DIVERSITY, DISTRIBUTION AND ECOLOGICAL IMPORTANCE OF WEEDS IN THE MAIZE CROP AT MAIDAN VALLEY, DIR (L), KHYBER PAKHTUNKHWA, PAKISTAN

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ABSTRACT
The present studywas conducted to investigate different weeds of maize (Zea mays L.) and their uses and distribution from 10 different localities i.e. Bagh, Chinarkot, Daro, Dokary, Hayaseri, Kaladog, Kotkay, Lal Qilla, Manial and Mulayano Banda of Maidan valley, District Dir, Pakistan. Forty six weeds species belonging to 22 families were found in maize crop. The dominant family was Poaceae having 7 species, followed by Amaranthaceae with 6 species, Asteraceae 5 species, Cyperaceae, Lamiaceae and Solanaceae with 3 species each, Chenopodiaceae, Fabaceae and Polygonaceae with 2 species each and remaining 13 families with one species each. On the basis of leaf size spectra 20 species (43.34 %) were Microphylls, 15 species (32.60%) Nanophylls, 6 species (13.04%) Leptophylls and 5 species (10.86 %) Mesophylls. The life form showed that there are 23 species (50%) of Therophytes, 11 species (23.91%) of Geophytes and Hemicryptophytes and 1 species (2.17%) was Chamaephyte.

Key words: Leaf size, Maidan Valley, maize fields, weeds diversity, District Dir Lower.

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INTRODUCTION
Maidan valleyis located in Dir Lower, Khyber Pakhtunkhwa covering an area of 300 km^2 lying between 34^0 $37^/$ to 35^0 $07^/$ N Latitudes and $71^0 31^/$ to 72^0 $14^/$ E longitudes. It is boundried in east by Upper Dir, north by Barwal Banda, south by Haji Abad and Koto and in the west by Jandool. The topography of the valley is dominated by Hindukush Mountains and hills. Mostly the crops are depending upon on rain. The summer season is moderate and hot, June and July are hottest months and in June maximum and minimum temperature has been recorded as 32.52 ^{0}C and 15.67 ^{0}C respectively. A chilly wind

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Badama come from Lowari Top in spring season. The winter season is cold and severe the temperatures rapidly decrease from November onwards. December, January and February are very cold months, during these months the temperature fall below the 0^0C. The maximum and minimum temperature during the month of January was recorded as 11.22^0C and -2.39^0C respectively. The natural flora of the Valley is consisting of some coniferous forest. The vegetation of the valley is degrades by various anthropogenic activities and intensive deforestation for agriculture practices. The commonly found plants of the area are *Melia, Morus, Zizyphus, Ficus,* and *Pyrus*and*Pinus*. Maidan is a lush green valley which provides a good habitat for many birds like sparrow, pigeon and other animals (Anonymous, 1998).

Maize is grown in Pakistan both in irrigated and rain-fed areas. In 2009 and 2010 Maize was grown on an area of 0.95 m ha and its production was 3.487 m tons with an average yield of 1865 kg ha^{-1} (Khatam *et al.*, 2013). In 2010 maize was cultivated on an area of 981 (000 ha) with a total production of 36581 (000 tons) in Pakistan and during the same season its area of cultivation and production in KP was 512 (000 ha) and 1468 (000 tons) respectively (Arif *et al.*, 2012). Maize is a multipurpose crop used as human food, animal's and poultry feedandin variousindustrial products.The maize grain contain protein (10.4%), fat (4.5%) starch (17.8%), vitamins, minerals and contributes 6.4% to the total grain production in the country (Khan *et al.*, 2012).

