PHYTOSOCIOLOGICAL AND ETHNOBOTANICAL PROFILE OF SUBTROPICAL VEGETATION OF DARAZINDA, FRONTIER REGION, DERA ISMAIL KHAN, PAKISTAN



BY

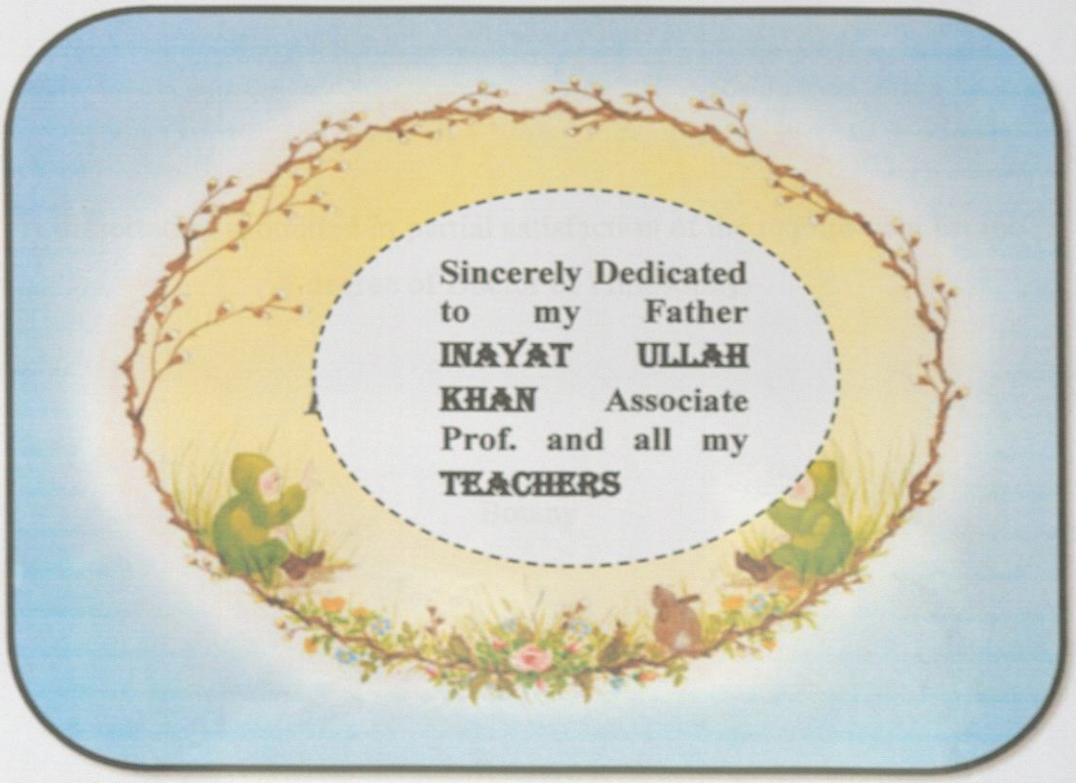
Ulfat Samreen

DEPARTMENT OF BOTANY

UNIVERSITY OF PESHAWAR

PESHAWAR

SESSION: 2013-2014



Date 11.5.17 Cont of Exam UOP

University of Peshawar
Peshawar

Phytosociological and Ethnobotanical Profile of Subtropical Vegetation of Darazinda, Frontier Region, Dera Ismail Khan, Pakistan

A dissertation submitted in partial satisfaction of the requirement for the degree of Doctor of Philosophy

in

Botany

By

Ulfat Samreen

Supervisor: Prof. Dr. Muhammad Ibrar

Graduate Studies Committee:

1. Prof. Dr. Siraj-ud-Din (Convener)
2. Prof. Dr. Muhammad Ibrar (Member)
3. Prof. Dr. Muhammad Nafees (Member)
4. Prof. Dr. Bashir Ahmad (Member)
5. Dr. Zahir Muhammad (Member)

PUBLICATION OPTION

I hereby reserve the rights of publication, including right to reproduce this thesis in any form for a period of 5 years from the date of submission

Ulfat Samreen

PAPERS PUBLICATIONS

1. Samreen. U., M. Ibrar, L. Badshah, S. Naveed, Imran and I. Khatak. 2016. Ethnobotanical study of subtropical hills of Darazinda, Takht-e-Suleman range F.R D.I. Khan, Pakistan. *Pure Appl. Biol.,* 5(1): 149-164.
2. Samreen. U., M. Ibrar, L. Badshsh and B. Ullah. 2016. Nutritional and Elemental Analysis of Some Selected Fodder Plants of Darazinda F.R.D.I Khan, Pakistan. *Advances in Plants & Agriculture Research*. 4 (1): 1-10.
3. Samreen. U., M. Ibrar, L. Badshsh and B. Ullah. 2016. Phenology of plant species of Subtropical hills of Darazinda, Takht-e Suleman Range F.R D.I. Khan, Pakistan. *Researcher*. 8(1): 21-28.
4. Samreen. U., M. Ibrar and L. Badshsh. 2016. Floristic composition, Ecological characters and Biological characters of Darazinda F. R. D. I. Khan, Pakistan. *Int. Inv. J. Agric. Soil Sci.* 4(1): 9-21.
5. Samreen. U., M. Ibrar and F. Hadi. 2016. Nutritional Analysis of Some Selected Fodder Plants of Darazinda Area, F.R. D.I. Khan, Subtropical Range, Pakistan. *American-Eurasian J. Agric. & Environ. Sci.,* 16 (3): 543-549.

APPROVAL SHEET

The Ph.D. dissertation of Miss. Ulfat Samreen, Ph.D. Scholar, Department of Botany, University of Peshawar is hereby Approved.

EXTERNAL EXAMINER:

Dr. Barkat Ulah
Assistant Professor
Department of Botany
Islamia College University of Peshawar

INTERNAL EXAMINER & SUYPERVISOR:

Prof. Dr. Muhammad Ibrar
Department of Botany
University of Peshawar

CO-SUPERVISOR:

Dr. Lal Badshah
Department of Botany
University of Peshawar

CHAIRMAN:

Prof. Dr. Siraj-ud-Din
Department of Botany
University of Peshawar

Date: 07/04/2017

ACKNOWLEDGMENT

I would like to thank my major supervisor of M.Phil and Ph.D Prof. Dr. Muhammad Ibrar, for his guidance and support from initial conception of the research to the final preparation of the dissertation. Not only was he a great counselor from my time in the Master of Philosophy, but his support, understanding and respect for me provided encouragement all the way through my studies. He has always been easy to approach and willing to help with any problem.

My sincere thanks go to Dr. Lal badshah (Co-supervisor) Peshawar University for their thoughtful suggestions and beneficial critiques at various stages of my study.

Sincere thanks to Dr. Mr. Zahir Muhammad, Dr. Ghulam Dastagir, Dr. Barkatullah, Mr. Rehmaullah and Ghulam Jilani for being willing to help me at different stages of my research. Without the provision of cooperation of all the teaching staff, clerical staff, lab assistance and lab attendants at the Department of Botany and other research sites, the current work would have not come to fruition. Special thanks to Mr. Ishfaq Ullah Department of Botany, University of Peshawar for composing the thesis.

My sincere thanks also goes to my friends Ms. Israr Bibi, Nosheen Begum, Samina Naz, Farhana Khan, Roshan Zameena, Shakeela Naz and Mr. Umar Khitab (GGDC Darazinda) who helped me in visits and collection of plants.

I wish to acknowledge Prof. Dr. Sajida Parveen, Chairperson, Department of Soil and Environmental Sciences, KPK Agriculture University, Peshawar and her team, particularly Mr. Arif and Mrs. Shaheen for their active involvement in the soil analysis. Sincere thanks are also due to Prof. Dr. Hamidullah Jan, Dean Faculty of Biochemistry, KPK Agriculture University, Peshawar for his cooperation in the nutritional analysis of forage plants. I would also like to offer sincere thanks to Abdullah Jan, Department of Physics, Peshawar University for his help in the elemental analysis of plants and soil.

I greatly acknowledge the financial support provided by My Father Associate Prof. Inayat Ullah Khan to undertake my study. I am also thankful to my mother and all brothers and sisiters for their cooperation in my completion of my thesis work. This thesis is a product of various field visits, surveys, group discussions and house hold flock monitoring. Many people have contributed towards the realization of this work in one way or the other. Therefore I ask for your understanding in case I forgot to mention the name of individuals and organizations that have played a positive role for this achievement.

Ulfat Samreen

VITAE

25 August 1985 Born Bannu city and belong from Azim Kalla jadid

2006- B.Sc. Government Frontier college for women Peshawar

2009- M.Sc. University of Peshawar, Peshawar

2013- M. Phil. University of Peshawar, Peshawar

Major Field: Botany

Courses studied	Teachers
1. Vegetation Ecology	Dr. Lal Badshah
2. Allelopathic Interactions	Dr. Zahir Muhammad
3. Fresh Water Algae	Dr. Nadeem Ahmad
4. Stress Physiology	Dr. Barkat Ullah

ABSTRACT

Phytosociological and Ethnobotanical Profile of Subtropical Vegetation of Darazinda, Frontier Region, Dera Ismail Khan, Pakistan

This study was conducted in order to assess the ecological resources of Darazinda F. R. Dera Ismail Khan during 2013- 2014 in various seasons. The floristic diversity showed presence of 213 species belonging to 68 families in which 46 species were monocotyledons and 163 species were Dicotyledons. Based on number of species, Poaceae (37Spp), Asteraceae (19Spp), Solanaceae (12 Spp), Brassicaceae (10Spp) and Papilionaceae (9 Spp) were the leading families. Life spectrum showed that therophytes were dominant followed by hemicryptophytes. Leaf size spectrum showed nanophylls and Leptophylls were dominant. *Cuscuta reflexa* and *Cistinche tubelosa* were the two parasitic plants in the area.

Phenological study showed that March was the highest flowering season as 24% of the plants blossomed. High fruiting was recorded in the month of April and June. Dominancy of vegetative phase was dominant in March followed by December and February. July and November were the two dormant seasons observed in the investigated area. The first dormant period extended from July to December with 62 Spp. (29.1%) while second dormant period was observed in October with 55 species (28.8%) in which the temperature slowly decreased facilitating leaf fall.

Vegetation structure of the area showed 20 plant communities in five habitats during different seasons. Qualitative analysis showed that 116 species were present throughout the year, in which 7 were trees, 17 shrubs and 92 were herbs. During autumn season 71 species were present, while, 73 species were present during winter, 87 species during spring and 68 species in summer. Similarity index between autumn and winter was 62.3%, spring-autumn 54.5%, spring-winter 79.1%, summer-autumn 53.8%, summer-winter 72.8%, summer-spring was 60.3%. Different communities like *Achyranthus biclentata-Tamarix aphylla–Tamarix dioica, Salvadora oleoides-Periploca aphylla-Withania coagulans, Calotropis procera-Rhazya stricta-Capparis spinosa* etc were recorded. Cluster analysis showed 4 associations among 20 communities.

Edaphology Of five sights (Bargholi, Pasta, Anghar ghara, Sin ghar and Sur ghar) showed the soil was mostly clay loam, with occasional gravel sandy soil having pH 7.3, EC between 0.37-0.89.

Palatability study indicated that 52 plants (24.4%) were non-palatable, 105 (49.2%) palatable, 23 (10.7%) highly palatable, 6 (2.8%) moderate palatable, 14 (6.5%) low palatable while 13 (6%) were rarely palatable. Live stock preference showed that cow preferred 47 (22%), goat 96 (45%), sheep 92 (43.2%) and camel 34 (16%). For palatability condition of plants showed that fresh plants were 100 (47%), dry form 24 (11.2%) and both fresh and dry form were 36 (17%) while the plants parts used by the grazing animals showed that whole plant were 89 spp. (42%), leaf of 64 (30%) and inflorescence of 3spp. (1.4%) were used by grazing animals.

Eight palatable species were analyzed for macro and micro minerals in three phenological stages i-e Pre-reproductive, reproductive and post reproductive stages which showed that Ca, Al, P, N, S, Na, K, Mg were macro and Fe, Si, Cu and Cl were micro minerals. Nutritional analysis showed that moisture, ash contents, crude protein, crude fiber, crude fat and carbohydrate contents were non-significant at three phenological stages of herbs and woody species.

Ethnobotanically 198 plant species were used for different purposes, like agriculture applications (2%), fodder (65%), fuel (15%), making furniture (4%), fruit yielding (6%), medicinal(55%), timber (5%), vegetables (13%) and fencing plants (4%).

Conservation assessment revealed that 49 plant species (31.4%) were vulnerable, 49 species (31.4%) endangered, 33 (21.1%) species were rare and 25 species (16%) were infrequent due to excessive collection, over grazing and other human influences.

TABLE OF CONTENTS

S. No	CONTENTS	Pages
1	**INTRODUCTION**	1-5
	Origin.....1	
	Geographic Location.....1	
	Race and Tribes.....1	
	Languages and ethnicity.....3	
	Topography.....3	
	Recent Population.....3	
	Water Resources.....3	
	Health.....4	
	Educational Institution.....4	
	Culture and Society.....4	
	Climate.....4	
	Fauna.....4	
	Flora.....5	
	Research Area.....5	
2	**REVIEW OF LITERATURE**	6-41
	Floristic Composition and its Ecological characters.....7	
	Vegetation Structure/ Phytosociology.....12	
	Palatability of Vegetation.....21	
	Chemical analysis of forage Plants.....25	
	Ethnobotany.....32	
	Plants Conservation Status.....39	
	AIMS AND OBJECTIVES	42
3	**MATERIALS AND METHODS**	43-52
	Floristic Composition and its Ecological Characters.....43	
	Life form spectra.....43	
	Leaf size spectra.....45	
	Phytosociology/Vegetation Structure.....45	
	Edaphology.....48	
	Palatability of Vegetation.....48	

	Chemical Evaluation of some palatable Plants.....49 Ethnobotanical Profile.....52 Conservation Status of Plants.....52	
4	**RESULTS AND DISCUSSION**	**53-216**
5	**I. Floristic Composition**	**53**
	Floristic Composition and its Ecological Characteristics.....53 Life form and its seasonal variation .....55 Leaf size spectra and its seasonal variation .....56 Phenological behavior.....57	
6	**II. Vegetation Structure/Phytosciology**	**83**
	Phytosociology/Vegetation Structure.....83 Autumn aspect .....84 Winter aspect .....89 Spring aspect.....93 Summer aspect.....97 Edaphology .....100 Similarity index.....109 Cluster analysis.....113	
7	**III. Palatability of Vegetation**	**120**
	Degree of palatability Preference by livestock.....120 Classification by parts used.....120 Classification by condition used.....121 Non palatable species.....121	
8	**IV. Chemical Evaluation of Some Plants**	**139**
	1. Minerals Composition **a. Macronutrients.....139** Calcium.....139 Potassium.....140 Sodium.....140 Phosphorous.....141 Nitrogen.....142 Magnesium.....142	

	Aluminium.....143 Sulphur.....143 **b. Micronutrients.....144** Chlorine.....144 Silicon.....144 Iron.....145 Copper.....145	
9	**2. Nutritional Composition**	**151**
	Moisture content.....151 Ash contents.....152 Crude protein.....152 Crude fiber.....153 Fat contents.....153 Carbohydrates.....154	
10	**V. Ethnobotany**	**158**
	A. Fodder utilization.....158 **B.** Medicinal utilization.....159 **C.** Fuel utilization.....159 **D.** Vegetable utilization .....160 **E.** Fruit yielding plants.....160 **F.** Timber wood utilization.....160 **G.** Agriculture tool making.....161 **H.** Other utilization of plant resources.....161	
11	**Vi. Medicinal plants**	**176-205**
12	**Vii. Conservation Status of Plants**	**206-216**
13	**GENERAL CONCLUSION AND RECOMMENDATIONS**	**217-219**
14	**REFERENCES**	**220-244**
15	**APPENDICES**	**245-264**

LIST OF FIGURES

S. No	Figures	Pages
1	Map of Darazinda F. R. D. I. Khan	2
2	Graphical representation of Life form spectra of Darazinda Vegetation	72
3	Graphical representation of Leaf size spectrum of Darazinda Vegetation	73
4	Cluster Dendrogram Analysis showing 4 associations of 20 plant communities based on importance value (IV) in Darazinda.	116
5	Bargholi area of Darazinda	117
6	Pasta area of Darazinda	117
7	Angharghara area of Darazinda	118
8	Spin ghar of Darazinda	118
9	Surghar of Darazinda	119
10	Graphical representation of Palatability status of plants of Darazinda	135
11	Grazing sheeps and goats	136
12	Goats browsing *Accacia modesta*	136
13	Shepherd depends upon plants directly and indirectly for income	137
14	Cow eating plant	137
15	Camel browsing *Accacia modesta*	138
16	Graphical representation of ethnobotanical profile of Darazinda Vegetation	171
17	Women carring wood for fuel purpose on donkey	172
18	Storage of wood for fuel purpose	172
19	Wood used as timber	173
20	Wood used for cooking cobs	173
21	Boys caring *Olea ferruginea* plants for fodder and as well as for fuel	174
22	Bird's nest in plant (Habitat for local birds)	174
23	*Caralluma tuberculata*	175
24	*Iphiona scabra*	175
25	*Cistinche tubelosa*	175
26	*Salvadora oleoides*	175
27	Local Hakim of Darazinda making medicines from plants	205
28	Graphical representation of conservation status of Darazinda Vegetation	216

LIST OF TABLES

S. No	List of TABLES	Pages
1	Floristic list, habitat, seasonal composition, life form spectra and size spectra, spines presence/absence of Darazinda	59
2	Summary of Table 2: flora characteristics of Darazinda.	71
3	Phenolgical study of Darazinda during 12 months of the year	74
4	Summary of phenological events (Table 4) of Darazinda F.R D.I Khan flora	82
5	Plant species with their importance values of 20 communities during different aspects of Darazinda	102
6	Soil analysis of research area of Darazinda	108
7	Similarity index of different plant communities of Darazinda	111
8	Seasonal Similarity index of communities	112
9	Seasonal Dissimilarity index of communities	112
10	Mean importance value of 20 communities of five sites in four seasons (Appendices) of darazinda	115
11	Palatibility classes, livestock, condition of plants and part used of Darazinda	122
12	Elemental composition of some plants of Darazinda	147
13	T.test of elemental analysis of plants species of Darazinda	149
14	Nutritional Analysis of some palatable plants of Darazinda	155
15	Statistical analysis (t. test) of nutritional analysis of palatable plants	157
16	Ethnobotanical profile of Darazinda plants	162
17	Medicinal plants profile of Darazinda	194
18	Conservation status of Darazinda Flora	208

INTRODUCTION

Chapter-1

Introduction

Darazinda is a small Frontier Region of Khyber Pakhtunkhwa, Pakistan. The area is also known as Largha Shirani. This area is located between North latitude 31-30° and 31-34° and West longitudes 69.55° and 70.24°. Total area of this region is 3,229 square kilometers. On the North it is boundered by South Waziristan Agency, on the east by Kulachi, on the South by Musa Khel and Dera Ghazi khan (Punjab) and on West by Zhob (Baluchistan). In this tribal area, there are no urban localities (Anon. 1998) (Fig 1).

Origin:

Darazinda and Daraban (an adjacent area) are Persian words and are linked to Dara Shikoh, one of the sons of Mughal king Shah Jahan. "Daraban" means Dara's forest, because Dara used the forest of the area for hunting, while "Darazinda" means prison of Dara, where Dara had established a prison (Zindan) (Anon. 1998).

Geographic location:

Daraban and Darazinda lies at the foot of Sulaiman Mountains. It is connected by road with the neighboring towns of Chaudwan, Darazinada and Musazai. The national highway passes through Daraban, connecting Khyber Pakhtunkhwa with Baluchistan province (Anon. 1998).

Races and Tribes:

The area, right up to Takht-e-Suleman range is inhabited by Shiranis and Usthranas. Sheranis are divided geographically into two zones, namely Bargha (western part) under the control of Baluchistan and Largha (eastern), under the control of Deputy Commissioner D.I.Khan. Shiranis are the descendants of one Sharkhbun, son of Sarban, the eldest son of Qais Abdul Rashid, by a Kakar mother. So generally they are classified

as Ghurghusht Pathans. They are divided into three clans; Hassan Khel, Oba Khel and Chuhar Khel (Anon. 1998).

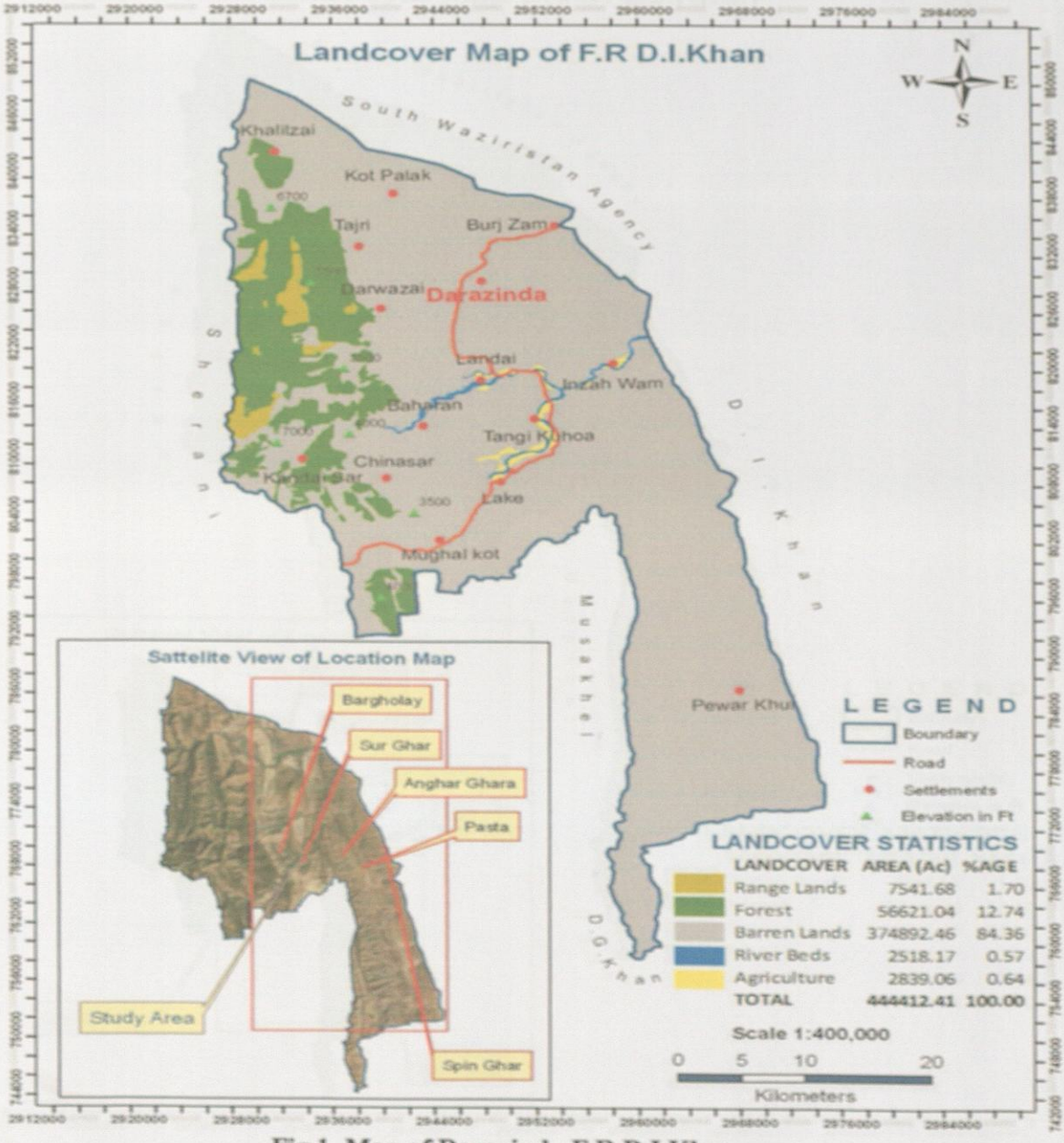


Fig 1. Map of Darazinda F.R D.I.Khan

as Ghurghusht Pathans. They are divided into three clans; Hassan Khel, Oba Khel and Chuhar Khel (Anon. 1998).

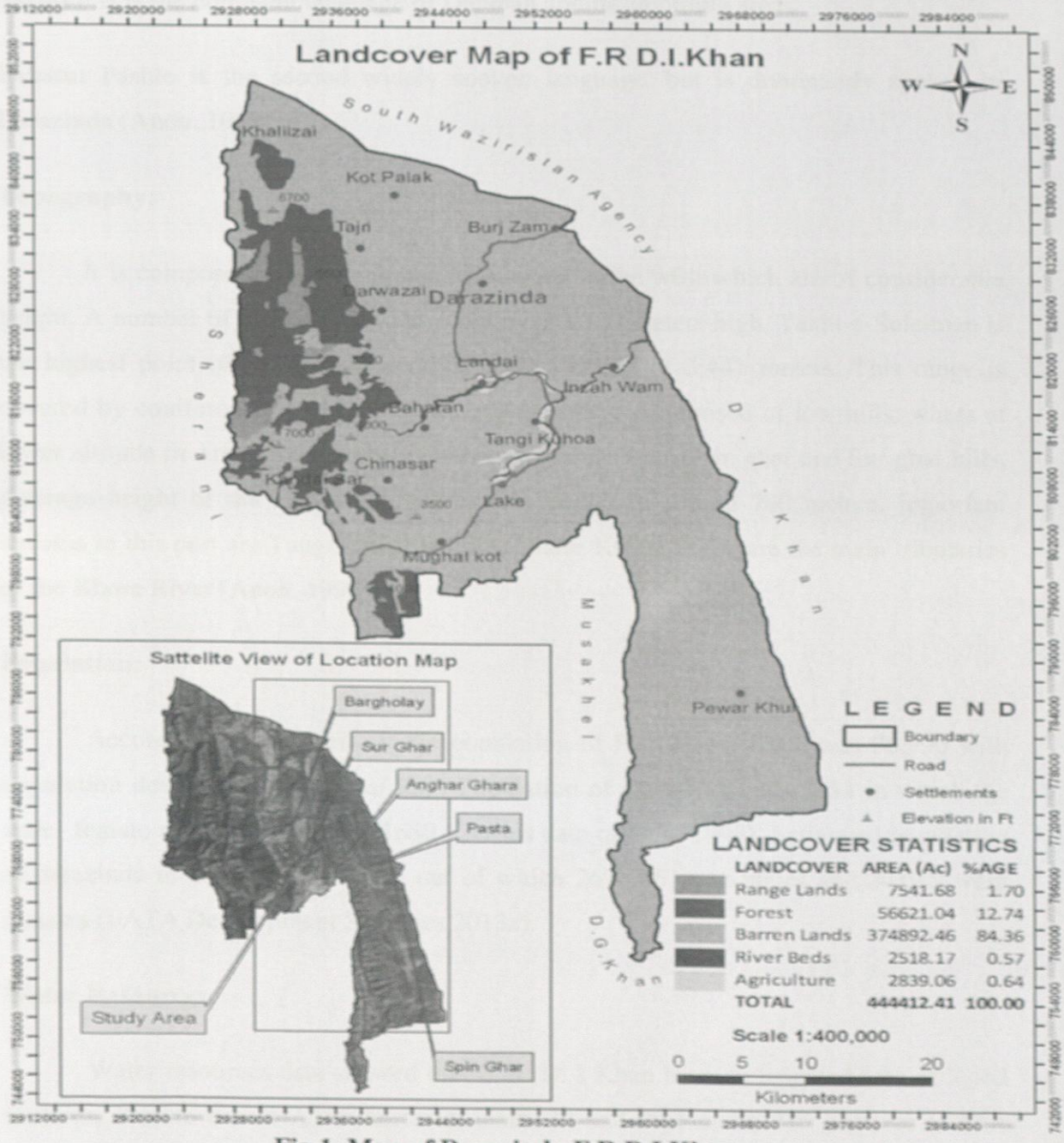


Fig 1. Map of Darazinda F.R D.I.Khan

Languages and ethnicity:

The following two languages are commonly spoken in this area,

Saraiki: It is the dominant language of Daraban and its adjoining areas.

Pahsto: Pashto is the second widely spoken language, but is dominantly spoken in Darazinda (Anon. 1998).

Topography:

It is composed of the Suleiman Mountains in the west which are of considerable height. A number of peaks in this range are over 2,750 meters high. Takht-e-Suleiman is the highest point of the Suleiman range with a height of 3,441 meters. This range is covered by coniferous forest. The entire eastern side is composed of low hills, where at lower altitude lie area, like Bargholay, Anghar ghara, Pasta, Spin ghar and Sur ghar hills. Average height of the hills along the eastern border is around 700 meters. Important streams in this part are Tangi khwar and Rangharar Kwar. These are the main tributaries of the Khora River (Anon. 1998).

Population:

According to 2008 census, the population of F. R. D. I. Khan was 38,990 with population density of 19 persons/ km^2. Population of Darazinda was 3554 in which the male- female ratio was 1874 and 1680 (Census data of Fata, 1998). Estimated population of darazinda in 2015 was 5117.76, out of which 2698.56 were males and 2419.2 were females (FATA Development Statistics 2013a).

Water Resources:

Water resources data showed that F. R. D. I Khan have an irrigated area of 3,463 hectares, Private canals 2,185 hectares, tanks 78 and tube wells 415 hectares (FATA Development Statistics, 2013b).

Health:

Darazinda people are facilitated by one Hospital (8 Beds), seven Dispensaries and one TB clinic (FATA Development Statistics, 2013b).

Educational institutions:

Majority of the people are illiterate; however, the new generation is inclined generation to generation. Presently there are 17 primary, 2 middle and 2 high schools. There is also one college of girls and one for Boys in Darazinda (FATA Sustainable Development Plan 2007-2015).

Culture and Society:

The native villagers are mainly farmers, who depend upon the flood waters to irrigate their lands as there is no proper irrigation system. Jirga Council which is a group of people (religious elder circles) decide disputes of the people by their indigenous principles and laws (Anon. 1998).

Climate:

Climatically F.R D.I. Khan is an arid area. Summer starts from April and continue up to October. The hottest months are June, July and August. From November winter starts and ends in March. Three months, December, January and February are colder, in which the coldest month is January with mean maximum 21.6°C and minimum 3.7°C. The hottest month is July with maximum 38.5°C and minimum 26.7°C (Metrological report of Dera Ismail Khan 2014).

Fauna:

In the area are present indigenous but endangered species of wild goat called the Suleiman Markhor and wild sheep called Afghan Urial. Wolves, Jackals, Rabbit, Wild cats and Deer can also be found in the area. Birds like chikor and sissy are found at high altitude, while sand grouse (khirgutae), quail, partridge, warblers, hikras, pigeon,

golden eagle, sparrows, hawks, dove and Houbara bustard (Taloor or Charai) are also found in the plains of the area (Anon. 1998).

Flora:

Darazinda people mostly depend on different forest and agricultural products for their daily life and economic needs. Most commonly cultivated crops are wheat, maize, potato, tomato and different vegetables. Hundreds of different species of plants, including some exotic plants species are present in the area. Some dominant species of the area include Junipers, *Calotropis procera, Withania coagulans, Pegnum harmala, Ephedra intermedia* and *Pinus gerardiana*. Rearing of cattle is important source of food and income for the local inhabitants. Wood is used for fuel and the people are dependent on forest resources for first hand money. Raring of cattles like, sheeps, goats, camels and cows are also prominent in this area (Anon. 1998).

Research Area:

The research area of Darazinda is composed of the following localities, with their respective heights;

Bargholi area: 300m

Pasta area: 200m

Angharghara area: 350m

Spin ghar: 500m

Sur ghar: 700m

REVIEW OF LITERATURE

Chapter-2

REVIEW OF LITERATURE

A. Floristic Composition and its Ecological Characteristics:

Gimenez *et al.* (2004) reported flora of Iberian Peninsula and recorded hemi-cryptophytes (31.37%) and Chamaephytes (46.08%) were abundantly present, while rare species were phanerophytes (0.98%) and therophytes (11.96%). Within 1400–2000m chamaephytes have highest density rates. Dondeyne *et al.* (2004) studied woodland vegetation and their soils of nine sites of South Eastern Tanzania. Total 133 plant species out of which 56% were scientifically identified.

Mendez (2005) reported 240 species belonged to 156 genera and 52 families with angiospermae (51), monocotyledoneae (10), dicotyledoneae (41) and gymnospermae (1) from Lagunade Llancanelo Provincial Reserve flora. Asteraceae (57genera) and Poaceae (82 genera) were the best representative families. The most abundant genera were *Baccharis* and *Stipa*. Each species life form, phytogeographic provinces and their distribution within the vegetation units together form the degree of endemism.

Segawa & Nkuutu (2006) reported 179 species from 146 genera and 70 families and Lake Victotia Central Uganda. Studies showed that Rubiaceae (16species), Euphorbiaceae (13spp), Apocynaceae (10spps) and Moraceae (9spps.) respectively. Herbaceous species (58), lianas (39), shrubs (10) and trees species were 72 in numbers.

Laidlaw *et al.* (2007) determined local and regional variation of Austerlian tropical rainforest and observed that the Meliaceae, Euphorbiaceae, Lauraceae, Myrtaceae and Apocynaceae were most abundant families. *Alstonias cholaris, Cleistanthus myrianthus, Normanbya normanbyi, Myristica insipid* and *Rockinghamia angustifolia* were most abundant species.

Costa *et al.* (2007) described 133 species of 47 families from Caatinga in North, Brazil. Herbaceous/woody ratio was 1:4 of. Chamaephytes (15.8%), therophytes (42.9%),

hemicryptophytes (12.8%), phanerophytes (26.3%) and cryptophytes (2.3%) following the Raunkiaerean life form spectrum.

Francisco *et al.* (2009) listed 46 taxain12 genera of Commelinaceae of Equatorial Guinea. The *Palisota*, with 11 species was dominated genus.

Manhas *et al.* (2010) recorded 206 species belonging to 59 families and 159 genera from Hoshiarpur, Pathankot and Garhshanker, India.

Silva *et al.* (2011) reported 264 species of 51 families from Central Amazon, Brazil. Dominant family was Fabaceae with 22 species in which Mimosoideae with 22 species. Other families like Lauraceae (13 spp), Sapotaceae (22 spp) and Lecythidaceae (15 spp) were also present. The most plentiful species were; Eschweilera coriacea (471), *Pouteria minima* (293), *Protium hebetatum* (1037), *Ocotea cernua* (258) and *Licania oblongifolia* (310).

