbachia-1sp., Sisymbrium-1sp., Torularia-1sp.), FRANKENIACEA (Frankenia-1sp.), ZYGOPHYLLACEAE (Peganum-1sp, Tribulus-1sp), MALVACEAE (Hibiscus-1sp., Malvastrum-1sp., Malva-1sp.) TILLIACEAE (Corchorus-4spp.), CARYOPHYLLACEAE (Spurgularia-2spp., Spergula-1sp., Stellaria-1sp., Cerastium-1sp., Silene-1sp., Vaccaria-1sp), PORTULACACEAE (Portulaca-1sp), EUPHORBIACEAE (Euphorbia- 4spp., Phyllanthus-1sp., Chrozophora-1sp), OXALIDACEAE (Oxalis-3spp.), LINACEAE (Linum-2spp.) UMBELLIFERAE (Anethum-1sp., Psamogeton-1sp. Scandix-1sp., Carum-1sp., Ammi-1sp., Torilis-1sp.), PAPILIONACEAE (Alhagi-1sp., Mellilotus-3spp., Medicago-5spp., Trigonnella-1sp., Trifolium, Argyrolobium-1sp., Lotus-1sp., Sesbania-1sp. Astragalus-2spp., Lathyrus-2spp., Vicia-2spp., LYTHRACEAE (Lathyrum-1sp., Ammania-4spp., Rotalia-2spp), PARNASSIACEAE (Parnasia-1sp), ONAGRACEAE (Epilobium-1sp., Oenothera-1sp.), AMARANTHACEAE (Digera-1sp., Pupalia-1sp., Celosia-1sp., Amaranthus-4spp., Achyranthus-1sp., Aerva-2 spp.), POLYGONACEAE (Polygonum-4 spp.,Rumex-3 spp.), CHENOPODIACEAE (Chenopodium-2 spp.), URTICACEAE (Urtica-1 sp.) CANNABACEAE (Cannabis-1 sp.), THYMELAEACEAE (Thymelaea-1 sp., Diarthron-1 sp.), AIZOACEAE (Corbichonia-1 sp., Zaleya-1 sp., Trianthema-2 spp.), ILLECEBRACEAE (Herniaria-1 sp), PRIMULACEAE (Anagallis-1 sp.) BORAGINACEAE (Heliotropium-1sp., Arnebia-1 sp., Trichodesma-1 sp., Cynoglossum-1 sp.),

Verbenaceae (Verbena 1sp., Phyla 1sp), SOLANACEAE (Datura, Solanum & physalis 1sp each)

PLANTAGINACEAE (Plantago-2 spp.), CONVOLVULACEAE (Ipomoea-1 sp., Convolvulus-1 sp.) SCROPHULARIACEAE (Veronica-1 spp.), ACANTHACEAE Ruellia-1 sp., Dicliptera-1 sp.), LABIATAE (Salvia-1 sp., Ajuga-1 sp., Lamium-1 sp., Stachys-1 sp.), OROBANCHACEAE (Cistanche-1 sp), COMPOSITAE (Eclipta-1sp., Bidens-1 sp., Matricaria-1 sp., Erigeron-1 sp., Calendula-1 sp., Pulicaria-1 sp., Conyza-3 spp., Silybum-1 sp., Circium-1 sp., Saussurea-1 sp., Consinia-1 sp., Carthamus-1 sp., Centaurea-1 sp., Ifloga-1 sp., Xanthium-1 sp., Vernonia-1sp., Ageratum-1sp., Blumea-1sp., Gnaphalium-3spp., Cichorium-1sp., Lactuca-2spp., Taraxacum-1sp., Launea-1sp., Sonchus-2spp.), SPHENOCLEACEAE (Sphenoclea-1sp.), VALERIANACEAE (Valeriana-2spp., Valerianella-2spp.) and RUBIACEAE (Galium-1sp).

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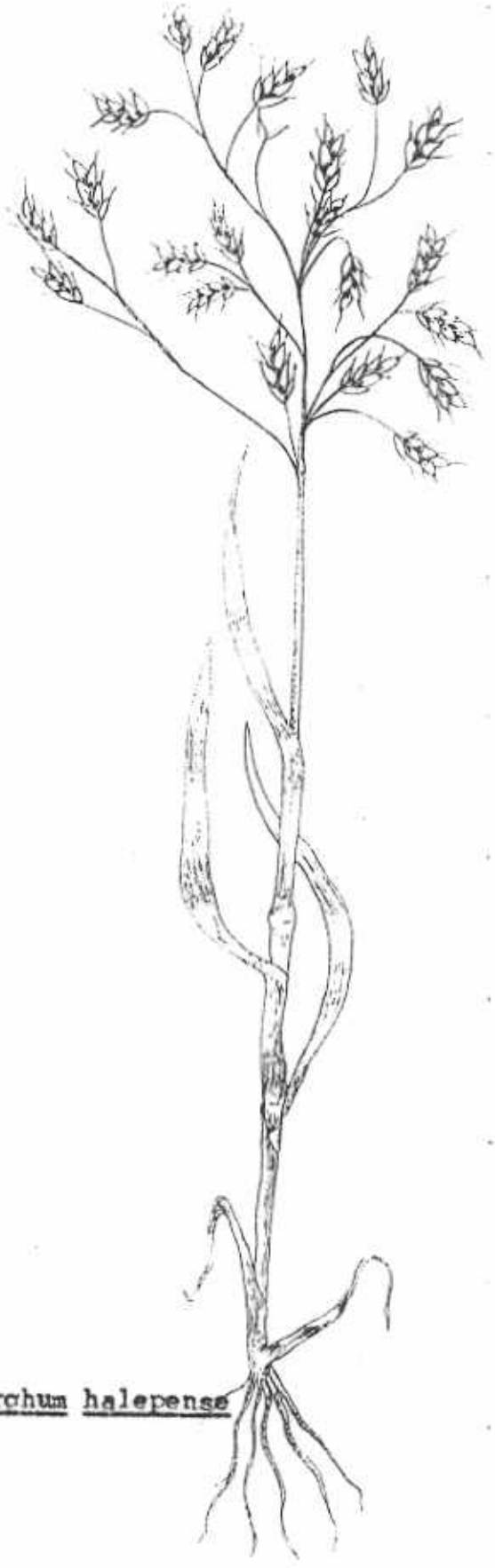