Weeds are undesirable plants species growing in the domesticated crops and compete mainly for water, light, nutrients and carbon dioxide. Weeds differ from other plants in being more aggressive, having peculiar characteristics that make them more competitive. They suppress the activity of all other weeds communities around them and establish a kingdom of their own within a short period of time. These weeds are generally associated with commercially important crops of export potential. They not only lower the quality but also the quantity of the crop produces resulting in heavy economic losses to the farmer (Muhammad *et al.*, 2009). Weeds often possess hard seeds, underground root stocks or tubers, and show greater persistence to domesticated plants and may secrete substances that inhibit the growth of other plants Maize is grown on large scale in rainfed area during summer season and used as food, fodder and feed and have so many commercial uses (Abbas *et al.*, 1998). Muhammad *et al*. (2009) reported sixty-seven weed species in Wheat, Maize and Potato crop fields of Tehsil Gojra, District, Toba Tek Singhand Punjab. If the weeds are left freely they compete with crop for growth which increases the yield loss up to 35-70% (Khan *et al.*, 2012).

More than 200 different types of weeds have been found in various crops in KP with varying densities and the most harmful weeds, infesting maize crop and causing its yield losses in Khyber Pakhtunkhwa are thought to be *Echinochloa crus-gallii* (L.) P. Beauv., *Leptochloa* sp., *Cyperus rotundus* L., *Sorghum halepense* (L.) Pers., *Cynodon dactylon* (L.) Pers., *Digitaria sanguinalis* (L.) Scop., *Convolvulus arvensis* L., *Tribulus terrestris* L*., Digera muricata* (L.) Mart. and *Portulaca oleracea* L. (Saeed *et al*., 2013; Saeed *et al*., 2014; Hadi *et al*., 2014; Inayat *et al*., 2014; Shah *et al*., 2014; Ullah *et al*., 2014).

MATERIAL AND METHODS

Regular study tours werecarried out to the research area during July to September 2013. Weeds species were collected from ten different localities of Maidan valley. The collected species were dried and pressed in Newspaper for two weeks. During the process of collection Photographs were taken by using Canon Power Shot A-2200 (14.1 Mega Pixel) Camera. The plant specimens were identified with the help of available literature i.e. (Nasir and Ali, 1970-1989; Ali and Nasir, 1989-1991; Tanveer and Ali, 2003; Ali and Qaiser, 1993-2014). The collected specimens were mounted on herbarium sheets, voucher specimen numbers were assigned and deposited in the herbarium of Botanical Garden University of Peshawar (UPBG).

RESULT AND DISCUSSION

The floristic study of weeds in maize crop was conducted for first time in Maidan Valley. The local people used these weeds species as fodder for cattle, medicinally for different disease, fuel, vegetable and as a food (Table-1). Fourty six (46) species of 39 genera and 22 families including 2 monocot families with 10 species and 20 dicot families with 36 species were recorded (Table-1). These species were collected from 10 different localities of Maidan Valley. Poaceae was the leading family with 7 species (15.21%), followed by Amaranthaceae 6 species (13.04%), Asteraceae 5 species (10.86%), Cyperaceae, Lamiaceae, and Solanaceae had 3 specieseach (6.52%) while Chenopodiaceae, Fabaceae, and Polygonaceae with 2 specieseach (4.34%). The remaining 13 families were represented by a single species (2.17%). Twenty three (23) species viz. *Verbena officinalis, Amaranthus spinosus, Amaranthus viridis, Conyza aegyptiaca, Parthenium hysterophorus, Commelina benghalensis, Chenopodium album, Cyperus rotundus, Euphorbia hirta, Vicia sativa, Malva neglecta, Boerhavia diffusa, Oxalis corniculata, Plantago lanceolata, Cynodon dactylon, Digitaria ciliaris, Eleusine indica, Setariaglauca, Sorghum halepense, Polygonum aviculare, Rumex dentatus, Portulaca*

oleracea and *Amaranthus gracilis* were distributed throughout the valley. While the remaining 23 species are distributed in two or more localities in the Valley. Maximum plants are used asfodder for cattle. The plant parts are usage is as whole plant (56.52%), leaves and shoots (30.43%), leaves, roots and shoots (4.34%) and fruit, leaves and shoots, flower, leaves and shoots, leaves and flowering tops and leaves (2.17%) (Table-1).