Nadaf & Mortazzvi (2011) identified 78 species of plants belonging to 25 families and 66 genera from Sarigol, Iran. Asteraceae, Brassicaceae, Fabaceae, Laminaceae and Poaceae were leading families.

Mishra *et al.* (2012) documented 266 plant species of 76 families and 204 genera from tropical moist deciduous forest of Biosphere Reserve, Orissa, India. Out of these 117 tree species, 17 climbers, 31 shrubs and 101 were herbs species.

Mei *et al.* (2012) listed 237 vascular plants of 184 genera of 73 families from Cheung Chau Island Hong Kong. Secondary evergreen broad leaved forest and shrub land were dominant vegetation types. Zangiabadi *et al.* (2012) reported 253 plant species belonging 49 families and 186 genera from Galoochar Juniper Forest Reservoir, Iran. Asteraceae (31 spps) was leading family followed by Brassicaceae (24 spps) and Papilionaceae (27 spps).

Emad *et al.* (2013) reported 251 plant species belonging to 160 genera and 50 families and their floristic composition of Khulais region, West Saudi Arabia. The

maximum number of species (41.2%) exhibited by Therophytes, followed by Chaemophytes (31.4%), Hemicryptophytes (13.7%) and Phanerophytes (10%), while the least frequent life form class was Geophytes.

Farag (2014) worked on Wadi Alkuf valley and reported 365 species of flowering plants represented by 257 genera and 75 families besides gymnosperms and pteridophytes.

Rampilla *et al.* (2015) carried out floristic diversity and phytosociological studies of the Indraki ladri sacred grove, Krishna district, Andhra Pradesh, India. Floristic analysis revealed that a total of 146 species belonging to 129 genera and 47 families were observed.

Work on floristic listing, ecological characteristics and composition in Pakistan has been done the review of which is as follows.

Malik & Malik (2004) reported 58 species of plant from Kotli Hills, Azad Jammu and Kashmir. These include woody species (9), shrubby (13) and herbaceous (13). Heavy overgrazing and deforestation showed by the investigated data.

Durrani *et al.* (2005) observed 202 plant species from Harboi rangeland Kalat. These species belonging to 45 plant families. Leading families were Asteraceae, Brassicaceae Poaceae, Lamiaceae and Papilionaceae. The only trees species was *Juniperus macropoda*. Qureshi & Bhatti (2005) recorded 160 species of plant from Desert Nara Pakistan. These plants belonged to 45families and 118genera. Gymnosperm (1), sedges (3) and Poaceae have 20 species.

Hussain *et al.* (2005) evaluate 92species of plants from Ghalegay Hills (District Swat), belonging to 56 families. Important families with FIV were Acanthaceae (123), Pinaceae (267), Poaceae (167), Oleaceae (93), Lamiaceae (244), Rosaceae (151) and Papilionaceae (150). Dominant species were microphyllous (46.6%) and Nanophanerophytic (33.6%).

Qureshi & Bhatti (2006) reported 25 plant species from Nara Desert having 3 monocot families. Sher & Khan (2007) reported biological spectrum of Chagharzai Valley, District Buner. Dominant life-form was nanophanerophytes (41spps), therophytes (86spps) and megaphanerophytes (38spps). Low occurrence of hemicryptophytes (17spps), geophytes (18spps), lianas (9spps) and chamaephytes (14spps) showed anthopogenic stress in flora.

Perveen *et al.* (2008) reported 79 plants species from Dureji Game Reserve. These plants belonged to 66genera, 32 families and 3 were rare species. Qureshi & Bhatti (2008b) determined five genera for the first time from Nara Desert including *Schweinfurthia, Anticharis, Kickxia* and *Bacopa* genera. Distribution of these species was narrow so, efforts should be made for the conservation of these species.

Hussain *et al.* (2009) recorded 69 species from District Chakwal belonging to 29 families. These included grasses (20), trees (12), shrubs (31) and under shrubs and herbs were among them 6 species.

Durrani *et al.* (2010) studied ecological characteristics and their effects on floristic of rangelands in Aghberg (Quetta) Pakistan. Results showed 123 plant species of 36 families. Important families of protected area were Asteraceae, Boraginaceae, Brassicaceae, Fabaceae, Lamiaceae and Poaceae.

Manhas *et al.* (2010) recorded 206 species belonging to 59 families and 159 genera from Hoshiarpur, Pathankot and Garhshanker, India. The dicotyledons (77.7%), monocotyledons (20.4%) and pteridophytes were 1.9%. The most dominant genus was *Ipomoea*. The most dominant were therophytes (52%) and phanerophytes (27%) according to Biological spectrum.

Rashid & Abas (2011) recorded 47 species from Karachi. These plants species included halophytes, psammophytes and xerophytes. Perennial shrubs and herbs were dominant. *Halopyrum mucronatum*, *Suaeda fruticosa* and *Arthrocnemum macrostachyum* were dominant species. Nadaf & Martazavi (2011) worked on life form of Sarigol, Iran

and results showed that Irano-Turanian hemicryptophytes 39.74%, chemophytes 19.23%, therophytes 21.79% and phanarophytes 7.69%.

Shaheen & Shinwari (2012) studied 108 plant species belonging to 27 families from Karambar lake Chitral, Hindukush Himalayas. Rosaceae (11%), Leguminosae (13%), Primulaceae (7%), Cappriforiaceae (11%), Asteraceae (19%) and Poaceae (5%) were leading families. Saeed *et al.* (2012) reported 52 plants belonged to 25 families from Lahore Pakistan. Of these species 37 herbs, 7 trees and 8 were shrubs, 35 epiphytic plants were present.

Hussain *et al.* (2015) carried out floristic diversity of Hindukush valley Range, Pakistan. A total 571 species belonging to 82 families including 2 pteridophyte, 13 monocots, 65 dicots, and 2 gymnosperms families were recorded. Biological spectrum showed that therophytes (234 spp., 40.98%) were dominant, followed by chamaephytes (44 spp., 7.71%). The leaf size spectra showed that nanophylls (40.98%), leptophylls (24.87%), mesophylls 18.56%) and microphylls (9.11%) were dominant.

Some work on floristic composition is also available in Khyber Pakhtunkhwa Province which is as follow:

Sher *et al.* (2003) reported 78 species from Udigram belonging to 47 families and 37genera. Dicotyledons (68), monocotyledons (6), gymnosperm (1), pteriodophytes (2) and fungus (1) were listed and major families were Lamiaceae (9species) and Asteraceae (5), Poaceae (5) and Rosaceae (4species).

Hussain *et al.* (2005) evaluate 92species of plants from Ghalegay Hills (District Swat), belonging to 56 families. Dicotyledonous (49), monocotyledons (3), pteridophytic (3) and gymnospermic (1), Rosaceae (l0), Asteraceae (6), Lamiaceae (6) and Poaceae (6) species were recorded.

Sher & Khan (2007) recorded 222 species in 88 families from Chagharzai Valley, District Buner. These families included 77 Dicots, 7 Monocots and 3 Pteridophytes and 1 Gymnosperms represented by Pinaceae only. Asteraceae was declared as the leading

family. Zabihullah *et al.* (2007) reported 279speciesof plants from Kot Manzaray BabaValley (District Malakand). These plants belonged to 81families and 229 genera. Families include dicotyledonous (69) with181genera and 204species, while monocot (11) with 54 species of 47genera and Pinaceae (1) of gymnosperm. Poaceae was dominant family with maximum number of genera and species.

Saima *et al.* (2010) listed 167 species from Ayubia National Park Abbottabad belonging to 65 families and 139 genera. *Abies pindrows, Cedrus deodara, Pinus wallichiana* and *Taxus wallichiana* were the prominent trees. Fazal *et al.* (2010) recorded 211 species of plant from District Haripur belonging to 66 families and 170 genera. Gymnosperm with 5 genera and species monocotyledons with 7 families, 26 species and 24 genera and dicotyledons were with 55 families, 141 genera and180 species.

Rashid *et al.* (2011) documented 200 species of 75 families from Malam Jabba, Swat, Pakistan. Poaceae, Asteraceae and Laminaceae were dominant families. Shaheen & Qureshi listed 114 species belonging to 28 families from Sheosar Lake Deosai plains of great Himalayas. Marwat *et al.* (2011) enlisted 11 edible fruiting plants belonging to 8 families and 8 genera from North Western Dera Ismail Khan Pakistan. Sher *et al.* (2011) reported forty species related to 21 families were identified from village Lahore, District Sawabi. Leading families were Poaceae (7 spp), followed by Brassicaceae (5 spp), Caryophyllaceae, Asteraceae and Fabaceae (each with 4 spp).

Ilyas *et al.* (2012) reported 209 vascular plant species belonging to 75 families and 167 genera from Qalagai hills, Swat. Ahmad *et al.* (2012b) studied 112 plant species belonging 51 families 97 genera from Senhsa, District Kotli (Azad Jammu & Kashmir).

Badshah *et al.* (2013) documented the floristic composition and its ecological characteristics of District Tank. The floristic diversity consisted of 205 species within 56 families in which major families were Poaceae (34 Spp), Papilionaceae (19 Spp). Biological spectrum of flora indicated that therophytes followed by hemicryptophytes were the prominent life form.

As no reference on the floristic composition of Darazinda F. R. D. I. Khan was exists. So there is need to report the floristic and phytosociological profile of this area.

B. Phytosociology/Vegetation Structure:

Hurka (2004) compared the relationship between composition and diversity of plant species and their life form of tropical dry forest in North western Costa Rica. Patrick *et al.* (2004) studied phytosocology of Lufuka, Degeya and Mpanga forests (central Uganda) in order to determine the density, regeneration and size of trees and their class distribution for making drums and also determination of number and species of seedlings, DBH (Diameter at breast height), poles and samplings of six trees species.

Walpole *et al.* (2004) studied the Masai Mara National Reservein Kenya woodlands. Species compositions of thirteen woody habitats which vary from species rich closed thickets and forest to less diverse open grasslands were identified.

Jorge *et al.* (2005) compared species richness and vegetation structure of dry tropical and divided in six replicated age classes across a 56 years chrono sequence island of Providencia (Colombia Southwest) and concluded that density of woody species reached high 32 to 56 years old while analysis of rare faction showed that increased age of stand have positively association with age while negative relationship to sprouting ability.

Prakash (2005) determined threatened medicinal plant density varied with protection of areas. Medicinal plants species are highest in protected area. The "moist" habitat was richest among all 10 habitats. The most common medicinal plants were *Ephedra gerardiana* and *Arnebia euchroma*.

Costa (2006) investigated the abundance and richness of herb in Central Amazonia. With altitude and slope richness, diversity and cover of herbs increased. The results showed that in slopes the richness and higher abundance of pteridophytes as compared to bottom lands.

Dharani *et al.* (2006) studied the rivers lake shores and flood plains of Lake Nakuru National Park woody vegetation. Within the *Acacia xanthophloea* woodlands of four different sites were studied. In the four sites woodlands vegetation structure was not significantly different, but these sites differed in the *Acacia* trees to their relative density. *A. xanthophloea* regeneration differed in each site, browsing took place with the highest regeneration rates.

Frances & Shahroukh (2006) reported communities in Kopjes (rock out crops) of Loliondo, Simba and Maasaiareas of National Park Serengeti. Different parameters like species diversity measured by techniques multivariate ordination in order to examine the similarity and turn over community species between sites. In grassland habitats species turnover was very high.

Muthuramkumar *et al.* (2006) recorded 312 species in103 families: 144 trees species, 60 species of lianas and108 species of under story plants. The changes in plant diversity and community composition in five tropical rain forest Valparai plateau, Western Ghats were tree, liana and under story. Highest density of understory species was observed, due to presence of weedy invasive species in rain forest plants.

Gould *et al.* (2006) recognized different eight parameters of mature tropical forest plants i-e diversity, ecological attribute species composition and conservation status. Total 374 species were reported in which 92% (native), 14% (endemic), and 4% (locally endangered)/critical elements to the island. The moist forest communities of lowland, occurring within matrix of agriculture, urbanization and disturbance, have the highest invasion by exotics.

Lovett *et al.* (2006) reported 2143 woody stems from Mwanihana forest out of which 204 plant species have $\geq$ 3cm dbh. At high elevations species diversity was highest. Maestre *et al.* (2006) evaluated species composition, heterogeneity, species richness, and soil nutrient. *Plantago* and *Lolium* communities responded to increasing above and below ground biomass nutrient heterogeneity.

Zheng *et al.* (2006) determined the large trees average density (DBH ≥100 cm) of two small plots was 9.4stems/ha and two large plots was 3.5 stems/ha. Results showed that estimations of biomass are similar to tropical rain forests in Neotropics and Southeast Asia.

Tripathi & Shukla (2007) compared two communities of grassland in Gorakhpur, one from managed and protected site while other moderately grazed. Total 100 species were reported in which to both sites 65 were common, exclusively occurred species at site I one were 9 and at site II 26 species. At managed site *Cassiaabsus, Hyptissuaveolens* and *Cassiatora* were rare while at natural site *Crotalaria ferugenia* and *Coccinia indica* were rare in occurrence.

Yadav & Gupta (2007) noticed herbaceous species in relation to various micro-environmental conditions, human disturbance and their diversity in Rajasthan, India. Several human sensitive species have disappeared due to anthropogenic activity in the area. The species diversity in dexin the undisturbed areas like Bharthari forest (3.027), Slopka forest (3.051) and Kalighati forest was (3.415). Hajipur forest have high species diversity index (3.564), due to species richness.

Wahab *et al.* (2008) recognized age, vegetation structure and growth of plant species in 5 places of Dangam District Afghanistan. Non tree species vegetation compositions were also presented. One bi specific and two monospecific on the basis of floristic composition and IVI (importance value index) of tree species were recognized. Results showed that rates of age, dbh and growth were not significant of *Piceas mithiana* (Wall.) Boiss. Poor regeneration of forest showed due to lack of tree seedlings.

Guo *et al.* (2009) studied hierarchical synusia and biological spectrum structure of *T. sutchuenensis* community. The results showed the percentage of phanerophyte (73.2%), hemicryptophyte (18%), geophyte (6%), chamaephyte (2%) and annual plants (0.8%). Microphyllous (60.8%) was dominant leaf size and simple (86%) was dominant leaf form.

Digiovinazzo *et al.* (2010) reported phytosociological relationship between features and woodland indicators of Italy forest and concluded that for conservation ecological thresholds provide guide lines. Forest indicators number increased up to 35–40 ha; above this value richness size remained constant. The two thresholds identification in relationship between indicators and patch area suggests response of species to changing features of lands cape and for conservation provide quantitative targets.

Adam & Crow (2010) analyzed the frequency and abundance data by using TWINSPAN and recorded 106 study plots. These six cover types (CT) were defined as *Pinusresinosa–Gaylussacia, baccata–Vaccinium angustifolium* CT, *Pinusstrobus–Gaylussacia baccata* CT, *Tsugacan adensis* CT, *Ruderal* CT, *Fagus grandifolia–Ostrya virginiana* CT and *Acerrubrum–Dulichium arundinaceum* CT. 50.0% similarity with Bear Island, Rattle snake Island with 52.7% and Mile Island 51.1% with three showed by Sorensen's Index.

Pandey *et al.* (2011) reported phytoscociology of grasslands from Hazaribagh, Jharkhand, India. They compared polluted grasslands with control species. Results showed that 12, 17 and 8 species as a control and 19, 27 and 40 species of polluted grasslands. Nogueira *et al.* (2011) worked on Central Amazonian terra frame forest and reported the Liana abundance and relationship between soil texture and vegetation structure by using 40 plots distributed over 64 km^2. Results showed that important predictor of liana forest was vegetation structure.

Strohbach & Jankowitz (2012) studied phytosociology of Nama Karoo biome of Southern Nambia by establishment of eight communities and sub communities. Pajazitaj (2012) documented 6 forest vegetation of Kosovo hilly area. Results showed that *Carpinetum-orientalis-scardicum* have 49.61% while *Seslerio-Ostryetum* species were 35.49%.

Pant & Samanth (2012) reported phytosociological study of Kho khan Wild life Sanctuary, North-Western Himalaya. Results showed that the most widely distributed

communities were *Cedrus deodara, Quercus leucotrichophora* and *Abies pindrow.* Maximum density of *Cedrus deodara* trees, while *Picea* had maximum basal area.

Mwakalukwa *et al.* (2014) reported 88 species belonging to 29 families from Miombo woodland area in Tanzania. Vegetation analysis revealed that four communities in which two communities were dominated by the family Caesalpiniaceae.

Fadl *et al.*, (2015) carried out floristic and vegetation analysis studies of wild leguminous species in Taif, Saudi Arabia. Three different localities like Alshafa area (with its different habitats), Wadi seesed and Taif Hawia road (cutting many small wadies) were selected for study of wild legumes in Taif. Twenty six legume species with their life forms, chorology and associated species in various sites of Taif district were recorded. The most common species was *Acacia gerrardii* in all localities of variable ecological conditions. Dominant life forms of plants were phanerophytes. TWINSPAN classification of the associated species showed eight different groups. Five new taxa as naturalized in district Taif were recorded like *Pithecellobium dulce, Parkinsonia aculeata, A. melanoxylon, Leucaena leucocephala* and *Acacia saligna.*

Das *et al.* (2015) reported community composition of Gorumara National Park in West Bengal, India forest. Ecological indicators showed that change in vegetation owing to its typical alarm either the change of weather or the change of attributes of community in the underground of forest floor which change the pattern and integrity of vegetation.

Work on vegetation structure and phytosociology in Pakistan is reviewed as follow:

Malik & Malik (2004) studied seven plant communities in Kotli Hills during monsoon, 2000 which were *Pinus-Carissa-Themeda, Adiantum-Olea, Acacia modesta, Dodonaea-Acacia-Themeda, Imperata-Pinus, Pinus-Themeda* and *Pinus roxburghii.* This type of vegetation belongs to Chirpine forest type.

Ahmad *et al.* (2006) studied floristic composition and IV (importance value) in Himalayan forests (Pakistan) in which 4 mono specific forest and 24 communities. Similar floristic composition showed by many communities however, in quantitative

values they differed. Nazir & Malik (2006) documented quantitative and qualitative study of Sarawa hills District Kotli. Results showed that qualitatively dominant communities were nanophanerophytes, bryophytes, megaphanerphytes, hemicryptophytes and geophytes were less in number.

Peer *et al.* (2007) reported vegetation (two-way indicator species) of eastern Hindu Kush Mountains (Pakistan) hierarchical classification of community analyzed by TWINSPAN analysis while CCA (canonical correspondence analysis) used for relationships between the environmental and vegetation parameters. Four communities were established (1) the *Artemisia brevifolia* steppe, (2) the desert steppe, (3) the alpine mats and (4) the alpine scree vegetation.

Perveen & Hussain (2007) studied phenological and phytosociological status in Gorakh hill (district Dadu). Species diversity on basis of quantitative analysis, phytosociological attributes and some ecological parameters like, species cover, life forms, species density, frequency and species relative density were conducted.

Ahmad *et al.* (2008 a) investigated vegetation and physical and chemical properties of soil. Mostly herbaceous species were frequently present during autumn and summer due to availability of suitable temperature, moisture and nutrients. While in winter grouping of plants were absent due to sparse vegetation and cold temperature.

Ahmad *et al.* (2008b) noticed that most commonly occurring species in Soone Valley, Punjab, Pakistan were woody leguminous plants (*Acacia modesta*), commonly occurred *Prosopis juliflora* and *Dalbergia sissoo* was totally absent, while *Medicago polymorpha* and *Melilotus indica* were commonly among the herbaceous weedy legumes were found during the winter seasons. *Olea ferruginea* association with *Acacia modesta* was found at higher altitudes. *Dodonaea viscose* and *Justicia adhatoda* were abundantly occurred species, because these species resist for grazing and fuel needs.

Arshad *et al.* (2008) reported types of vegetation, cover, importance value index, density, frequency and chemical composition of the soils in range lands of Cholistan desert. Low organic matter and high salinity of soil showed by plant species like *Suaeda*

fruticosa and *Haloxylon recurvum*. Better organic matter showed by *Calligonum polygonoides, Aerva javanica, Dipterygium glaucum, Capparis deciduas* and *Haloxylon salicornicum*.

Perveen *et al.* (2008) investigated quantitative analysis of species diversity and phytosociological attributes of Dureji game reserve. Some ecological parameters like, density, life form, relative frequency, cover, relative cover frequency relative and density were also studied. From place to place vegetation cover varies depending upon soil structure and texture. Due to rainfall density and vegetation structure and was greatly affected. Grazing was the main threats to the vegetation of this study area.

Malik & Hussain (2008) documented phytosociology of Lohibehr scrub forest in then or the east Foot hills of Himalaya, Pakistan. The relationship between vegetation communities and remote sensing data and their ecological importance were the main objectives. The results showed that the potential of remote sensing data and types of different plant communities could be used in management, planning and conservation of Himalaya subtropical forest.

Qureshi (2008) investigated different parameters of vegetation by quadrat method like frequency, cover and density of Sawan Wari (Nara Desert). The results showed that based on Importance Value five plant communities were investigated 1) in desert: *Calligonum-Dipterygium-Salvadora* 2) in wetland: *Phragmites- Typha-Saccharum* 3) in agricultural habitats: *Desmostachya-Brachiaria-Cynodon* 4) in protected forest: *Salvadora-Desmostachya-Prosopis* and 5) in marshland: *Saccharum-Pluchea-Typha.*

Wazir *et al.* (2008) reported five types of vegetation in Chapurn Valley, Gilgit Pakistan. On the basis of topographic and edaphic heterogeneity these vegetation include: moist sub-alpine pastures, crassulescent steppes, riverine pseudo-steppes and chamaephytic steppes.

Hussain & Perveen (2009) worked on phytosociological attributes and plant biodiversity of Khirthar range, Tiko Baran, Dadu district. Phenological status of each species like fruiting and flowering conditions were also observed. Phytosociological

attributes analysis and quantitative analysis; species diversity, ecological parameters like density, life forms, relative density, cover and frequencies were conducted.

Hussain *et al.* (2009) worked on Chakwal and reported plant variation among grasses, shrubs and trees in the three growth seasons and calculated their frequency, density and cover. Results showed highly significant difference in grasses, shrubs and trees in all four range sites. Highest plant density in flat areas as compared to sloping areas and channels/beds respectively. In spring and summer, in flat areas highest plant density was observed as compared to other range.

Ali & Malik (2010) documented vegetation communities of the open urban spaces like green belts, gardens and parks of Islamabad city. Results showed that in green belts *Pinus roxburghii* and *Grewia asiatica* were more prevalent while *Dalbergia sissoo* and *Acacia nilotica ssp.* were dominated vegetation in undisturbed green spaces. Indrains/nullahs *Broussonetia papyrifera* and *Populus euphratica* were mostly distributed. Ahmad *et al.* (2010 b) documented a review work on the vegetation of Pakistan.

Siddiqui *et al.* (2010) worked on Himalayan region of Pakistan and described quantitative vegetation of moist temperate coniferous forest. Three groups were presented i-e *Pinus wallichiana* stand was as group I, *Abies pindrow* as group II and *Cedrus deodara* as group III. Akbar *et al.* (2010) described seven plant communities from Keenjhar Lake District Sindh including *Populus euphratica*, *Tamarix sarenensis* and *Luffa echinata*.

Nawaz *et al.* (2010) worked on Lehrianda Jindisub mountainous open scrub forest and stated that 60% vegetation (tree) cover and plant diversity was high over 140 species. Results showed that a significant difference in vegetation structure between protected and non-protected area.

Shaheen & Qureshi (2011) reported vegetation communities of Sheosar Lake Deosai plains of Great Himalayas. Dominant communities were *Sibbaldia-Saxifraga* and *Carex-Geranium-Bistoria*.

Sher *et al.* (2013) reported summer vegetation phytosociology of 13 plant communities from Sudan Galli hills, District Bagh, Azad Kashmir. Shah *et al.* (2013) studied five plant communities of Mastuj Valley, Hindukush range, Pakistan.

Phytosociological work in Khyber Pakhtunkhwa is presented as follow:

Hussain *et al.* (2005) reported seven plant communities divided into subtropical pine forest, sub tropical semi-evergreen forest and blue pine temperate forests from Ghalegay Hills, District Swat.

Ahmad *et al.* (2009 b) recognized 63 plant species and 5 major communities from roadsides of Abbottabad. Lead, copper and zinc were most important factors influencing the roadside vegetation. Improve the roadside vegetation and reservation of native flora is the basic theme of this study. Jabeen & Ahmad (2009) worked on vegetation of Ayub National Park. Classification based on species dichotomy, represented by two major communities.

Shah and Hussain (2009) determined 5 plant communities from Hayatabad, District Peshawar. Poaceae, Asteraceae, Brassicaceae and Solanaceae were the richest families. Cryptophytes (19%) and therophytes (48%) were dominant life form while leptophylls (22%) and microphyllous (40%) species were dominant leaf size spectra.

Ahmad *et al.* (2010 c) worked on vegetation of the selected graveyards in Upper Swat and compared floristic composition and less disturbed were different due to religious sanctities. Wahab *et al.* (2010) studied phytosociology by using quadrat method and prepared twenty five forest types samples in Distict Dir. Different parameters like basal area, frequency, density and their importance values were also calculated by establishing communities.

Badshah *et al.* (2010 a) worked on vegetation of Tabai during autumn and reported phytosociological and edaphic features. Due to elevation there were differences in air and soil temperature. Due to deforestation and overgrazing the original vegetation structure has been altered.

Rashid *et al.* (2011) studied eleven plant associations of Malam jabba, Swat, Pakistan. Rahim *et al.* (2011) documented twelve plants associations of Tehsil Ferozewala, district Sheikhupura Panjab, Pakistan. Results showed that *Desmostachyetum bipinnata, Polypogaetum monspeliensae, Suaedetum fruticosae, Kochietum indicum, Scirpetum maritimae, Diplachnetum fuscae, Typhetum angustitae* and *Vateviarietum cylindrieae* were important plant communities.

Ilyas *et al.* (2012) documented 8 communities from Qalagai hills, Swat 1) *Cedrus-Indigofera-Amaranthus* 2) *Poulus-Debregeasia-Nasturtium* 3) *Pinus wallichiana-Indgigofera-Galium* 4) *Cedrus-Viburnum-Pteridium* 5) *Quercus-Indigofera-Amaranthus* 6) *Cedrus-Indigofera-Thymus* 7) *Cedrus-Vibernum-Pteridium* and 8) *Olea-Plectranthus-Micromeria.* Sarangzai *et al.* (2012) reported *Juniperus excels* forest from Baluchistan Pakistan. From Ziarat highest density 268stem/ha were recorded. From Sasnamana Kha was Neikh lowest stand density was 29 stem/ha.

Nasrullah *et al.* (2015) quantified the composition, structure and regeneration dynamics of *Olea ferruginea* forests in Malak and Division, Hindukush range of Pakistan. Present study showed that five communities dominated by *Olea ferruginea* were identified using Ward's agglomerative cluster analysis. Total tree density ranged from 153–2602 plants/ha, and basal area from 19.55-2353 m^2 ha^{-1} with *Olea* having a relative density of 51%-87% and basal area of 48% -93% respectively.

C. Palatability of Vegetation:

Hickman *et al.* (2004) stated that in grazed area the native plant species richness, species diversity and growth form diversity were significantly higher as compared to un-grazed area; at the highest stocking density the diversity was greatest. Frequency of weedy/exotic species was not enhancement in plant species diversity under grazing.

Lucas *et al.* (2004) assessed that increasing the grazing pressure have not significant effect on cotton wood populations. Seasonal effects have significant effect on both herbaceous species diversity and richness. In maintaining riparian communities grazing treatments appeared to have been successful.

Mapinduzi *et al.* (2004) evaluated that herbaceous species richness in calf-grazing pastures had greater than then on calf pastures, which results more woody species. The results showed that for assessing rangeland biodiversity the indigenous systems of landscape classification provided a valuable role. Wang (2004) reported that the total rhizomes biomass increased considerably with increased grazing intensity and on the extremely high grazing treatment its biomass peaked.

Hirata *et al.* (2005) stated that the herbaceous vegetation with higher cover results higher grazing impacts while at end of the growing season reduced the total available forage. With a higher cover of shrub vegetation types lighter grazing impact would occur. To protect the land against soil erosion is stressed the maintaining plant cover over the rangeland area is important.

Miller & Thompson (2005) studied that the predominant species was *Cortaderia pilosa* which consumed during the cooler periods of the year. The highest live weight gains of sheep occur in summer due highest the proportion grass species, including *Poa spp, Agrostis capillaris* and *Festucam agellanica*.

Ross *et al.* (2005) observed that as the proportion of berseem clover in the winter crops increased the impact of harvest timing on yield decreased. Total dry matter yield of oats decreased with decreasing density of oats. Clover inter crops of Oats–*berseem* showed the pattern of manipulate yield of annual forage.

Anon, (2005) reported that the land of Swaziland is used for extensive grazing. Grazing takes places on natural grasslands, savannas and woodlands areas. Majority population live in farm households which are located on communal areas and are predominantly engaged in subsistence of rain-fed crop farming, dry land farming and animal rearing. Smet and Ward (2005) noticed that high cattle densities causes overgrazing are often associated in this region with communal rangelands, it prevails that uncontrolled management of grazing lands.

Kinloch and Friedel, (2005) studied that heavy grazing decreases the occurrence of palatable and mostly perennial species, and causes a long-term reduction in the capacity of vegetation to respond to rain after drought.

Dalle *et al.* (2006) recorded the cover and density of woody species by considering 192 plots of 500 m^2 area. It was concluded that woody plant density was 3014 woody plants ha^{-1} and cover was 52%.

Knoop & Smith (2006) determined intensity of cropping per tuft, changes in grazing of different grass species, differences in height between grazed and ungrazed tillers. The extent of grazing in the up land exceeded that in the bottom land in the dry year. Milewsk & Madden (2006) recorded the intensive browser utilization by observing lose shoot tips, relatively few flowers and fruits and produce long thorns. Lateral branching and short thickened spines increased browser utilization.

Pavlu *et al.* (2006) studied that due to delayed defoliation increases the number of forbs plants, particularly *Taraxacum* spp. Results showed that in species-rich grass lands plant density increased if the function of intensive defoliation was not restricted it ultimately effects on grass tillers, legume and forbs species.

Randall & Diaz (2006) compared the plant community responses to spring-fed wetlands to grazing level in ten sities (light and moderate) and no grazing over 10 years. Under moderate grazing and herbaceous cover over time was negative while under light grazing or without grazing it will be positive. At springs species composition was highly variable from year to year.

Smit *et al.* (2006) determined that without unpalatable plants in plots the grazing intensity was significantly higher and *Cirsium* than with *Gentiana* significantly higher in plots. Survival of large tree significantly better than small ones and for survival less depended on the unpalatable plants. This study showed that in wooded pastures the unpalatable plants can enhance tree regeneration.

Loeser *et al.* (2007) studied that perennial forbs cover decreases and an increase in annual plants particularly exotic cheat grass (*Bromus tectorum*) due to high-impact grazing. Cattle removal/ moderate grazing control causes little increase in native plant cover and reduced plant species richness. Native plant diversity increases due to inter mediate level of cattle grazing, cattle removal or high-density and short-duration grazing.

Camanella and Bisigato (2010) determined losses in soil nutrients due to grazing, decreased plant cover and changes in species composition. Inputs of nitrogen, leaf litter and soluble lignin and phenolics of the soil reduce due grazing. This reduction causes decrease in plant species composition and plant cover.

Ekblom and Gillson (2010) investigated that availability of herbivory and nitrogen, vegetation cover and grazing were the important factors of controlling woody cover in Limpopon National Park, Mozambique.

Gunasekaran *et al.* (2014) reported that preference among tree fodders of both sheep and goat, palatability of *Leuceana leucocephala* followed by *Inga dulce*. *Gliricidia sepium* is greater than *Albizzia lebbeck* and low palatable *Gliricidia sepium*.

Gamoun (2014) reported that primary production were significantly greater on the un-grazed site and significantly weaker on the heavily grazed site, in contrast, moderate grazing had no significant effect on total vegetation cover, species richness, Shannon diversity index, species composition and primary production. Results also showed that desert rangelands plant communities in general lack response to moderate grazing disturbance and if managed properly then it can provide a valuable source of feed for livestock.

Nicholas *et al.*, (2015) investigated the benefits of restoring native plants to intensive agricultural landscapes of New Zealand. Due to browsing of crop on endemic species potentially and paddock borders, could add value to more sustainable food systems. Less nitrogen in their foliage was found while higher concentrations of trace elements and tannins as compare to both border-planted willows and ryegrass. It was concluded that consumption of small amount would provide negligible overall nutritional benefits to stock.

Koyama (2015) reported that *A. splendens* (*Achnatherum splendens*) tussocks had smaller culm height and basal area and greater culm density under heavy grazing. The palatable graminoids densities of adjacent to and inside tussocks were equal to or lower as compare to outside, but inside tussocks damage decreased due to grazing.

In Pakistan the following research is available on palatability of range plants.

Neal & Miller (2007) worked on some herbaceous species in Khirthar National Park, Pakistan which adversely affected by live stock grazing and species richness. During the dry season/reappeared rain effects the presence of many grass and herb species in open sites.

Akram *et al.* (2009) stated that the over grazed pastures causes due to uncontrolled grazing. Conversion of 100 had decertified land in to productive land at Dingarh Cholistan through and dune fixation and stabilization by vegetative and mechanical means have done by the Pakistan Council of Research in Water Resources.

Now the area is under forest trees like orchard of grafted *Zizyphus* and date palm, grass land grown and fodder crops with collected saline ground water and rainwater.

Hussain & Durrani (2009) reported 129 palatable species including 41.1% (53 species) mostly palatable, 50.4% (65 species) highly palatable, 4.65% (6 species) less palatable and 3.87% (5 species) rarely palatable species. Goats browsed on 104 species including 27% shrubs, 12% grasses, 60% herbs, and 1% tree species. Sheep consumed 98 species that included 23% grasses, 54% herbs, 22% shrubs and 1% tree species.

Amjad *et al.* (2014) reported that 60 species (55%) were palatable and 50 species (45%) were non- palatable. Among the palatable 10 species (16.66%) were highly palatable, 22 species (36.66%) mostly palatable, 19 species (31.66%) less palatable and 9 (15%) were rarely palatable species. Most plant parts acceptable by animals were leaves (42, 53%) while least acceptable parts are flowers/fruits (14, 18 %). The goat browsed 52 species (33%), buffalo 37 species (24%) sheep 36 species (23%) and cow 31 species (20 %).