Fig.2. Sorghum halepense



Fig.3. Echinochloa crus-galli



Fig.4. Setaria viridis

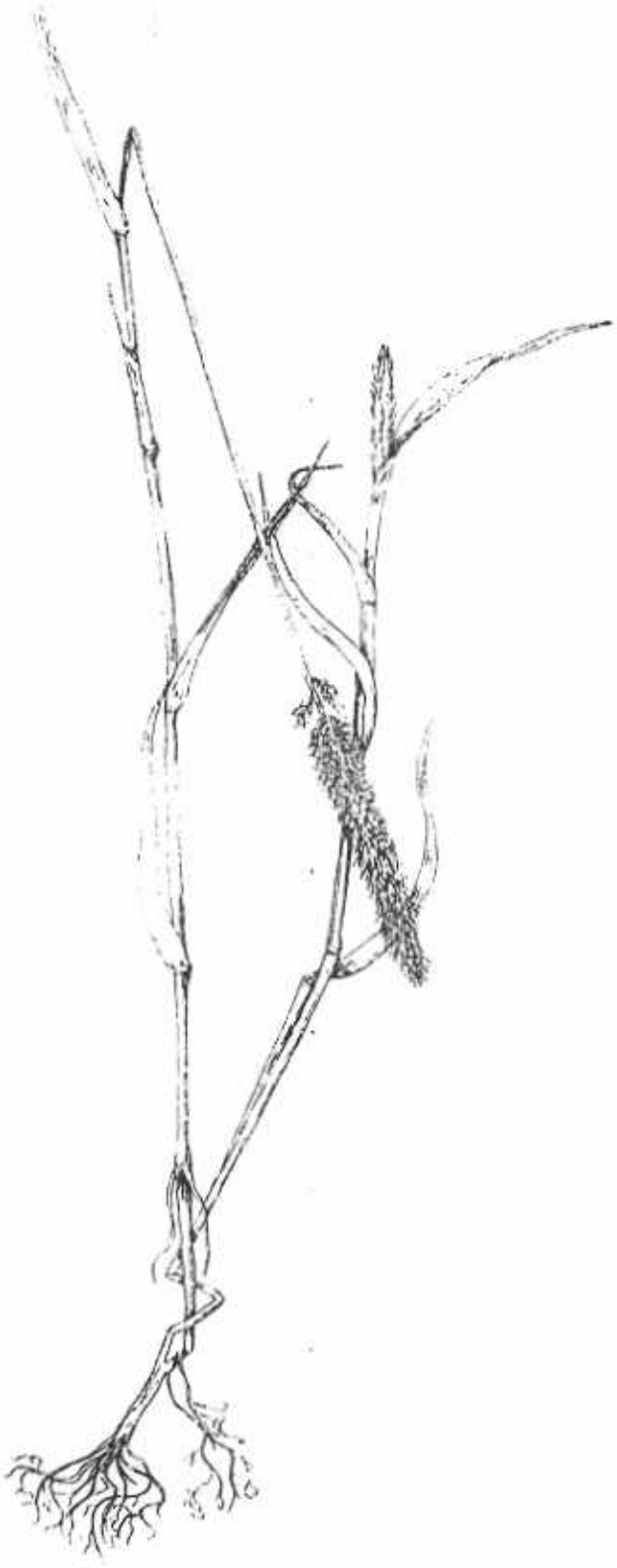


Fig.5. Setaria pumila



Fig.6. Avena fatua



Fig.7. Bromus japonicus



Fig.8. Cynodon dactylon



Fig.9. Lolium multiflorum

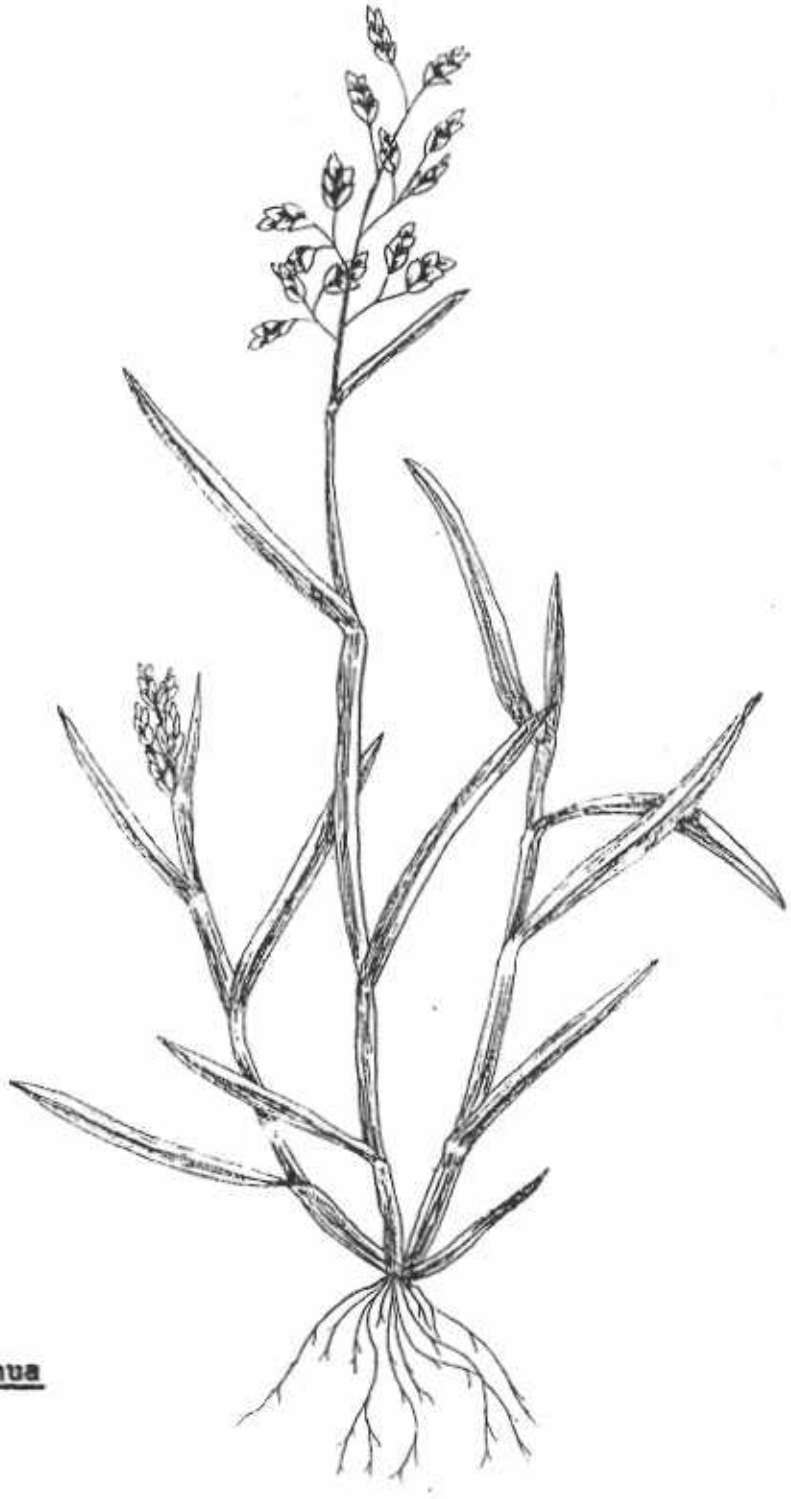


Fig.10. Poa annua