Some similar species have been collected by different researcherin past i.e. (Hussain *et al.,* 2009; Hadi *et al.,* 2011; Muhammad *et al.,* 2011; Ullah and Rashid, 2013; Inayat *et al*., 2014; Shah *et al*., 2014; Ullah *et al*., 2014). The previous studies show similarities with life form spectra that Therophytes are dominant followed by Hemicryptophytes, Geophytes and Chamaephytes. Leaf size spectra also show similarities that Microphylls is the leading one followed by Nanophylls, Leptophylls and Mesophylls. Hadi *et al*. (2014) noted the uses of 31 weed species and concluded that 26 species were therophytes and some weeds are also used as astringent, in constipation, as diuretic, as laxative, as anthelmintic and in jaundice. Naila *et al*. (2014) also reported that among the total 43 weeds, therophytes were 93% and were the dominant weeds, they also reported that weed competes for with crops and thus decrease the production. It is reported by some scientists that mulching can be used as a technique for management of weed species and enhancing Maize productivity (Saeed *et al*., 2013). According to Saeed *et al*. (2014) the inter cropping is also help in management and enhancement of productivity in Maize crop. Similar studies are also carried out by Ullah *et al*. (2014) in Landi Kotal Valley and they concluded that 31 weed species are present in various crops and these can be managed and utilized for curing various diseases and other purposes. All the previous researchers agreed that in majority of cases the dominant group id therophytes which are showing that maximum weeds are annual and if proper and on time eradication is carried out then the weed will cause minimum losses to various crops. Thus due to the adoptability of eradication method the society will get rid of using various systemic and non-systemic dangerous herbicides and weedicides. This will not only increase the production but will also save hidden charges on account of its purchase and will avoid the fate of dangerous chemical compounds in the soil.

During the present studies according to respondents *Mentha arvensis* is highly medicinal plant used 45% in diarrhea, 25% prevent vomiting and 20% in toothache. *Mentha longifolia* is second medicinally important species. Tea is prepared from leaves which isused 40 % in fever, 25 % stimulant and 10% in mouth wash and also used 10% in kidney stone. *Achyranthes aspera*decoction is used

35% as diuretic, 20% inabdominal pain and 15% in toothache. *Chenopodium album* is the third importantweed species, the leaves are boiled and then kept in refrigerator for an hour used 30% as anthelmintic, 25% for blood purification and 10% in constipation. *Rumex dentates* is used as a diuretic 25%, leaves are used for healing of wound 35% and 10% as carminative. *Xanthium strumarium* leaves are boiled andused 20% in malaria fever; 5% as a tonic and 5% in gum disease. Some other plants are alsoused for the various diseases in the valley (Table-3).
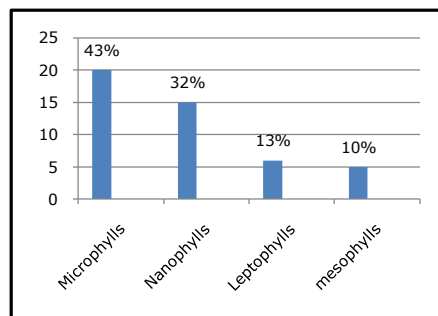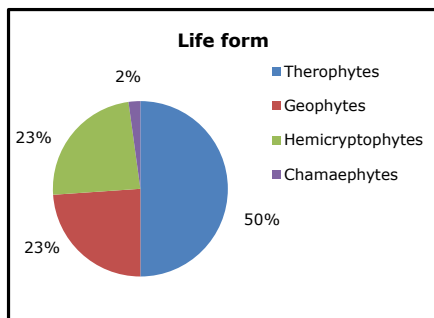

Figure 1. Percentage of life form classes
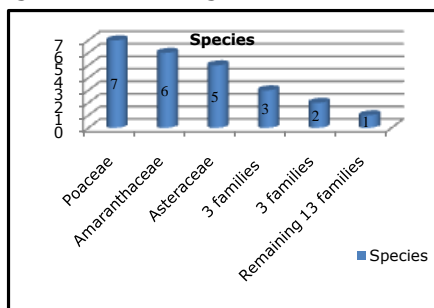

Figure. 2. Nos. & %age of leaf size classes

Figure 3. Number of species in families

Plate-1. *Mentha longifolia* (L.) Huds.