D. Chemical Evaluation of forage Plants:

Storeheier *et al.* (2002) stated that high contents of crude protein (0.072-0.108g/kg dry matter (DM)) and water-soluble carbohydrates (0.098-0.167g/kg DM) and were highly digestible (50-65% IV DMD) compared with the withered parts of the plants (27-53% IV DMD) were present in winter green parts of graminoids. The digestibility of cellulose and lignin contents of both shrubs and graminoids was inversely related and positively correlated with increasing water-soluble carbohydrates contents.

Dave & Dave (2003) documented that P and K levels were typically adequate for beef cattle early in the growing season particularly in July and August. For cattle mixed stand of forages can extend the period of adequate mineral.

Enujiugha (2003) worked on proximate chemical composition of freshly harvested mature conophor nut (*Tetratcarpidium conophorum*). Results showed that on a dry weight basis protein 29.09%, fiber 6.34%, carbohydrates 12.58%, oil 48.9% and ash

3.09%. The element an analysis showed that conophor nut had high phosphorus content (465.95mg/100g) while cadmium 0.01 mg/100g and nickel were very low 0.38 mg/100g.

Cookson *et al.* (2004) reported metabolized energy concentrations of the whole plant, leaves and stems of *Prangs ferulae.* Results showed that on basis of dry matter (DM) metabolized energy concentrations of whole plant 12.2, leaves11.9 and stem 12.7kg −1. Seiler & Campbell (2004) worked on Jerusalem artichoke populations (genotypic variability) on basis of N, P, Ca, Mg, K, and the Ca/P ratio in the forage. Results showed that Ca/P ratio as excessive, N, Ca, Mg and K as adequate and Pin adequate.

Starks *et al.* (2004) studied the feasibility of estimating neutral detergent fiber (NDF), concentrations of nitrogen (N) and acid detergent fiber (ADF) of live standing forages. The results showed that estimates of N, NDF and ADF were 63 to 76 percent from the radio meter.

Carvalho & Saraiva (2005) worked on seeds from lupine species and reported that during the water stress period significant increase in macro elements (Ca, Na, K, Mg) and microelements (Fe, Zn, Mn, Cu) as well as phytate contents, sugar and ash.

Cherney & Cherney (2005) stated that selection of species of forage, fertilization and harvest management have a major effect concentration of K and for non-lactating dairy cow forage low K is critical. Under split applications of K fertilizer of dry matter yield was 5.6% higher compared than the K fertilizer treatment. Quality of forage was not greatly affected by K fertilization although the concentration of K increased 12% due to K fertilization. Smith *et al.* (2005) examined *in-vitro* trials indehiscent fruits of six tree species common in Matabele land. In *Acacia nilotica ssp* more phenolic compounds than *D. cinerea* but less nitrogen and fiber (NDF and ADF).

Staaland *et al.* (2006) worked on several important in deer forage plants in Sval bard by estimating their minerals contents (Na, K, P, Ca, Mg, S, Cl, Fe, Cu, Mn, Zn, Mo and Co) and nutritional contents like ash, crude protein, crude fiber, nitrogen free

extracts and ether extracts. Results showed that vegetation of Sval bard had higher contents of Na, Ca, Fe, Mg, Cl and Co than the similar plants from Southern Norway.

Starks *et al.* (2006) analyzed genotypes *Cynodon dactylon* by their seasonal variation in concentrations of herbage mass, neutral-detergent fiber (NDF), acid-detergent fiber (ADF) and crude protein (CP) and showed the relationships between the senutritive values of herbage and canopy reflectance in broad spectral wave bands.

Dairo & Adanlawo (2007) determined the two green leafy vegetables *Crassocephalum crepidioides* (CC) and *Senecio biafrae* (SB) by proximate composition, amino acid and mineral profile. Crude protein of both plants *Crassocephalum crepidiodies* (27.17±0.51%), *Senecio biafrae* (28.93±0.68%) were not significantly. The crude fiber of *Senecio biafrae* (7.26±0.22%) *Crassocephalum crepidioides* was (8.13±0.06%) and ash contents of SB 16.30±0.21%, CC17.31±0.02%. For SB the nitrogen free extract (NFE) was 20.81±1.36% and CC was 19.03±0.56%. The results showed that both these plants are good sources of protein in the nutrition for both animal and human.

Garg *et al.* (2007) analysed 15 wild herbs by mineral composition. Several herbs were dominant elements were Ca, Co, Cu, Mg, P, Fe, Mn and Zn. These species enriched in Co, Cr, Cu, Na, Mn, Fe, Rb and Zn was often used as fodder forage, antipyretic, heart tonic and antibacterial.

Chiesa *et al.* (2008) reported that with age of regrowth the nitrogen intake, organic matter, neutral-detergent fiber and concentration of ammonia-N decreased. For all treatments indigestible intakes and acid-detergent fiber, apparent digestibility of organic matter NDF, microbial protein synthesis, N retention, pH of rumen fluid and sugars, amino acids and peptide concentration sinrumen fluid were similar for all treatments.

Gutierrez *et al.* (2008) determined the chemical composition of 14 weed species in Mexico including mineral, crude protein, fiber and total phenolic contents. For the maintenance of cattle the crude fiber and protein contents in the weeds fell in to the

recommended range. Weed extracts have higher phenolic contents than several Mediterranean forage species.

Zhao *et al.* (2008) stated that for forage quality nitrogen (N) and non structural carbohydrate (NSC) concentrations are important. The results showed that in13 perennial cool-season grass the concentrations of N, neutral detergent fiber (NDF), acid detergent fiber (ADF), glucose, fructose, sucrose, fructans and starch were obtained from five plant species.

Enyisi *et al.* (2014) evaluate proximate composition of maize products were in the ranging of moisture (11.6- 20%), Ash (1.10 – 2.95%), crude protein (4.50-9.87%), crude fat (2.17-4.43), fiber 2.10- 26.70% and carbohydrate (44.60-69.60%). Except moisture significant differences ($P \leq 0.05$) present between the mean values of the nutrient contents of all the products. Mineral elements: Mg, phosphorus (P) and potassium (K) were found to be high compared to other elements: copper, zinc, calcium, sodium, manganese and iron.

Brahma & Singh (2014) determined chemical nutrient composition and phytochemical contents of the leaves of *Gonostegia hirta*. Proximate composition analysis showed that the leaves of *Gonostegia hirta* have moisture (85kcal/100g), crude fat (0.61kcal/100g), ash (35kcal/100g), crude protein (21.3kcal/100g) and carbohydrate (42kcal/100g). Mineral analysis showed essential minerals: manganese (3.0±0.05ppm), iron (21.99±0.17ppm), zinc (9.571±0.12ppm), copper (0.487±0.01ppm), magnesium (3.266±0.07ppm) and molybdenum (5.40±0.88ppm).

Mónica *et al.* (2015) compared the chemical composition and nutritional of dried leaf powder *Moringa oleifera* two different regions in Mexico. All samples of *M. oleifera* showed moisture contents ranging from 3.06-3.34%, lipids from 10.21-10.31%, fiber from 7.29-9.46%, ashes from 10.71 -11.18%, crude protein from 10.74-11.48% and carbohydrates from 54.61-57.61%.

The review on chemical evaluation of forage plants in Pakistan are summarized as follows.

Khan *et al.* (2005) reported forages sampling period affected soil Cu^{2+}, Zn^{2+}, Se^{2+}except Se^{2+}. During winter forages contained marginal deficient of Co^{2+} level, while in summer $Co^{2+}$and Se^{2+} were deficient. During the summer moderate deficient levels of $Fe^{2+}$and severed efficient level of Zn^{2+}, $Mn^{2+}$and Co^{2+}. During winter forage Co^{2+}, Fe^{2+}, Zn^{2+}, $Mn^{2+}$and Se^{2+}were deficient.

Khan *et al.* (2006 a) reported that due to seasonal changes soil micro-mineral sex except zinc, while forage iron, zinc and selenium were affected. For normal growth during both seasons all soil mineral levels except cobalt and selenium were sufficiently high for requirements of plants. During winter soil Fe, Zn, Co and Se levels were higher and during summer Cu and Mn lower.

Khan *et al.* (2006 b) reported macro and micro minerals levels of herbage forages of Leiah District of South-Western Punjab, Pakistan. Ca and Mg of grazed for ages had different concentrations. Micro minerals content varied among the grazing pasture forages i-e Cu levels lower and slightly low to moderate of Zn contents.

Kiyani *et al.* (2007) reported that *Caragana ambigua, Clematis graveolens, Juniperus excels* and *Pistacia khinjak* of Hazar ganji Chiltan National Park Quetta have alkaloids, saponins, tannins and quantification of total phenolic contents. All three secondary metabolites were present in *Caraganaam bigua, Clematis graveolens, Juniperus excels* and *Pistacia khinjak* contained while absent in *Chrysopogon aucheri, Ferulaoo poda, Fraxinus xanthoxyloides, Pennisetum orientale, Saccharum griffithii* and *Verbascum erianthum.*

Khan *et al.* (2007) determined Ca, Na, Cu and Zn levels in forage plants of Punjab, Pakistan. Results showed that from summer to winter minerals were significantly increased, with plant maturity generally.

Hussain & Durrani (2008) determined some grasses and shrubs mineral composition including K, P, Cu, Mn, Fe and Zn and three phonological stages of Harboi range land, Kalat, Baluchistan. K, P, Fe and Zn contents differences between grasses and shrubs were non-significant. In shrubs the concentration of Cu was higher than grasses while in grasses Mn was higher than shrubs. Among the various phonological stages the K, P, Mn, Fe and Zn were insignificant different. K and Fe were sufficient in these plants while P and Zn were deficient.

Rahim *et al.* (2008) work on the nutritive analysis of twelve land grasses of Himalayan Pakistan. At early bloom stage the mean *in vitro* dry matter digestibility (IVDMD) was58.4±2.05%and metabolizable energy (ME) was 7.74±0.29 MJ/kg DM, while at maturity IV DMD was 43.3±1.89% and ME 5.64±0.25MJ/kg DM. It is suggested from macro and micro mineral composition, IV DMD, RP and PIR values of these land grasses are suitable for feeding to live stock.

Ahmad *et al.* (2008 b) reported different plant parts such as leaves, leaflets and pods, which were lavishly grazed by the grazing animals in Soone Valley, Punjab, Pakistan, were separated and analyzed for macro-minerals, Na, P, K, Ca and Mg. It was concluded that most of the forage samples were sufficient in Na, P, K, Ca and Mg for the requirements of ruminants grazing there in. Comparatively, the macro-mineral concentrations in pods were higher than those found in the leaves and leaflets showing no need of mineral supplementation.

Abbasi *et al.* (2009) analyzed legumes and grasses comparatively by nutritionally and their mineral contents (N, P, K, Ca, Mg, Fe, Mn, Cu and Zn). Results showed that white clover forage had quality and high nutritional value and mineral nutrient contents. In 2–3 fold to the content found in the grass macro nutrients P (0.32%), K (1.96%), N (2.61%), Ca (1.10 %) and Mg (0.29%). Micro nutrients also showed similar concentration.

Cheema *et al.* (2010) determined that different nitrogen rates significantly affects crop growth rate (CGR), dry matter (TDM), seed yield, oil yield, protein content and leaf area duration (LAD). During both years of study for all these traits the highest N level (120 kg ha-1) produced maximum values as compared to minimum in control. Nitrogen application time did not significantly affect TDM, CGR, protein and oil contents while split application of nitrogen (½atsowing+½atbranching or flowering) significantly higher in seed and oil yield and at sowing/ its split application as ½at branching+ ½at flowering than full nitrogen.

Bahadur *et al.* (2011) evaluate the nutritional and elemental analysis of some fodder plant species like *Amaranthes viridus, Chenopodium album, Medicago denticulata, Setaria viridus* and *Sonchus arvrnsis*. Elemental composition and proximate composition of crude fibers, proteins, fats and oils, ash, moisture and carbohydrates contents of aerial parts was determined by using Atomic Absorption Spectrophotometer (AAS). A total of 16 elements; Na, Mg, Rb, Al, Si, P, S, K, Ca, Fe, Ti, Ni, Cl, Mn, Cu and Zn were observed.

Tahira *et al.* (2012) evaluate the elemental and nutritional values from aerial part of five medicinal plants *Convolvulus arvensis* L., *Rumex dentatus* L., *Physalis divaricata* D. Don, *Achyranthes aspera* L. and *Chenopodium ambrosiodes* L., of District Sawabi Khyber Pakhtoon Khwa, Pakistan. Elements were determined by Atomic Absorption Spectrophotometer (AAS); a total 10 elements five micro and five macro elements like Na, Al, Fe, Mn, Zn and K, P, Mg, Ca and S were measured and nutritional analysis like total ash, crude protein, crude fiber, nitrogen free extracts, acid detergent fiber, neutral detergent fiber, hemi-cellulose, carbohydrate and moisture contents of wild medicinal plant species were determined and showed significant results.

Ghani *et al.* (2014) evaluate nutritional and mineral contents of four medicinal plants like *Achryanthus aspera, Solanum nigrum, Peganum hermala* and *Mentha longifolia* of Khushab Valley, Pakistan. Proximate analysis showed that in *Mentha longifolia* protein (7.491%), ash (22.79%) was highest and in *Peganum hermla,* fats (12.595%) carbohydrate (75.23%) and in *Achryanthus aspera* moisture (6.82%) was

present. For elemental analysis Absorption Spectrometric method was used for essential elements such as Cu, Na, Fe, Cd, Mn, Ni, Pb and Cr were present in medicinal plants.

No work can be traced from Darazinda on the nutritional and mineral composition of forage plants. This gap of knowledge is being filled during this study.

E. Ethnobotany

Macia (2004) documented 37 palm species used by the Huaoranisin Huaoraniin Amazonian Ecuador. In eight ethnobotanical categories one hundred and ninety-one different uses were recorded. For house construction and human food (64.9%) species, for domestic utensils (59.4%) and for hunting and fishing implements (54.6%) species were used.

Tardío *et al.* (2006) reported a total of 419 plant species belonging to 67 families from Spain. Different food categories considered out of seven in which green vegetables was the largest group, followed by plants used for preparation of beverages, wild fruits, seasoning plants, sweets, preservatives and other uses.

Mizaraite *et al.* (2007) reported the possibilities of private forests in Lithuania of increasing the use of wood from bio energy purposes. Consumption and potential of wood fuel were investigated. Okello & Sesgawa (2007) documented ethnobotanical study in Ngaisub country in Apac District. The most commonly harvested parts were roots which greatly affect the regeneration of medicinal plants. Plants collected from the wild were more effective.

Miah *et al.* (2009) reported that in Bangladesh family size, income, amount cooked and burning hours significantly affected the amount of wood fuel used per family/ year. Results showed that fuel woods consumed per family per year were 4.24 tones. Fuel biomass was (40%) of homestead forests.

Meena & Yadav (2010) reported 31 species, belonging to 31 genera and 22 families medicinally used by the people of Rajasthan including Chittorgarh, Udaipur, Dungar pur and Banswara districts.

Patel & Petel (2013) conducted ethnobotanical study of tribal of R.D.F. Poshina forest range of Sabarkantha District, North Gujarat, India. About 35 plant species belonging to 24 families. Plant species of these forest areas are documented with their local names, botanical names, family and their ethnobotanical uses.

Kumari *et al.* (2013) documented 70 plant species belonging to 43 families that have been used for medicinal purposes by the Gujjars in Trikuta hills. These have been arranged alphabetically and the information has been provided about their botanical name, family, local and English name, plant part used, and the method of administration.

Kaur & Vashistha (2014) conducted ethnobotanically study of 71 species belonging to 67 genera and 38 families from district Karnal, Haryana (India). Among these families Leguminosae (8 species) was dominant followed by Asteraceae (7 species). Major plant parts used are leaves, fruits, seeds and roots for the preparation of medicines. Medicinal plants are listed with plant part used, botanical name, family, local name, diversity status and use value of each ethnomedicinal species.

Moussaoui *et al.* (2014) reported an ethnobotanical survey of city Meknès. About 194 species distributed in 165 genera and 72 families were observed. Lamiaceae (18%) Aseraceae, (17%), Apiaceae (14%) and Fabaceae (10%) were the most represented families. Swati and Kanungo (2014) collected ethnobotanical information of medicinal plants used by meager community of Uraon of Surguja district Chhattishgarh India. About 17 plant species belonging to 14 families majority of them are tree were documented. In terms of plant parts use stem/bark and leaf were in top priorities.

In Pakistan ethnobotanical studies present as follows:

Gillani *et al.* (2003) observed 54 plant species used medicinally and various local uses of these in Parachinar (Kurram agency). For stomach diseases most of the plants were used. In this area average daily fuel wood consumption was 60 kg/house hold/day.

Hussain *et al.* (2004) listed eleven species in South Waziristan Pakistan used for various timber purposes. In this area *Pinus wallichiana*, *Populus afghanica* and *Cedrus*

deodara were used best timber wood. Wazir *et al.* (2004) reported 41 species, belonging to 29 families from Chapursan Valley District Gilgit. Majority of these plants were used medicinally.

Jabbar *et al.* (2006) reported 29 species from southern Punjab, Pakistan including *Azadirachta indica, Lamiumam plexicaule, Mallotus philippinensis, Citrullus colocynthis, Withania somnifera* used to treat helminthes is in ruminants.

Hussain *et al.* (2006) evaluated 67 species belonging to 40 families from South Waziristan Pakistan. These plants used in traditional health care system. The most important medicinal plants in this area were *Morchella esculenta, Citrullus colocynthis, Mentha longifolia* and *Thymus serpyllum* etc.

Badshah *et al.* (2006) reported 26 species belonging to 19 families having 19 trees and 7 shrubs South Waziristan Pakistan. These plant species were used as fuel wood. In this regard 100% of the respondent species were *Monotheca buxifolia, Olea ferruginea* and *Quercus baloot*.

Ishtiaq *et al.* (2007) documented that for cure urinary calculi, heart pain, rheumatism *Solanumm iniatum*is used, as a wound healer *Momordica balsamina* leaves used; as anti-cancer, for blood pressure and contraceptive *Allium sativum* bulb juice used, roots of *Boerhavia diffusa* used edema, anti-jaundice, anemia; *Capsicum annuum* fruit for evil eye and giant, yellow fever; *Corriandrum sativum* seeds used as diuretic, antispermatogenesis; *Raphanus sativus* seeds for syp hilis.

Khan and Khatoon (2007) reported 48 species from Bugrote Valleys in District Gilgit including shrubs and trees used as medicine, fuel, shelter and agricultural tools. Primarily the population of this region depends upon plants used for domestic needs and cultivation.

Hussain *et al.* (2008) listed 41 plant species with 39 genera and 27 families from District Sahiwal and also reported 49 traditional recipes used for the treatment of helminthosis in animals. Qureshi & Bhatti (2008 a) reported 51 plant species with 43

genera and 28 families from Nara Desert used medicinally by local inhabitants. The most dominant families were Amaranthaceae and Boraginaceae.

Sardar & Khan (2009) documented 102 plant species belonging to 62 families and 93 genera used by local inhabitants as vegetables, fodder, fuel, furniture, brushing teeth, making baskets and mats, medicinal and edible fruits of Tehsil Shakargarh, District Narowal.

Ajaib *et al.* (2010) listed 38 plant species belonging to 25 families and 36 genera from District Kotli, Azad Jammu & Kashmir, Pakistan. These plants were used as a medicinal, fuel, shelter, fodder and in making agricultural tools by local inhabitants.

Tareen *et al.* (2010) reported 61 medicinal plants species belonging to 34 families and 56 genera from Kalat and Khuzdar, Baluchistan. These plants were traditionally used as medicines for treatment of various diseases of women. Dominant family was Lamiaceae (9 species) with maximum number of species followed by Asteraceae (7species), Solanaceae, Apiaceae, Papilionaceae (Leguminosae) and Zygophyllaceae with 3 species each.

Qasim *et al.* (2010) listed 48 wild coastal plant species belonging to 26 families from Hub, Lasbela District Baluchistan. These plants were used for 12 different purposes like fodder (56%), medicine (22%), other uses (8%), food (5%), household utensils (5%) and for increasing milk production in cattle (3%). Most family was Poaceae (29%) followed by Chenopodiaceae and Amaranthaceae (10%), Convolvulaceae and Mimosaceae (6%).

Amjad *et al.* (2015) documented that 78 spp (44.07%) of the plant species were medicinally used. Frequently leaves (69 spp., 42.86%) were used for the preparation of indigenous recipes and for fodder from Pir Nasoora National Park, Azad Jammu and Kashmir.

Rashid *et al.* (2015) listed 73 shrub and trees species belonging to56 genera and 37 families were used ethnomedicinally for the treatment of various ailments from of

Himalayan region of Azad Jammu and Kashmir, Pakistan. Medicinal plant diversity revealed that dominating family was Rosaceae (9spp.), Moraceae (7spp.), Pinaceae, Euphorbiaceae, Mimosaceae, Rhamnaceae (4spp.each), Oleaceae (3spp.), Acanthaceae, Apocynaceae, Ebenaceae, Lythraceae, Caesalpinaceae, Fagaceae, Verbenaceae Papilionaceae (2spp.each) while remaining 22 families were represented by one species each. The highest FIC was recorded for Gastro-intestinal disorders (0.58) followed by nail, skin and hair disorders (0.44).

Choudhury *et al.* (2015) reported 75 plant species of 68 genera belonging to 43 families from North Tripura district, Tripura, North East India, which were used for the treatment of 15 disease categories. Leaves were the most frequently used plant parts and most of the medicines were prepared in the form of extract and administered orally. Highly effective plants were *Justicia adhatoda, Pajanelia longifolia, Catharanthus roseus* etc.

Malik *et al.* (2015) reported 86 plant species belonging to 38 families and 67 plant species belonging to 29 families from Pothwar (Potohar) Plateau of Punjab and Cholistan desert, Pakistan. They compare and document the therapeutic flora, their remedial use, and the traditional knowledge used frequently by the residents of these plants species. Similar plant species were 10.5% present in the studied areas.

Ethnobotanical studies in Khyber Pakhtunkhwa present as follows:

Ahmad *et al.* (2004) documented 41 wild plant species of 40 genera and 33 families from Galliyat areas District Abbottabad. Local people used these plants for treatment of various diseases. Hussain *et al.* (2004) documented eleven species from South Waziristan Pakistan. These plants were used for various timber purposes. The best timber wood in the area *Populus afghanica, Cedrus deodara* and *Pinus wallichiana* were declared.

Wazir *et al.* (2007) listed 20 medicinal halophytes plants belonging to 18 families from District Karak. These medicinal plants are wide spread and are common up to salt

range of Bahadar Khel. Manan *et al.* (2007) reported 52 plants belonging to 35 families from Upper Dir. These plants were used for treatment of different diseases.

Shah and Hussain (2008) documented 76 plants belonging to 52 families from Mount Elum District Bunir. The species used 47% medicinal plants, 21% fuel wood, 19% honey bee species, 20% timber yielding species, 9% fruit species and 4% poisonous species.

Badshah & Hussain (2008) documented 20 plants species belonging to 20 genera of 18 families Village Tabai, South Waziristan, Pakistan. Ten plant species were affectively used for women diseases for example: stop menses, excessive menstrual flow and tightening the flagged breast. The remaining10 plants were used for curing various diseases in children.

Kamal *et al.* (2009) reported 50 plant species belonging 30 families from District Bannu. These plants used medicinally for curing various diseases like cough, stomach problems, diarrhea, dysentery and constipation. Zahoor *et al.* (2009) listed 52 plant species belonging to 45 genera and 30 families used traditionally from Darra'e Pezo District, Lakki Marwat, Pakistan. 47 plant species were used as medicine.

Khan *et al.* (2009) recorded 50 plant species from F.R. Bannu which are being used locally for medicinal and other purposes. The dominant families were Moraceae and Poaceae with 5 species.

Akhtar & Begum (2009) documented 55 plants belonging to 38 families Jalala area District Mardan. More than 42 families were used for ailments. *Boerhavia diffusa* and *Calotropis procera* used for multipurpose medicinal uses. Taj *et al.* (2009) reported 29 plants species belonging to 25 families from Godi Khel District Karak. These plants were used for medicinal purposes.

Hazrat *et al.* (2010) carried out ethnobotanical study in Usherai Valley and recorded 50 wild herbs, shrubs and trees species, belonging to 32 families. These plants were used medicinally by the inhabitants in the valley.

Attaullah *et al.* (2010) reported 27 species belonging 19 families from Kurram River beds of District Bannu. These plants were used in traditional health. Badshah *et al.* (2010 b) listed 41 species from Parachinar Kurram Valley. These plants were used locally for various purposes.

Jan *et al.* (2011) carried out ethnobotanical exploration of Dir Kohistan Valleys. The results showed that 65 species in which 62 species belonging to 47 angiospermic families while 3 were of gymnospermic families. Mostly these plants were used medicinally and for other purposes.

Mahmood *et al.* (2012) reported 25 common medicinal plants belonging to the 14 families district Kotli Azad Jammu and Kashmir (AJK), Pakistan. In these indigenous medicines herbs (56%), shrubs (28%) and trees were 16%.

Zereen *et al.* (2013) reported the flora of eight districts of Central Punjab, *viz.*, Faisalabad, Pakpattan, Lahore, Nankana Sahib, Narowal, Sahiwal, Sialkot and Vehari. A total number of 102 plant species were recorded belonging to 90 genera and 38 families. These plants were being used by local people for various purposes e.g. medicine, fuel, fodder, vegetables, fruits and for making mats and baskets.

Noman *et al.* (2013) documented 31 potential medicinal plants belonging to 21 families which were traditional used in the Omara, Gawadar, Pakistan. Out of total 45% were used by local communities as medicine and 26% plants have multiple uses and the remaining are utilized as fodder (29%).

Ahmad *et al.* (2013) reported 93 plants species belonging to 80 genera and 56 families Patriata (New Murree) of district Rawalpindi in Pakistan. Out of these medicinal and fodder purposes (27.93% each), followed by fuel (16.90%), fruit (6.55%), vegetable (5.52%) and ethno-veterinary (3.79%).

The review suggested that no work is reported from Darazinda.

F. Conservation Status of Plants

Maria *et al.* (2005) studied one of the richest flora in the world is Brazil with more than 56,000 species (excluding fungi) which is nearly 19% of the world flora. Monocotyledons (in which 45% of the species are endemic) that was more reliable than any other flora.

Prakash (2005) reported 60 threatened medicinal plant species from Himalayan region out of which in the sampling plots 54 species occurred. Critically endangered species were 22%, endangered were 16% and vulnerable were 27%. Endemic to the Himalayan region 32 were threatened medicinal plant species.

Raimondo *et al.* (2007) determined red list for South Africa's plant species and almost70% of threatened plant taxa which occur in the Fynbos Biome. In the past decade new threats have appeared.

Ture & Bocuk (2007) reported Eskışehır Province Turkey flora in which *Elymus*, *Eremopyrum* & *Lolium*, *Alopecurus*, *Melica* and *Secale* 3 each *Bromus*10 sp., *Poa* 9, *Aegilops* 8, *Avena* 5, *Phleum*, *Stipa* and *Hordeum* 6 each were found. The phyto geographic elements was East Mediterranean 3 (2.4%), Irano-Turanian 12 (9.6%), Mediterranean 6 (4.8%) and Euro-Siberian 20 (16.0%). It can be seen that four (3.2%) species were endemic, 3 in LC (*Least Concern*) categories, one taxonis in VU (*Vulnerable*) and 1taxain DD (*Data Deficient*).

Fischer & Bliss (2008) studied values, beliefs and socio economic contexts through in depth individual and focus group interviews in order to understand the irmotivations to conserve oak. Complex motivations by owners had done in order to conserve oak.

Kimmel *et al.* (2009) studied the diversity and status of wetlands in Estonia and described them in problems and challenges of sustainable wetland use. The wet land preservation and use the main challenges are: (1) By attaining the sustainable peat resources and ensuring the restoration of cut-away peat lands use; (2) valuable semi-

natural wet lands maintenance and traditional management; (3) drained wetland areas management and sources of green house gases.

Tandon *et al.* (2009) stated that the valuable plant genetic resources in North east India region are being lost due to varied human activities including fuel wood and shifting cultivation which leads to the depletion of forest cover. In order to meet the growing requirements of food, fodder, fiber, health, water and other needs, there is an urgent need for conservation, management of plant genetic resources sustainable utilization and of this region.

Bulut & Yilmaz (2010) reported 3504 endemic plants from Turkey, in which 12 are extinct and 3492 (99%) are still being threatened. Endemic plants were 61 in Kemaliye region, extinct were 5 and threatened were 54 (88%). Some suggestions about conservation and management of such plants by considering their threatened categories have also considered.

Dansi *et al.* (2010) worked on *Digitaria longiflora* and *Digitaria horizontalis* by farmers as putative parents of cultivated fonio in Benin. Interesting agronomic traits (erect habit; stem long, big, strong and resistant to lodging; panicle long and riching rains; large sized seeds) showed by *Digitaria longiflora* that are useful for the improvement of cultivated fonio. The crop is under threat in the study area. Therefore, efforts should be made to preserve its diversity and increase its use to combat food in security and mal nutrition.

Zhang & Wenming (2010) reported that in Shanxi the protect ion medicinal plant species of *Taxus chinensis* var. *mairei*, their ecological and biological characteristics of its populations were analyzed and investigated. The species diversity, floristic composition and life form spectrum of *Taxus chinensis var. mairei* forests showed the features of both subtropical regions and warm-temperate.

Ahmad *et al.* (2010 a) reported two major divided into sixteen sub-communities along 358km long near motor way. The study provides basic information of

conservation and implementation of oriented planning and management in order to preserve and improve the road verges of M-2.

Rampilla *et al.* (2015) carried out floristic diversity and phytosociological studies of the Indrakiladri sacred grove, Krishna district, Andhra Pradesh, India. Important value index showed that in east side & west side, *Azadirachta indica* was predominant and dominant species in south side and north side was *Leucaena leucocephala*. In east side for dominance the Simpson value index and Shannon-weiver index of herbs and shrubs showed highest species diversity. The above findings showed that conservation practices are immediately needed and recommendation of local community participation for successful conservation.

Work on conservation status of Pakistan is reviewed as follow:

Ahmad *et al.* (2007) worked *in-situ* conservation of ten stuffy sites in the valley of mountainous region of Pakistan. Variation in their ecological parameters was also observed. Some anatomical, morphological as well as physiological adaptations are mainly responsible for perpetuation and survival of harsh habitat of this environment.

Hadi *et al.* (2009) reported excellent conservatories of plant natural resources in Muslim graveyard of Palosi, District Peshawar. In graveyards the people hesitate of cutting plants and grazing animals. In graveyard *Peganum harmala*, *Aerva javanica*, *Capparis decidua* and *Prosopis farcta* were common were almost absent in the study areas.

Hussain *et al.* (2010 b) investigated 135 endangered plants from Karachi which including 8 extinct species including *Tecomella undulata*, endangered species10, rare species 25 and vulnerable species were 28.

Alam & Ali (2010) stated that exclusively endemic specie is *Androsa cerussellii* in District Gilgit, Pakistan. Originally it was reported from Gharesa glacier, Gilgit district. Are-assessment (i.e., 2003-2008) showed that this species now restricted in two localities of Hunza (Gilgit) i.e. Shatu Bar and Ultar Nullah.

Abbas *et al.* (2010) investigated the *Cadaba heterotricha* conservation status in Pakistan. Studies based on 4 years extensive field like geographic range population, size and habitat of *Cadaba heterotricha* classified as endangered (EN) species in Pakistan.

An effort is made in the present study to record present conservation status of the plants of Darazinda.

Aims and Objectives:

Following are the objectives of the present study;

- To prepare flora of the area by finding floristic diversity and its ecological characters.
- To evaluate the flora of the area regarding its various uses like,
  - Medicinal
  - Fuel wood
  - Furniture making
  - Plants used for food, forage & fodder
  - Miscellaneous uses
- To observe the diversity of vegetation and its ecological relationship.
- To establish plant communities in various localities of the area.
- To find out nutritional and chemical composition of important palatable species of the area.
- To analyze the soil characteristics of the research area.
- To make ethnobotanical profile of the plants with reference to their medicinal uses.
- To know gender role in utilization and conservation of the plant resources of the area.
- Evaluate the present conservational status of the flora and to suggest measures for its conservation and sustainable use.

MATERIALS AND METHODS

CHAPTER-3

MATERIALS AND METHODS

Floristic composition and its ecological characters:

Floristic composition

Plant species collection from Darazinda was carried out during 2013-2014. The collected plant species were identified with the help of Flora of Pakistan (Nasir and Ali, 1971-2007; Ali and Qasir, 2010) and conformation was done at Botany Department Herbarium, University of Peshawar. A complete floristic list of collected plant species containing Angiosperm, Gymnosperm, Bryophytes, Fungi and Pteridophytes was compiled. Plants were arranged alphabetically and assigned to their respective families.

Biological Spectra

1.1. Life form classes

Following life form classes were established according to Raunkiaer and Hussain (1934, 1936):

i. Therophytes (Th)

These are annual plants which produced seeds and complete their life cycle in one year. Reproduction takes place by means of spores and seeds.

ii. Geophytes (G)

These plants have perenating buds below the soil surface. This group contained rhizomes, sub-merged, bulbs, tubers, corms, free floating and leaf floating water plants.

iii. Hemicryptophytes (H)

In this group death of aerial portions of herbaceous perennials plants occurred at the end of growing seasons by leaving a perennating bud above or below the surface of ground.

iv. Chamaephytes (Ch)

Perennating buds of this group were located close to surface of ground at height of 25cm or below ground surface.

v. Phanerophytes

a. Nanophanerophytes (NP)

On aerial shoots perenating buds were borne from 0.25 m (25 cm) to 2 m (0.8 ft to 6 ft) above the surface of ground.

b. Microphanerophytes (MicP)

Perenating buds of shrubby plant species located above 2 m to 7.5 m (6 ft to 25ft) height from ground surface.

c. Mesophanerophytes (MesP)

Perenating buds of small trees located from 7.5 m to 30 m (25 ft to 100 ft) height above the ground surface.

d. Megaphanerophytes (MgP)

Perenating buds of tall tree are located above the ground surface above height of 30 m (100 ft).