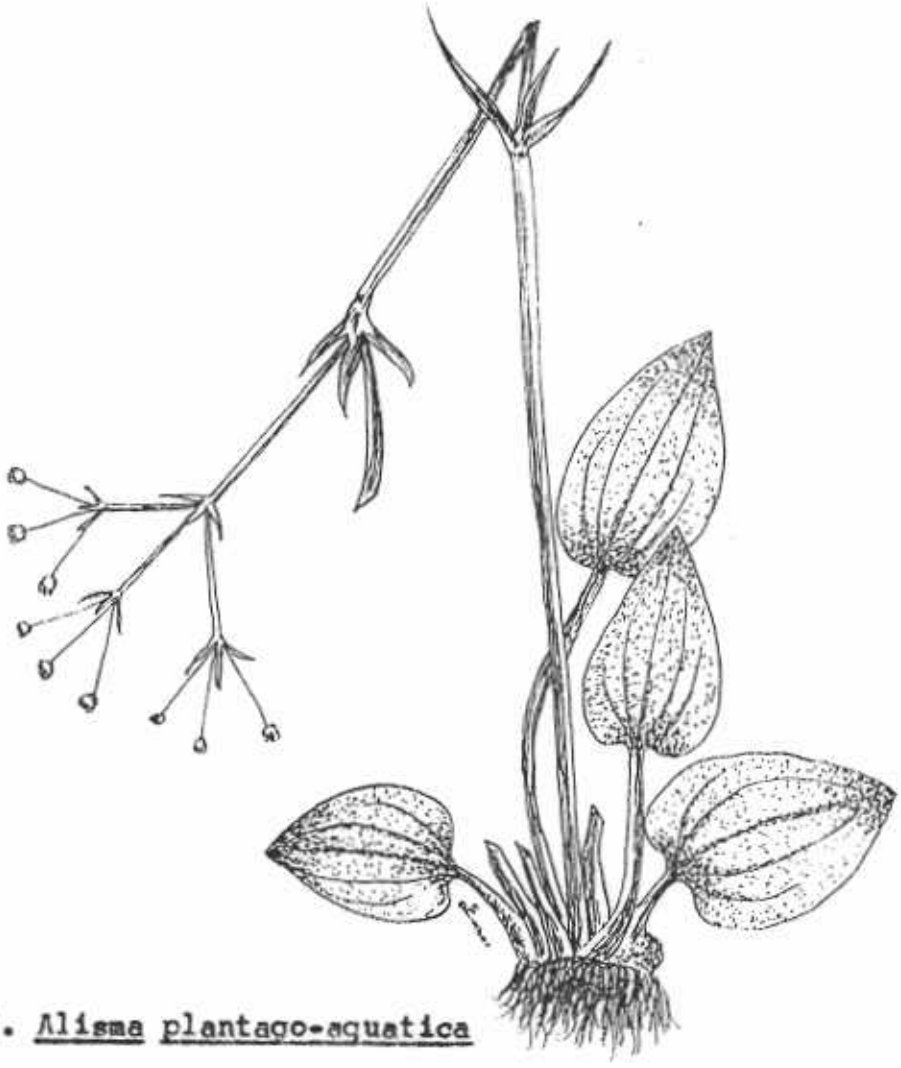


Fig.11. Alisma plantago-aquatica

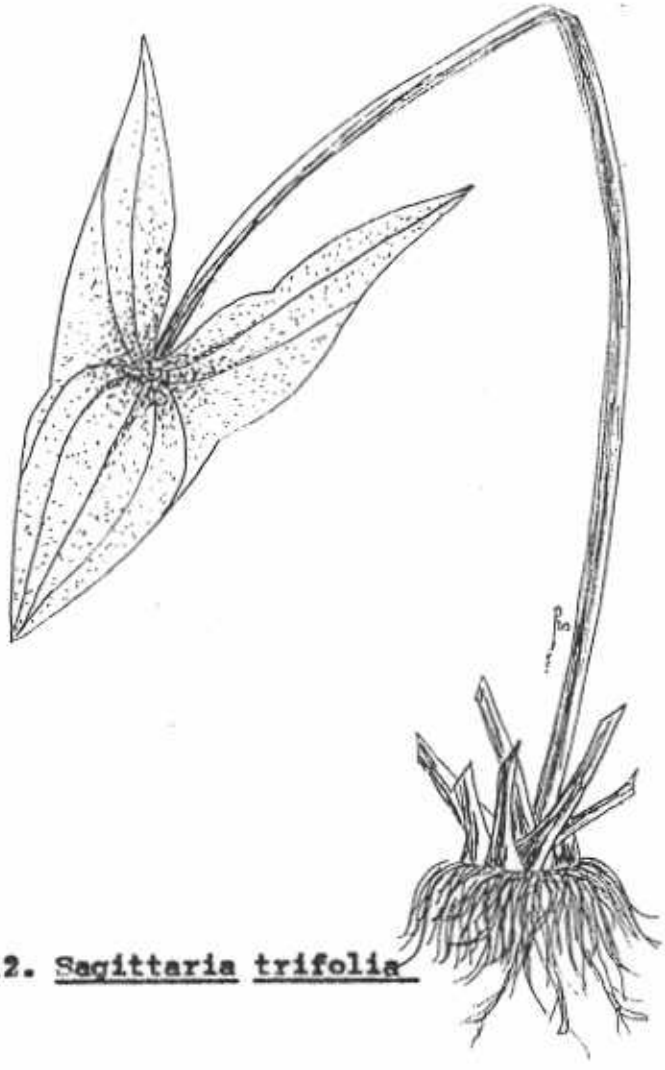


Fig.12. Sagittaria trifolia

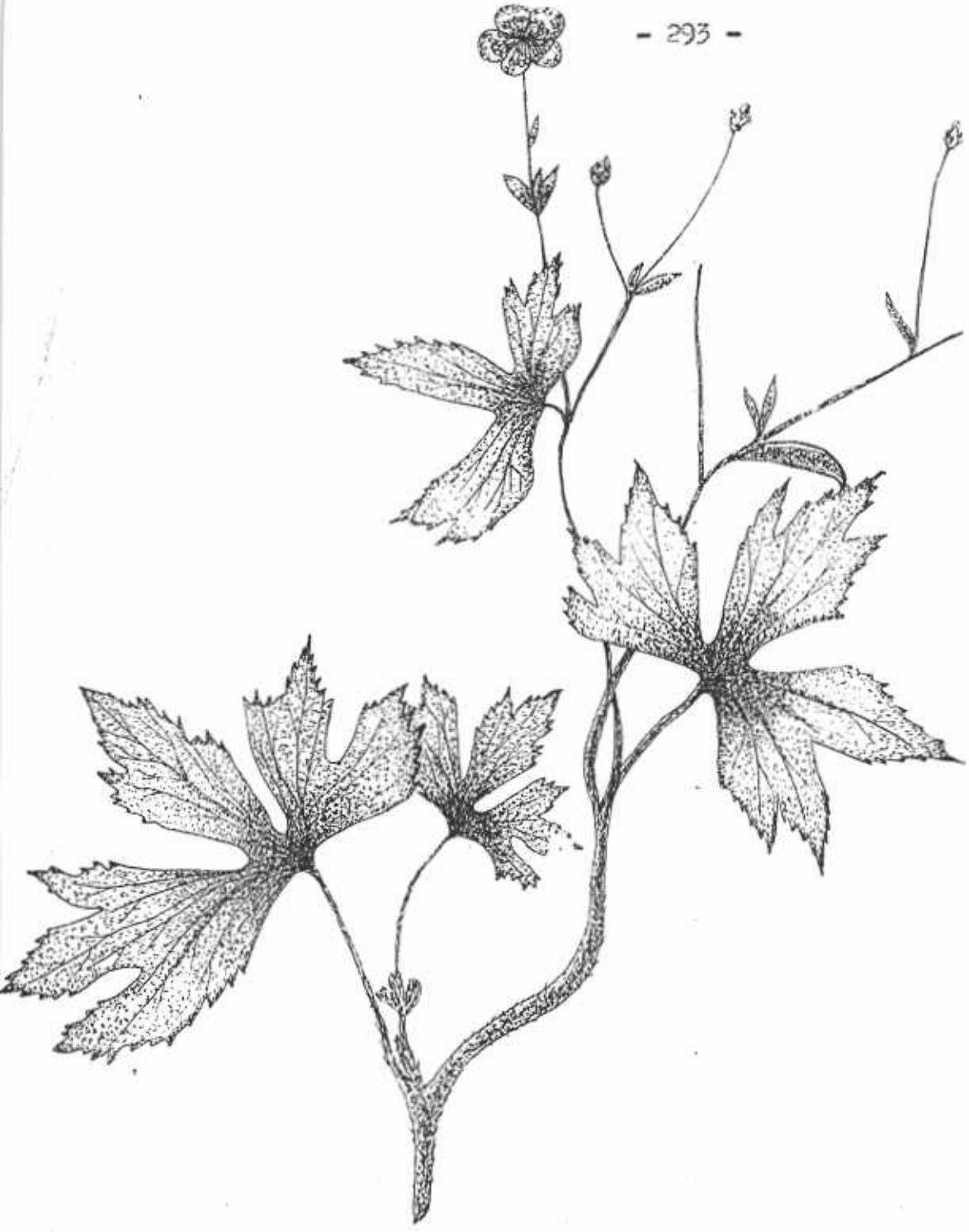


Fig.13. Ranunculus lactus



Fig.14. Ranunculus arvensis



Fig.15. Ranunculus muricatus



Fig.16. Papaver hybridum