Plate-2. *Tribulus terrestris* L.

Plate-3. *Physalis minima* L.

Table-1. Botanical, localnames, voucher numbers, distribution, part used, uses, leaf size and life form of weedsgrowing in Maidan Valley, District Dir (L).

S #	Botanical Name	Local Name	Voucher Nos.	Distribution	Part Used	Uses	Leaf size	Life form
1.	**1. Amaranthaceae** *Achyranthes aspera* L.	Gishkay	F-111	Bagh, Chinarkot, Dokary, Hayaseri, Kaladog, Manial, Mulayano Banda	WP	Abdominal pain, toothache, diuretic and fodder	Nan.	H.
	Alternanthera pungens Kunth.	Gishkay	F-112	Chinarkot, Hayaseri, Lal Qilla	WP	Fodder	Mic.	H.
	Amaranthus gracilis Desf.	Ghata Chalwaey	F-113	Throughout Maidan	WP	Vegetable and fodder	Mic.	Geo.
	Amaranthus spinosus L.	Chalwaey	F-114	Throughout Maidan	WP	Fodder, vegetable and diuretic	Mic.	Th.
	Amaranthus viridis L.	Wara Chalwaey	F-115	Throughout Maidan	L&S	Fodder and potherb	Mic.	Geo.
	Digera muricata (L.) Mart.	Chalwaey	F-116	Dokary, Kaladog Kotkay, Daro	WP	Mature plant used as fodder	Mic.	Geo.
2.	**2. Asteraceae** *Conyza aegyptiaca* (L.) Ait.	Malloch	F-117	Throughout Maidan	L&S	Diarrhea, dysentery, fodderand fuel	Nan.	Th.
	Launaea procumbens L.	Shodapia	F-118	Chinarkot, Shaddas	WP	Fodder and increase cattle milk	Mic.	Th.
	Parthenium hysterophorus L.	Khar Booty	F-119	Throughout Maidan	L, S & R	Fodder, mature and dry plant used as fuel	Mes.	Th.
	Tagetes minuta L.	Zangaley hamisha	F-120	Chinarkot, Manial, Shaddas, Dokary	WP	Fuel	Mic.	Th.
	Xanthium strumarium L.	Ghat Ghiskay	F-121	Kotkay, Lal Qilla, Manial	WP	Anti-malaria, tonic, treat gum disease, fodder and fuel	Mes.	Th.
3.	**3. Brassicaceae** *Cardamine impatiens* L.	Trwaky	F-122	Chinarkot, Shaddas, Hayaseri	WP	Fodder	Nan.	Th.
4.	**4. Cannabaceae** *Cannabis sativa* L.	Bhang	F-123	Bagh, Chinarkot, Kaladog, Dokary	L&Ft.	Broom, Narcotics and fuel	Nan.	Th.
5.	**5. Commelinaceae** *Commelina benghalensis* L.	Qaurhmay	F-124	Throughout Maidan	L&S	Diuretic, Laxative and fodder	Mic.	Th.

