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MEDICINAL AND ECOLOGICAL DIVERSITY OF WEEDS IN WHEAT CROP AT LOWER DIR, PAKISTAN

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ABSTRACT

A total of 40 weeds in wheat crop belonging to 21 families and 38 genera were evaluated for their medicinal values and ecological importance during 2014. The dominant family was Asteraceae with six genera and six species followed by Papilionaceae with four genera and five species, Brassicaceae, Poaceae and Polygonaceae with three species each, Amaranthaceae, Caryophyllaceae, Chenopodiaceae and Plantaginaceae with two species each and remaining 12 families were with one species each. Though these were weeds, still their importance could not be ignored and were used to cure various diseases. It is noted during the study that they were used as carminative (15 species.), laxative (13), in constipation (five), diarrhea (four), as diuretic (three), carminative and laxative in animals (three), vomiting (three), in diarrhea and constipation (two), while five species were used in other diseases including eye disease, dysentery, malaria, in blood pressure and as blood purifier. Beside their medicinal uses, it is noteworthy to mention that 38 species were used for feeding cattle. Weed ecology study is must for dealing different dynamics of weed flora in an ecological region. Studies on biological spectrum including life form showed 25 species (62.50%) as Therophytes, eight species (20.00%) as Geophytes and seven species (17.50%) as Hemicryptophytes. According to leaf size, 15 species (37.50%) were Microphylls, 13 (32.50%) were Nanophylls and six (15.00%) each were Leptophylls and Mesophylls. Plant part used showed there were 28 species (70%) whose whole plants were used for treating various ailments, seven species (17.50%) whose leaves and shoots were used, three species (7.50%) with leaves and fruit used , one species (2.50%) with leaves, shoot and fruit together used and one species (7.50%) with leaves, shoot and seed used. It is recommended after the present research work that physical eradication of weeds will improve the environment and will decrease the use of herbicides but will also provide fodder for animals and low cost medicines for human beings.

Key words: District Dir, ecological, medicinal, weeds, wheat fields,.

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INTRODUCTION

Maidan valley is situated in the district of Dir (Lower), the area of the valley is 300 km^2 surrounded by famous mountains of Hindukush range. This area is lying at 34^0 $37^/$ to 35^0 $07^/$ N latitudes and 71^0 $31^/$ to 72^0 $14^/$ E longitudes. It is surrounded in west by Jandool valley, in east by Upper Dir, in north by Barwal Banda and in South by Haji Abad and Koto. The topography shows variation in altitude from 1000 m to 4012m. The valley has famous mountains i.e. Monrh and Sheklai which are dominated by rain fed land (Fazalullah *et al.,* 2014; Anonymous, 1999).

Wheat is the most important crop in the world and provides food to one third of the world population. Wheat grain is used for different purposes including large number of industrial and commercial uses. Weeds are the unwanted plants which grow in the crop fields and reduce production by 25-30%. The production of wheat will increase up to 37% if weeds are controlled in the fields (Hammad *et al.,* 2010). In 2011-12, wheat was cultivated on an area of 8.65 m ha, which produced 23.5 m t with a national average yield of 2713 kg ha^{-1} (Khaliq *et al.,* 2014). Pakistan is among the top 10 wheat producing countries. Weeds compete with crops for essential nutrients and decrease the crop productivity up to some extent (Rajpar *et al.,* 2010). Some weeds are removed and used as fodder for animals (Khaliq *et al.,* 2013).

Weeds are one of the major problems in crop production. They compete with crop plants for nutrients, light, space, moisture and many other growth factors through inter-specific competition and allelopathy, which results in direct and indirect loss to quantity and quality of the produce (Inayat *et al.,* 2014; Hadi *et al.,* 2014). Weeds quickly disseminate in a large area and compete with crop plants and effect the native plant population. Families like Asteraceae, Poaceae, Amaranthaceae and Fabaceae constitute major weed flora of the world. Weed flora also depends upon the local climatic conditions of the area (Ullah *et al.,* 2014). It also increases harvesting costs, clog water channels, and increase fire hazards (Rajpar *et al.,* 2010). Crop losses due to weed competition are more than those resulting from the combined effects of insects and plant diseases. Weeds may encourage the development of many diseases; provide shelter and acts as an alternate host for pests (Marwat *et al*., 2005; Rahman *et al.,* 2012).