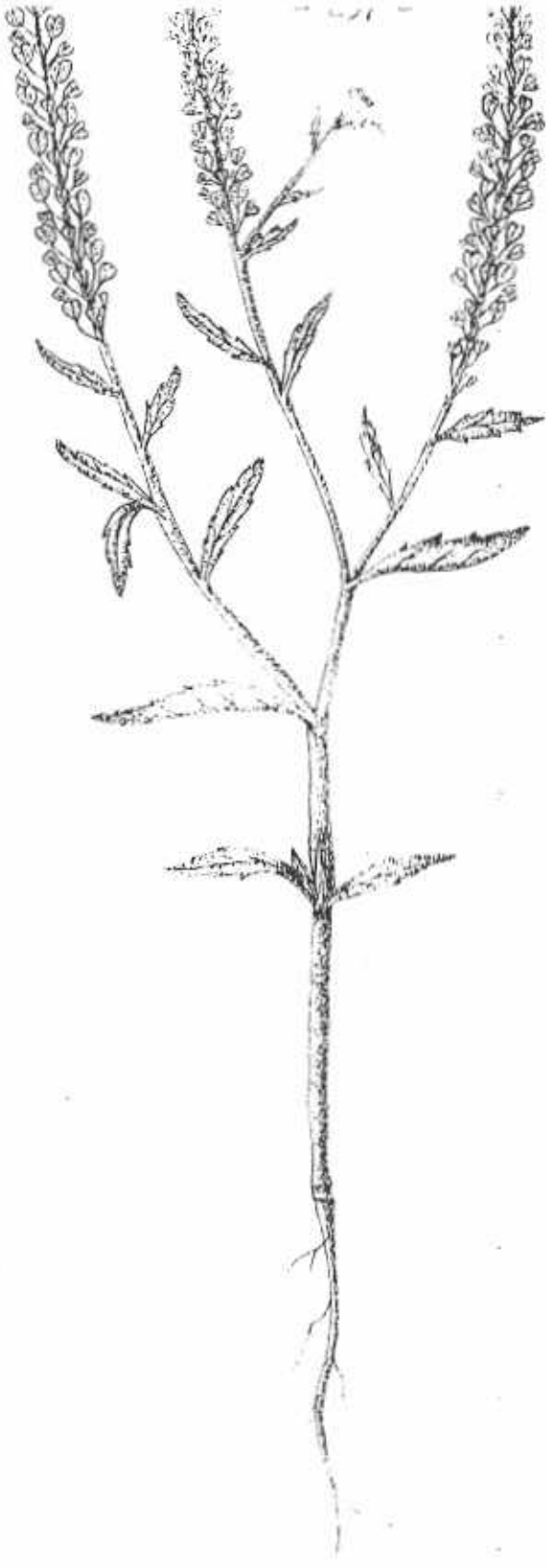


Fig.17. Lepidium pinnatifidum

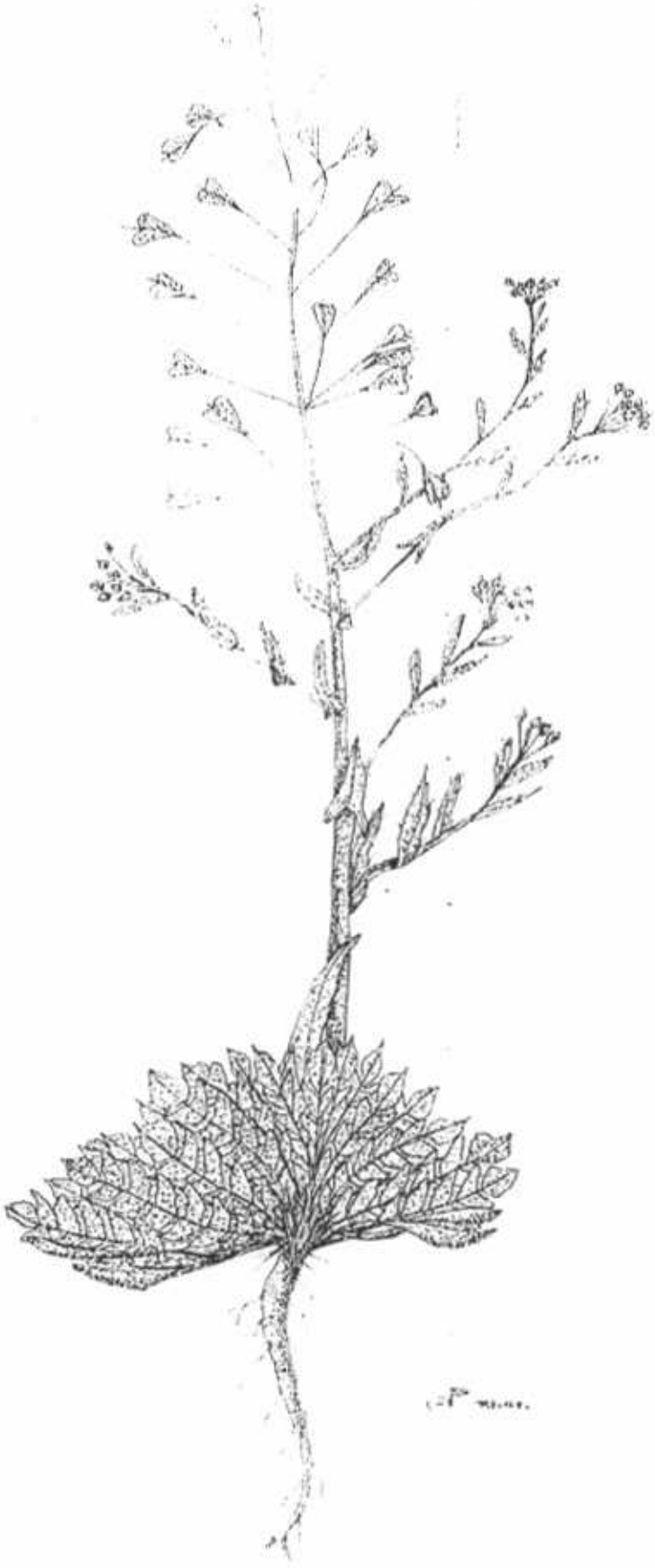


Fig.18. Capsella bursa-pastoris



Fig. 19. Descurainia Sophia



Fig.20. Goldbachia laevigata

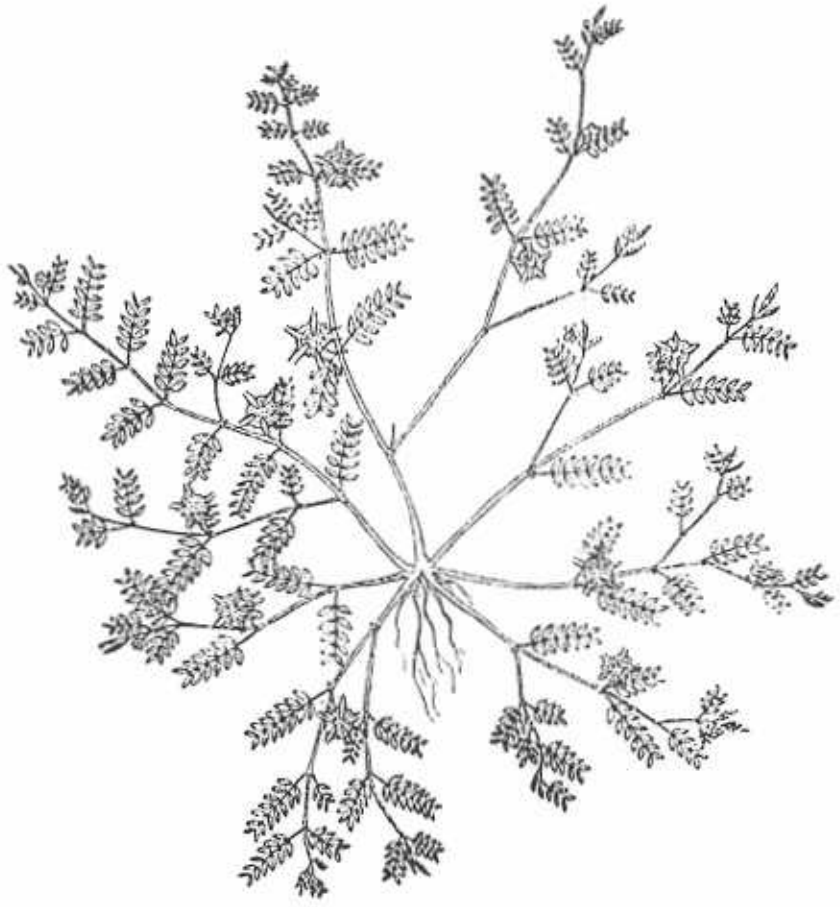


Fig. 21. Tribulis terrestris



Fig.22. Malvastrum coromendehianum