6.	**6. Chenopodiaceae** *Chenopodium album* L.	Sarmay	F-125	Throughout Maidan	WP	Blood purifier, anthelmintic, Constipation, fodder and potherb	Nan.	Th.
	Chenopodium botrys L.	Skha Booty	F-126	Bagh, Daro, Kaladog, Kotkay	WP	Cough, hepatitis, Fodder and vegetable	Nan.	Ch.
7.	**7. Convolvulaceae** *Convolvulus arvensis* L.	Prewaty	F-127	Dokary, Hayaseri, Shaddas	L&S	Fodder, extraction used for antidandruff and skin diseases	Mic.	Th.
8.	**8. Cyperaceae** *Cyperus distans* L.	Kabal	F-128	Bagh, Chinarkot, Kotkay, Lal Qilla	L&S	Fodder	Lep.	Geo.
	Cyperus laevigatus L.	Kabal	F-129	Chinarkot, Dokary, Manial	L&S	Fodder, increase cattle milk	Lep.	Geo.
	Cyperus rotundus L.	Kabal	F-130	Throughout Maidan	WP	Fodder and anti diarrhea	Mic.	Geo.
9.	**9. Euphorbiaceae** *Euphorbia hirta* L.	Prewatka	F-131	Throughout Maidan	WP	Fodder, powder is used for external wounds	Nan.	Th.
10	**10. Fabaceae** *Medicago polymorpha* L.	Chupathra	F-132	Chinarkot, Hayasari, Manial, Shaddas	L&S	Vegetable and fodder	Nan.	Th.
	Vicia sativa L.	Marghay Khpa	F-133	Throughout Maidan	WP	The seed are very taste in eating and fodder	Nan.	Th.
11.	**11. Lamiaceae** *Mentha arvensis* L.	Podina	F-134	Bagh, Hayasari, Kaladog	WP	Diarrhea, gastric problem, toothache, vomiting and salad	Mic.	Geo.
	Mentha longifolia (L.) Huds.	Welanay	F-135	Chinarkot Dokary, Manial,	WP	Fever, salad, spices, stimulant, mouth wash and digestive	Mic.	Th.
	Salvia moorcroftiana Wall. ex Benth.	Khardug	F-136	Bagh, Chinarkot,	WP	Healing wounds; young shoots eaten for its taste and fodder	Mes.	H
12.	**12. Malvaceae** *Malva neglecta* Wallr.	Pandirak	F-137	Throughout Maidan	L&S	Fodder and potherb	Mic.	Th.
13.	**13. Nyctaginaceae** *Boerhavia diffusa* L.	Insut	F-138	Throughout Maidan	WP	Fodder	Mic.	Geo.
14.	**14. Oxalidaceae** *Oxalis corniculata* L.	Tarookay	F-139	Throughout Maidan	WP	Leaves are eaten as its sour taste, flower are attractants	Lep.	Th.
15	**15. Papaveraceae** *Papaver rhoeas* L.	Reeday	F-140	Bagh, Chinarkot, Mulayano Banda	F, L&S	Fodder, and red flower attract honeybee	Nan.	Geo.
16.	**16. Plantaginaceae** *Plantago lanceolata* L.	Speghoul	F-141	Throughout Maidan	WP	Fodder, dysentery and mouth diseases	Mes.	Th.

17.	17. Poaceae *Brachiaria mutica* (Forsk.) Stapf.	Wakha	F-142	Hayaseri, Shadas	L&S	Fodder	Mic.	H
	Cynodon dactylon (L.) Pers.	Kabal	F-143	Throughout Maidan	WP	Fodder and children dysentery	Nan.	H
	Digitaria ciliaris (Retz.) Koel	Shamokha	F-144	Throughout Maidan	WP	Fodder and fuel	Nan.	Geo.
	Eleusine indica (L.) Gaertn.	Wakha	F-145	Throughout Maidan	L&S	Fodder	Nan.	H
	Eragrostiscilianensis (All.) Vign. exJanchen.	Wakha	F-146	Bagh, Kaladog, Kotkay	L&S	Fodder	Nan.	Th.
	Setaria glauca (L.) P. Beauv.	Wakha	F-147	Throughout Maidan	L&S	Fodder	Nan.	Th.
	Sorghum halepense (L.) Pers.	Dadum	F-148	Throughout Maidan	L&S	Fodder	Mic.	H
18.	18. Polygonaceae *Polygonum aviculare* L.	Bandakay	F-149	Throughout Maidan	WP	The powder is toxic and poisoning for fish	Lep.	Th.
	Rumex dentatus L.	Shalkhay	F-150	Throughout Maidan	L	Potherb and fodder, healing of wounded and carminative	Mes.	Th.
19.	19. Portulacaceae *Portulaca oleracea* L.	Warkharay	F-151	Throughout Maidan	L, R&S	Vegetable and fodder	Lep.	H
20.	20. Solanaceae *Physalis minima* L.	Taqtakay	F-152	Bagh, Chinarkot, Kaladog	L&S	Poison for cattle and laxative	Mic.	Th.
	Solanum nigrum L.	Karmacho	F-153	Dokary, Lal Qilla	Fr, L&S	Diarrhea and potherb	Mic.	Geo.
	Solanum surattense Burm.	Manra Ghonay	F-154	Dokary, Lal Qilla, Manial	WP	Fever, diuretic and hepatitis	Mic.	H
21.	21. Verbenaceae *Verbena officinalis* L.	Wakha	F-155	Throughout Maidan	WP	Fodder and cure scorpion stings	Mic.	H
22.	22. Zygophyllaceae *Tribulus terrestris* L.	Markundai	F-156	Chinarkot, Hayaseri, Kotkay, Lal Qilla	WP	Fodder, kidney stone and diabetes	Lep.	H