Quantitative spectra of the flora were calculated by Raunkiaerian method:

i. Life form spectrum of Raunkiaerian =

$$\frac{\text{No. of spp. Falling in a particular life form}}{\text{Total number of all the species}} \text{ class} \times 100$$

ii. Calculation of quantitative life form spectra proposed on the basis of each specie importance value (IV) encountered by quadrat method of Cain & Castro (1956) and Qadir & Shetvy (1986).

1.2. Spectra of Leaf Size

Plants were classified into various quantitative leaf sizes classes following Raunkiaer, (1934).

S. No	Leaf Classes	Leaf area
I	Leptophyll (L)	up to 25 mm^2
Ii	Nanophyll (N)	25 to 225 mm^2
Iii	Microphyll (Mic)	225 to 2025 mm^2
Iv	Mesophyll (Mes)	2025 to 18225 mm^2
V	Macrophyll (Mac)	18225 to 164025mm^2
Vi	Megaphyll (Meg)	larger than Macrophyll

Calculation of Raunkiaerian spectrum was as follows:

$$\text{Spectrum of Leaf size} = \frac{A}{B} \times 100$$

A= Number of species falling in a particular leaf-size class
B= Total number of all species for that community

a. Quantitative leaf size spectra were calculated using importance value indices of plant species following Cain & Castro (1956).

2. Vegetation Structure or Phytosociology

Phytosociological studies were carried out in 6 representative selected sites (Bargholay, Surghar, Anghar gara, Pasta and Spin ghar). Site selection was due on the basis of habitats, altitude, physiognomic contrast and species composition. Vegetation analysis was done using different quadrates according to habit of the species following method;

S.No	Plant catagories	Number & Quadrat size
i.	For trees	5 quadrates of 10 x 10m
ii.	For shrubs	10 quadrates of 5 x 5m
iii.	For herbs	15 quadrates size of 1x1m

Frequency Density and cover of each species were measured and the values were changed to their relative values. Establishment of plant communities were based on highest importance values.

2.1 Density

Average No of individuals of a species in area or per unit area is called density.

$$\text{Density} = \frac{\text{No. of individuals of a species}}{\text{Total No. of Quadrats}}$$

$$\text{RD (Relative Density)} = \frac{\text{Density of a species}}{\text{Total densities of all species}} \times 100$$

2.2. Cover of Herbage

The vertical projection of crown or shoots of foliage species to the surface of ground is called Cover. Cover is expressed as percent of a surface area/fraction.

$$\text{Cover} = \frac{\text{\% Cover of a species}}{\text{Total cover of all species}}$$

$$\text{Relative Cover (RC)} = \frac{\text{Cover of a species}}{\text{Total Cover of all species}} \times 100$$

2.3 Frequency

The percentage occurrence of species in an area is called frequency. Determination of frequency was as follow:

$$\text{Frequency} = \frac{\text{No. of quadrats in which a species was present}}{\text{Total number of quadrats applied}} \times 100$$

$$\text{Relative frequency (RF)} = \frac{\text{Frequency of a species}}{\text{Total frequencies of all species}} \times 100$$

2.4. Importance Value:

Importance value is the sum of all the RF, RD and RC values. Plant communities were established on the basis of highest importance values and named after three leading species.

IV = RD+RC+RF

2.5. Determination of Similarity index (ID or ISMO):

Sorensen's index (Sorensen, 1948), modified by Motyka *et al.* (1950) was used for calculation of Similarity index. The similarities among the stands were compared by using following formula;

$$\text{ID Or ISMO} = \frac{2W}{A+B} \times 100$$

Where;

ID =100 - Index of Similarity

W= Sum of lowest quantitative value of the species pair common to both communities,

A =Sum of quantitative value of all species in community A,

B=Sum of quantitative value of all species in community B,

2.10. Cluster Analysis

A technique of classification for placing similar objects into a clusters/group is called Cluster analysis (CA). The hierarchical tree like arrangement is called a "dendrogram". These sampling units of clusters/group represent different biotic communities. The classification of community was performed following Multivariate Statistical Package (MVSP) programme. Dendrograms were constructed for vegetational stands of the area and compositional dissimilarity among stands was considered in classification.

2.11. Analysis of Principal Coordinate:

Multivariate statistical package (MVSP) is a technique used for measurement of internal structure of matrices. In ecology Analysis of Principal coordinate procedure is most widely used. For measurement of resemblance between communities this analysis is used. In order to determine dissimilarity of 20 stands, Principal Coordinate and Cluster analysis was applied.

3. Edaphology:

Soil samples from five different localities were collected from 0-15 cm depths for physicochemical characteristic and elemental analysis of the soil.

3.1. Mineral composition of Soil:

The soil samples were dried in air tight oven at 70 °C for 48 hour following AOAC (1990). For N, O, Mg, Al, Si, P, K, Ca, Ti and Fe soil sample were analyzed by using Spectrometer of Atomic Absorption (Anon., 1982; 1985; Galyean, 1985).

3.2 Soil Texture

For soil texture determination Hydrometeric method was used (Bouyoucos, 1936) and for textural class determination textural determination triangle method was used (Brady, 1990).

3.3. Electrical Conductivity (EC) and soil pH

For soil EC and pH determination Conductivity meter was used following Richard, (1954) method.

4. Palatability of Vegetation

The degree of plant species palatability was determined by observing the live stock grazing level during the field study. Cow, camels, goats and sheep Preferences were noticed in order to determine palatability. Plants classification into palatable and non-palatable classes was done by following Hussain & Durani (2009 a) method.

S.No	Classes of Palatability	Different categories of livestock
i.	Non Palatable (NP)	Not grazed by livestock
ii.	Highly Palatable (HP)	Plant species highly preferred by the livestock
iii.	Mostly Palatable (MP)	Plant species with average likeness by the livestock
Iv.	Less Palatable (LP)	Plant species with less preference by livestock
v.	Rarely Palatable (RP)	Plant species rarely grazed when no other choice was available

5. Chemical analysis of some forage plants

Eight palatable plants species (*Convunvulus Prostratus*, *Portulaca quadrifida*, *Taraxacum officinale*, *Albizia lebbeck*, *Olea ferruginea*, *Salvadora oleoides*, *Suaeda fruticosa* and *Vitex negundo*) were collected from the research area. For mineral and proximate analysis these plants were dried, powdered and stored in plastic bags.

5.1 Mineral composition

Plant samples were dried at 70 °C in air tight oven for 48 hour following method of AOAC (1990). For mineral composition of C, N, O, Na, Mg, Si, Al, P, S, Cl, K, Ca, Cu, Fe the powdered plant materials were analyzed by using Atomic Absorption Spectrometer (Anon., 1982; 1985; Galyean, 1985).

Statistical Analysis

Statistically t-test was applied for elemental contents of herbaceous and woody plant species.

5.2. Proximate Analysis

i. Determination of the moisture content

Equipment and glassware

Electric balance, Electric oven, Petri dishes and desiccators

Procedure

In a clean pre weighted Petridis 2 gram powder of a respective plants sample was taken (W1). The Petri dish was partially covered with lid, placed in electric oven at temperature of 105°C for 4-6 hours, and then transferred to desiccators for 30 minutes to cool down; the petridishes was weighted again (W2). This procedure was adopted for all the eight plants. The following formula for calculating percent moisture contents was used (AOAC, 2000).

% Moisture = X/wt of sample ×100

Where

W1= Wt of Petri dish + powder before drying

W2 = Wt of Petri dish + powder after drying

X = W2 - W1= Weight of the sample (after heating)

ii. Ash Contents

Two grams powder of each plant was incinerated for 8 hrs in muffle furnace at 600° C. After completion of incineration and cooling down, weight of the ash was

Th. 14737

determined following AOAC (1984) protocol. Percent ash content of the plant was calculated as per following formula;

$$\% \text{ Ash Content} = \frac{\text{Wt of ash}}{\text{Wt of fresh Sample}} \times 100$$

iii. Nitrogen / Crude Protein

For N/ crude protein determination "Macrojeldahl distillation method" was adapted.

Reagents

32% NaOH, Conc. H2SO4, 4% Boric Acid, K2SO4, CuSO4 and 0.1 N standard HCl solution.

Mixed indicator

Mixed indicator was prepared by dissolving 0.016g of methyl red and 0.03g of bromocresol green in 100 ml of alcohol.

Apparatus

Kjeldahl flask, digestion and distillation apparatus, burette

Procedure:

For protein determination micro Kjeldahl procedure was used (AOAC, 1984). Nitrogen was collected from the digested sample through distillation process. By semi automatic titrator 4% Boric acid was titrated against 0.02 H_2SO_4. Crude protein was calculated by following formula:

$$\text{Crude protein} = \frac{(H_2SO_4 - \text{blank}) \times N \times 6.25 \times 14.01}{\text{Sample weight} \times 10000}$$

iv. Crude Fate/ Fixed oil Determination

Fat determination (ether extract)

Chemicals, Equipment and glassware

H.T (Tecator), Petroleum ether with boiling point

Soxhlet extraction apparatus, Extraction thimbles, water bath, heating mantle.

Procedure:

For ether extract procedure reflux apparatus was used, which boils and condense ether and allows to passes through sample (plant powder). Ether extract was calculated by following formula (Galyean, 1985):

$$\% \text{ Crude Fat} = \frac{X}{\text{Wt of Sample}} \times 100$$

X = W2 - W1= Wt of the extract

W1 = Empty flask Wt

W2 = Empty flask Wt + sample Wt after solvent evaporation.

v. Determination of crude fiber

Glassware and Equipment

Muffle furnace, apparatus for crude fiber extraction (Fiber Tec System M. Tecator), Suction pump and oven

Reagents

Sulphuric Acid (H_2SO_4) 0.255N

Sodium Hydroxide (NaOH) 0.313 N

Asbestos, Ethyl Alcohol and Petroleum Ether

Procedure:

For crude fiber determination sample was digested with 1.25% H_2SO_4 and 1.25% % NaOH for 30 minutes. The dried insoluble residues were weighed and ashed, which was crude fiber (AOAC, 1984)

$$\% \text{ Crude fibers} = \frac{\text{weight loss in ignition}}{\text{Wt of sample}} \times 100$$

vi. Carbohydrates contents

Carbohydrates contents were determined by subtracting the sum of the % weights of proteins, fat, crude fibers, ash, and moisture contents from 100 (Merrill & Watt, 1973).

% Carbohydrate = 100 – (Protein +fats +crude fiber +ash + moisture contents).

5. Ethnobotanical Profile

Classification of plant species into different categories (availability, collection, growth and part used) was done on the basis of their uses by locals. The information was collected from personal observation and interviewing local elder knowledgeable person during the field surveys.

6. Plants Status Conservation

Plants were divided into various conservational classes by using criteria of IUCN (2001) as follow:

Character	Class	Status
Availability	**0**	Uncommon or very rare
	1	Rare or less common
	2	Occasional
	3	Abundant
Growth	**0**	Regrowth in more 3 years
	1	Regrowth within 3 years
	2	Regrowth within 2 years
	3	Regrowth within 1 year
	4	Regrowth in a season
Collection	**0**	More than 1000 kg/yr
	1	Consumed from 500-1000 kg/yr
	2	Consumed from 300-500 kg/yr
	3	Consumed from 100-200 kg/yr
Part used	**0**	Root/Whole plant
	1	Bark
	2	Seeds, Fruits
	3	Flowers
	4	Leaves/Gum/Latex
Total Score	**1**	0 - 4 Endangered:
	2	5 - 8 Vulnerable:
	3	9 - 12 Rare:
	4	13 - 14 Infrequent:
	5	15 - 16 Dominant

RESULTS AND DISCUSSIONS

FLORISTIC COMPOSITION

CHAPTER-4

FLORISTIC COMPOSITION

1. Floristic composition and its ecological characteristics:

Floristic diversity of an area is the reflection of vegetation and plant resources. It is the total number of plant species within its boundaries. These species may be cultivated or wild. These resources of Plant are affected by over grazing, agriculture, interaction of anthropogenic and natural disasters. The flora of Darazinda consisted of 213 species belonging to 68 families, in which there were 163 dicotyledons species, 46 species of monocotyledons, two Pteridophytes (*Equisetum* and *Adiantum capillusveneris)* and Two species of fungi (*Agaricus campestris* and *Morchella esculenta)*. Among the families Poaceae (37Spp) was dominant followed by Asteraceae (19Spp), Solanaceae (12 Spp), Brassicaceae (10Spp) and Papilionaceae (9 Spp) were the leading families. Other families included Amaranthaceae (6 species) followed by Boraginaceae, Chenopodiaceae, Cucurbitaceae and Euphorbiaceae (5 Spps each), Apiaceae, Lamiaceae, Myrtaceae, Mimosaceae and Polygonaceae had 4 spps each, while Cyperaceae, Asclepiadaceae, Malvaceae, Moraceae, Rhamnaceae, Scrophulariaceae, Verbenaceae and Zygophyllaceae had 3 species each. Eleven families (Alliaceae, Arecaceae, Typhaceae, Aizoaceae, Apocyanaceae, Caryophyllaceae, Convolvulaceae, Plantaginaceae, Rubiaceae, Resedaceae and Tamaricaceae) had 2 species each while 30 families had 1 spp each (Table 1). There was variation in flora of five sights. Dominant plant species at bargholi was *Salvedora oleoides*, *Caralluma tuberculata* at Spin ghar, *Ficus palmate* at Angharghara, *Zizyphus nummularia* at Pasta and *Olea ferruginea* at Surghar. Soil of Bargholi and sur ghar was slightly alkaline while pasta, anghar ghara and spin ghar were alkaline.

Our results were supported by Malik & Malik (2004) & Durrani *et al*., (2005) observed all these families were present in their respective areas from Pakistan. Some other studies from abroad also support our findings like (Farag, 2014; Emad *et al*., 2013). Our results showed that Poaceea, Asteraceae and Solanaceae were the leading families in the investigated area. Mendez (2005) and Muthuramkumar *et al*., (2006) also reported

similar results of abundance same families in Laguna and Western Ghats. The floristic studies of Qureshi & Bhatti (2005), Parveen *et al.*, (2008), Qureshi & Bhatti (2008), Durrani *et al.* (2010), Shaheen and Shinwari (2012) also supported our findings. Both these leading plant families like Poaceae and Asteraceae with more species were reported from Chakwal, Pakistan (Hussain *et al.*, 2009). The genera, of *Euphorbia* and *Chenopodium* (5 Spps each) had highest number of species while remaining genera had one or two species (Table 1). Some other studies have also reported these genera of having more species in other areas (Badshah *et al.* 2013; Durrani *et al.*, 2005). Hussain *et al.* (2015) reported that in Hindukush valley Range, Pakistan the leading families were Papilionaceae, Asteraceae and Rosaceae were leading families from. In our results the first two families, (Papilionaceae and Asteraceae) were dominant. Rashid *et al.* (2011) reported that Poaceae, Asteraceae and Laminaceae were dominant families in Malam Jabba, Swat, Pakistan. In this study too the two families (Poaceae and Asteraceae) were dominant.

Climatic conditions and seasonal variation are very much noticeable in Pakistan. The different seasons, (spring, summer, autumn and winter) are categorized by a specific range of temperature, rainfall and humidity and influence floristic composition of an area. Seasonal variations showed that 64 species (30%) were in autumn, 93 species (43.6%) in winter, 164 spps (77%) in spring and summer 134 spps (63%). Mild to hot temperature, reasonable rainfall and good soil moisture in spring and early summer provided favourable ecological conditions, resulting in increase in species diversity during these seasons, while due to low temperature, low precipitation and low soil moisture, the winter season had minimum number of species. These results showed that summer and spring have high flora as compared to other seasons. The ecological behavior of plant like habit, life form, phenology, leaf size spectra and ethnoecological profile were also worked out. Studies by Durrani *et al.*, (2010) and Ahmad *et al.*, (2009) have also shown that spring and summer flora/ aspect have higher number of species than other aspects. The same results were observed in the present study.

According to habitat plants occurred in various habitats. The results showed that 41 spps (19.2%) occurred in wet habitats. In cultivated fields, 21 spps (9.8%) were in wet, while 24 spps (11.2%) were in irrigated (wet) fields, 127 spps (59.6%) were found in dry habitat.

The leaf lamina study showed that 177 species (83%) with simple lamina, 7 species (3.2%) were aphyllous, while 29 species (13.6%) had compound lamina. Presence of aphyllous plants indicated harsh environment conditions. From other parts of Pakistan same species have also been reported by (Durrani *et al.*, 2005; Badshah *et al.*, 2006; Durrani *et al.*, 2010). Similarly Sher *et al.*, (2003) also recorded similar results from Udigram Swat, Hussain *et al.*, (2005) from Ghalegay Swat, Sher & Khan (2007) from Buner and Fazal *et al.*, (2010) from District Haripur.

Life form spectra:

The physiognomy of the flora reflects all life processes with environment. Most reliable life form classification is of Raunkiaer (1934). This classification based on the position and degree of protection of parenting buds in adverse conditions or during the unfavorable season.

Based on Raunkiaerean classification the present study of the research area showed presence of 105 Spp., (49.2%) therophytes, hemicryptophytes 26 Spp., (12.2%), geophytes 23 Spp., (10.7%), chamaephytes 19 Spp., (8.9%), nanophanerophytes 14 Spp., (6.5%) and microphanerophytes 24 spp., (11.2%). *Cuscuta reflexa* and *Cistanche tubulosa* were the parasitic plants (Table 1 & Fig 2). Raunkiaer (1934) distinguished these major types of phytoclimates; tropic have phanerophytic climate, arid (desert) areas have therophytic, while the temperature zones have hemicryptophytic climate. The present study showed that dominant life form in the area was therophytic flora. In widely separated plant communities biological spectra are important for comparing these on the basis of geography and habit. Due to biotic influences like deforestation, agricultural practices, grazing and climatic change, the biological spectra of the area also changed. The life form spectra of flora and communities in the present study showed that

therophytes was dominant followed by hemicryptophytes, chamaephytes, geophytes, nanophanerophytes and microphanerophytes. Two parasitic plants were *Cuscuta reflexa* and *Cistanche tubulosa* were also present in the area. Costa *et al.*, (2007) reported that in south eastern Brazil therophytes are generally the most common life forms and this is in line with to the present findings. Hussain *et al.*, (2009), Sher & Khan (2007) and Fazal *et al.*, (2010) also reported similar studies regarding prevalence and dominance of therophytes and hemicryptophyte in degraded and arid environments. Due to unfavorable habitat conditions the dominancy of therophytes was suggested by Manhas *et al.*, (2010), Hussain *et al.*, (2015), Nadaf and Martazavi, (2011). Our findings agreed with these reports. Nazir & Malik (2006) reported biological spectrum of Sarsawa hill Kotli (AJK) in which nanophanerophyte, therophytes and hemicryptophytes were present. The predominance of therophytes is reflected disagreed to our present study. Our results also agree with those of Sher & Khan (2007), who also reported that therophytes and nanophanerophytes were dominant in subtropical habitats of Chagharzai Bunir. This also supports our results.

Leaf size spectra:

The overall leaf size spectra of the Darazinda area showed that there were 74 Spp (34.7%) species of nanophylls, 45 Spp (21.5%) of leptophylls, 44 Spp (20.1%) of microphylls, 41 Spp (19.2%) mesophylls and 2 (1%) species of megaphylls while 7 Spps (3.2%) were aphyllus (Table 1 and Fig 3). Leaf size spectra of vegetation of other areas have also been reported; Husain *et al.*, (2005) reported that microphylls are usually characteristics of steppes, while nanophylls and leptophylls leaf size spectra are characteristics of hot desert and saline areas. The present study showed the presence of high percentage of nanophylls followed by leptophylls and microphylls and during dry and hot season a high percentage of nanonphylls. Sher & Khan (2007) also reported the presence of high percentage of leptophylls and nanophylls from Chagarzai, Pakistan. Generally in dry habitats soil is poor nutrient in dissolved and soil moisture is very less, creating water stress, as was dissolved in the present research area. This situation encouraged nanophyllous and leptophyllous vegetation. Badshah *et al.*, (2010) reported

nanophyllous as the dominant leaf size from Waziristan, which has almost similar climatic condition.

Phenological behavior:

Seasonal occurrence of developmental such event as bud opening, autumn leaf drop or life cycle events, such as flowering is called Phenology (Kafak *et al.*, 2009). So phenomenon tied to periodic environmental changes is Phenology. Due to climatic variability the plants/flora of Darazinda also exhibited seasonal phonologic characters as shown in (Table 3, 4).

In the present research phenology of 213 plants, including 24 trees, 34 shrubs and 155 herbs was studied which showed that 22 plants flowered from February to August; spores were produced by *Equisetum arvense* in October and December. Tables 4 & 5 show that the month of March had the highest flowering plants, in which total of 51 species (24%) blossomed. During April, May, June, July, August, October and December the number of flowering species was 42 (19.7%), 32 (15%), 10 (4.6%), 07 (8%), 22 (10.3%), 02 (1%) and 20 (9.3%) respectively. During different times of the year the species varied in their phenologic events. The present study showed that the growing season started from the end of February and extended upto August during which flowers were produced by majority of plants. Zhang *et al.* (2007) stated that warm weather conditions advances spring vegetation. This was evident in our findings, because in this semiarid zone temperature increases during these months due to which flowering also increases in these months. During December to February few plants bloomed, which included *Malcolmia scorpioides*, *Malvastrum coromendelianum* and *Cicer arietinum*. During March flowering reached to its peak as 51 species (24%) blossomed. Generally initiation of flowers and other growth activities are at the peak during rainy and early spring season in semi-arid region. This is also supported by findings of Rocha *et al.*, (2004). In present case maximum flowering of grasses took placed in winter season. Golluscio *et al.* (2005) also reported that grasses had higher autumn and winter phenological activity.

Fruiting activity (Tables 3 & 4) showed that from April to June 70 species (32.8%) fruited, while 49 species (23%) fruited from August to October. Moth wise fruits production showed that 36 (17%) fruited in June followed by April with 34 (16%) species. The percentage of fruiting species in was February 9 (4.2%), March 11 (5.1%), May 14 (6.5%), July 5 (2.3%), August 21 (9.8%), September 28 (13.1%), October 07 (3.2%) and in November 1 (0.4%), While January and December there were no plants with fruiting. Dominant fruiting months were extending from April to June with 70 species (32.8%).

Major bulk of the flora in vegetative phase were 168 species (78.8%) during the months of March 59 Spps (10.3%) followed by December 24 (11.2%) and February 22 (10.3%). Some species including *Prosopis cineraria, Convolvulus arvensis, Cynodon dactylon, Taraxacum officinale, Datura alba, Desmostachya bipinata,* and *Urtica pilulifera* could be seen in most part of the year. Other species like *Collegonum polygonoides, Periploca aphylla, Vitex negundo* and *Equisetum arvensis* were not observed in seedling stage. Similar study reported by (Morellato, 2003) stated that fruiting started at the end of April and beginning of May. In contrast to our findings Yadav & Yadav (2008) who reported that woody species exhibited fruiting during September. Present study showed that most grasses and annuals flowered and produced seeds/fruits. Phenological analysis provides knowledge about the development, pattern of plant growth and the effects of environment and selective pressures on fruiting and flowering (Zhang *et al*., 2006). Present studies showed that December and January had no fruiting plants. Jadeja & Nakar (2010) observed that fruiting activity was high in December month as 50% species produced fruits this disagreed with our results. In the present case peak month for fruiting was April, which showed that the area is semiarid with extreme temperatures which are unsuitable for annual plants. This result agreed with the findings of Osada *et al*. (2003) who reported that fruiting and flowering were found abundantly in April and May.

Three dormant seasons were observed in present investigated area. The first dormant period extended from July and December with 62 (29.1%). Plants showing sign of dormancy in the third dormant period in October 55 species (28.8%) due to which leaf fall accelerated.

Table 1. Floristic list, habitat, seasonal composition, life form spectra and leaf size spectra, Shape of Lamina and Spine presence/absence of plants of Darazinda.

S#	Division / Family / Species	Habitat	Seasonality				Life form	Leaf size	Lamina	Spines
			A	W	S	Sm				
A. PTERIDOPHYTA										
1. Equisetaceae										
1	*Equisetum arvense* L.	W	-	-	+	-	G	Ap	Abs	-
2. Adiantaceae										
2	*Adiantum capillusveneris L*	W	-	-	+	-	G	Ap	Abs	-
B. Fungi										
3.Agaricaceae										
3	*Agaricus campestris* L.	W	-	-	+	-	G	Ap	Abs	-
4. Helveliaceae										
4	*Morchella esculenta* Fries	W	-	-	+	-	G	Ap	Abs	-
C. MONOCOTYLEDONS										
5. Alliaceae										
5	*Allium sativum* L.	C	-	+	+	-	G	N	S	-
6	*Allium cepa* L.	C	-	+	+	-	G	N	S	-
6. Asphodelaceae										
7	*Asphodelus tenufolius L.*	D	-	+	-	-	G	L	S	-
7. Arecaceae										
8	*Nannorrphs ritchiana* H. Wendl.	W&D	+	+	+	+	MP	Mes	Com	-
9	*Phoenix dactylifera* L.	W&D	+	+	+	+	MP	Mes	Com	-
8.Asparagaceae										
10	*Asparagus gracilisRoyle.*	D	-	-	+	+	Th	L	S	-
9. Cyperaceae										
11	*Cyprus elumoids* L.	W	-	-	+	+	G	N	S	-
12	*Cyperus rotundrus*	W	-	-	-	-	G	N	S	-

13	*Eleocharis palusris* (L.)	W	-	-	+	+	G	N	S	-
10. Poaceae										
14	*Apluda mutica*	D	+	+	-	-	H	Mic	S	-
15	*Aristida adscensionis L.*	D	+	+	-	-	H	Mic	S	-
16	*Aristida cyananthaNees ex Steud*	D	+	+	-	-	Th	Mic	S	-
17	*Argyrolobium roseum*	D	+	+	+	+	Th	N	S	-
18	*Avena fatua* Linn.	D	+	+	-	-	Th	N	S	-
19	*Arndu dedonix*	D	-	+	+	+	Th	N	S	-
20	*Brachiaria ramose*	D	-	-	+	+	Th	N	S	-
21	*Brachiaia reptans*	D	-	-	+	+	Th	N	S	-
22	*Bromus japonica* Thunb.	D	-	-	+	+	He	N	S	-
23	*Cymbopogon jwarancusa (Jones) Schult.*	D	-	-	+	-	H	N	S	-
24	*Cynodon dactylon (L.) Pers.*	W&D	+	+	+	+	H	L	S	-
25	*Cencrus ciliaris*	D	-	+	+	+	H	L	S	-
26	*Dinebra retroflexa*	D	-	-	+	+	H	L	S	-
27	*Disteria cilians*	D	-	-	+	+	H	L	S	-
28	*Desmostachya bipinnata (L.) Stapf.*	W&D	+	-	+	-	H	N	S	-
29	*Dactyloctenium carstatum*	W&D	-	+	-	-	H	N	S	-
30	*Dactyloctenium aegyptium* (L.) Willd.	W&D	-	+	+	+	H	N	S	-
31	*Dichanthium annulatum* (Forssk.) Stapf	W&D	-	+	-	-	H	N	S	-
32	*Eragrostis minor*	W&D	-	+	+	+	H	N	S	-
33	*Echinochloa colona* (Linn.) Link	W&D	-	-	+	-	Th	N	S	-
34	*Hordeum vulgare* L.	C	-	-	+	+	Th	Mic	S	-
35	*Imperata cylindrica* (Linn.) Raeuschel	W	+	-	+	-	Th	N	S	-
36	*Lolium temulentum* Linn.	D	+	-	-	+	H	N	S	-

37	*Oryza sativa*	C	-	-	+	+	Th	Mic	S	-
38	*Polypogon monspeliensis (L.) Desf.*	W	-	+	+	+	Th	Mic	S	-
39	*Phragmites karka (Retz) Trin.*	W	+	+	-	+	Ch	Mes	S	-
40	*Pennisetum oriantale*	C&D	-	-	-	+	Hem	N	S	-
41	*Phalaris minor* Retz.	W	-	-	-	+	G	N	S	-
42	*Poa annua* Linn.	W	-	+	+	-	Th	L	S	-
43	*Poa infirma H. B. K.*	W	-	+	+	-	Th	L	S	-
44	*Sorghum vulgare* (L.) Pers.	D&W	-	-	+	+	Hem	Mic	S	-
45	*Setaria vercillata (L.)*	D	-	+	-	-	Th	Mic	S	-
46	*Saccharum bengalensis*	D&W	+	-	+	+	Ch	N	S	-
47	*Saccharummunja* Roxb.	D	+	-	-	-	Ch	N	S	-
48	*Triticum aestivum L.*	C	-	+	+	+	Th	Mic	S	-
49	*Zea mays L.*	C	-	-	-	+	Th	Mes	S	-
11. Typhaceae										
50	*Typha latifolia L.*	W	+	+	+	+	G	Mes	S	-
51	*Typha minima Funck er Hoppe*	W	+	+	-	+	G	Mes	S	-
D. Angiosperm										
12. Acanthaceae										
52	*Dicleptera bupleuroides*	D	-	-	+	+	Th	L	S	-
13. Aizoaceae										
53	Zelays *petendra (L.) C. Jeffery*	D	-	-	+	+	Th	N	S	-
54	*Trianthema portulacastrum L.*	D	-	-	-	+	Th	N	S	-
14. Amaranthaceae										
55	*Achyranthus aspera L.*	D	-	+	-	-	Th	N	S	Sp
56	*Achyranthus dentatus*	D	-	+	-	-	Th	N	S	Sp
57	*Amaranthus viridis L.*	D	+	-	-	-	Th	N	S	-

58	*Aerva javanica* (Burm.f.) Juss	D	+	+	+	+	Ch	L	S	-
59	*Celosia cristata*	D	-	-	-	+	Th	Mes	S	-
60	*Digera muricata*	D	+	+	+	+	Th	Mic	S	-
15. Anacardaceae										
61	*Mengifera indica*	D	-	-	+	+	Mp	Mes	S	-
16. Apiaceae										
62	*Coriandrium sativum* L.	W	-	-	+	+	Th	L	Com	-
63	*Foeniculum valgare* Mill.	C	-	-	+	+	Th	Mic	S	-
64	*Daucus carrota* L.	D	-	+	+	-	Th	L	Com	-
65	*Torilis japonica* (Houtt.) DC.	D	-	-	+	+	Th	N	Dis	-
17. Apocyanaceae										
66	*Rhazya stratica Decne.*	D	-	-	+	+	Ch	N	S	-
67	*Nerium indicum* Mill.	W	+	+	+	+	Np	Mic	S	-
18. Asclepiadaceae										
68	*Caralluma tuberculata* N.E. Brown	D	-	+	-	-	Th	L	Abs	-
69	*Calotropis procera (Wild) R.Br.*	D	+	+	+	+	Ch	Mes	S	-
70	*Calotropis Gigantea* L. R.Br.	D	+	+	+	+	Ch	Mes	S	-
71	*Periploca aphylla* Decne.	D	+	+	+	+	Np	Ap	Abs	-
19. Asteraceae										
72	*Artemisia scoparaia. Waldst & Kitam*	D	-	+	-	+	Th	Mic	S	-
73	*Carthamus oxycantha* Bieb	D	-	-	-	+	Th	Mic	S	Sp
74	*Conyza bonariensis*	D	-	-	+	+	Th	Mic	S	-
75	*Conyza canadensis (L.) Cronquist*	D&W	-	-	+	+	Th	Mic	S	-
76	*Filago hunclwarica*	D	-	-	+	-	Th	L	S	-
77	*Filago arenaria (Smoljan.)*	D	-	-	+	-	Th	L	S	-

	Chrtek & Holub									
78	*Helianthus annus L.*	D&W	+	+	+	+	Th	Mes	Com	-
79	*Iphiona scabra DC.k*	D	+	+	+	+	Th	Mes	S	-
80	*Lactuca serriola L.*	W	-	-	+	-	Th	N	S	-
81	*Lactuca sativa L.*	W	+	-	+	+	Th	N	S	-
82	*Launaea procumbens* Roxb.	D	-	-	+	-	Th	N	S	-
83	*Leaucaena nudicaulis* (L.) Hook.	D	-	-	+	-	Th	Mes	S	-
84	*Pulicaria crispa* (Forssk.) Oliv.	D	+	-	+	+	H	L	S	-
85	*Parthenium hysterophous L.*	W	-	-	-	+	H	L	S	-
86	*Sonchus asper (L.) Hill.*	W	-	+	+	-	Th	Mic	Dis	-
87	*Sonchus oleraceus*	W	-	+	+	-	Th	Mic	Dis	-
88	*Saussurea heteromalla (D.Don.)Hand*	D	-	+	-	-	Th	Mic	S	-
89	*Taraxacum officinaleWeber*	W	-	-	-	+	Th	Mic	S	-
90	*Xanthium strumarium L.*	D	-	-	-	-	Th	N	S	-
20. Bamboceae										
91	*Bombix ceba*	D	+	+	+	+	Mp	Mes	Com	-
21. Boraginaceae										
92	*Cordia myxa L.*	D	+	+	+	+	Mp	Mes	S	-
93	*Cynoglossum lanceolatum Forssk*	D	+	-	-	-	H	N	S	-
94	*Ehrctia obtusifolia*	D	-	-	-	+	Mp	Mes	S	-
95	*Heliotropium europaeum* L.	D	-	-	+	+	H	Mic	S	-
96	*Heliotropism elipticum Ledeb.*	D	-	-	+	+	Th	N	S	-
22. Brassicaceae										
97	*Arabidoptis thaliana*	D	-	-	+	+	Th	L	S	-
98	*Brassica napus* L	W	-	+	+	-	Th	Mes	S	-
99	*Brassica olaraceae* L.	W	-	+	+	-	Th	Mes	S	-
100	*Brassica campestris*	C	-	+	+	-	Th	N	Dis	-