Many researchers investigated wheat and weeds relationship Ibrar *et al.* (2003) conducted ethnobotanical study of weeds of five

crops in District Abbottabad, Pakistan. Hadi *et al.* (2014) carried out research on the weed diversity in wheat and maize at Rech Valley, Chitral, Hindukush Range. The present research is the first ever attempt to record the weed flora of wheat fields at Maidan Valley. The aim of present research is to document various aspects of weeds and provide baseline information related to medicinal and ecological diversity of weeds in wheat crop. This will be helpful for further research endeavors in the research area and in adopting control measures of various weeds to enhance wheat productivity.

MATERIALS AND METHODS

Regular field tours were conducted in the study area during Rabi season 2014-15. Weeds species were collected from different wheat fields, dried, pressed in news papers and preserved for about three weeks. The newspapers were changed daily till the plants were fully dried.

During collection of weeds, Photographs were also taken with Sony Powershoot 6x Optical Zoom (20.1 Mega Pixels). The plants were collected, preserved, documented and identified with the help of available literature (Stewart, 1972; Tanveer and Ali, 2003; Nasir and Ali, 1970-1989; Ali and Nasir, 1989-1991; Ali and Qaiser, 1993-2015). The voucher specimens were mounted on herbarium sheets, numbered, and deposited in the Herbarium of Botanical Garden University of Peshawar (UPBG).

RESULTS AND DISCUSSION

An aggregate of 40 weed species belonging to 21 different families including two monocot (five species) and 19 dicot families (35 species) were collected from Maidan Valley. Asteraceae was the dominant family with (six species 15%), followed by Papilionaceae (five dpecies 12.5%), Brassicaceae, Polygonaceae and Poaceae (each with three species 7.5%), Amaranthaceae, Caryophyllaceae, Chenopodiaceae and Plantaginaceae each had two species (5%). The remaining 12 families were represented by one species each (2.5% each). The present findings agreed with many other researchers (Inayat *et al.,* 2014; Ullah *et al.,* 2014). Life form classes showed that there were 25 species (62.50%) as Therophytes, eight species (20.00%) as Geophytes and seven species (17.50%) as Hemicryptophytes. These findings were supported with the work of Inayat *et al.* (2014) who carried out research on the diversity and ecological characteristics of weeds of wheat fields of University of Peshawar Botanical Garden Azakhel and found 53 species (85.48%) as Therophytes, five species (8.06%) as Hemicryptophytes, two species (2.22%) as Chamaephytes and Geophytes. Leaf size spectra showed

that there were 15 species (37.50%) as Microphylls, 13 species (32.50%) as Nanophylls, and finally the Leptophylls and Mesophylls were represented by six species (15.00%) each. Life form also showed similarity with those of Inayat *et al.* (2014) (Fig. 1, 2 and 3).

Locally these plants were used for different purposes viz. 38 fodder (38 species), carminative (15), laxative (12), potherb (eight), constipation (five), diarrhea (four), diuretic (three), toxic, laxative and carminative (three), vomiting problems (three), constipation (two species) and five species were used for curing eye disease, laxative, dysentery, malaria, blood pressure and blood purifier (Table-1).

Previous research on various aspects of weeds has been carried out by different researchers including Ullah and Rashid (2013), who collected 31 weed species belonging to 15 families from maize crop at Mankial Valley Hindukush Range, Pakistan. Afterwards, the use of 31 weeds distributed in 27 genera and 15 families was investigated by Hadi *et al*. (2014) for similar purposes in the isolated communities of Chitral District. While Inayat *et al.* (2014) conducted a research on weeds growing in wheat and sugarcane fields of District Charsadda, and collected 43 weeds species belonging to 17 families and 39 genera. Marwat *et al.* (2010) studied the alien and exotic weeds of northern Pakistan and noted that 16 species were invasive viz. *Xanthium strumarium, Ipomoea eriocarpa, Alternanthera pungens, Trianthema portulacastrum, Tagetes minuta, Imperata cylindrica, Amaranthus hybridus* subsp.*hybridus, Robinia pseudo-acacia, Broussonetia papyrifera, Ailanthusa ltissima, Pistia stratiotes, Phragmites australis, Parthenium hysterophorus, Cannabis sativa, Galium aparine* and *Emex spinosus*. Among these *Robinia pseudo-acacia, Broussonetia papyrifera* and *Ailanthus altissima* are trees and were purposely introduced as they later became invasive.