Keys: 1. Leaf size classes: 1. Lep= Leptophylls, 2. Nan= Nanophylls, 3. Mes= Mesophylls, 4. Mic= Microphylls
2.**Life form classes:** 1. Ch= Chamaephytes, 2. Geo= Geophytes, 3. H= Hemicryptophytes, 4. Th=Therophytes
3. Part used: WP: Whole Plant, Fr: Fruit, Fl:Flowers, L: Leaves, S: Shoot, Ft: Fruit, R: Root

Table-3. Six weeds species are used as highly medicinal in many disease different plants used for the same disease in Maidan Valley.

S.No.	Weed Species Name	Disease Name	(%) age used	Species used for same disease
1.	*Mentha arvensis* L.	Diarrhea	45%	*Amaranthus caudatus*L. *Oleaferruginea*Royle.
		Vomiting	25%	*Rumex hastatus*D.Don *Citrus limon* (L.) Burm.
		Toothache	20%	*Cheilanthesacrostica*L.
2.	*Mentha longifolia* (L.) Huds.	Fever and cough	40%	*Allium sativum* L.
		Stimulant	25%	*Morus alba* L.
		Mouth wash	10%	*Rumex hastatus*D.Don
3.	*Achyranthusaspera* L.	Diuretic	35%	*Solanum surattense*Burm. f.
		Abdominal pain	20%	*Punicagranatum* L.
		Toothache	15%	*Cheilanthes acrostica* L.
4.	*Chenopodium album* L.	Anthelmintic	30%	*Cuscutareflexa*Roxb. *Coriandrum sativum* L.
		Blood purifier	25%	*Fumaria indica* L.
		Constipation	10%	*Avena sativa* L., *Rosa indica* L. *Ailanthusaltissima* (Mill.) Swingle.
5.	*Rumex dentatus* L.	Diuretic	25%	*Solanum surattense*Burm. *Oleaferruginea* Royle.
		Healing of wound	35%	*Datura stramonium* L. *Dodonea viscosa* L.
		Carminative	10%	*Rumex hastatus*D.Don *Avena sativa* L.
6.	*Xanthium strumarium* L.	Malaria fever	20%	*Artemisiaabsinthium* L.
		Tonic	5%	*Berberislycium* L.
		Gum Disease	5%	*Berberis lycium* L. *Oleaferruginea* Royle.

Table-2. Leaf size and life form of maize weeds of Maidan valley District Dir Lower

i. Leaf size classes

S.No.	Parameter	No. of Species	Percentage (%)
i.	Microphylls	20	43.34
ii.	Nanophylls	15	32.60
iii.	Leptophylls	6	13.04
iv.	Mesophylls	5	10.86

ii. Life form classes

i.	Therophytes	23	50.00
ii.	Geophytes	11	23.91
iii.	Hemicryptophytes	11	23.91
iv.	Chamaephytes	1	2.17

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