101	*Coronopus didymus* (L) *Smith.*	W	+	+	-	-	Th	Mic	Dis	-
102	*Lepidium draba*	C	-	-	+	+	Th	Mic	S	-
103	*Malcolmia scorpioides* (Bunge) Boiss.	D	-	-	+	-	Th	N	S	-
104	*Malcolmia africana* (L.) R. Br.	D	-	-	+	-	Th	N	S	-
105	*Raphanus sativus L*	W	-	+	+	-	Th	Mes	S	-
106	*Sissymbrium irrio L.*	D	-	-	+	+	Th	N	Dis	-
23. Buxaceae										
107	*Buxus wallichiana Bail.*	W	-	-	+	+	Mp	Mic	S	-
24. Capparidiaceae										
108	*Capparis spinosa L.*	D	+	+	+	+	Ch	Mic	S	Sp
25. Cleomaceae										
109	*Cleome brachycarpa Vahl ex DC.*	D	-	+	-	-	Th	N	Com	-
26. Caryophyllaceae										
110	*Saponaria vaccaria*	W	-	-	+	-	Th	L	S	-
111	*Stellaria media L. Vill*	C	-	-	+	+	Th	N	S	-
27. Cannabinaceae										
112	*Cannabis sativus* L.	C	-	-	+	+	Th	Mes	S	-
28. Chenopodiaceae										
113	*Chenopodium album L*	D	-	+	+	-	Th	N	S	-
114	*Chenopodium murale L.*	D	+	-	-	-	Th	L	S	-
115	*Chenopodium nepalense* Colla	D	-	-	-	+	Th	N	S	-
116	*Chenopodium ambrosioides* L.	W	-	-	+	-	Th	L	S	-
117	*Suaeda fruticosa* Forssk. Ex J.F. Gmelin	D	-	-	+	+	Ch	L	S	-
29. Convolvulaceae										
118	*Convunvulus arvensis L.*	D	-	+	-	-	Th	N	S	-

119	*Convunvulus prostrate* Forssk	D	+	-	-	+	Th	L	S	-
30. Cucurbitaceae										
120	*Cucumis sativus* Linn.	C	-	-	+	+	He	Mes	S	-
121	*Cacumis propheterum*	D &W	-	-	+	+	Th	Mic	S	-
122	*Cucurbita pepo L.*	C	-	-	+	+	Th	Mes	S	-
123	*Cucurbita maxima* Duchesne.	C	-	-	+	+	Th	Mes	S	-
124	*Luffa clyndrica* (L.) Roem	D&W	-	-	+	+	Th	Mes	S	-
31. Cuscutaceae										
125	*Cuscuta reflexa* Roxb	D	+	+	+	+	P	AP	Abs	-
32. Euphorbiaceae										
126	*Euphorbia hirta*	D	-	-	+	+	Th	L	S	-
127	*Euphorbia helioscopia L.*	D	-	-	+	-	Th	N	S	-
128	*Euphorbia prostrate* Ait.	D	+	-	+	-	Th	L	S	-
129	*Echinops echinatus D.C*	D	-	-	-	+	Th	Mic	S	Sp
130	*Ricinus communis*	D	-	-	+	+	Ch	Mes	S	-
33. Fumaraceae										
131	*Fumariai ndica (Hausskn.) Pugsley*	D	-	+	+	-	Th	N	Dis	-
34. Lamiaceae										
132	*Salvia aegyptiaca L.*	W	-	+	+	-	G	Mic	S	Sp
133	*Mentha longifolia*	W	-	+	+	-	G	N	S	-
134	*Mentha arvensis L.*	W	-	+	+	-	G	N	S	-
135	*Ocimum bascillicum L.*	D	+	+	+	+	Ch	N	S	-
35. Malvaceae										
136	*Abelmoschus esculentus* (L.)	C	+	+	+	+	Ch	N	S	-
137	*Hibiscus trionum*	C	+	+	+	+	Ch	N	S	-
138	*Malvastrum coromandelianum* (L.) Gareke.	D	-	-	+	-	H	N	S	-

36. Meliaceae										
139	*Melia azedarach L.*	D	+	+	+	+	Mp	N	Com	-
37. Mimosaceae										
140	*Acacia nilotica* (L) Delice.	D	+	+	+	+	Mp	L	Com	Sp
141	*Acacia modesta Wall.*	D	+	+	+	+	Mp	L	Com	Sp
142	*Albizia lebbeck* (L.) Benth.	D	+	+	+	+	Mp	L	Com	-
143	*Prosopis farcta* (Banks & Sol.) Macbride	D	+	+	+	+	Mp	L	Com	Sp
38. Moraceae										
144	*Ficus palmate*	D	+	+	+	+	Np	Mes	S	-
145	*Morus alba L.*	D	+	+	+	+	Mp	Mes	S	-
146	*Morus nigra L.*	D	+	+	+	+	Mp	Mes	S	-
39. Myrtaceae										
147	*Eucalyptus globules L.*	D	+	+	+	+	Mp	N	S	-
148	*Eucalyptus lanceolatus*	D	+	+	+	+	Mp	N	S	-
149	*Syzygium cuminii* (L.) Skeels	D	-	-	+	+	Mp	Mes	S	-
150	*Psidium guajava* L.	D & W	-	-	+	+	Mp	Mes	S	-
40. Musaceae										
151	*Musa paradisiaca L.*	D	-	-	+	+	Mp	Mac	S	-
41. Nyctaginaceae										
152	*Mirabilis jalapa L.*	D	-	-	+	+	Ch	Mes	S	-
42. Oleaceae										
153	*Olea ferruginea Royle.*	D	+	+	+	+	He	Mic	S	-
43. Papilionaceae										
154	*Astragalus psilocentros* Fisch.	D	-	-	+	-	Th	L	S	-
155	*Cicer arietinum* L.	C	-	-	+	+	Th	L	Com	-
156	*Dalbergia sissoo Roxb.*	D&W	+	+	+	+	Mp	N	Com	-
157	*Medicago laciniata* (L.) Mill.	D	-	+	+	-	Th	N	Com	-
158	*Melilotus longifolia (L.)*	D	-	+	+	-	Th	N	S	-

159	*Melilotus indicus (L.) All.*	D	-	+	+	-	Th	N	S	-
160	*Trifolium alexandrianum L.*	C	-	+	+	-	Th	N	Com	-
161	*Trigonella mcisa*	D	-	-	-	+	Th	L	S	-
162	*Vicia sativa L.*	D	-	-	+	+	Th	L	Com	-
44. Papaveraceae										
163	*Papaver somniferum*	D	-	-	+	+	Th	Mic	Dis	-
45. Plantaginaceae										
164	*Plantago lanceolata L.*	W	-	-	+	+	Th	N	S	-
165	*Plantago minor L.*	W	-	-	+	+	Th	Mic	S	-
46. Portulacaaeae										
166	*Portulaca quardrifida L.*	D&W	-	-	+	-	Th	N	S	-
47. Polygonaceae										
167	*Calligonum polygonoides* L.	D	+	+	+	+	NP	L	S	-
168	*Polygonum plebeium* R. Br	D	-	+	+	-	H	N	S	-
169	*Rumex dentatus* L.	W	-	-	+	-	G	Mes	S	-
170	*Rumex hastatus*	W	+	-	+	-	G	Mic	S	-
48. Primulaceae										
171	*Anagallis arvensis*	W	-	-	-	+	Th	N	S	-
49. Punicaceae										
172	*Punica granatum L.*	D	-	+	-	-	Mp	Mic	S	-
50. Ranunculaceae										
173	*Ranunculus muricatus* L.	W	-	-	+	-	G	Mic	Dis	-
51. Resedaceae										
174	*Reseda odorata* L.	D	-	+	-	-	Th	N	S	-
175	*Oligomeris linifolia (Vahl.) Macbride*	D	-	-	+	-	Th	N	S	-
52. Rosaceae										
176	*Rosa indica* L.	D	-	-	+	-	Np	Mic	Com	-
53. Rhamnaceae										
177	*Zizyphus nummularia.*	D	+	+	+	+	Np	N	S	Sp

	(Burm.f) W.&A									
178	*Zizyphus oxyphylla Edge.*	D	-	-	+	+	Np	N	S	Sp
179	*Zizyphus mauritiana*	D	-	-	+	+	Mp	Mic	S	Sp
54. Rubiaceae										
180	*Galium aparine*	C	-	-	+	+	Th	L	S	-
181	*Galium tricorne*	C	-	-	+	+	Th	L	S	-
55. Rubinciaceae										
182	*Cistanche tubulosa* (Schrenk) Hook. F.	D	-	-	+	+	P	Ap	Abs	-
56. Rutaceae										
183	*Citrus medica*	D & W	-	+	-	-	Np	Mes	S	-
57. Salvadoraceae										
184	*Salvadora oleoides* Decne.	D	+	+	+	+	Np	N	S	-
58. Salicaceae										
185	*Populus alba* L.	D	+	+	+	+	Mp	Mes	S	-
59. Sapindaceae										
186	*Dodonaea viscosa L.*	D	+	+	+	+	Np	N	S	-
60. Sapotaceae										
187	*Monotheca buxifolia* (Falc.) A. DC.	D	+	+	+	+	Mp	Mic	S	Sp
61. Scrophulariaceae										
188	*Veronica aquatica* Bern	W	-	-	+	-	G	N	Dis	-
189	*Lindenbergia indica*	D	-	-	-	+	Th	L	S	-
190	*Kickxia incana* (Wall) Penn.	D	-	-	-	+	Th	L	S	-
62. Solanaceae										
191	*Capsicum annum L.*	D & W	-	-	+	+	Ch	Mic	S	-
192	*Datura alba Nees*	D	-	-	+	-	Th	Mic	S	Sp
193	*Datura innoxia*	D	-	+	+	-	Ch	Mes	S	-
194	*Hyosyamus niger*	D	-	-	-	-	Th	Mes	S	-
195	*Hyoscyamus squarrosus* Griffith.	D	-	-	+	+	Ch	Mac	S	Sp

196	*Hyosyamus insanus*	D	-	-	+	+	Th	Mes	S	-
197	*Lycopersicom esculentum* Mill.	D&W	+	+	+	+	Th	Mic	S	-
198	*Solanum surattense* Burm.f.	D	-	-	+	+	Th	Mes	S	-
199	*Solanum melangena*	D&W	-	-	+	+	G	Mes	S	-
200	*Solanum tuberosum*	D&W	-	+	+	+	G	Mes	S	-
201	*Withania coagulans* Dunal.	D	+	+	+	+	Ch	Mic	S	-
202	*Withania somnifera* (L.) Dunal.	D	-	-	+	+	Ch	Mic	S	-
63. Tamaricaceae										
203	*Tamarix aphylla* (L.) Karst.	D	+	+	+	+	Mp	L	S	-
204	*Tamarix dioica* Roxb-ex-Roth	W	+	+	+	+	Np	L	S	-
64. Thymelaceae										
205	*Thymelaea passerine*	D	-	-	+	+	Th	L	S	-
65. Utricaceae										
206	*Utrica pilulifera* L.	W & D	-	-	+	-	G	Mic	S	-
66. Verbenaceae										
207	*Verbena hybrid*	D	-	-	-	+	Th	L	S	-
208	*Verbena officinalis*	D	-	-	-	+	Th	L	S	-
209	*Vitex negundo* L.	D	+	+	+	+	Np	N	Com	-
67. Vitaceae										
210	*Vites vinifera* L.	D	-	-	+	+	Np	Mes	S	-
68. Zygophyllaceae										
211	*Fagonia cretica* L.	D	-	-	+	+	Th	L	S	Sp
212	*Peganum harmala* L.	D	-	-	+	-	H	L	Dis	-
213	*Tribulus terrestris* L.	D	+	-	-	-	H	L	Com	Sp

Key:

D = Dry; W = Wet; C = Cultivated; A = Autumn; S = Spring; W = Winter; Sm = Summer; Th = Therophyte; H = Hemicryptophyte; Ch = Chamaephyte; G = Geophyte; Np = Nanophanerophyte; Mp = Microphanerophyte P = Parasite L =Leptophyll; N = Nanophyll; Mic = Microphyll; Mes = Mesophyll; Ap = Aphyllous; S = Simple; Dis = Disected; Com = Compound; Abs = Absent; Sp = Spiny

Table No 2. Summary of Table 2: flora characteristics of Darazinda.

S. No	Ecological characteristics	No of spp	Percentage
1. Flora			
i.	Total species	213	-
ii.	Families	68	-
iii.	Genera	168	-
2. Seasonal aspects			
i.	Autumn	64	30%
ii.	Winter	93	43.6%
iii.	Spring	164	77%
iv.	Summer	134	63%
3. Types of habitat			
i.	Wet	41	19.2%
ii.	Dry	127	59.6%
iii.	Both dry & wet	24	11.2%
iv.	Cultivated	21	9.8%
4. Lamina shape			
i.	Simple	177	83%
ii.	Compound/divided	29	13.6%
iii.	Aphyllous	7	3.2%
5. Life form spectra			
i.	Therophyte	105	49.2%
ii.	Hemicryptophyte	26	12.2%
iii.	Chamaephyte	19	9%
iv.	Geophyte	23	10.7%
v.	Nanophanerophyte	13	6.1%
vi.	Microphanerophyte	25	11.7%
vii.	Parasite	02	1%
6. Leaf size spectra			
i.	Leptophyll	46	21.5%
ii.	Nanophyll	74	34.7%
iii.	Microphyll	43	20.1%
iv.	Mesophyll	41	19.2%
v.	Aphyllous	7	3.2%
vi.	Macrophyll	2	1%
7. Spines presence			
i.	Spiny	17	8%
ii.	Spines absent	196	92%

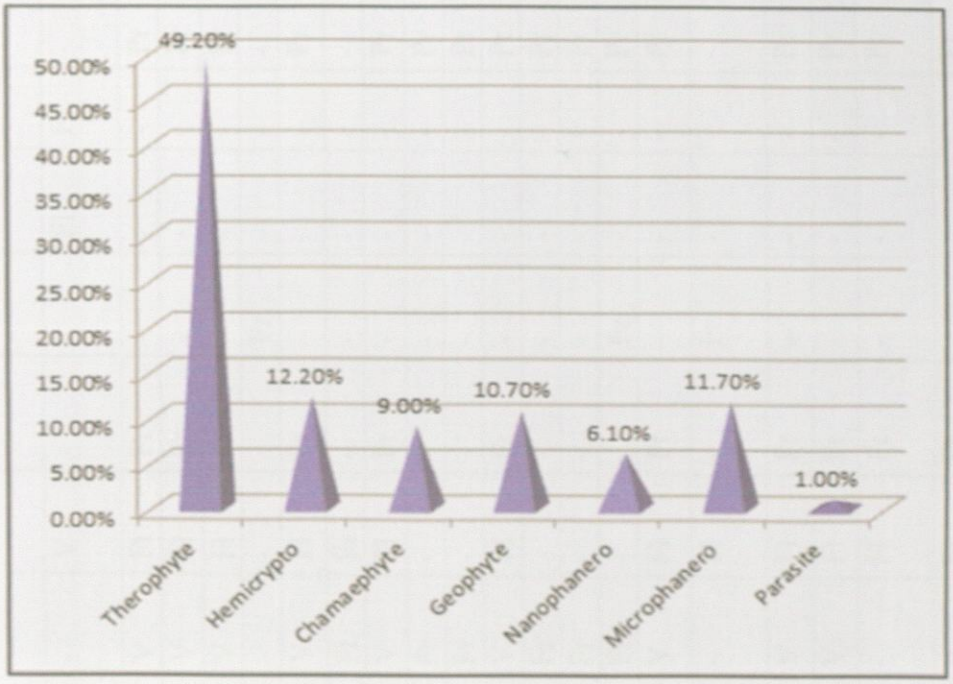


Fig 2. Graphical representation of Life form spectra of Darazinda Vegetation

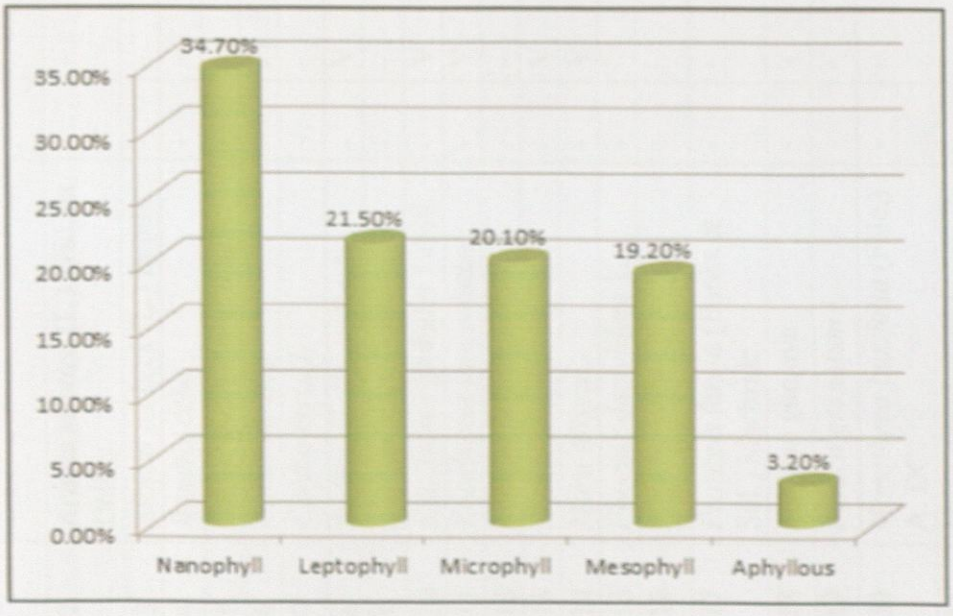


Fig 3. Graphical representation of Leaf size spectrum of Darazinda Vegetation

Table 3. Phenolgical study of Darazinda during of the year 2014

S. No	Species	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
A .Trees													
1	*Acacia modesta* Wall.	-	-	-	V	Fl	Fr	-	-	-	Pr	-	-
2	*Acacia nilotica* (L.) Wid. ex Delile	-	-	-	-	V	-	-	Fl	Fr	-	Pr	-
3	*Albizia lebbeck* (L.) Benth.	-	-	-	V	Fl	Fr	-	-	-	Pr	-	-
4	*Bombix ceba*	-	-	-	V	Fl	Fr	-	-	-	Pr	-	-
5	*Buxus wallichiana Baill.*	-	-	-	V	Fl	Fr	-	-	-	Pr	-	-
6	*Citrus medica*	-	Fl	Fr	-	-	-	Pr	-	-	-	-	V
7	*Cordia myxa L*	-	-	-	V	Fl	Fr	-	-	-	Pr	-	-
8	*Dalbergia sissoo* Roxb.	-	V	-	Fl	Fr	-	-	-	-	-	Pr	-
9	*Ehrctia obtusifolia*	-	-	-	V	Fl	Fr	-	-	-	Pr	-	-
10	*Eucalyptus globules* Labill.	-	V	Fl	Fr	-	-	-	-	-	Pr	-	-
11	*Eucalyptus lanceolatus*	-	V	Fl	Fr	-	-	-	-	-	Pr	-	-
12	*Mengifera indica*	-	-	-	V	Fl	Fr	-	-	-	Pr	-	-
13	*Morus alba* L.	-	V	Fl	Fr	-	-	-	-	-	Pr	-	-
14	*Moru snigra*L.	-	V	Fl	Fr	-	-	-	-	-	Pr	-	-
15	*Phoenix dactylifera* L.	-	-	-	Fl	-	-	Fr	-	-	Pr	-	V
16	*Populus alba* L.	-	-	-	V	Fl	Fr	-	-	-	Pr	-	-
17	*Prosopis farcta* (Banks & Sol.) Macbride.	-	-	V	-	Fl	-	Fr	-	-	-	-	Pr
18	*Psidium guajava*	-	-	-	V	Fl	Fr	-	-	-	Pr	-	-
19	*Punica granatum L*	-	-	-	V	Fl	Fr	-	-	-	Pr	-	-
20	*Monotheca buxifolia* (Falc.) A. DC.	-	-	V	-	Fl	Fr	-	-	-	Pr	-	-
21	*Musa paradisiaca L.*	-	-	-	V	Fl	Fr	-	-	-	Pr	-	-
22	*Syzygium cuminii* (L.)	-	-	-	V	Fl	Fr	-	-	-	Pr	-	-

	Skeels												
23	*Tamarix aphylla* (L.) Karst.	-	-	-	V	-	-	-	Fl	-	Fr	-	Pr
24	*Zizyphus mauritiana* Lam.	-	-	-	Fr	-	Pr	-	V	-	Fl	-	-
B . Shrubs													
1	*Aerva javanica* (Burm.f.) Juss. Ex Schult.	-	-	V	-	-	Fl	-	-	Fr	-	-	Pr
2	*Abelmoschus esculentus* (L.)	-	-	V	-	-	Fl	Fr	-	-	-	-	Pr
3	*Calotropis procera*sub sp. *Hamiltonii* (Wight)	-	-	V	-	Fl	-	-	Fr	-	-	-	Pr
4	*Calotropis Gigantea* L. R.Br	-	-	V	-	Fl	-	-	Fr	-	-	-	Pr
5	*Cannabis sativus* L.	-	-	V	-	Fl	-	-	Fr	-	-	-	Pr
6	*Capsicum annum L.*	-	-	V	-	Fl	-	-	Fr	-	-	-	Pr
7	*Calligonum polygonoides* L.	-	-	-	-	-	Fl	-	-	Fr	-	-	Pr
8	*Capparis spinosa L*	-	-	V	-	-	Fl	-	-	Fr	-	-	Pr
9	*Datura innoxia*	-	-	-	Fl	-	Fr	-	-	-	-	-	Pr
10	*Dodonaea viscose* (L.) Jacq.	-	-	V	Fl	-	Fr	-	-	-	-	-	Pr
12	*Ficuspalmate*L.	-	-	V	-	-	Fl	Fr	-	-	Pr	-	-
13	*Helianthus annus L*	-	-	V	Fl	-	Fr	-	-	-	-	-	Pr
14	*Hyoscyamus squarrosus Griffith.*	-	-	V	Fl	-	Fr	-	-	-	-	-	Pr
15	*Hibiscus trionum*	-	-	V	Fl	-	Fr	-	-	-	-	-	Pr
16	*Melia azedarach L.*	-	-	V	-	Fl	-	-	Fr	-	-	-	Pr
17	*Mirabilis jalapa L.*	-	-	V	Fl	-	Fr	-	-	-	-	-	Pr
18	*Nannorrphs ritchiana* H. Wendl.	-	-	-	V	-	-	-	-	-	-	-	-
19	*Nerium indicum* Mill.	-	-	V	Fl	-	Fr	-	-	-	Pr	-	-
20	*Ocimum bascillicum L.*	-	-	V	Fl	-	Fr	-	-	-	Pr	-	-
21	*Olea ferruginea* Royle.	-	-	V	Fl	-	Fr	-	-	-	Pr	-	-
22	*Periploca aphylla* Decne.	-	-	-	-	-	-	-	Fl	Fr	-	-	Pr
23	*Rhazya stricta* Decne.	-	-	V	-	-	-	Fl	Fr	-	-	-	Pr
24	*Ricinus communis*	-	-	Fl	-	Fr	-	Pr	-	-	V	-	-

25	*Rosa indica* L.	-	-	Fl	-	Ft	-	Pr	-	-	V	-	-
26	*Salvadora oleoides* Decne.	-	-	-	-	-	-	Fl	-	Fr	-	Pr	-
27	*Suaeda fruticosa* Forssk.ex J. F. Gmelin	-	V	-	-	-	-	-	Fl	Fr	-	-	Pr
28	*Tamarix dioica* Roxb. ex Roth.	-	-	-	V	-	-	-	Fl	-	Fr	-	Pr
29	*Vitex negundo* L.	-	-	-	-	-	-	Fl	-	Fr	-	Pr	-
30	*Vites vinifera L.*	-	-	-	-	-	-	-	Fl	-	Fr	-	Pr
31	*Withania coagulans* (Stocks) Dunal	-	-	-	V	-	-	-	Fl	Fr	-	-	Pr
32	*Withania somnifera (L.) Dunal.*	-	-	-	V	-	-	-	Fl	Fr	-	-	Pr
33	*Zizyphus nummularia* (Burm. f.) Wight & Arn.	-	-	-	-	V	-	Fl	-	Fr	-	-	Pr
34	*Zizyphus oxyphylla* Edge	-	-	-	-	V	-	Fl	-	Fr	-	-	Pr
C. Herbs													
1	*Adiantum capillusveneris L*	-	-	V	-	-	-	-	Fl	-	Fr	-	Pr
2	*Achyranthes aspera* L.	-	-	V	-	-	-	-	Fl	-	Fr	-	Pr
3	*Achyranthus dentatus*	-	-	V	-	-	-	-	Fl	-	Fr	-	Pr
4	*Agaricus campestris* L.	-	-	-	-	-	-	-	-	-	Fr	-	Pr
5	*Allium cepa* L.	-	-	Fl	-	Fr	-	Pr	-	-	V	-	-
6	*Allium sativum* L.	-	-	Fl	-	Fr	-	Pr	-	-	V	-	-
7	*Amaranthus viridis* L.	-	-	-	-	V	-	Fl	Fr	-	Pr	-	-
8	*Anagallis arvensis* L.	-	-	-	V	Fl	Fr	-	-	-	-	Pr	-
9	*Aristida adscensionis* L.	-	-	-	-	-	V	-	Fl	Fr	-	-	Pr
10	*Aristida cyanantha* Nees ex Steud.	-	-	V	Fl	Fr	-	-	-	-	Pr	-	-
11	*Astragalus psilocentros Frisch.*	-	-	Fl	Fr	-	-	Pr	-	-	-	V	-
12	*Asparagus gracilis Royle.*	-	-	V	-	-	-	-	Fl	-	-	-	Pr
13	*Asphodelus tenufolius L.*	-	-	Fl	Fr	-	-	Pr	-	-	-	V	-

14	*Aphida mutica*	-	-	V	Fl	Fr	-	-	-	-	-	-	Pr
15	*Arabidoptis thaliana*	-	-	-	-	-	V	-	Fl	Fr	-	-	Pr
16	*Argyrolobium roseum*	-	-	-	-	-	V	-	Fl	Fr	-	-	Pr
17	*Arndu dedonix*	-	-	-	-	-	V	-	Fl	Fr	-	-	Pr
18	*Artemisia scoparaia. Waldst & Kitam*	-	-	V	-	-	-	-	Fl	Fr	-	-	Pr
19	*Avena sativa* L.	-	-	Fl	Fr	-	Pr	-	-	-	-	V	-
20	*Brassica napus L.*	-	Fr	Pr	-	-	-	-	-	-	V	-	Fl
21	*Brassica olaraceae* L.	-	-	Fl	-	Fr	-	Pr	-	-	V	-	-
22	*Brassica campestris*	-	Fr	Pr	-	-	-	-	-	-	V	-	Fl
23	*Brachiaria ramose*	-	-	-	-	-	-	-	Pr		Fl	Fr	-
24	*Brachiaia reptans*	-	-	-	-	-	V	-	Fl	Fr	-	-	Pr
25	*Bromus japonica* Thunb.	-	-	-	-	-	V	-	Fl	Fr	-	-	Pr
26	*Caralluma tuberculata* N.E. Brown	-	-	V	-	-	-	-	-	-	-	-	-
27	*Carthamus oxycantha Bieb*	-	-	V	Fl	-	Fr	-	-	-	-	-	Pr
28	*Celosia cristata Linn.*	-	-	-	-	-	V	-	Fl	Fr	-	-	Pr
29	*Cenchrus ciliaris* L.	-	-	V	Fl	Fr	-	-	-	-	Pr	-	-
30	*Cucumis sativus* Linn.	-	-	V	-	-	-	Fr	-	-	-	-	Pr
31	*Cacumis propheterum*	-	-	V	Fl	Fr	-	-	-	-	Pr	-	-
32	*Chenopodium album* L.	-	-	Fl	Fr	-	-	Pr	-	-	-	-	V
33	*Chenopodium ambrosioides* L.	-	-	Fl	Fr	-	-	Pr	-	-	-	-	V
34	*Chenopodium murale* L.	-	-	-	-	-	V	Fl	-	Fr	-	-	Pr
35	*Chenopodium nepalense* Colla	-	-	-	-	-	V	Fl	-	Fr	-	-	Pr
36	*Cicer arietinum* L.	-	Fl	Fr	-	Pr	-	-	-	-	V	-	-
37	*Cistanche tubulosa*	-	-	V	Fl	-	Pr	-	-	-	-	-	-
38	*Cleome brachycarpa* Vahl ex DC.	-	Fr	-	-	-	-	Pr	-	V	-	-	Fl
39	*Convolvulus arvensis* L.	-	-	Fl	Fr	-	-	Pr	-	-	-	-	-
40	*Convolvulus Prostratus* Forssk.	-	-	-	V	-	-	-	Fl	Fr		-	Pr
41	*Conyza bonariensis*	-	-	V	-	Fl	Fr	-	-	-	Pr	-	-

42	*Conyza canadensis* (L.) Cronquist	-	-	V	-	Fl	Fr	-	-	-	Pr	-	-
43	*Coriandrium sativum* L.	-	-	V	Fl	-	Fr	-	-	Pr	-	-	-
44	*Coronopus didymus* (L.) Smith	-	-	V	Fl	-	Fr	-	-	-	Pr	-	-
45	*Cucurbita maxima*	-	-	V	-	Fl	-	Fr	-	-	-	-	Pr
46	*Cucurbita pepo*	-	-	V	-	Fl	-	Fr	-	-	-	-	Pr
47	*Cuscuta reflexa* Roxb.	-	-	Fl	-	Fr	-	-	-	-	Pr	-	-
48	*Cymbopogon jwarancusa* (Jones) Schult.	-	V	-	Fl	-	Fr	-	-	-	-	Pr	-
49	*Cynoglossum lanceolatum* Forssk.	-	-	-	-	V	Fl	-	-	Fr	-	-	Pr
50	*Cynodon dactylon* (L.) Pers.	-	-	Fl	Fr	-	Pr	-	-	-	-	-	-
51	*Cyprus elumoids* L.	-	-	V	Fl	Fr	-	-	-	-	Pr	-	-
52	*Cyprus rotundus* L.	-	Fr	-	-	-	-	Pr	-	-	V	-	Fl
53	*Dactyloctenium carstatum*	-	-	V	-	Fl	Fr	-	-	-	Pr	-	-
54	*Dactyloctenium aegyptium* (L.) Willd.	-	-	V	-	Fl	Fr	-	-	-	Pr	-	-
55	*Daucus carrota* L.	-	Fl	Fr	-	Pr	-	-	-	-	V	-	-
56	*Datura alba* Nees	-	-	-	Fl	-	Fr	-	-	-	-	-	Pr
57	*Desmostachya bipinnata* (L.) Stap f.	-	-	-	-	-	Fl	-	Fr	-	-	-	Pr
58	*Dichanthium annulatum* (Forssk.) Stap f.	-	-	Fr	-	-	-	Pr	-	-	V	-	Fl
59	*Dicleptera bupleuroides*	-	V	-	Fl	-	Fr	-	-	-	-	-	Pr
60	*Digeria muricata*	-	V	-	Fl	-	Fr	-	-	-	-	-	Pr
61	*Dinebra retroflora*	-	V	-	Fl	-	Fr	-	-	-	-	-	Pr
62	*Disteria cilians*	-	V	-	Fl	-	Fr	-	-	-	-	-	Pr
63	*Echinochloa colona* (L.) Link.	-	-	Fr	-	-	-	Pr	-	-	V	-	Fl
64	*Echinops echinatus D.C*	-	-	Fr	-	-	-	Pr	-	-	V	-	Fl

65	*Eleocharis palustris*	-	-	V	Fl	-	-	Pr	-	-	-	-	Fl
66	*Eragrostis minor* Host	-	-	V	-	-	Fl	-	Fr	-	-	-	Pr
67	*Equisetum arvense* L.	-	-	-	Fr	-	-	Pr	-	-	-	-	-
68	*Euphorbia helioscopia* L.	-	-	Fl	Fr	-	-	Pr	-	-	-	-	V
69	*Euphorbia hirta*	-	-	-	-	V	-	Fl	-	Fr	Pr	-	-
70	*Euphorbia prostrate* Ait.	-	-	-	-	V	-	Fl	-	Fr	Pr	-	-
71	*Fagonia indica* var. *schwein furthii* Hadidi	-	-	-	-	V	-	Fl	-	Fr	Pr	-	-
72	*Filago arenaria* (Smoljan.) Chrtek & Holub	-	-	V	-	Fl	-	-	Fr	-	Pr	-	-
73	*Filago hunclwarica*	-	-	V	-	Fl	-	-	Fr	-	Pr	-	-
74	*Foeniculum valgare* Mill.	-	-	V	-	Fl	-	-	Fr	-	Pr	-	-
75	*Fumaria indica* (Hausskn.) Pugsley	-	-	Fl	Fr	-	-	Pr	-	-	-	V	-
76	*Galium aparine*	-	-	Fl	Fr	-	-	Pr	-	-	-	V	-
77	*Galium tricorne*	-	-	Fl	Fr	-	-	Pr	-	-	-	V	-
78	*Heliotropium elipticum* Ledeb.	-	-	-	-	V	-	Fl	-	Fr	Pr	-	-
79	*Heliotropium europaeum* L.	-	-	Fl	Fr	-	-	Pr	-	-	-	V	-
80	*Hordeum vulgare* L.	-	-	Fl	Fr	-	-	Pr	-	-	-	V	-
81	*Hyosyamus niger*	-	-	V	Fl	-	Fr	-	-	-	-	Pr	-
82	*Hyosyamus insanus*	-	-	V	Fl	-	Fr	-	-	-	-	Pr	-
83	*Imperata cylindrica* L.	-	-	-	-	V	-	Fl	-	Fr	Pr	-	-
84	*Iphiona scabra DC.k*	-	-	Fl	-	Fr	-	-	-	-	V	-	Pr
85	*Kickxia incana (Wall) Penn.*	-	-	Fl	-	-	-	Pr	-	-	V	-	Fl
86	*Lactuca serriola L.*	-	-	Fl	Fr	-	-	Pr	-	-	-	-	V
87	*Lactuca sativa L.*	-	-	Fl	Fr	-	-	Pr	-	-	-	-	V
88	*Launaea nudicaulis* (L.) Hook.f.	-	-	-	-	V	-	Fl	-	Fr	Pr	-	-
89	*Launaea procumbens* Roxb.	-	-	-	-	V	-	Fl	-	Fr	Pr	-	-
90	*Lepidium draba*	-	-	Fr	-	-	-	Pr	-	-	V	-	Fl