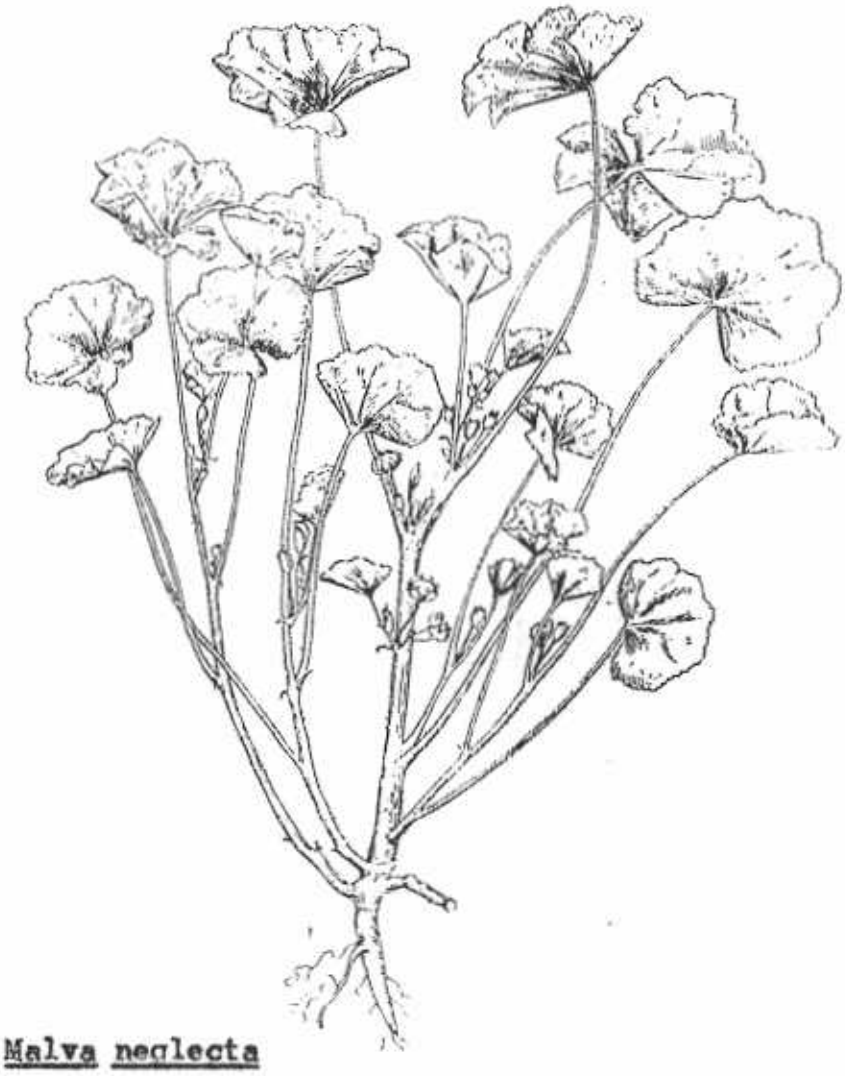


Fig.23. Malva neglecta



Fig.24 Corchorus aestuans



Fig.25. Corchorus tridens

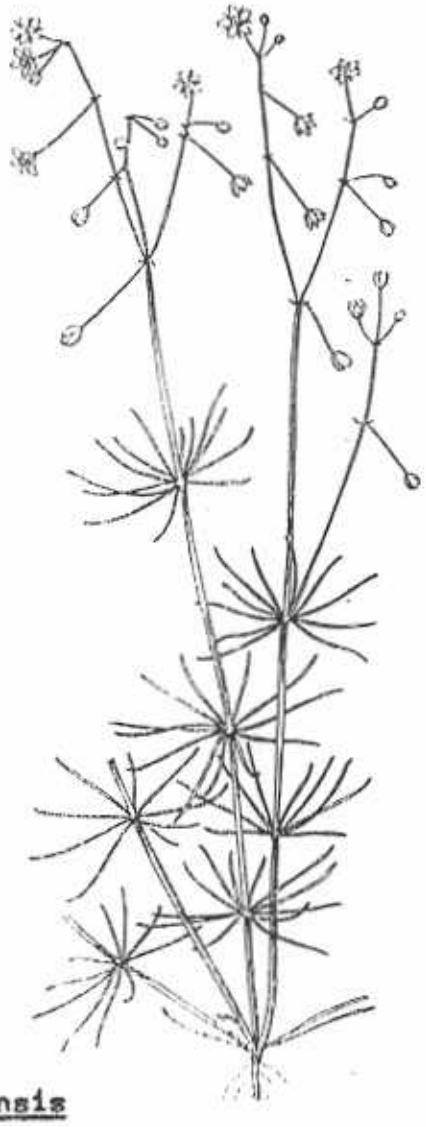


Fig.26. Spergula arvensis



Fig. 27. Stellaria media

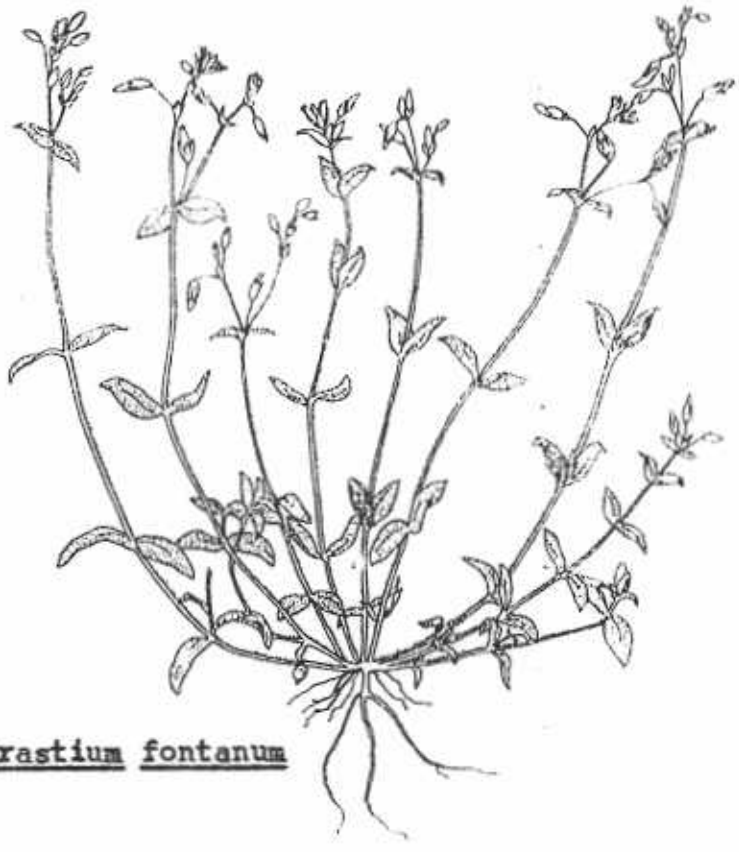


Fig. 28. Cerastium fontanum