Based on these findings some recommendations are made for further studies and management of weed flora of wheat crop. Since the weeds can be utilized for medicinal and fodder purposes therefore, biological control measures including physical eradication should be adopted to reduce use of herbicides. A comprehensive catalogue of weed flora may be helpful for proper weed management practices and conservation of wild weed flora, which may insure sustainable utilization of various weed species. Important species can be further screen out for its fodder value, elemental analysis and other related aspects. Further more intensive research on weed physiology is recommended to understand the weed and crop interaction and allelopathic potential of various weeds species.

Table-1. Checklist showing families, botanicalname, local name,voucher numbers, flowering period,lifeform, leaf size, part used and uses of weed species in wheat crop growing in Maidan Valley, District Dir (Lower), Pakistan.

S. No	Family/Botanical name	Local Name	Voucher Nos.	Flowering period	Life Form	Leaf form	Part used	Uses
1	Amaranthaceae 1. *Amaranthus viridis*L.	Chalwaey	F-161	Jul-Sep.	Geo	Mic	WP	Fodder, laxative and potherb
	2. *A.spinosus* L.	Ghano wala Chalwaye	F-162	Jul-Aug	Geo	Mic	WP	Fodder, potherb, laxative and carminative
2	Asteraceae 3. *Calendula arvensis* L.	Ziargully	F-163	Jan-Nov	Th	Nan	WP	Fodder and carminative
	4. *Conyza aegyptiaca* L.	Malooch	F-164	Jul-Sep.	Th	Nan	WP	Fodder and fuel
	5. *Launaea procumbens*	Shudapai	F-165	Nov- Dec	Th	Mic	L, S &F	Used as fodder, enhance milk in animals and diuretic
	6. *Parthenium hysterophorus* L.	Kharboty	F-166	May-Oct	Th	Mes	L & S	Used as fodder and sometime cause laxative and carminative in animals
	7. *Sonchus asper* L.	Shodapia	F-167	Jul-Sep.	Geo	Mic	L & S	Fodder, enhance milk and used as carminative
	8. *Taraxacum officinale* F.H. Wigg	Shodapia	F-168	May-Jul	H	Mes	WP	Fodder and use a laxative
3	Brassicaceae 9. *Brassica campestris* L.	Sharsham	F-169	Jan-Mar	Geo	Mes	WP	Fodder, potherb and oil is extracted from the seeds used in hair
	10. *Coronopus didymus* (L.) Smith.	Sakhaboty	F-170	Mar-Jun	H	Nan	WP	Fodder and used in low blood pressure
	11. *Sisymbrium irio* L.	Oray	F171	Mar-May	Geo	Mic	L, S & SD	Fodder, leaves used as potherb and oil as extracted from seeds

4	Caryophyllaceae 12. *Silene conoidea* L.	Mangoty	F-172	Mar-Apr	Th	Lep	L, S & FT	Fodder, potherb and fruit eaten raw
	13. *Stellaria media* (L.) Villars.	Qarmy	F-174	Apr-Aug	Th	Nan	WP	Fodder, carminative and laxative
5	Chenopodiaceae 14. *Chenopodium album* L.	Sarmay	F-175	Jan-Sep.	Th	Nan	WP	Fodder, potherb and used as carminative
	15. *Chenopodium ambrosiodes* L.	Skhaboty	F-176	Apr-Jan	Th	Mic	WP	Fodder, the ''gowty'' is made which is used in malaria and vomiting problems
6	Convolvulaceae 16. *Convolvulus arvensis* L.	Prewaty	F-177	Throughout year	Th	Mic	WP	Fodder, diarrhea, laxative and carminative
7	Euphorbiaceae 17. *Euphorbia helioscopia* L.	Mandaro	F-178	Jan-Jul	Th	Mic	L & S	Toxic and cause carminative and laxative effect in animals
8	Fumariaceae 18. *Fumaria indica* (Husskn.) Pugsley	Shahtara	F-179	Mar-Jun	H	Nan	WP	Fodder, laxative and carminative and used indiarrhea
9	Lamiaceae 19.*Lamium amplexicaule* L.	Wakha	F-180	Dec-Apr	Th	Nan	WP	Fodder and the flower attract insect
10	Liliaceae 20. *Tulipastellata* Hook.	Gantol	F-181	Mar-May	Geo	Mic	WP	Flower attract insect
11	Malvaceae 21. *Malva neglecta* Wallr.	Panderic	F-182	Jun-Sep.	Th	Mic	WP	Fodder, laxative, used in dysentery and constipation
12	Oxalidaceae 22. *Oxalis corniculata* L.	Trwaky	F-183	Mar-Dec	Th	Lep	WP	Fodder, constipation, carminative, the fruit is eaten raw and laxative