91	*Lindenbergia indica*	-	-	Fr	-	-	-	Pr	-	-	V	-	Fl
92	*Lolium temulentum* Linn.	-	-	Fr	-	-	-	Pr	-	-	V	-	Fl
93	*Luffa clyndrica* (L.) Roem	-	-	Fr	-	-	-	Pr	-	-	V	-	Fl
94	*Lycopersicom esculentum Mill.*	-	-	Fr	-	-	-	Pr	-	-	V	-	Fl
95	*Malcolmia scorpioides* (Bunge) Boiss.	-	Fl	-	Fr	-	-	Pr	-	-	-	V	-
96	*Malcolmia africana* (L.) R. Br.	-	-	Fl	Fr	-	-	Pr	-	-	-	-	V
97	*Malvastrum coromandelianum* (L.) Garcke	-	-	Fl	Fr	-	-	Pr	-	-	-	-	V
98	*Medicago laciniata* (L.) Mill.	-	-	Fl	Fr	-	-	Pr	-	-	-	-	V
99	*Melilotus indica* (L.) All.	-	-	Fl	Fr	-	-	Pr	-	-	-	-	V
100	*Melilotus longifolia* Desr.	-	-	Fl	Fr	-	-	Pr	-	-	-	-	V
101	*Mentha arvensis L.*	-	-	-	Fl	Fr	-	-	Pr	-	-	-	V
102	*Mentha longifolia* (L.)	-	-	-	Fl	Fr	-	-	Pr	-	-	-	V
103	*Morchella esculenta* Fries	-	-	-	V	Fr	-	-	Pr	-	-	-	-
104	*Oligomeris linifolia* (Vahl.) Macbride	-	-	Fl	Fr	-	-	Pr	-	-	-	-	V
105	*Oryza sativa* L.	-	-	V	-	-	-	Fl	Fr	-	Pr	-	-
106	*Parthenium hysterophous L.*	-	V	Fl	Fr	-	-	Pr	-	-	-	-	-
107	*Papaver somniferum* L.	-	-	V	-	-	-	Fl	Fr	-	Pr	-	-
108	*Peganum harmala L.*	-	V	Fl	-	Fr	-	Pr	-	-	-	-	-
109	*Pennisetum oriantale* L.	-	-	V	-	-	-	Fl	Fr	-	Pr	-	-
110	*Portulaca quadrifida* L.	-	V	Fl	Fr	-	-	Pr	-	-	-	-	-
111	*Phalaris minor* Retz.	-	V	-	Fl	Fr	-	Pr	-	-	-	-	-
112	*Phragmites karka* (Retz.) Trin. ex. Steud.	-	-	-	V	-	-	-	Fl	Fr	-	-	Pr
113	*Plantago lanceolata* L.	-	-	V	-	Fl	Fr	-	-	-	Pr	-	-
114	*Plantago major* L.	-	-	V	-	Fl	Fr	-	-	-	Pr	-	-
115	*Polypogon monspeliensis* (L.) Desf.	-	V	Fl	Fr	-	-	Pr	-	-	-	-	-
116	*Poa annua* L.	-	Fr	-	-	-	-	Pr	-	-	-	V	Fl

117	*Poa infirma H. B. K.*	-	Fr	-	-	-	-	Pr	-	-	-	V	Fl
118	*Polygonum plebejum* R.Br.	-	Fr	-	-	-	-	Pr	-	-	-	V	Fl
119	*Pulicaria crispa* (Forssk) B. H.	-	-	V	-	Fl	Fr	-	-	-	Pr	-	-
120	*Raphanus sativus L*	-	Fr	-	-	-	-	Pr	-	-	-	V	Fl
121	*Ranunculus muricatus* L.	-	-	V	-	Fl	Fr	-	-	-	Pr	-	-
122	*Reseda odorata* L.	-	Fr	-	-	-	-	Pr	-	-	-	V	Fl
123	*Rumex dentatus* L.	-	V	Fl	Fr	-	-	Pr	-	-	-	-	-
124	*Rumex hastatus*	-	V	Fl	Fr	-	-	Pr	-	-	-	-	-
125	*Saccharum munja* Roxb.	-	V	Fl	Fr	-	-	-	-	-	-	-	Pr
126	*Saccharum bengalense* Retz	-	V	-	Fl	-	Fr	-	-	-	Pr	-	-
127	*Salvia aegyptiaca L.*	-	-	V	Fl	-	Fr	-	Pr	-	-	-	V
128	*Saponaria vaccaria*	-	-	V	Fl	-	Fr	-	Pr	-	-	-	V
129	*Saussurea heteromalla (D.Don.) Hand*	-	-	V	Fl	-	Fr	-	Pr	-	-	-	V
130	*Setaria vercillata (L.)*	-	-	-	-	Fl	-	-	-	-	Pr	V	Fl
131	*Sisymbrium irio* L.	-	-	V	Fl	-	Fr	-	Pr	-	-	-	-
132	*Solanum melangena*	-	-	V	Fl	-	Fr	-	Pr	-	-	-	-
133	*Solanum surattense* Burm.f.	-	-	-	-	V	Fl	-	Fr	-	-	-	Pr
134	*Solanum tuberosum*	-	-	V	Fl	-	Fr	-	Pr	-	-	-	-
135	*Sonchus asper* (L.) Hill	-	-	Fl	Fr	-	-	Pr	-	-	-	-	V
136	*Sonchus oleraceus* L.	-	-	Fl	Fr	-	-	Pr	-	-	-	-	V
137	*Sorghum vulgare (L.) Pers.*	-	-	Fl	Fr	-	-	Pr	-	-	-	-	V
138	*Stellaria media L. Vill*	-	-	Fl	Fr	-	-	Pr	-	-	-	-	V
139	*Taraxacum officinale* F.H. Wigg.	-	-	Fl	Fr	-	-	Pr	-	-	-	-	-
140	*Torilis japonica* (Houtt.) DC.	-	-	V	Fl	Fr	-	Pr	-	-	-	-	-
141	*Trianthema portulacastrum* L.	-	-	V	-	Fl	Fr	-	-	-	Pr	-	-
142	*Tribulus terrestris* L.	-	-	-	-	V	Fl	-	Fr	-	-	-	Pr
143	*Trifolium alexandrianum* L.	-	-	-	Fl	Fr	Pr	-	-	-	V	-	-
144	*Trigonella mcisa*	-	-	V	Fl	Fr	-	Pr	-	-	-	-	-
145	*Triticum aestivum* L.	-	-	Fl	Fr	-	Pr	-	-	-	-	V	-

146	*Typha latifolia* L.	-	-	V	-	Fl	-	-	Fr	-	-	-	Pr
147	*Typha minima Funck er Hoppe*	-	-	V	-	Fl	-	-	Fr	-	-	-	Pr
148	*Utrica pilulifera L.*	-	-	V	Fr	-	Pr	-	-	-	-	Pr	-
149	*Verbena hybrid*	-	V	Fl	Fr	-	-	Pr	-	-	-	-	-
150	*Verbena officinale*	-	V	Fl	Fr	-	-	Pr	-	-	-	-	-
151	*Veronica aqutica* Bern.	-	V	Fl	Fr	-	-	Pr	-	-	-	-	-
152	*Vicia sativa* L.	-	-	Fl	Fr	-	-	Pr	-	-	-	-	V
153	*Xanthium strumarium* L.	-	-	Fl	Fr	-	-	Pr	-	-	-	-	V
154	*Zea mays* L.	-	-	-	-	V	-	Fl	Fr	-	Pr	-	-
155	Zelays *petendra* (L.) C. *Jeffery*	-	-	-	-	V	-	Fl	Fr	-	Pr	-	-

Key: V= Vegetative stage; FL= Flowering stage; FR =Fruiting stage and PR = Post Reproductive stage

Table No 4. Summary of phenological events (Table 3) of Darazinda F.R D.I Khan Flora

S#	Phenological stage	Months											
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
1	Vegetative(V)	-	22 (10.3%)	59(27.6%)	24(11.2%)	12 (5.6%)	8(3.7%)	0	1 (0.4%)	2 (1%)	21 (9.8%)	16(7.5%)	24(11.2%)
2	Flowering(FL)	-	04 (1.8%)	51 (24%)	42(19.7%)	32 (15%)	10 (4.6%)	17(8%)	22(10.3%)	-	2 (1%)	-	20(9.3%)
3	Fruiting (FR)	-	09 (4.2%)	11(5.1%)	34 (16%)	14 (6.5%)	36 (17%)	5 (2.3%)	21(9.8%)	28(13.1%)	7(3.2%)	1(0.4%)	-
4	ost Reproductive (PR)	-	-	02 (1%)	-	02 (1%)	05 (2.3%)	62(29.1%)	10 (4.6%)	12 (5.6%)	55(25.8%)	9(4.2%)	62(29.1%)

VEGETATION STRUCTURE

Phytosociology:

Qualitative analysis of the flora showed that 116 species were present throughout the year, in which 7 were trees, 17 shrubs and 92 were herbs (Table 5). During autumn season 71 species were found, while 73 species during winter, 87 species during spring and 68 species in summer. Similarity index between different seasons of the year is as follow;

Autumn-winter = 62.3%
Spring-autumn = 54.5%
Spring-winter = 79.1%
Summer-autumn = 53.8%
Summer-winter = 72.8% and
Summer-spring = 60.3%.

Community structure:

Climate, soil and vegetation have interrelated with each other. Changes in associated components are due to variations in any one of these components. Establishment and existence of community showed the type of plants and habitat conditions under which they develop. Biotic interactions especially human interaction and successions pattern of a community play important role in vegetation structure (Grubb, 1987; Badshah *et al*., 2010 b). Aggregation of living plants in one type of habitat and their mutual relationship with their environment is called community or plants population in one type of habitat and their integration by competition and dependence (Hussain & Badshah, 1998; Ahmad *et al*., 2006). The present study showed that 20 different plant communities were present in four different seasons in different localities (Bargholi, Pasta, Anghar ghara, Spin ghar and Sur ghar). During establishment of plant communities 87 plants were collected in spring from these areas. Various seasonal aspects of the area are as follow;

A. Autumn Aspect:

During autumn 71 plant species were recorded. Five different plant communities during autumn season at 5 respective sights i.e (Bargholi, Pasta, Anghar ghara, Spin ghar and Sur ghar) localities were as follow;

1. *Achyranthus dentatus-Tamarix aphylla–Tamarix dioica* (ATT)

Achyranthus dentatus-Tamarix aphylla–Tamarix dioica community was present at Bargholi (Appendix 1). A total of 16 spps were recorded, in which 3were trees, 5 shrubs and 8 were herbs. The sum of importance value (IV) of the 3 dominant species was 119.2. The sum of importance value contributed by tree species was 75.9, by shrubs 65.1 and by herbs 124.7 (Appendix 1). The subdominant species were *Phoenix dactylifera*, *Phragmites karka* and *Imperata cylinderica*. Importance value of *Achyranthus dentatus* was 47.5, *Tamarix aphylla* 38.4 and that of *Tamarix dioica* was 33.3 (Table 5). Similar studies were carried out by Hadi *et al.*, (2009) who reported *Tamarix* and *Capparis* community in Peshawar, Akbar *et al.* (2010) reported *Tamarix* community from Keenjhar District Sindh. Both these results agreed with our findings, as these areas are also arid.

The life form of vegetation showed that dominant life form was Therophytes (31.25%) followed by Megaphanerophytes, Chamaephytes and Nanophanophytes had (18.7%) each and geophytes 6.25% (Appendix 1). Our results agreed with those of Shukla & Mishra (2006) stated that highest therophytes occurrence followed by chamaephytes. Gimenez *et al.* (2004), Batalha & Martin (2004) and Malik & Hussain (2009) reported that geophytes were rare in their reported areas which strengthen our results. Hussain & Perveen (2009), Bocuk *et al.* (2009) and Perveen *et al.* (2008) reported nanophanerophytic and microphanerophytic plants communities in their respective areas which disagree with our present work at their research areas based on different ecological conditions. Al- Yemeni & Sher (2010) reported that in Asir Mountain, the xeric condition showed that nanophanerophytes and chamaephytes were dominant life form. Bocuk *et al.* (2009) reported that therophytes and leptophylls from Kandi region India. Manhas *et al.* (2010), Hussain *et al.* (2009), Ali & Malik (2010), and Siddiqui *et al.* (2010) also reported therophytes and leptophyll as dominant life form and

leaf size, respectively, in their reported areas. All these results agreed with our recent findings.

Results showed that the dominant leaf size was leptophyll (31.2%), nanophyll (43.7%) while mesophyll and microphyll were 12.5% each (Appendix 1). The dominancy of leptophyllous indicated drought condition of the investigated area. This fact is supported by various workers Nazir & Malik, (2006); Badshah *et al.*, (2010a) reported leptophyllous followed by nanophyllous communities from Azad Kashmir and South Waziristan. Hussain & Perveen (2009) also reported leptophyll as leaf size spectrum under dry desert condition of Kito Baran (Kirthar Range).

2. *Chenopodium murale-Desmostachya bipinnata-Acacia nilotica* (CDA)

Chenopodium murale-Desmostachya bipinnata-Acacia nilotica community was present at Pasta locally. Total 11 species were recorded in which 3 were trees, 4 were shrubs and 4 herbs. Sum of importance value (IV) of dominants was 130.1. The sub dominant species were *Tamarix aphylla, Convunvulus arvensis* and *Zizyphus mauritiana* with sum of importance value of 39.5. The sum of importance value shared by trees was 53.6, shrubs 24.3 and by herbs was 125.7 (Appendix 2). Importance values of three dominant species were 52.2, 51 and 26.9 respectively (Table 5). Qureshi (2008) reported communities of *Desmostachya-Brachiaria-cynodon* and *Salvedora- Desmostachya-Prosopis* from Swan Wari (Nara desert) which agreed with our results in *Desmostachya* specie. Rahim *et al.* (2011) reported *Desmostachya bipinnata* communities with other plant species which also agreed with our results. Similar studies were carried out by Devineau & Fournier, 2007; Frances & Shahroukh, 2006).

Life form of this community comprises of that megaphanerophytes and therophytes (27.27%), nanophanerophytes (36.36%) and Hemicryptophytes (9.0%) (Appendix 2). Our results agreed with the results of Shukla & Mishra (2006) stated that highest therophytes occurrence followed by chamaephytes. Gimenez *et al.* (2004), Batalha & Martin (2004) and Malik & Hussain (2009) reported that geophytes were rare in their reported areas which strengthen our results. Hussain & Perveen (2009), Bocuk *et al.* (2009) and Perveen *et al.* (2008) reported nanophanerophytic and microphanerophytic plants communities in their respective areas which disagree with our present work. Al- Yemeni & Sher (2010) reported that in Asir Mountain, the xeric

condition showed that nanophanerophytes and chamaephytes were dominant life form. Bocuk *et al.* (2009) reported that therophytes and leptophylls from Kandi region India. Manhas *et al.* (2010), Hussain *et al.* (2009), Ali & Malik (2010), and Siddiqui *et al.* (2010) also reported therophytes and leptophyll as dominant life form and leaf size, respectively, in their reported areas. These all results agreed with our recent findings.

Leaf size spectra of this community showed that 27.7% were Laptophyll, Nanophyll (54.5%) and Aphyllous plants were (18.18%) (Appendix 2). The dominancy of leptophyllous show drought condition of the investigated area this result supported by various workers Badshah *et al.*, (2010 a) reported leptophyllous followed by nanophyllous communities from Waziristan. Hussain & Perveen (2009) also reported leptophyll as leaf size spectrum under dry desert condition of Kito Baran (Kirthar Range). Similar studies were carried out by Malik and Hussain (2006), Guo *et al.*, (2009), Tripathi (2007) and Malik & Malik (2004).

3. *Saccharum munja- Tribulus terristris-Capparis spinosa* (STC)

Saccharum munja-Tribulus terristris-Capparis spinosa community was present at Anghar ghara. Total 14 species were recorded which included one tree, 5 shrubs and 8 herb species. Sum of importance value (IV) of dominant species was 122.5. The subdominant species were *Acacia nilotica, Ficus palmata* and *Salvedora oleoides* with sum of importance value 72.7 (Appendix 3). Importance values of three dominant species were 56.6, 41.3 and 24.6 repectively (Table 5). Our results agreed with Arshad *et al.* (2008) reported *Caparis* communities with other plants species from Cholistan desert, Pakistan. Qureshi (2008) reported *Saccharum* community from Swan Wari (Nara Desert). Badshah *et al.* (2010a) reported *Capparis* community from Waziristan. Hadi *et al.* (2009) reported *Tamarix* and *Capparis* community from Peshawar. Dasti *et al.* (2010) reported vegetation of Suleiman ranges, where *Calotropis* and *Capparis decidua* were dominant plant species. All these results strengthen our findings, as these area almost similar ecological conditions.

Life form of this community showed that megaphanerphytes (7.1%), hemicryptophytes (35.7%), therophytes (21.4%) and chaemophytes (14.2%) (Appendix 3). Our studies agreed with Guo *et al.* (2009) reported that hemicryptophytic life was

dominant in synusia. Malik & Hussain (2006), Shukla and Mishra (2006) reported therophytes as dominant followed by chaemophytes. These results disagreed with our recent findings.

Leaf size spectra showed that laptophyll and nanophyll (35.7%), microphyll (7.1%), mesophyll and aphyllous plants were each 14.2% (Appendix 3). The dominancy of leptophyllous showed drought condition of the investigated area. This result is also supported by various workers (Nazir & Malik, 2006; Badshah *et al.*, 2010a; Hussain & Perveen 2009; Malik and Hussain, 2006; Guo *et al.*, 2009; Tripathi 2007 and Malik & Malik, 2004).

4. *Salvadora oleoides-Periploca aphylla-Withania coagulans* (SPW)

Salvadora oleoides-Periploca aphylla-Withania coagulans community was present at Spin ghar locality of the research area. In This community contain total plant species were 14 out of which 3 trees, 7 shrubs and 4 herbs. Sum of importance value (IV) of 3 dominants was 152.45. Sub dominant species in this community were *Acacia nilotica, Tamarix aphylla* and *Acacia modesta*. The sum of importance value of sub dominant species was 57.63. Sum of importance value contributed by in this community by trees 57.63, shrubs 189.84 and herbs 51.79 (Appendix 4). Importance values of three dominant species were 77.42, 53.91 and 21.12 respectively (Table 5). Overgrazing and deforestration affects the physiognomy of vegetation. Our results agreed with Qureshi (2008) who reported *Salvedora* communities from Swan Wari (Nara Desert).

Life form of this community showed that nanophanerphytes (28.5%), megaphanerophytes and chaemophytes (21.4%), therophytes (14.2%) and geophytes were 7.1% (Appendix 4). Our studies agreed with results of Hussain & Perveen (2009), Bocuk *et al.* (2009) and Perveen *et al.* (2008) they reported nanophanerophytic plants communities in their respective areas which agreed with our present work. Malik & Hussain (2006), Shukla and Mishra (2006) reported therophytes were dominant followed by chaemophytes. These results disagreed with our recent findings.

Leaf size spectra of this community showed that leptophyll (35.7%), mesophyll and aphyllous (7.1%), microphyll (28.5%) and nanophyll were 21.4% (Appendix 4). The dominancy of leptophyllous show drought condition of the investigated area this result supported by various workers (Nazir & Malik, 2006; Badshah *et al.*, 2010a) reported leptophyllous followed by nanophyllous communities respectively from Azad Kashmir and South Waziristan. Hussain & Perveen (2009) also reported leptophyll as leaf size spectrum under dry desert condition of Kito Baran (Kirthar Range). Similar studies were carried out by Malik and Hussain (2006), Guo *et al.*, (2009), Tripathi (2007) and Malik & Malik (2004).

5. ***Solanum surattense-Aerva javanica-Rumex hastatus* (SAR)**

Solanum surattense-Aerva javanica-Rumex hastatus community was present at Sur ghar. In this community is composed of 16 species in which 3 trees, 5 shrubs and 8 were herbs. Sim of importance value (IV) of dominant species was 162.5. Subdominant species were *Vitex negundo, Typha minima, Tamarix aphylla* and *Prosopis faracta* with sum of importance value 88.4 (Appendix 5). Importance values of three dominant species were 72, 48.2 and 42.3 respectively (table 5). Our results agreed with the results of Arshad *et al.* (2008) and Badshah *et al.* (2010a) desert of Cholistan and Waziristan respectively.

Life form of this community showed that therophytes were (37.5%), megaphanerophytes and chaemophytes (18.7%), nanophytes and geophytes (12.5%) (Appendix 5). Our results agreed with the results of Shukla & Mishra (2006) stated that highest therophytes occurrence followed by chamaephytes. Gimenez *et al.* (2004), Batalha & Martin (2004) and Malik & Hussain (2009) reported that geophytes were rare in their reported areas which strengthen our results. Hussain & Perveen (2009), Bocuk *et al.* (2009) and Perveen *et al.* (2008) reported nanophanerophytic and microphanerophytic plants communities in their respective areas which disagree with our present work. Al- Yemeni & Sher (2010) reported that in Asir Mountain, the xeric condition showed that nanophanerophytes and chamaephytes were dominant life form. Bocuk *et al.* (2009) reported that therophytes and leptophylls from Kandi region India. Manhas *et al.* (2010), Hussain *et al.* (2009), Ali & Malik (2010), and Siddiqui *et al.*

(2010) also reported therophytes and leptophyll as dominant life form and leaf size, respectively, in their reported areas. These all results agreed with our recent findings.

Leaf size spectra showed that leptopyll (37.5%), mesophyll and microphyll (18.7%) and nanophyll (25%) (Appendix 5). The dominancy of leptophyllous show drought condition of the investigated area this result supported by various workers (Nazir & Malik, 2006; Badshah *et al.*, 2010a) reported leptophyllous followed by nanophyllous communities respectively from Azad Kashmir and South Waziristan. Hussain & Perveen (2009) also reported leptophyll as leaf size spectrum under dry desert condition of Kito Baran (Kirthar Range). Similar studies were carried out by Malik and Hussain (2006), Guo *et al.,* (2009), Tripathi (2007) and Malik & Malik (2004).

B. Winter aspect

1. *Tamarix dioca-Chenopodum album-Phoenix dactylifera* (TCP)

Tamarix dioca-Chenopodum album-Phoenix dactylifera was community in Bargholi in winter season. Total plant species in this community were 16 out of which 3 trees, 5 shrubs and 8 herbs. Sum of importance value of dominant species was 138.8. Sub dominant species were *Tamarix aphylla, Typha latifolia* and *Seteria verticillata*. Sum of importance value of these sub dominant species was 56.7 (Appendix 6). Importance values of three dominant species were 55.5, 45.8 and 37.5 respectively (Table 5). Similar studies were carried out by Hadi *et al.* (2009) who studied *Tamarix* and *Capparis* community in Peshawar. Akbar *et al.* (2010) reported *Tamarix* community from Keenjhar District Sindh. Both these results agreed with our recent findings.

Life form showed that therophytes (25%) megaphanerophytes and chaemophytes (18.7%), hemicryptophytes, nanophanerophytes and geophytes were (12.5%) ((Appendix 6). Our results agreed with the results of Shukla & Mishra (2006) stated that highest therophytes occurrence followed by chamaephytes. Gimenez *et al.* (2004), Batalha & Martin (2004) and Malik & Hussain (2009) reported that geophytes were rare in their reported areas which strengthen our results. Hussain & Perveen (2009), Bocuk *et al.* (2009) and Perveen *et al.* (2008) reported nanophanerophytic and microphanerophytic plants communities in their respective areas which disagree with our present work. Al-

Yemeni & Sher (2010) reported that in Asir Mountain, the xeric condition showed that nanophanerophytes and chamaephytes were dominant life form. Bocuk *et al.* (2009) reported that therophytes and leptophylls from Kandi region India. Manhas *et al.* (2010), Hussain *et al.* (2009), Ali & Malik (2010), and Siddiqui *et al.* (2010) also reported therophytes and leptophyll as dominant life form and leaf size, respectively, in their reported areas. These all results agreed with our recent findings.

Leaf size of this form showed that leptophyll and nanophyll (37.5%) and microphyll and mesophyll (12.5%) (Appendix 6). The dominancy of leptophyllous show drought condition of the investigated area this result supported by various workers (Nazir & Malik, 2006; Badshah *et al.*, 2010a) reported leptophyllous followed by nanophyllous communities respectively from Azad Kashmir and South Waziristan. Hussain & Perveen (2009) also reported leptophyll as leaf size spectrum under dry desert condition of Kito Baran (Kirthar Range). Similar studies were carried out by Malik and Hussain (2006), Guo *et al.*, (2009), Tripathi (2007) and Malik & Malik (2004).

2. ***Dichanthium annulatum-Cymbopogon jwarancusa-Acacia nilotica* (DCA)**

Dichanthium annulatum-Cymbopogon jwarancusa-Acacia nilotica was community present at Pasta. Sum of importance value (IV) of dominant species was 144.7. Sub dominant species were *Convunvulus arvensis, Suaeda fruticosa* and *Ziziphus mauritiana*. Sum of importance value of subdominant species was 58 (Appendix 7). Importance values of three dominant species were 54.3, 40.9 and 35.6 respectively (Table 5). Similar results were carried out by workers (Kareston *et al.*, 2005; Costa *et al.*, 2006; Parveen & Hussain, 2007; Ahmad *et al.*, 2008a).

In these plants megaphanerophytes, hemicryptophytes and therophytes (21.4%), nanophanerophytes (14.2%) and chaemophytes (7.1%) (Appendix 7). Our results agreed with the results of Shukla & Mishra (2006) stated that highest therophytes occurrence followed by chamaephytes. Gimenez *et al.* (2004), Batalha & Martin (2004) and Malik & Hussain (2009) reported that geophytes were rare in their reported areas which strengthen our results. Hussain & Perveen (2009), Bocuk *et al.* (2009) and Perveen *et al.* (2008)

reported nanophanerophytic and microphanerophytic plants communities in their respective areas which disagree with our present work. Al- Yemeni & Sher (2010) reported that in Asir Mountain, the xeric condition showed that nanophanerophytes and chamaephytes were dominant life form. Bocuk *et al.* (2009) reported that therophytes and leptophylls from Kandi region India. Manhas *et al.* (2010), Hussain *et al.* (2009), Ali & Malik (2010), and Siddiqui *et al.* (2010) also reported therophytes and leptophyll as dominant life form and leaf size, respectively, in their reported areas. These all results agreed with our recent findings.

Leaf size form showed that dominant was nanophyll (57.1%), leptophyll (28.5%) and microphyll were (7.1%) (Appendix 7). The dominancy of leptophyllous show drought condition of the investigated area this result supported by various workers (Nazir & Malik, 2006; Badshah *et al.*, 2010a) reported leptophyllous followed by nanophyllous communities respectively from Azad Kashmir and South Waziristan. Hussain & Perveen (2009) also reported leptophyll as leaf size spectrum under dry desert condition of Kito Baran (Kirthar Range). Similar studies were carried out by Malik and Hussain (2006), Guo *et al.,* (2009), Tripathi (2007) and Malik & Malik (2004).

3. ***Cymbopogon jwarancusa-Dichanthium annulatum-Eleocharis palastris* (CDE)**

Cymbopogon jwarancusa-Dichanthium annulatum-Eleocharis palastris community was present at Anghar ghara. Total species in this community was 13 out of which 1 tree, 6 shrubs and 6 herbs. Importance value showed that each species was 54.3, 35.6 and 40.9 respectively (Table 5). Total importance value of dominant species was 130.8. Sub dominant species in this community was *Acacia nilotica, Ficus palmate* and *Salvedora oleoids*. Sum of importance values of sub dominant species was 80 (Appendix 8). Similar studies were carried out by workers (Kareston *et al.*, 2005; Costa *et al.*, 2006; Parveen & Hussain, 2007; Ahmad *et al.*, 2008a) they similar conclusions in their study.

Life form showed that nanophanerophytes (30.7%), hemicryptophytes (23%), therophytes (15.3%), megaphanerophytes, geophytes and chaemophanerophytes (7.6%) (Appendix 8). Hussain & Perveen (2009), Bocuk *et al.* (2009) and Perveen *et al.* (2008)

reported nanophanerophytic and microphanerophytic plants communities in their respective areas which strengthen our present work.

Leaf size spectra showed that nanophyll (38.4%), leptophyll (23%), mesophyll and aphyllous (15.3%) and microphyll were 7.6% (Appendix 8). Our work supported by (Nazir & Malik, 2006; Badshah *et al.*, 2010a) reported leptophyll and nanophyllous communities from Azad Kashmir and South Waziristan respectively. Similar results were also obtained by Sher & Khan (2007) and Hussain & Perveen (2009) who studied similar climatic conditions which strengthen our findings.

4. *Salvadora oleoides- Datura innoxia-Withaniacoagulans* (SDW)

Salvadoraoleoides- Datura innoxia Withaniacoagulans community was present at Spin ghar. Total plant species in this community was 18 in which 3 trees, 10 shrubs and 5 herbs were present. Sum of importance value of these three dominants was 138.2. Sub dominant species were *Rhyza stricta, Acacia modesta* and *Aerva javanica*. The sum of importance value of subdominant species was 40.67 (Appendix 9). Impotance values of dominant species were 53.9, 43.8 and 40.5 respectively (Table 5). Our results agreed with Qureshi (2008) who reported *Salvedora* communities from Swan Wari (Nara Desert).

Life form of this community showed that nanophanerophytes and chaemophytes (27.7%), therophytes (22.2%), megaphanerophytes (16.6%) and hemicrptophytes were 5.5% (Appendix 9). Hussain & Perveen (2009), Bocuk *et al.* (2009) and Perveen *et al.* (2008) reported nanophanerophytic and microphanerophytic plants communities in their respective areas which strengthen our present work.

Leaf size showed that leptophyll (44.4%) followed by nanophyll (27.7%) mesophyll and aphyllous (11.1%) while microphyll were 5.5% (Appendix 9). The dominancy of leptophyllous show drought condition of the investigated area this result supported by various workers (Nazir & Malik, 2006; Badshah *et al.*, 2010a) reported leptophyllous followed by nanophyllous communities respectively from Azad Kashmir and South Waziristan. Hussain & Perveen (2009) also reported leptophyll as leaf size spectrum under dry desert condition of Kito Baran (Kirthar Range). Similar studies were carried

out by Malik and Hussain (2006), Guo *et al.,* (2009), Tripathi (2007) and Malik & Malik (2004).

5. *Calotropis procera-Rhazya stricta-Capparis spinosa* (CRC)

Calotropis procera-Rhazya stricta-Capparis community was present at Sur ghar. Total plants species in this community were 12 out of which 2 trees, 6 shrubs and 4 herbs. Importance value of this community of each species was 43.9, 43.8 and 43.3 respectively (Table 5). In this community sub dominant species were *Acacia nilotica, Withania somnifera* and *Suaeda fruticosa.* Sum of importance value of these sub dominant species was 47.3 (Appendix 10). Our results agreed with Arshad *et al.* (2008) reported *Capparis* community from Cholistan desert. Dasti *et al.* (2010) reported that *Calotropis* and *Capparis decidua* as dominant plant were as associated species in Suleiman ranges which strengthen our present work. This habitat differed from others. Similar studies were carried out by workers (Badshah *et al.*, 2010a; Malik & Husain, 2006).

Life form of this community showed that chaemophytes (41.6%), cryptophytes (25%), megaphanerophytes (16.6%), nanophanerophytes, therophytes and hemicyptophytes (8.3%) (Appendix 10). Hussain & Perveen (2009) also reported similar results that chamaephytes were the dominant life form. While Shah & Hussain (2009) reported that cryptophyte and therophytes were dominant in vegetation of Hayatabad, District Peshawar this disagreed with our recent results.

Leaf size spectra showed that leptophyll (58.3%), nano and microphyll (16.6%) and mesophyll were 8.3% (Appendix 10). Our results supported by Hussain & Perveen (2009) and Shah and Hussain (2009) reported that leptophyll was dominant in their leaf size spectra.

Spring aspect

1. *Tamarix dioica- Rhazya stricta –Salvadora* (TRS)

Tamarix dioica-Rhazya stricta-Salvadora community was present at Bargholi. TIV of these dominant plants were 56.0, 46.1 and 42.9 respectively (Table 5). In this community total plants were 20 out of which 3 trees, 5 shrubs and 12 were herbs. Sub dominant species were *Phoenix dactylifera, Tamarix aphylla* and *Disteria cillians*. Sum of importance values of these three subdominant species was 91.1 (Appendix 11). Similarly, Malik & Hussain (2008), Arshad *et al.* (2008), Pavlu *et al.* (2006) and Perveen *et al.* (2008) concluded similar results from their studies which strengthen our findings also.

Life form of this community showed that therophytes and geophytes (20%), megaphanerophytes, chaemophytes and nanophanerophytes (15%), and hemicryptophytes were 10% (Appendix 11). Our findings agreed with Manhas *et al.* (2010), Hussain *et al.* (2009), Ali & Malik (2010), and Siddiqui *et al.* (2010) reported therophytes were dominant life spectra in their study area. Bocuk *et al.* (2009) also recorded therophytes were dominant life spectra from Kandi region India. Shukla & Mishra (2006) studied highest therophytes occurrence followed by chamaephytes also favours our findings.

Leaf size showed that nanophyll (35%), microphyll (25%) while mesophyll and leptophyll were 20% (Appendix 11). Our work supported by (Nazir & Malik, 2006; Badshah *et al.*, 2010a) reported leptophyll and nanophyllous communities from Azad Kashmir and South Waziristan respectively. In our case nanophyll followed by microphyllous plants while in another case of workers (Nazir & Malik, 2006; Badshah *et al.*, 2010a) leptophyll followed by nanophyllous plants in this regard their studies disagree with our present study.

2. *Zizyphus nummularia-Convolvulusarvesis-Lactuca serriola* (ZCL)

Zizyphus nummularia-Convolvulusarvesis-Lactuca serriola community was present at Pasta. Importance value of 3 dominant species was 45.5, 39.6 and 34.0c respectively (Table 5). In this community total plants were 19 out of which 3 trees, 4 shrubs and 12 were herbs. In this community sub dominant species were *Acacia nilotica, Cymbopogon jawarancusa* and *Eleocharis palastris*. Sum of importance value of these subdominant species was 57 (Appendix 12). Our results were also supported by Malik & Hussain (2008), Arshad *et al.* (2008), Pavlu *et al.* (2006) and Perveen *et al.* (2008).