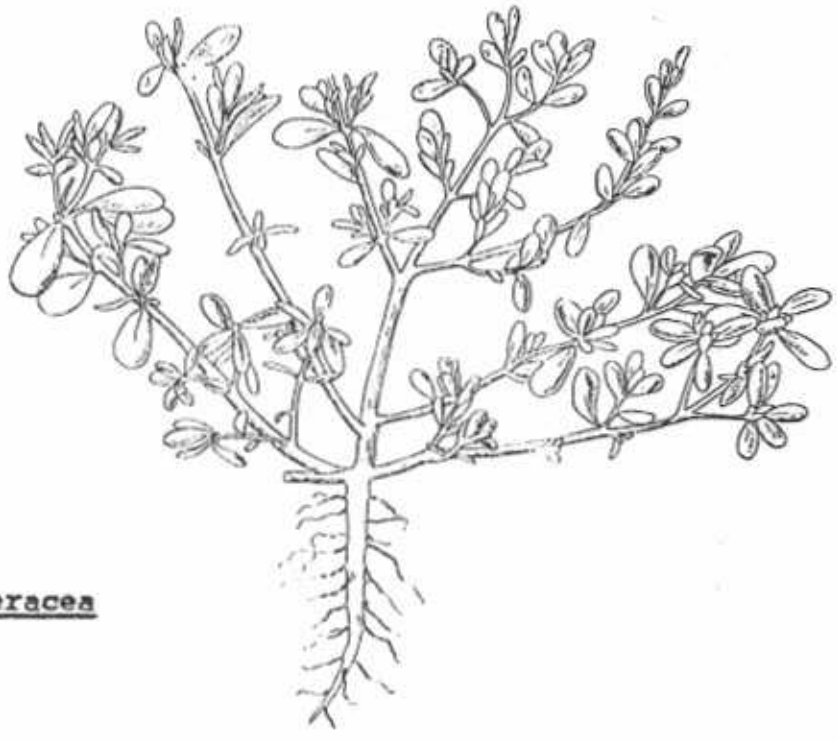


Fig.29. Portulaca oleracea

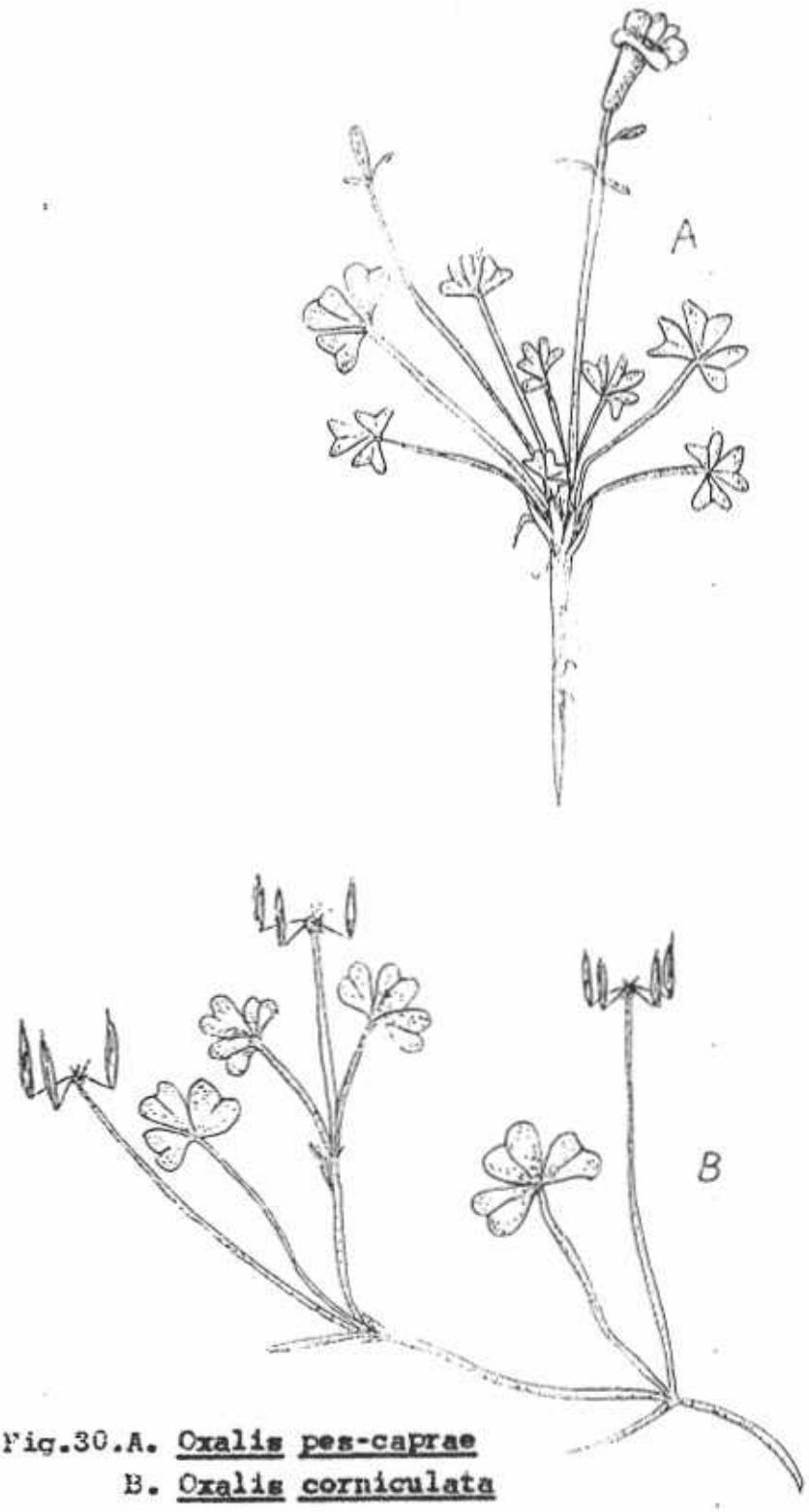


Fig.30.A. Oxalis pes-caprae
B. Oxalis corniculata



Fig. 31. Linum corymbulosum



Fig. 32. Medicago lupulina

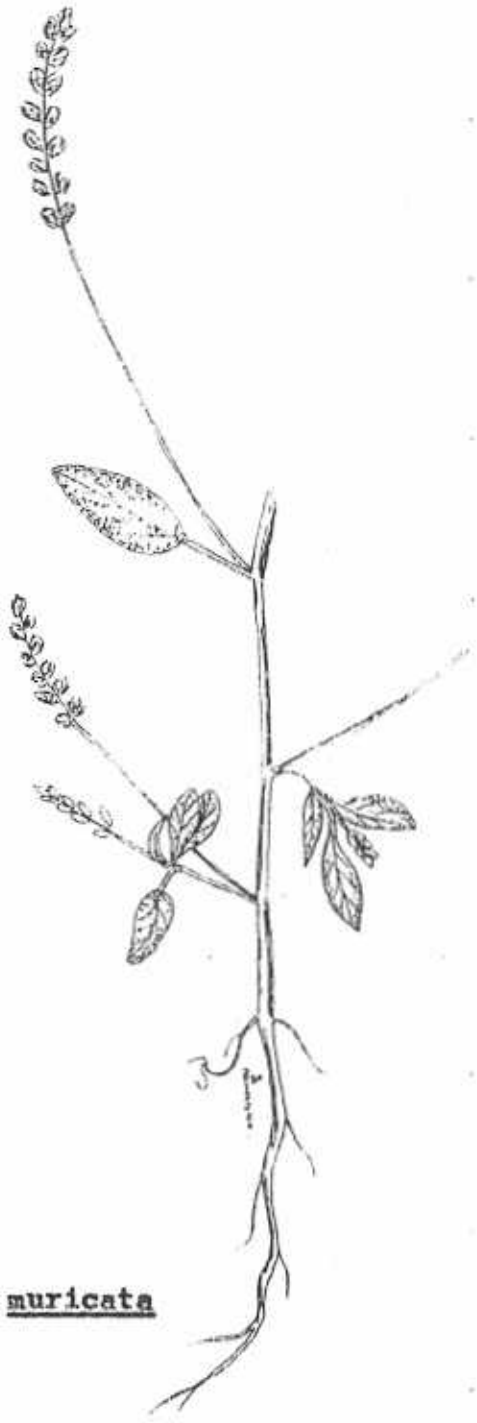


Fig. 33. Digera muricata



Fig. 34. Celosia argentea