13	Papilionaceae 23. *Lathyrus aphaca* L.	Korkamanay	F-184	Feb-Apr	Th	Lep	WP	Fodder, potherb, carminative and fruit is eaten as raw
	24. *Medicago sativa* L.	Chupathra	F-185	May-Sep.	H	Nan	WP	Fodder, potherb and used as blood purifier
	25. *Trigonella foenum-graecum* L.	Shftalparny	F-186	Apr	Geo	Lep	WP	Fodder and potherb
	26. *Vicia faba* L.	Gatamarghy Khfa	F-187	Aug-Feb	Th	Nan	WP	Fodder, carminative and potherb
	27. *Vicia sativa* L.	Marghykhfa	F-188	Jul-Aug	Th	Nan	WP	Fodder and potherb
14	Plantaginaceae 28. *Plantago lanceolata* L.	Speghoul	F-189	Apr- Aug	Th	Mes	WP	Fodder, used in diarrhea, constipation and vomiting
	29. *Plantago major* L.	Gat Sath	F-190	Aug-Sep.	Th	Mes	WP	Fodder, carminative and laxative
15	Poaceae 30. *Avena sativa* L.	Juwder	F-191	Mar-May	Th	Mic	WP	Fodder, diuretic and used as food in crisis
	31. *Cynodon dactylon* (L.) Pers.	Kabal	F-192	Throughout year	H	Mic	WP	Fodder, carminative, laxative and used in diarrhea
	32. *Dichanthium annulatum* (Forssk.) Stapf.	Wakha	F-193	Mar-Nov	Th	Mic	L and S	Fodder and used as laxative
16	Polygonaceae 33. *Polygonum aviculare* L.	Bandiky	F-194	Mar-Sep.	H	Nan	WP	Fodder and used as carminative
	34. *Rumex dentatus* L.	Shalkhy	F-195	May-Jun	Th	Mes	WP	Fodder, laxative carminative , constipation
	35. *Rumex hastatus* L.	Taroky	F-196	Jun-Oct	Geo	Lep	L & S	Fodder, diarrhea, used in vomiting problem and constipation

17	Primulaceae 36. *Anagallis arvensis* L.	Shangully	F-197	Mar-May	Th	Nan	WP	Fodder
18	Ranunculaceae 37. *Ranunculus muricatus* L.	Zyargully	F-198	Mar-Apr	Th	Mic	L, S & F	Fodder, toxic, cause carminative and laxative effect
19	Rubiaceae 38. *Galium aparine* L.	Gishky	F-199	Mar-Jul	H	Lep	L & S	Fodder and used as diuretic
20	Scrophulariaceae 39. *Veronica biloba* L.	Shangully	F-200	Apr-Aug	Th	Nan	L & S	Fodder
21	Solanaceae 40. *Solanum nigrum* L.	Karmacho	F-201	Jul-Oct	Th	Mic	WP	Fodder, used in eyes disease and potherb

Keys:
Life form classes: 1. Geo: Geophytes, 2. H: Hemicryptophytes, 3. Th: Therophytes
Leaf size classes: 1. Lep: Leptophylls, 2. Nan: Nanophylls, 3. Mes: Mesophylls, 4. Mic: Microphylls
Part Used: 1.WP: Whole Plant, 2. L: Leaves, 3. F: Flower, 4.FT: Fruit, 5.S: Shoot, 6.SD: Seed,