Life form of this community showed that therophytes (47.3%), megaphanerophytes and nanophanerophytes (15.7%), hemicryptophytes (10.5%) while chaemophytes and geophytes were (5.2%) (Appendix 12). Our results agreed with the results of Shukla & Mishra (2006) stated that highest therophytes occurrence followed by chamaephytes. Gimenez *et al.* (2004), Batalha & Martin (2004) and Malik & Hussain (2009) reported that geophytes were rare in their reported areas which strengthen our results. Hussain & Perveen (2009), Bocuk *et al.* (2009) and Perveen *et al.* (2008) reported nanophanerophytic and microphanerophytic plants communities in their respective areas which disagree with our present work. Al- Yemeni & Sher (2010) reported that in Asir Mountain, the xeric condition showed that nanophanerophytes and chamaephytes were dominant life form. Bocuk *et al.* (2009) reported that therophytes and leptophylls from Kandi region India. Manhas *et al.* (2010), Hussain *et al.* (2009), Ali & Malik (2010), and Siddiqui *et al.* (2010) also reported therophytes and leptophyll as dominant life form and leaf size, respectively, in their reported areas. These all results agreed with our recent findings.

Leaf size spectra showed that nanophyll were (63.1%) followed by leptophyll (31.5%) and mesophyll (5.2%) (Appendix 12). Our work supported by (Nazir & Malik, 2006; Badshah *et al.*, 2010a) reported leptophyll and nanophyllous communities from Azad Kashmir and South Waziristan respectively.

3. *Salvadora-Periploca-Ficus palmate* (SPF)

Salvadora-Periploca-Ficus palmate (SPF) community was present at Anghar ghara. Imprtance value of each species was 88.1, 52.9 and 24.7 respectively (Table 5). In this community total 13 plants were present out of which one tree, 6 shrubs and 6 were herbs. Sub dominant species in this community were *Acacia nilotica, Pegnum harmala* and *Kickxia incana* while sum of importance value of these sub dominant species was 51.2 (Appendix 13). Our results agreed with Qureshi (2008) who reported *Salvedora* communities from Swan Wari (Nara Desert). Recent work also supported by Badshah *et al.* (2010a) reported *Salvedora* community from Waziristan.

Life form of this community showed that nanophanerphytes (46.1%) followed by hemicryptophytes and therophytes (23%) while megaphanerophytes 7.6% (Appendix 13). Hussain & Perveen (2009), Bocuk *et al.* (2009) and Perveen *et al.* (2008) reported nanophanerophytic and microphanerophytic plants communities in their respective areas which strengthen our present work.

Leaf size spectra showed that leptophyll and nanophyll (38.4%), mesophyll and aphyllous species were 7.6% (Appendix 13). Our work supported by Manhas *et al.* (2010), Hussain *et al.* (2009), Ali & Malik (2010), and Siddiqui *et al.* (2010) they concluded same results that leptophyll as dominant leaf size.

4. *Taraxacum-Aerva javanica-Withania coagulans* (TAW)

Taraxacum-Aerva javanica-Withania coagulans community was present at Spin ghar ghara. Importance value of dominant species at this site was 37.2, 27.4 and 23.6 respectively (Table 5). Total plant species in this community were 18 in number out of which included 2 trees, 4 shrubs and 12 were herbs. The subdominant species in this community were *Tamarix aphylla, Trianthema portulacastrum* and *Plantago lanceolata*. Sum of importance value of these subdominant species was 64.1(Appendix 14). Our results supported by Malik & Hussain (2008) and Perveen *et al.* (2008).

Life form of this community showed that therophytes (33.33%), chaemophytes and geophytes (22.2%), megaphanerophytes and hemicryptophytes (11.1%) (Appendix 14). Our results agreed with the results of Shukla & Mishra (2006) stated that highest therophytes occurrence followed by chamaephytes. Gimenez *et al.* (2004), Batalha & Martin (2004) and Malik & Hussain (2009) reported that geophytes were rare in their reported areas which strengthen our results. Hussain & Perveen (2009), Bocuk *et al.* (2009) and Perveen *et al.* (2008) reported nanophanerophytic and microphanerophytic plants communities in their respective areas which disagree with our present work. Al-Yemeni & Sher (2010) reported that in Asir Mountain, the xeric condition showed that nanophanerophytes and chamaephytes were dominant life form. Bocuk *et al.* (2009) reported that therophytes and leptophylls from Kandi region India. Manhas *et al.* (2010), Hussain *et al.* (2009), Ali & Malik (2010), and Siddiqui *et al.* (2010) also reported therophytes and leptophyll as dominant life form and leaf size, respectively, in their reported areas. These all results agreed with our recent findings.

Leaf size spectra showed that nanophyll were (38.8%) followed by leptophyll (22.2%), mesophyll and microphyll (16.6%) while aphyllous were 5.5% (Appendix 14). Our work supported by (Nazir & Malik, 2006; Badshah *et al.*, 2010a) reported leptophyll and nanophyllous communities from Azad Kashmir and South Waziristan respectively.

5. *Salvadora oleoides-Olea ferruginea-Suaeda fruticosa* (SOS)

Salvadora oleoides-Olea ferruginea-Suaeda fruticosa community was present at Sur ghar. TIV of these dominant species were 43.3, 37.1 and 32.6 respectively (Table 5). Total plant species were 17 out of which 2 trees, 6 shrubs and 9 were herbs. In this community the sub dominant species were *Capparis spinosa, Sonchus oleraceus* and *Sonchus asper*. Sum of importance value of these subdominant species was 63.4(Appendix 15). Our results supported by Ahmad *et al.* (2009d) reported ten *Olea* communities from Dir Khyber Pakhtunkhwa. Similarly Ilyas *et al.* (2012) reported *Olea* community from Qalagai hilla, swat. Nasrullah *et al.* (2015) reported *Olea* communities from Malakand Division, Hindukush range of Pakistan.

Life form of this community showed that therophytes were (52.9%) while meaphanerophytes, chaemophytes, nanophytes and hemicryptophytes were (11.76%) (Appendix 15). Our results agreed with the results of Shukla & Mishra (2006) stated that highest therophytes occurrence followed by chamaephytes. Gimenez *et al.* (2004), Batalha & Martin (2004) and Malik & Hussain (2009) reported that geophytes were rare in their reported areas which strengthen our results. Hussain & Perveen (2009), Bocuk *et al.* (2009) and Perveen *et al.* (2008) reported nanophanerophytic and microphanerophytic plants communities in their respective areas which disagree with our present work. Al-Yemeni & Sher (2010) reported that in Asir Mountain, the xeric condition showed that nanophanerophytes and chamaephytes were dominant life form. Bocuk *et al.* (2009) reported that therophytes and leptophylls from Kandi region India. Manhas *et al.* (2010), Hussain *et al.* (2009), Ali & Malik (2010), and Siddiqui *et al.* (2010) also reported therophytes and leptophyll as dominant life form and leaf size, respectively, in their reported areas. These all results agreed with our recent findings.

Leaf size spectra of this community showed that nanophyll and microphyll were 35.29% followed by leptophyll (23.5%) and mesophyll (5.8%) (Appendix 15). Our work supported by (Nazir & Malik, 2006; Badshah *et al.*, 2010a) reported leptophyll and nanophyllous communities from Azad Kashmir and South Waziristan respectively. In our case nanophyll followed by microphyllous plants while in another case of workers leptophyll followed by nanophyllous plants in this regard their studies disagree with our present study.

C. Summer aspect

1. *Tamarix dioica-Capparis spinosa-Phoenix dactylifera* (TCP)

Tamarix dioica-Capparis spinosa-Phoenix dactylifera community was present at Bargholi. Importance values of dominant species were 43.3, 37.1 and 32.6 respectively (Table 5). Sum of importance values of these dominant species was 167. Total plants in this community were 13 which included 3 trees, 4 shrubs and 6 herbs. Sub dominant species were *Phragmites karka, Amaranthus viridis* and *Tamarix aphylla*. Sum of Importance value of these sub dominant species was 93.1 (Appendix 16). These findings agree with Hadi *et al.* (2009) who reported *Tamarix* and *Capparis* community from Peshawar. Similar results were obtained by workers like Badshah *et al.* (2010 a) from Waziristan and Qureshi *et al.* (2008 a) form Nara desert (Sindh) which favored our present findings.

Life form spectra of this community showed that chaemophytes (30.7%), therophytes (23%), nanophanerophytes (7.6%), megaphanerophytes while geophytes (15.3%) (Appendix 16). Our results supported by Hussain & Perveen (2009) reported that chamaephytes were the dominant life form under dry desert condition of Tiko Baran (Kirthar Range).

Leaf size spectra showed that leptopyll (30.7%) while mesophyll, microphyll and nanophyll (23%) (Appendix 16). Our result strengthen by Manhas *et al.* (2010) and Bocuk *et al.* (2009) studied leptophylls were dominant in their respective areas.

2. *Salvadora-Periploca aphylla-Acacia nilotica* (SPA)

Salvadora-Periploca aphylla-Acacia nilotica (SPA) community was present at Pasta. Importance values of these dominant plants were 109.8, 30.3 and 25.9 respectively (Table 5). Total plants species in this community was 11 including 2 trees, 5 shrubs and 4 herbs. Subdominant species in this community were *Zizyphus mauritiana, Calligonum polygonoides* and *Zizyphus nummularia*. Sum of importance value of subdominant species was 56.6 (Appendix 17). Our results agreed with Qureshi (2008) who reported

Salvedora communities from Swan Wari (Nara Desert). Recent work also supported by Badshah *et al.* (2010a) reported *Salvedora* community from Waziristan.

Life form spectra showed that nanophanerophytes (36.36%), therophytes (27.27%), megaphanerophytes (18.18%) while chaemophytes and hemicryptophytes (9%) (Appendix 17). Our results agreed with Hussain & Perveen (2009), Bocuk *et al.* (2009) and Perveen *et al.* (2008) reported nanophanerophytic and microphanerophytic plants communities in their respective areas were dominant. Similarly from abroad Al-Yemeni & Sher (2010) reported xeric condition exhibited nanophanerophytes dominant vegetation in Asir Mountain.

Leaf form spectra showed that nanophyll (36.36%), leptophyll and microphyll (27.27%), and aphyllous (9%) (Appendix 17). Similar studies were carried out by worker (Nazir & Malik, 2006; Badshah *et al.*, 2010a) they studied lepto and nanophyllous communities from Azad Kashmir and South Waziristan respectively.

3. ***Conyza bonariensis-Fagonia indica-Acacia nilotica* (CFA)**

Conyza bonariensis-Fagonia indica-Acacia nilotica community was present at Anghar ghara. Importance value of these species was 45.2, 43.3 and 37.6 respectively (Table 5). Total plant species in this community were 14 including 4 trees, 4 shrubs and 6 herbs. This community was sub dominated by *Ficus palmate*, *Salvedora oleoides* and *Zizyphus mauritiana* with sum of importance value 50.8 (Appendix 18). Similar results were carried out by workers (Kareston *et al.*, 2005; Costa *et al.*, 2006; Parveen & Hussain, 2007; Ahmad *et al.*, 2008a).

Life size spectra showed that megaphanerophytes (28.5%), nanophanerophytes (21.4%) and chaemophytes and hemicryptophytes were 7.1% (Appendix 18). Our results agreed with Hussain & Perveen (2009), Bocuk *et al.* (2009) and Perveen *et al.* (2008) reported nanophanerophytic and microphanerophytic plants communities in their respective areas were dominant. Similarly from abroad Al- Yemeni & Sher (2010) reported xeric condition exhibited nanophanerophytes dominant vegetation in Asir Mountain.

Leaf size spectra of this community showed that nanophyll (50%), leptophyll (42.8%), and microphyll were 7.1% (Appendix 18). Khan & Khatoon (2007) also stated that therophytes were the main group of life form and leptophylls as the dominant leaf spectra in Chagharzai which satisfied our results in this regard. Similarly, Badshsh *et al.* (2010) and Hussain *et al.* (2009) reported therophytic and leptophyllous communities which also supported our results.

4. ***Capparis-Zizyphus nummularia-Datura innoxia* (CZD)**

Capparis-Zizyphus nummularia-Datura innoxia community was present at Spin ghar. Importance value of these species was 52.7, 48.2 and 37.8 respectively (Table 5). Total 13 plant species were present in this community including 1 tree, 6 shrubs and 6 were herbs. This community was sub dominated by *Calotropis procera, Cynodon dactylon* and *Withania coagulans*. Sum of importance value of these sub dominated species was 73.4 (Appendix 19). Our results agreed with Dasti *et al.* (2010) reported *Capparis* communities from Suleiman ranges. Hadi *et al.*, (2009) also studied *Capparis* community in Peshawar.

Life form of this community showed that therophytes (38.46%), chaemophytes (30.7%), nanophanerophytes (15.38%), megaphanerophytes and hemicryptophytes were 7.6% (Appendix 19). Leaf size spectra showed that leptophyll (46.1%), nanophyll (23%), micro and mesophyll were 15.38% (Appendix 19). Similar results were obtained by Sher & Khan (2007) studied that therophytes in life form and leptophylls were dominant leaf spectra in Chagharzai which strengthen our results. Badshsh *et al.* (2010) and Hussain *et al.* (2009) also concluded similar results that therophytic and leptophyllous communities which also agreed with our results.

5. ***Withania somnifera- Olea ferruginea –Zizyphus nummularia* (WOZ)**

Withania somnifera- Olea ferruginea –Zizyphus nummularia community was present at Sur ghar. Importance value of these plant species was 99.0, 41.7 and 23.3 respectively (Table 5). Total plants in this community were 17 including 2 trees, 5 shrubs and 10 herbs. This community was sub dominated by *Zizyphus nummularia, Tamarix*

aphylla and *Typha minima* with sum of importance values 68.1 (Appendix 20). Similarly, Ahmad *et al.* (2009d) reported ten *Olea* communities from Dir Khyber Pakhtunkhwa, which are in agreement with the present results.

Life size spectra showed that therophytes (47%) and chaemophytes were 17.4% (Appendix 20). Our results agreed with the results of Shukla & Mishra (2006) stated that highest therophytes occurrence followed by chamaephytes. Gimenez *et al.* (2004), Batalha & Martin (2004) and Malik & Hussain (2009) reported that geophytes were rare in their reported areas which strengthen our results. Hussain & Perveen (2009), Bocuk *et al.* (2009) and Perveen *et al.* (2008) reported nanophanerophytic and microphanerophytic plants communities in their respective areas which disagree with our present work. Al- Yemeni & Sher (2010) reported that in Asir Mountain, the xeric condition showed that nanophanerophytes and chamaephytes were dominant life form. Bocuk *et al.* (2009) reported that therophytes and leptophylls from Kandi region India. Manhas *et al.* (2010), Hussain *et al.* (2009), Ali & Malik (2010), and Siddiqui *et al.* (2010) also reported therophytes and leptophyll as dominant life form and leaf size, respectively, in their reported areas. These all results agreed with our recent findings.

Leaf size spectra showed that nanophyll and microphyll (35.29%), leptophyll (23.5%) while megaphanerophytes, nanophanerophytes and geophytes (11.7%) and mesophyll (5.88%) (Appendix 20). Our results strengthen by (Nazir & Malik, 2006; Badshah *et al.*, 2010a) who reported nanophyllous communities from Azad Kashmir and South Waziristan respectively.

Soil properties/Edaphology of the Research localities

1. **Bargholi soil:**

Results showed that Bargholi hill give proper unit for electrical conductivity clay loam with grey color. The pH of Bargholi soil was 7.3, electrical conductivity 0.89. Presence of various elements as given below; N = 5.6 ppm, O = 75.2 ppm, Mg = 0.7 ppm, Al = 5.9 ppm, Si = 19.8 ppm, P = 0.01 ppm, K = 0.6 ppm, Ca = 1ppm, Ti = 1 ppm and Fe = 2 ppm were present (Taable 6).

2. **Pasta soil:**

Soil of Pasta hill showed that the soil texture was clay loam with red colour. pH of the soil was 7.8, electrical conductivity 0.37. Various elements were present like, N = 2.4 ppm, O = 73.2 ppm, Mg = 1 ppm, Al = 7.6 ppm, Si = 16.8 ppm, P = 0.01 ppm, K = 0.7 ppm, Ca = 0.3 ppm, Ti = 0.2 ppm and Fe = 2.3 ppm were present (Table 6).

3. **Anghar ghara soil:**

Soil of Anghar ghara was also clay loamy with grey color. The soil was slightly alkaline with pH of the soil was 7.8, electrical conductivity 0.50. Various elements were present like, N = 9.6 ppm, O = 72.6 ppm, Mg = 63.9 ppm, Al = 0.6 ppm, Si = 16.8 ppm, P = 0.01 ppm, K = 0.7 ppm, Ca = 0.3 ppm, Ti = 0.2 ppm and Fe = 2.3 ppm were present (Table 6).

4. **Spin ghar soil:**

Soil of Spin ghar showed that soil texture was gravel white sandy gravel with grey color. The pH of soil was alkaline (8.1), electrical conductivity 0.67. Various elements present like, N = 3.3 ppm, O = 71.3 ppm, Mg = 1.3 ppm, Al = 4.4 ppm, Si = 11.3 ppm, P = 0.1 ppm, K = 0.9 ppm, Ca = 3.3 ppm, Ti = 0.2 ppm and Fe = 1.6 ppm were present (Table 6).

5. Sur ghar soil:

Soil of Sur ghar showed that soil texture was loamy with red and grey colour. The pH of soil was 7.3, electrical conductivity 0.43. Various elements were present like, N = 2.2 ppm, O = 72.1 ppm, Mg = 1 ppm, Al = 6.7 ppm, Si = 17.9 ppm, P = 0.04 ppm, K = 0.9 ppm, Ca = 0.6 ppm, Ti = 0.2 ppm and Fe = 2.5 ppm were present (Table 6).

Overall results showed that soil texture was clay-loam to sandy gravel, slightly alkaline and abundant minerals. Other workers like Ali *et al.* (2011); Khan *et al.*, (2010) and Rashid *et al.* (2011) also carried similar studies and concluded that due to deforestation and soil erosion affected soil nutrient and composition quantatively and qualitatively.

Table 5. Plant species with their importance Values of 20 different communities during different aspects of Darazinda

S.N0	Species	Autumn					Winter					Spring					Summer				
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
	A. Trees																				
1	*Acacia modesta* Wall.	-	-	-	18.9	-	-	-	-	14.	-	-	-	-	-	-	-	-	-	-	-
2	*Acacia nilotica* (L.) Wild. ex Delile	11.2	26.9	27.5	20.4	9.2	9.4	41.8	29.6	10.	16.	6.0	30	20.	11.4	10.	8.7	25.9 c	37.6	18.5	11.
3	*Ficus palmate*	-	-	24.0	-	-	-	-	27.5	-	-	-	-	24.7c	-	-	-	-	17.8	-	-
4	*Phoenix dactylifera* L.	26.3	-	-	-	-	37.5	-	-	-	-	36.	-	-	-	-	36c	-	-	-	-
5	*Prosopis farcta* (Banks&Sol.)Macbride	-	-	-	-	19.8	-	-	-	-	14.	-	-	-	-	9.8	-	-	-	-	-
6	*Tamarix aphylla* (L.) Karst	38b	15.0	-	-	19.8	27.0	4.0	-	10.	-	29.	7.8	-	25.1	-	26.	-	11.7	-	23.
7	*Zizyphus mauritianaLam.*	-	11.7	-	19	-	-	12.4	-	-	-	-	9.8	-	-	-	-	23.9	15.3	-	-
	B. Shrubs																				
8	*Artemisia scoparia*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.	-	-	-	-	-
9	*Calotropis procera* subsp.hamiltonii (Wight)Ali	-	-	-	11.5	-	-	-	-	8.6	44	-	-	-	10.8	-	-	-	-	28.7	-
10	*Capparis spinosa* L.	-	9.6	24.6c	-	-	-	-	13.2	3	43.	5.6	-	-	-	30.	47.4	14.0	-	52.7	-
11	*Calligonum polygonoides L.*	1.8	-	-	-	-	-	-	-	11.6	-	-	-	11.6	-	-	-	22.9	-	-	-
12	*Datura innoxia*	-	-	-	2.8	-	-	8.4	-	7.8	-	-	11	-	-	-	-	-	-	37.8	-
13	*Dodonaea viscosa* (L.)cq.	-	-	-	-	-	-	-	14.0	-	-	-	-	12.3	-	-	-	-	15.2	-	-
14	*Aerva javanica* (Burm.f.)Juss.	8.1	-	-	-	48.2b	6.8	-	-	11.7	-	-	-	-	27b	-	-	-	-	-	-
15	*Olea ferruginea* Royle	-	-	-	-	-	-	-	-	-	-	-	-	-	-	37b	-		-	-	21.
16	*Periploca aphylla* Decne.	-	4.7	15.2	54b	-	-	-	18.3	44b	-	-	8.	53b	-	-	-	30.3b	-	-	-
17	*Rhazya stricta* Decne.	2.7	-	-	14.12	11.2	11.8	-	-	14.8	43.	6.7	-	-	-	-	13.	-	-	-	-
18	*Salvadora oleoides*	19.2	9.7	21.2	77a	10.1	8.6	-	22.9	53.9	-	42.	11	38a	-	43.3	-	110a	17.7	-	-

	Decne.																				
19	*Suaeda fruticosa Forssk.exJ.F.Gmelin*	-	-	16.4	-	10.4	-	15.8	11.4	-	15	-	-	-	-	32.	10.	-	33.5	-	17.
20	*Tamarix dioica* Roxb. ex Roth.	33.3c	-	-	8.84		55a	-	-	-	-	56.0	11	-	-	-	68.	-	-	10.1	-
21	*Vitex negundoL.*	-	-	-	-	27.9	-	-	-	-	12	-	-	-	-	-	-	-	-	-	6.4
22	*Withania coagulans* (Stocks)Dunal	-	-	-	21 c	-	-	-	-	41c	-	-	-	-	23.6	-	-	-	-	21.5	-
23	*Withania somnifera* (L.) Dunal.	-	-	-	-	-	-	-	-	-	15.	-	-	-	-	-	-	-	-	-	99.0
24	*Zizyphus nummularia* (Burm.f.) Wight & Arn.	-	5.3	-	-	-	9.3	14.1	-	10	-	14.8	11	12.1	-	-	-	18.8	11.9	48b	23.2
									C. Herbs												
25	*Achyranthes aspera L.*	-	-	-	-	9.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	*Achyranthus dentatus*	47.5a	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-
27	*Amaranthus viridis L.*	-	9.7	-	-	-	-	-	-	-	-	-	-	-	-	-	51.	-	-	-	11.6
28	*Anagallis arvensis L.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.3	-	-	-
29	*Aristida adscensionis L.*	-	-	12.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	*Aristida cyanantha NeesexSteud.*	-	-	-	-	-	10.7	-	-	-	-	4.9	-	-	-	-	8.5	-	-	-	-
31	*Apluda mutica*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18.0	-	-	-
32	*Astragalus amherstianus Royle exBenth.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	*Argyrolobium roseum*	6.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	*Brachiaria ramose*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	*Brachiaia reptans*	-	-	-	-	-	-	-	-	-	-	6.6	-	-	-	-	-	-	-	-	-
36	*Bromus japonica Thunb.*	-	-	-	-	-	7.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	*Caralluma tuberculata N.E. Brown*	-	-	-	-	-	-	-	-	4.	-	-	-	-	-	-	-	-	-	-	-
38	*Cynodon dactylon (L.) Pers.*	-	-	9.0	-	-	-	-	-	-	9.2	-	9.	-	-	-	-	-	-	23..	-

39	*Cenchrus ciliaris L.*	-	-	9.9	-	-	-	13.6	-	-	13.	-	-	-	-	-	-	-	-	-	-
40	*Chenopodium album L.*	-	-	-	-	-	45.8c	-	-	-	-	-	5.	-	-	-	-	-	-	-	-
41	*Chenopodium murale L.*	-	52.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	*Chenopodium ambrosioides L.*	-	-	-	-	-	-	-	-	-	-	-	10	-	--	-	-	-	-	-	-
43	*Cleome brachycarpa* Vohl. ex Dc.	-	-	-	-	-	11.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44	*Convolvulus arvesis L.*	-	12.8	12.6	-	-	-	28.2	-	-	-	-	39	-	-	-	-	-	-	12.	-
45	*Convolvulus Prostratus* Forssk	-	-	-	-	-	-	-	-	9.	-	-	-	-	--	-	-	-	-	14.	-
46	*Conyza canadensis* (L.) Cronquist	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.	-	-	-	-	15.2
47	*Conyza bonariensis*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	45.8	-	14.4
48	*Coronopus didymus* (L.) Smith	6.2	-	-	11.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
49	*Cyprus rotundus L.*	-	-	-	-	-	12.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
50	*Cyprus difformis L.*	11.0	-	- -	-	-	-	-	-	-	-	6.1	-	-	-	-	-	-	-	-	-
51	*Cynoglossum lanceolatum Forssk.*	-	-	12.8	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	*Cymbopogon jwarancusa* (Jones) Schult.	-	-	-	-	-	-	50b	54.3	-	-	-	15	-	-	-	-	-	-	-	-
53	*Dactyloctenium aegyptium* (L. Willd.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14.1	-	-
54	*Dactyloctenium carstatum*	2.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
55	*Datura alba Nees*	-	-	-	17.0	13.6	-	-	-	-	-	3.2	-	-	-	-	-	-	-	-	-
56	*Desmostachya bipinnata (L.) Stapf.*	-	51.0	-	9.6	-	-	-	-	4.	-	9.1	-	-	-	-	-	-	-	-	-
57	*Dichanthium annulatum* (Forssk.) Stapf.	-	-	-	-	-	-	52.8	35.6	-	-	-	-	-	-	-	-	-	-	- -	-

58	*Dissebra retroflora*	-	-	-	-	-	-	-	-	-	10.	-	-	-	-	-	-	-	-	-	-
59	*Disteria cilians*	-	-	-	-	-	-	-	-	-	-	25.	-	-	-	-	-	-	-	-	-
60	*Echinochloa colona* (L.) Link	-	-	-	-	-	-	-	12.5	-	-	-	-	-	-	-	-	-	-	-	-
61	*Echinops echinatus D.C*	-	-	-	-	-	-	11.7	-	-	-	-	-	-	-	-	-	-	-	-	-
62	*Eleocharis palastris*	-	-	-	-	-	-	-	40.9	-	-	-	45	-	-	-	-	-	-	-	-
63	*Equisetum arvense L.*	-	-	-	-	-	-	-	-	-	-	-	-	-	15.1	-	-	-	-	-	-
64	*Eragrostis mino r*Host	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.9	-	-	-	-	-
65	*Euphorbia hirta*	-	-	-	-	-	-	-	-	-	-	-	-	-	6.4	-	-	-	-	-	-
66	*Euphorbia helioscopia L.*	-	-	-	-	-	-	-	-	-	-	3.1	-	-	-	-	-	-	-	-	-
67	*Euphorbia prostrate Ait*	-	-	-	-	10.2	-	-	-	6.	-	-	-	-	-	7.1	-	-	-	-	-
68	*Fagonia indica* var. schwa in furthii Hadidi	-	-	-	-		-	-	11.8	-	-	-	-	-	-	-	-	-	43.3b	-	-
69	*Fumaria indica* (Hausskn.) Pugsley	-	-	-	-	-	-	-	-	-	-	-	-	11.3	-	-	-	-	-	11.	-
70	*Heliotropium europaeum* L.	-	-	-	-	-	-	-	-	-	-	7.9	-	-	-	-	-	-	-	-	-
71	*Heliotropium elipticum* Ledeb	-	-	-	-	-	-	-	-	-	-	-	-	-	12.6	-	-	-	-	-	-
72	*Imperata cylindrica L.*	15.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
73	*Iphiona grantoides*	-	-	8.8	-	-	-	-	8.0	-	-	-	-	-	15.2	-	-	-	-	-	-
74	*Kickxia incana* (Wall) Penn.	-	-	-	-	-	-	-	-	-	-	-	-	12.7	-	-	-	-	-	-	-
75	*Lactuca serriola L*	-	-	-	-	-	-	-	-	-	-	-	34 c	-	-	-	-	- -	-	-	-
76	*Launaea procumbens Roxb.*	-	-	-	-		-	-	-	-	-	-	-	-	-	10.	-	-	-	-	-
77	*Launaea nudicaulis (L.) Hook .f.*	-	-	-	-	72.0a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
78	*Lindenbergia indica*	-	-	-	-	-	-	-	-	-	-	-	-	9.3	-	-	-	-	-	-	-
79	*Malcolmia Africana* (L.) R. Br	-	-	-	-	-	-	-	-	7. 65	-	-	-	-	-	-	-	-	-	-	-
80	*Malcolmia scorpioides*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.1	-	-

	(Bunge) Boiss.																				
81	*Malvastrum coromandelianum* (L.) Garcke	-	-	-	-	-	-	-	-	-	-	-	-	-	10.4	-	-	-	-	-	-
82	*Medicago laciniata* (L.) Mill.	-	-	-	-	-	-	-	-	-	-	-	11	-	-	8.9	-	-	-	-	-
83	*Melilotus indica (L.) All.*	-	-	-	-	-	-	12.8	-	-	-	-	10	-	-	-	-	-	-	-	-
84	*Melilotus longifolia* Des	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14.7	-	-
85	*Oligomeris linifolia* (Vahl.) Macbride	-	-	-	-	-	-	-	-	-	-	-	9.	-	-	-	-	-	-	-	-
86	*Portulaca quadrifida L.*	-	-	-	-	-	-	-	-	-	-	-	-	10.7	-	-	-	-	-	-	-
87	*Peganum harmala L.*	-	-		-	-	-	-	-	-	-	-	-	18.2	-	-	-	-	-	-	-
88	*Phragmites karka* (Retz.) Trin. *ex Steud.*	30.3	-	-	-	-	-	-	-	-	-	9	-	-	-	-	16.	-	-	-	-
89	*Plantago minor L.*	-	-	5.7	-	-	-	-	-	-	-	-	-	-	17.7	-	-	10.7	-	-	-
90	*Plantago lanceolata L.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.8	-	-	15.1
91	*Poa annua L.*	-	-	-	-	-	-	-	-	-	6.8	-	-	-	-	-	-	-	-	9.8	-
92	*Poa infirma H.B.K*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.6	-	-
93	*Polypogon monspeliensis* (L.) Desf.	3.0	-	-	-	17.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
94	*Polygonum plebejumR.Br*	-	-	-	-	-	-	-	-	-	-	-	-	-	11.6		-	-	-	-	-
95	*Pulicaria crispa* (Forssk.)B.H	-	-	-	-	-	-	-	-	-	-	-	-	14.1	-	-	-	-	-	8.6	-
96	*Ranunculu smuricatus L.*	-	-	-	-	-	-	-	-	-	-	-	-	-	15.1	-	8.5	-	-	-	-
97	*Reseda odorataL.*	-	-	-	-	-	-	8.2	-	-	-	-	-	-	-	-	-	-	-	-	-
98	*Rumex dentatusL*	-	-	-	-	-	-	-	-	-	-	3.8	-	-	9.5	-	-	-	-	-	-
99	*Rumex hastatus L.*	-	-	-	-	42.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
100	*Saccharum munja Roxb.*	-	-	56.5a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
101	*Salvia aegyptiaca L.*	-	-	-	13.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23.3
102	*Saponaria vaccaria*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
103	*Setaria verticillata* (L.) P.Beauv.	-	-	-	-	-	14.0	-	-	-	-	-	-	-	-		-	-	-	-	-
104	*Solanum surattense* Burm.f.	-	-	-	-	11.0	-	-	-	-	-	-	9.	-	-	-	-	-	-	-	-
105	*Sonchus asper (L.) Hill*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.	-	-	-	-	-
106	*Sonchus oleraceus L.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18.	-	-	-	-	-
107	*Taraxacum officinale*	-	-	-	-	-	-	-	-	-	-	-	-	-	37a	-	-	-	-	-	14.6

	F.H.Wigg.																			
108	*Trianthema portulacastrum L.*	-	-	-	-	-	-	-	-	-	-	-	-	-	20.4	-	-	-	-	-	18.7
109	*Tribulus terrestrisL.*	-	-	41.3b	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
110	*Trifolium alexandrianum L.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.	-	-	-	-
111	*Typha latifolia L.*	-	-	-	-	-	15.7	-	-	-	-	46. 1b	-	-	-	-	30.	-	-	-	-
112	*Typha minima* Funck ex Hopp	-	-	-	-	20.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	41.7
113	*Urtica pilulifera* L.	-	-	-	-	-	-	-	-	-	-	8.0	-	-	-	-	-	-	-	-	-
114	*Veronica aquatica* Bern.	-	-	-	-	-	-	-	-	-	-	-	-	-	13.3	-	-	-	-	-	18.8
115	*Vicia sativa* L.	-	-	-	-	-	-	-	-	-	-	-	8.	-	-	-	-	-	-	-	-
116	*Zelays petendra* (L.) C. Jeffer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.1	-	-	-	-	10.5

Key: 1= Bagholi area, 2= Pasta, 3= Anghar ghara, 4= Spin ghar and 5=Sur ghar each species with mean importance value of five quadrates of each area

Table 6. Soil analysis of research area of Darazinda

S. No	Habitat	Soil texture	pH	EC	Color	Elements									
						N ppm	O ppm	Mg ppm	Al ppm	Si ppm	P ppm	K ppm	Ca ppm	Ti ppm	Fe ppm
1	**Bargholi**	Clay loam	7.3	0.89	Grey	5.6	75.2	0.7	5.9	19.8	0.01	0.6	1.0	0.1	2.0
2	**Pasta**	Silty loam	7.8	0.37	Red	2.4	73.2	1.0	7.6	16.8	0.01	0.7	0.3	0.2	2.3
3	**Anghar ghara**	Clay loam	7.8	0.50	Grey	9.6	72.6	63.9	0.6	5.5	14.8	0.04	0.5	0.5	1.6
4	**Spin ghar**	Gravel sandy	8.1	0.67	Grey + white gravel	3.3	71.3	1.3	4.4	11.3	0.1	0.9	3.3	0.2	1.6
5	**Sur ghar**	Loamy	7.3	0.43	Red and grey	2.2	72.1	1.0	6.7	17.9	0.04	0.9	0.6	0.2	2.5

Similarity index (S.I)

Similarity index does not show abundance of a species. Similarity index show the presence or absence of a species. Degree of similarity allows plant communities to combine them in an association/vegetation type. The higher number of plant communities reduces into few similar associations or vegetation type. Communities having similarity index less than 65% are considered as dissimilar (Chao *et al.* 2006, 2008). In the present study it was found that similarity index between *Achyranthus dentatus-Tamarix aphylla–Tamarix dioica* and *Solanum surattense-Aerva javanica-Rumex hastatus* was (73.3%), *Tamarix dioca-Chenopodum album-Phoenix dactylifera* and *Solanum surattense-Aerva javanica-Rumex hastatus* has 72% similarity index, *Tamarix dioca-Chenopodum album-Phoenix dactylifera* and *Achyranthus dentatus-Tamarix aphylla–Tamarix dioica* had (75.6%), *Dichanthium annulatum-Cymbopogon jwarancusa-Acacia nilotica* and *Achyranthus dentatus-Tamarix aphylla–Tamarix dioica* has 79.5%, *Dichanthium annulatum-Cymbopogon jwarancusa-Acacia nilotica* and *Chenopodium murale-Desmostachya bipinnata-Acacia nilotica* had 66.6% similarity index (Table 7).