Fig.35. Amaranthus graecizans



Fig.36. Amaranthus viridis



Fig.37. Aerva javanica



Fig.38. Comphrena celosioides



Fig.39. Cannabis sativa

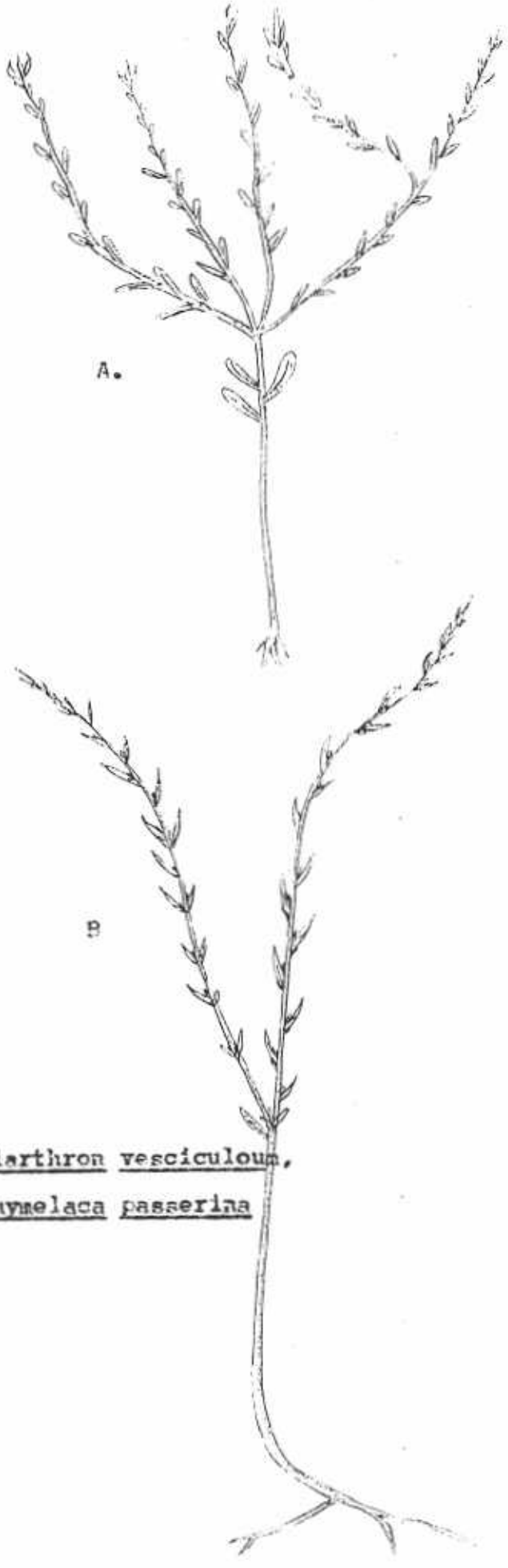


Fig.40. A. Diarthron vesciculosum.
B. Thymelaea passerina



Fig. 41. Plantago major



Fig.42. Plantago lanceolata