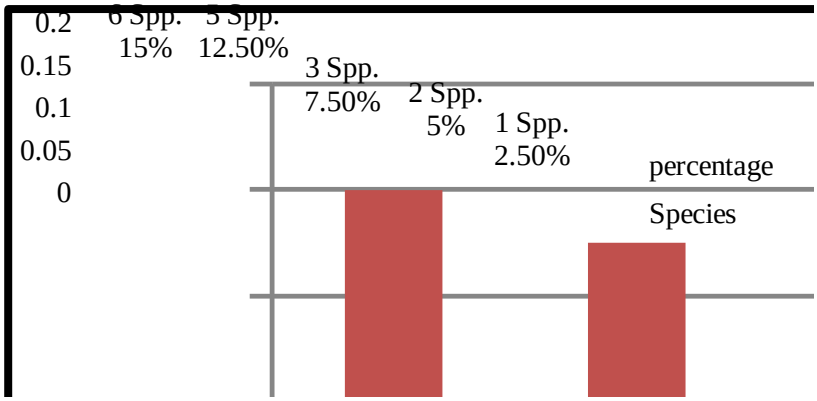

Figure 1. No. of Species and percentage in various families

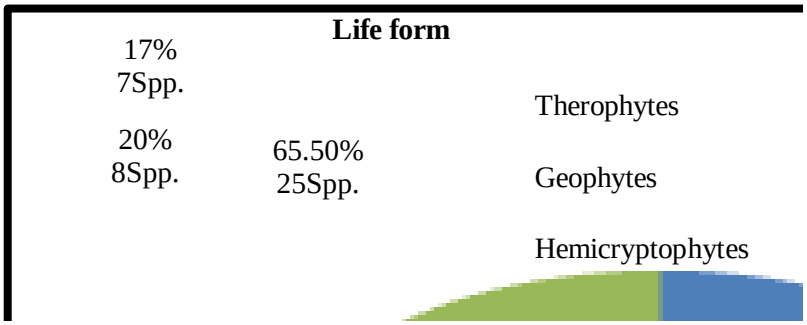

Figure 2. Percentage and number of species of life form

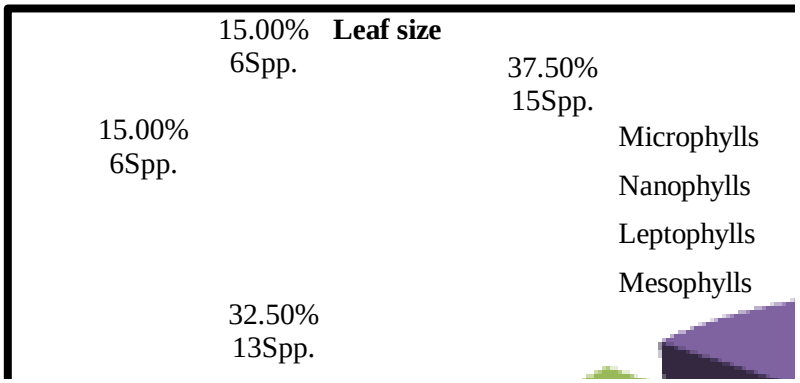

Figure 3. Showing percentage and no. of species of leaf size.

CONCLUSION

In conclusion, the plants that are generally considered weeds are hiddenly having medicinal values and ecological importance. These studied plants have traditionally beed used as carminative, laxative, diuretic both in humans and animals, and as blood purifier; in treatment of constipation, diarrhea, vomiting, eye disease, dysentery, malaria and blood pressure. Majority of these plants can also be used as fodder. According to life form the plants were grouped in Therophytes, Geophytes and Hemicryptophytes. Based on leaf size, the groups made were Microphylls, Nanophylls, Leptophylls and Mesophylls. The plant parts used for treatment of various ailments were whole plants, leaves, shoots, fruit and seeds. Such studies will help reduce the chemical weed control with proper cultural practices and there will be low cost of medicines for human beings.

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