Fig.43. Solanum miniatum



Fig.44. Lamium amplexicaule



Fig.45. Circium arvense



Fig.46. Xanthium strumarium



Fig.47. Cichorium intybus

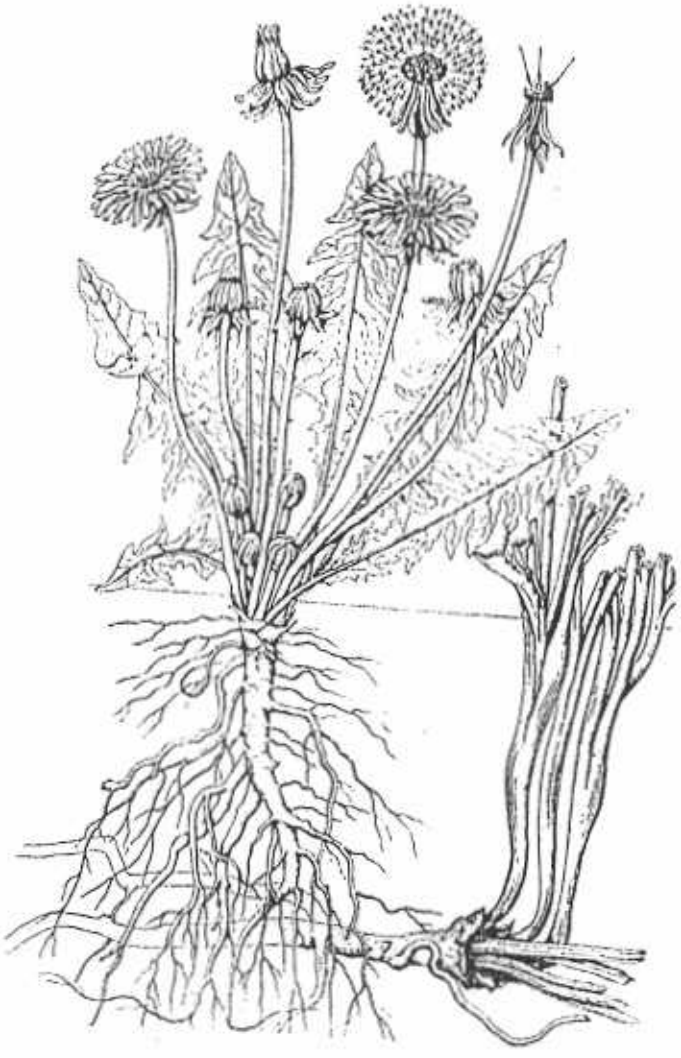


Fig.48. Taraxacum officinale



Fig. 49. Sonchus oleraceous

بسم الله الرحمن الرحيم

In the Name of ALLAH
the most merciful,
the most gracious.