Low similarity index between the communities showed that *Achyranthus dentatus-Tamarix aphylla–Tamarix dioica* (ATT) and *Salvadora oleoides-Periploca aphylla-Withania coagulans* (501%), *Chenopodium murale-Desmostachya bipinnata-Acacia nilotica* and *Salvadora oleoides-Periploca aphylla-Withania coagulans* (40.9%), *Salvadora oleoides-Periploca aphylla-Withania coagulans* and *Saccharum munja-Tribulus terristris-Capparis spinosa* (39.8%), *Dichanthium annulatum-Cymbopogon jwarancusa-Acacia nilotica* and *Salvadora oleoides-Periploca aphylla-Withania coagulans* (53.7%) etc (Table 7).

Seasonal similarities between communities showed that winter and spring (79.1%), winter and summer (72.8%), summer and spring (64.5%) had high similarity index, while low similarity were shown between atumn and winter (63.2%), summer and autmn (53.8%), spring and autmn 54.4% (Table 8).

Seasonal dissimilarities between the communities (Table 9) was also worked out which showed dissimilarities between autumn and winter 36.8%, spring and autumn 45.5%, spring and winter 20.9%, autumn and summer 46.2%, winter and summer 27.2%, spring and between summer 35.5%. Similar studies were also carried out by Malik and Hussain (2008) and Badshah *et al.* (2010a).

Table 7. Similarity index of different plant communities of Darazinda

ATT	X																			
CDA	63.6	X																		
STC	63.0	51.2	X																	
SPW	50.1	40.9	39.8	X																
SAR	73.3	61.9	61.3	50.4	X															
TCP	75.6	63	62.3	50.3	72	X														
DCA	79.5	66.6	66.1	53.7	75.3	77.6	X													
CDE	76	63	62.3	50	72.3	74.4	78.1	X												
SDW	80.3	67	66.5	53.8	75.9	78.3	82.1	78.9	X											
CRC	88.2	73.5	73.1	58.8	82.3	85.5	89.2	86.2	82	X										
TRS	81.0	33.9	67.5	54.8	76.6	79	82.6	79.5	83.4	90.8	X									
ZCL	78.7	64.6	64	50.9	74.3	76.7	80.6	77.2	81.5	89.4	82.1	X								
SPF	51.1	42.2	41.2	33.6	51.3	51.3	54.5	51	54.6	59.4	55.6	51.9	X							
TAW	75.6	60.1	59.3	45.6	71.3	73.9	78	74	78.9	87.8	79.7	76.9	46.9	X						
SOS	79.2	64.8	64.1	50.7	74.6	77.1	81.1	77.6	82	90.3	82.7	80.4	51.7	77.5	X					
TCP	69	57.7	56.9	46.4	66.6	67.9	71.4	68.1	71.9	78.2	72.6	69.9	47.5	66.4	70.2	X				
SPA	52.3	43.4	42.4	34.6	52.4	52.5	55.7	52.2	55.8	60.7	56.8	53.1	36	48.3	44.8	48.6	X			
CFA	81.3	61.2	66.3	53.4	76.5	79.1	82.9	79.6	83.7	91.8	84.4	82.4	54.2	79.9	72.4	72.3	55.5	X		
CZD	76.1	63.4	62.7	50.7	72.4	74.4	78.1	74.8	78.8	86	79.5	77.2	51.6	74.1	67.7	68.3	52.8	80.9	X	
WOZ	49.9	41.1	40.1	32.6	50.2	50.2	53.4	49.9	53.5	58.3	54.5	50.7	34	45.6	42.4	46.4	35	53.1	50.5	X

Key:

Achyranthus dentatus-Tamarix aphylla–Tamarix dioica (ATT), *Chenopodium murale-Desmostachya bipinnata-Acacia nilotica* (CDA), *Saccharum munja-Tribulus terristris-Capparis spinosa* (STC), *Salvadora oleoides-Periploca aphylla-Withania coagulans* (SPW), *Solanum surattense-Aerva javanica-Rumex hastatus* (SAR), *Tamarix dioca-Chenopodum album-Phoenix dactylifera* (TCP), *Dichanthium annulatum-Cymbopogon jwarancusa-Acacia nilotica* (DCA), *Cymbopogon jwarancusa-Dichanthium annulatum-Eleocharis palastris* (CDE), *Salvadora oleoides- Datura innoxia Withaniacoagulans* (SDW), *Calotropis procera-Rhazya stricta-Capparis* (CRC), *Tamarix dioica- Rhazya stricta –Salvadora* (TRS), *Zizyphus nummularia-Convolvulusarvesis-Lactuca serriola* (ZCL), *Salvadora-Periploca-Ficus palmate* (SPF), *Taraxacum-Aerva javanica-Withania coagulans* (TAW), *Salvadora oleoides-Olea ferruginea-Suaeda fruticosa* (SOS), *Tamarix dioica-Capparis spinosa-Phoenix dactylifera* (TCP), *Salvadora-Periploca aphylla-Acacia nilotica* (SPA), *Conyza bonariensis-Fagonia indica-Acacia nilotica* (CFA), *Capparis-Zizyphus nummularia-Datura innoxia* (CZD), *Withania somnifera-Olea ferruginea –Zizyphus nummularia* (WOZ).

Table 8. Seasonal Similarity index of communities

X	Autumn	Winter	Spring	Summer
Autumn	X			
Winter	63.2	X		
Spring	54.5	79.1	X	
Summer	53.8	72.8	64.5	X

Table 9. Seasonal Dissimilarity index of communities

X	Autumn	Winter	Spring	Summer
Autumn	X			
Winter	36.8	X		
Spring	45.5	20.9	X	
Summer	46.2	27.2	35.5	X

Cluster Analysis

In the present study of Darazinda, F.R. D. I. Khan the following four plants associations were recognized based on cluster dendrogram analysis (Table 10; Fig 4). Each association is confined to particular habitat features and composed of characteristic species as discussed below:

1. Association I (Group I)

This association consists of *Cymbopogon jwarancusa-Dichanthium annulatum-Eleocharis palastris* (MIV=43.6)*; Calotropis procera-Rhazya stricta-Capparis spinosa* (MIV=43.6)*; Tamarix dioca-Chenopodum album-Phoenix dactylifera* (MIV=46.2)*; Salvadora oleoides-Datura innoxia–Withania somnifera* (MIV=46) and *Chenopodium murale-Desmostachya bipinnata-Acacia nilotica* (MIV=29.7) (Table 10; Fig 4). Tis association includes *Calotropis procera, Rhazya stricta, Capparis spinosa, Tamarix dioca* and *Withania somnifera* were shrubs only *Phoenix dactylifera* was tree while *Cymbopogon jwarancusa, Dichanthium annulatum, Eleocharis palastris* and *Chenopodum album* were herbs.

2. Association II (Group II)

In this association communities with mean impotance value were: *Salvadora-Periploca aphylla-Acacia nilotica* (MIV= 55.3); *Withania somnifera-Olea ferruginea-Zizyphus nummularia* (MIV=54.6); *Conyza bonariensis-Fagonia indica-Acacia nilotica* (MIV=42); *Capparis-Zizyphus nummularia-Datura innoxia* (MIV=46.2) and *Tamarix dioca-Chenopodum album-Phoenix dactylifera* (MIV=50.7) (Table 10; Fig 4). In these communities association *Salvadora, Periploca aphylla, Olea ferruginea, Zizyphus nummularia, Capparis, Datura innoxia* and *Tamarix dioca* were shrubs, *Conyza bonariensis* and *Chenopodum album* were herbs and *Acacia nilotica* was tree in this association.

3. Association III (Group III)

This association was composed of five plant communities: *Salvadora oleoides-Datura innoxia- Withania coagulans* (MIV=50.8)*; Solanum surattense-Aerva javanica-Rumex hastatus* (MIV=54.16); *Saccharum munja-Tribulus terristris-Capparis spinosa* (MIV=40.8); *Achyranthus dentatus-Tamarix aphylla–Tamarix dioica* (MIV=39.7) and *Dichanthium annulatum-Cymbopogon jwarancusa-Acacia nilotica* (MIV=29.7) (Table 10; Fig 4). This association includes *Salvadora oleoides, Datura innoxia, Withania coagulans, Tamarix dioica, Aerva javanica* and *Capparis spinosa* were shrubs, trees includes *Tamarix aphylla* while in herbs *Solanum surattense, Rumex hastatus, Saccharum munja, Tribulus terristris* and *Achyranthus dentatus* were present.

4. Association IV (Group IV)

Plants communities were present in association: *Tamarix dioica-Rhazya stricta-Salvadora* (MIV=48.3); *Salvadora-Periploca-Ficus palmate* (MIV=55.2); *Zizyphus nummularia-Convolvulus arvesis-Lactuca serriola* (MIV=39.7); *Salvadora oleoides-Olea ferruginea-Suaeda fruticosa* (MIV=37.6) and *Taraxacum-Aerva javanica-Withania coagulans* (MIV=29.4) (Table 10; Fig 4). In this association *Tamarix dioica, Rhazya stricta, Salvadora, Periploca, Ficus palmate, Zizyphus nummularia, Olea ferruginea-Suaeda fruticosa, Aerva javanica* and *Withania coagulans* were shrubs, *Convolvulus arvesis, Lactuca serriola* and *Taraxacum* were herbs while no tree was present in this association.

Similar studies were also carried out by Ahmad *et al.* (2004) who observed cluster analysis and TWINSPAN (Two Way Indicator Species Analysis) grouped different communities grouped into few associations of District Abbottabad. Jafari *et al.* (2007) who plotted 90 plant communities based on environmental needs and were clustered into seven main types which are in line with our findings. Similarly our work is also strengthen by Lyon & Gross (2004) who evaluated the assemblage of various vegetation communities based on frequency value by using detergent correspondence analysis (DCA). Xianping *et al.*, (2006) divided communities quantitavely into seven groups by

using DCA in the forest communities in Pangquangou National Nature Reserve. Enright *et al.* (2005) reported different associations of annual and perennial plant of desert of Kirthar National Park Pakistan by using simple clustering and graph ordination.

Table 10. Mean importance value of 20 communities of five sites in four seasons (Appendices) of darazinda

S. No	Communities	Association I	Association II	Association III	Association IV
1	ATT	39.7	0	0	0
2	CDA	29.7	0	0	0
3	STC	40.8	0	0	0
4	SPW	50.8	0	0	0
5	LAR	54.16	0	0	0
6	TCP	0	46.2	0	0
7	DCA	0	48.2	0	0
8	CDE	0	43.6	0	0
9	SDW	0	46	0	0
10	CRC	0	43.6	0	0
11	TRS	0	0	48.3	0
12	ZCL	0	0	39.7	0
13	SPF	0	0	55.2	0
14	TAW	0	0	29.4	0
15	SOS	0	0	37.6	0
16	TCP	0	0	0	50.7
17	SPA	0	0	0	55.3
18	CFA	0	0	0	42
19	CZD	0	0	0	46.2
20	WOZ	0	0	0	54.6

Key: ATT= *Achyranthus dentatus-Tamarix aphylla–Tamarix dioica,* **CDA=** *Chenopodium murale-Desmostachya bipinnata-Acacia nilotica,* **STC=** *Saccharummunja-Tribulusterristris-Capparis spinosa,* **SPW=** *Salvadoraoleoides-Periplocaaphylla-Withaniacoagulans,* **LAR=** *Solanum surattense-Aerva javanica-Rumex hastatus,* **TCP=** *Tamarix dioca-Chenopodum album-Phoenix dactylifera,* **DCA=** *Dichanthium annulatum-Cymbopogon jwarancusa-Acacia nilotica,* **CDE=** *Cymbopogonjwarancusa-Dichanthiumannulatum-Eleocharis palastris,* **SDW=** *Salvadoraoleoides- Datura innoxia –Withaniacoagulans,* **CRC=** *Calotropis procera-Rhazya stricta-Capparis spinosa,* **TRS=** *Tamarix dioica- Rhazya stricta –Salvadora oleoides,* **ZCL=** *Zizyphus nummularia-Convolvulusarvesis-Lactuca serriola,* **CPF=** *Salvadora-Periploca-Ficus palmate,* **TAW=** *Taraxacum-Aerva javanica-Withania coagulans,* **SOS=** *Salvadoraoleoides-Olea ferruginea-Suaedafruticosa,* **TCP=** *Tamarix dioica-Capparis spinosa-Phoenixdactylifera,* **SPA=** *Salvadora-Periploca aphylla-Acacia nilotica,* CFA= *Conyza bonariensis-Fagonia indica-Acacia nilotica,* **CZD=** *Capparis-Zizyphusnummularia-Datura innoxia,* **WOZ=** *Withania somnifera-Olea ferruginea –Zizyphus nummularia*

HIERARCHICALCLUSTER ANALYSIS

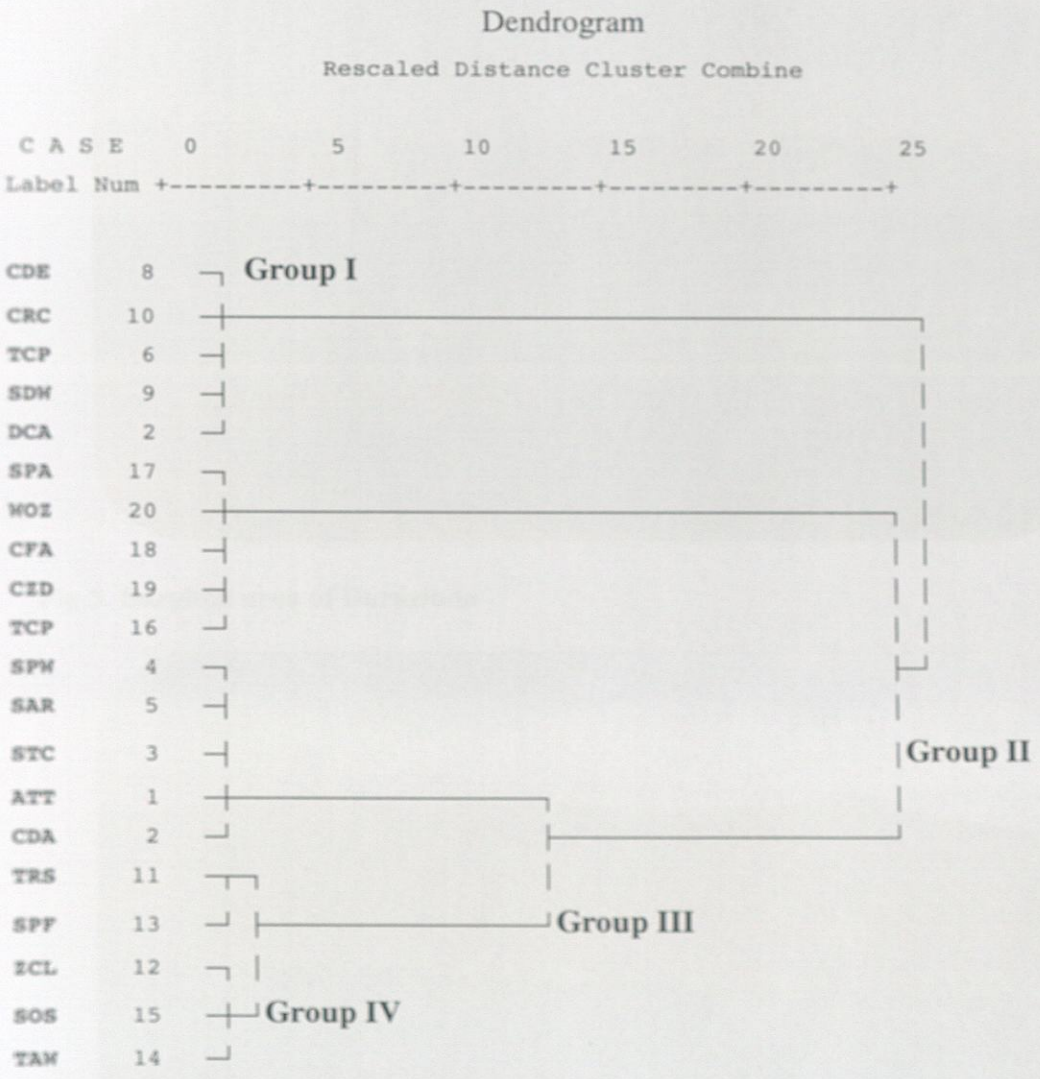


Fig 4. Cluster Dendrogram Analysis showing 4 associations of 20 plant communities based on Mean Importance value (IV) in Darazinda.



Fig 5. Bargholi area of Darazinda



Fig 6. Pasta area of Darazinda

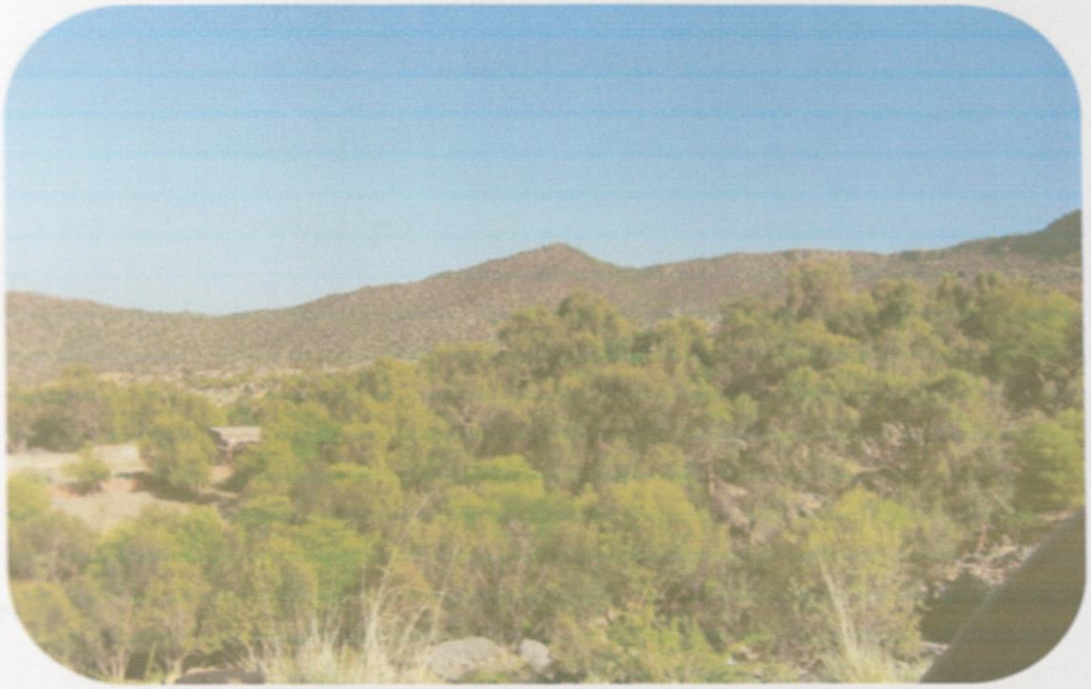


Fig 7. Angharghara area of Darazinda



Fig 8. Spin ghar of Darazinda



Fig 9. Surghar of Darazinda

PALATABILITY

PALATABILITY

Degree of Palatability

Palatability is the relative acceptability or preference of plants by the grazing animals. Different characteristics of plants like growth stage, chemical composition and types of plant part affect their preference of palatability. These may stimulate the selective responses of live stocks or may prevent them from grazing (Heady, 1964). A total 213 plant species belonging to 68 families were reported from the research area. Out of which 52 (24.4%) were non-palatable, 105 (49.2%) were palatable, 23 (10.7%) were highly palatable, 6 (2.8%) moderate palatable, 14 (6.5%) low palatable while 13 (6%) were rarely palatable.

Livestock preference:

Plants palatability depends on nutritional need and animal's energy requirements (Provenza, 1996). Goat preferred 98 species (46%), Cow 47 (22%), sheep 92 (43.2%) and camel 36 (17%) (Table 11; Fig. 10). The herbaceous species preference was highest by sheep and cow while grasses and woody plant were prepared by goat and camel. These findings are in line with those of Knoop and Smith (2006), Milewsk & Madden, (2006), Hussain and Durrani (2009), Amjid *et al.* (2014) and Husain & Durrani (2007), who also reported that goat and sheep usually preferred forbs and shrubs while cow prefer grasses.

Classification by part used:

Part of plant grazed showed that whole plant 91 (42.7%), leaf 64 (30%) and inflorescence 3 (1.4%) were grazed by different live stock (Table 11). Our findings supported by Hussain and Durrani, (2009) who concluded that whole plants were preferred mostly, followed by leaves and floral parts. These finding are also in line with Amjid *et al.* (2014), Milewsk & Madden (2006) and Hussain & Durrani (2009a) concluded same results. Palatability depends upon the availability, nature of forage and kinds of animals. The chemical nature like nutritive value and mineral contents causes

variation in plant part selection of the same plants by the grazing animals. The plant parts with less nutrition/containing harmful chemicals is generally avoided by animals.

Classification by condition used

The study showed that fresh form of plant 102 (47.8%) was the most favourable form, while dry form 24 (11.2%) and fresh and dry form of 36 Spps (17%) were used (Table 11). Hussain and Durrani (2009) noticed that fresh fodder species is preferred by livestock. Similarly our results are supported by Marqueus *et al.* 2004) who reported that in absence of annuals, the shrubs provide fresh fodder. Knop & Smith (2006) reported that changes in the extent of grazing of different plant species. It was noticed in the present study that most of the grasses like *Avena sativa*, *Cymbopogan jwarncusa*, *Echinochloa* and *Dichanthium annulatum* were preferred by livestock mostly in fresh condition.

Non palatable species

Out of the total 213 species of the research area 52 Spps (24.4%) were non-palatable. These included shrubs like *Withania coagulans, Nerium indicum, Rhazya stricta, Vitex negundo* and *Datura alba* (Table 11). Some species such as *Peganum harmala* and *Euphorbia helioscopia* were poisonous to livestock. Our findings are supported by Towhidi & Zhandi (2007), who reported that due to lack of fodder non palatable plants like *Salsola*, *Alhagi*, and *Haloylon* etc are grazed in Iran. Same was also observed our study. *Calotropis procera* and *Tamarix aphylla* are otherwise non palatable but in Darazinda these plants are grazed under compulsions/starvation. Hirata *et al.* (2005) reported that the higher cover of herbaceous vegetation indicate higher grazing which reduce the available forage at the end of the growing season. Similarly, plants like *Euphorbia helioscopia* were non palatable which is in line with findings of Kayani *et al.* (2007) who reported that *Euphorbia helioscopia* was non palatable probably due to presence of phenolics, alkaloids, saponins and other toxic materials. Plant species like *Euphorbia prostrate* were palatable. *Cynodon dactylon* was highly palatable in this area. This result was supported by Sultan *et al.* (2008), Amjid *et al.* (2014) and Inam-ur-Rahim

et al. (2008) who also reported that among most common grasses along field boundaries and margins of the heaps was *Cynodon dactylon* grazed by animals.

Table 11. Palatability classes, livestock, condition of plants and part used of Darazinda

S. No	Species	Classes of Palatability						Live stock				Condition of plants			Part used		
		Np	P	Hp	Mp	Lp	Rp	Cow	Goat	Sheep	Camel	Fresh	Dry	Both	W	L	I
A. Trees																	
1	*Acacia modesta* Wall.	-	+	-	-	-	-	-	+	-	+	+	-	-	-	+	-
2	*Acacia nilotica* (L.) Wid. ex Delile	-	+	-	-	-	-	-	+	+	+	+	-	-	-	+	-
3	*Albizia lebbeck* (L.) Benth.	-	+	-	-	-	-	-	+	+	+	+	-	-	-	+	-
4	*Bombix ceba* L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	*Buxus wallichiana Baill.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	*Citrus medica*	-	-	-	+	-	-	+	+	-	-	+	-	-	-	+	-
7	*Cordia myxa L*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	*Dalbergia sissoo* Roxb.	-	-	-	-	+	-	-	+	+	-	+	-	-	-	+	-
9	*Ehrctia obtusifolia*	-	+	-	-	-	-	+	-	-	-	+	-	-	-	+	-
10	*Eucalyptus globules* Labill.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	*Eucalyptus lanceolatus*	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	*Mengifera indica*	-	-	-	-	-	+	+	-	-	-	+	-	-	-	+	-
13	*Morus alba* L.	-	+	-	-	-	-	-	+	+	-	+	-	-	-	+	-
14	*Morus nigra* L.	-	+	-	-	-	-	-	+	+	-	+	-	-	-	+	-
15	*Phoenix dactylifera* L.	-	+	-	-	-	-	-	+	+	-	+	-	-	-	+	-
16	*Populus alba L.*	-	+	-	-	-	-	+	-	-	+	+	-	-	-	+	-
17	*Prosopis farcta* (Banks & Sol.) Macbride.	-	+	-	-	-	-	-	+	-	+	+	-	-	-	+	-
18	*Psidium guajava* L.	-	+	-	-	-	-	-	+	-	+	+	-	-	-	+	-
19	*Punica granatum* L.	-	+	-	-	-	-	-	+	-	+	+	-	-	-	+	-
20	*Monotheca buxifolia* (Falc.) A. DC.	-	+	-	-	-	-	-	+	+	+	+	-	-	-	+	-

21	*Musa paradisiaca* L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	*Syzygium cuminii* (L.) Skeels	-	+	-	-	-	-	-	+	+	+	+	-	-	-	+	-	
23	*Tamarix aphylla* (L.) Karst.	-	-	-	-	-	+	-	+	-	+	+	-	-	-	+	-	
24	*Zizyphus mauritiana* Lam.	-	-	+	-	-	-	-	+	-	+	+	-	-	-	+	-	
								B. Shrub										
1	*Aerva javanica* (Burm.f.) Juss. ex Schult.	-	-	-	-	-	+	-	+	-	+	-	+	-	-	+	-	
2	*Abelmoschus esculentus* (L.)	-	+	-	-	-	-	+	+	+	+	+	-	-	-	+	-	
3	*Calotropis procera* L. (Wight)	-	-	-	-	+	-	-	+	+	-	-	+	-	-	+	-	
4	*Calotropis Gigantea* L. R.Br	-	-	-	-	+	-	-	+	+	-	-	+	-	-	+	-	
5	*Cannabis sativus* L.	-	+	-	-	-	-	-	+	+	+	+	-	-	-	+	-	
6	*Capsicum annum* L.	-	-	-	-	-	+	-	-	-	-	+	-	-	-	+	-	
7	*Calligonum polygonoides* L.	-	+	-	-	-	-	-	-	-	+	+	-	-	-	+	-	
8	*Capparis spinosa* L.	-	+	-	-	-	-	-	+	-	+	+	-	-	+	-	-	
9	*Datura innoxia*	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10	*Dodonaea viscose* (L.) Jacq.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
11	*Ficus palmate* L.	-	+	-	-	-	-	-	+	-	-	-	+	-	-	+	-	
12	*Helianthus annus* L	-	+	-	-	-	-	-	+	-	-	-	+	-	-	+	-	
13	*Hyoscyamus squarrosus*	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

	Griffith.																
14	*Hibiscus trionum*	-	-	-	-	+	-	-	+	-	-	-	+	-	-	+	-
15	*Melia azedarach* L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	*Mirabilis jalapa* L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	*Nannorrphs ritchiana* H. Wendl.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	*Nerium indicum* Mill.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	*Ocimum bascillicum* L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	*Olea ferruginea* Royle.	-	+	-	-	-	-	-	+	+	+	+	-	-	-	+	-
21	*Periploca aphylla* Decne.	-	-	-	-	-	+	-	+	-	+	+	-	-	+	-	-
22	*Rhazya stricta* Decne.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	*Ricinus communis*	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	*Rosa indica* L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	*Salvadora oleoides* Decne.	-	-	-	-	+	-	-	-	-	+	+	-	-	-	+	-
26	*Suaeda fruticosa* Forssk.ex J. F. Gmelin	-	-	-	+	-	-	-	-	-	+	-	-	+	+	-	-
27	*Tamarix dioica* Roxb. ex Roth.	-	-	-	-	-	+	-	+	-	+	+	-	-	-	+	-
28	*Vitex negundo* L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	*Vites vinifera* L.	-	-	-	+	-	-	-	+	+	-	+	-	-	-	+	-
30	*Withania coagulans* (Stocks) Dunal	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

31	*Withania somnifera* (L.) Dunal.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	*Zizyphus nummularia* (Burm. f.) Wight & Arn.	-	-	+	-	-	-	+	+	+	+	+	-	-	+	-	-
33	*Zizyphus oxyphylla* Edge	-	-	+	-	-	-	+	+	+	+	+	-	-	+	-	-
							C.Herb										
1	*Adiantum capillusveneris* L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	*Achyranthes aspera* L.	-	+	-	-	-	-	+	-	+	-	+	-	-	-	+	-
3	*Achyranthus dentatus*	-	-	-	-	+	-	+	-	+	-	+	-	-	-	+	-
4	*Agaricus campestris* L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	*Allium cepa* L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	*Allium sativum* L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	*Amaranthus viridis* L.	-	+	-	-	-	-	+	-	-	+	-	+	-	-	+	-
8	*Anagallis arvensis* L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	*Aristida adscensionis L.*	-	+	-	-	-	-	+	-	+	-	-	+	-	+	-	-
10	*Aristida cyanantha* Nees ex Steud.	-	+	-	-	-	-	-	-	+	+	-	+	-	+	-	-
11	*Astragalus psilocentros* Frisch.	-	+	-	-	-	-	-	+	-	-	-	-	+	+	-	-
12	*Asparagus gracilis* Royle.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	*Asphodelus tenufolius* L.	+	-	-	-		-	-	+	-	-	-	+	-	+	-	-

14	*Apluda mutica*	-	+	-	-	-	-	+	+	+	-	+	-	-	+	-	-
15	*Arabidoptis thaliana*	-	+	-	-	-	-	+	+	+	-	+	-	-	+	-	-
16	*Argyrolobium roseum*	-	+	-	-	-	-	+	+	+	-	+	-	-	+	-	-
17	*Arndu dedonix*	-	+	-	-	-	-	+	+	+	-	+	-	-	+	-	-
18	*Artemisia scoparaia.* Waldst & Kitam	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	*Avena sativa* L.	-	-	+	-	-	-	-	+	+	-	+	-	-	+	-	-
20	*Brassica napus* L.	-	-	+	-	-	-	-	-	+	-	+	-	-	-	+	-
21	*Brassica olaraceae* L.	-	+	-	-	-	-	-	+	+	-	+	-	-	+	-	-
22	*Brassica campestris* L.	-	-	+	-	-	-	-	-	+	-	+	-	-	-	+	-
23	*Brachiaria ramose*	-	+	-	-	-	-	+	+	+	-	+		-	+	-	-
24	*Brachiaia reptans*	-	+	-	-	-	-	+	+	+	-	+		-	+	-	-
25	*Bromus japonica* Thunb.	-	+	-	-	-	-	+	+	+	-	+		-	+	-	-
26	*Caralluma tuberculata* N.E. Brown	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	*Carthamus oxycantha* Bieb	-	+	-	-	-	-	+	+	+	-	+		-	+	-	-
28	*Celosia cristata* Linn.	-	+	-	-	-	-	+	+	+	-	+		-	+	-	-
29	*Cenchrus ciliaris* L.	-	+	-	-	-	+	+	-	-	-	+	-	-	+	-	-
30	*Cucumis sativus* Linn.	-	+	-	-	-	-	-	+	+	-	+	-	-	-	+	-
31	*Cacumis propheterum*	-	+	-	-	-	-	+	+	+	-	+		-	+	-	-
32	*Chenopodium album* L.	-	+	-	-	-	-	-	-	+	-	-	-	+	+	-	-
33	*Chenopodium ambrosioides* L.	-	+	-	+	-	-	-	-	+	-	-	-	+	+	-	-
34	*Chenopodium murale* L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

35	*Chenopodium nepalense* Colla	-	+	-	-	-	-	-	+	-	-	-	-	+	-	+	-
36	*Cicer arietinum* L.	-	+	-	-	-	-	+	+	+	+	-	-	+	+	-	-
37	*Cistanche tubulosa*	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	*Cleome brachycarpa* Vahl ex DC.	-	-	-	-	+	-	-	-	+	-	-	-	+	-	+	-
39	*Convolvulus Prostratus* Forssk.	-	+	-	-	-	+	-	-	+	-	+	-	-	-	+	-
40	*Convolvulus arvensis* L.	-	+	-	-	-	-	-	-	+	-	+	-	-	+	-	-
41	*Conyza bonariensis*	-	-	-	-	-	+	-	+	-	-						
42	*Conyza Canadensis* (L.) Cronquist	-	-	-	-	-	+	-	+	-	-	+	-	-	+	-	-
43	*Coriandrium sativum* L.	-	+	-	-	-	-	+	+	+	-	+	-	-	+	-	-
44	*Coronopus didymus* (L.) Smith	-	-	-	-	+	-	-	-	+	-	+	-	-	+	-	-
45	*Cucurbita maxima*	-	+	-	-	-	-	-	+	+	-	+	+	-	-	+	-
46	*Cucurbita pepo*	-	+	-	-	-	-	-	+	+	-	+	+	-	-	+	-
47	*Cuscuta reflexa* Roxb.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	*Cymbopogon jwarancusa* (Jones) Schult.	-	-	-	-	+	-	-	+	+	-	-	-	+	+	-	-
49	*Cynoglossum lanceolatum* Forssk.	-	-	-	-	+	-	-	+	+	-	-	-	+	+	-	-
50	*Cynodon dactylon* (L.) Pers.	-	-	+	-	-	-	+	+	+	-	+	-	-	+	-	-
51	*Cyprus elumoids* L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
52	*Cyprus rotundus* L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

53	*Dactyloctenium carstatum*	-	-	-	-	+	-	-	+	-	-	-	-	+	-	-	+
54	*Dactyloctenium aegyptium* (L.) Willd.	-	-	-	-	+	-	-	+	-	-	-	-	+	-	-	+
55	*Daucus carrota* L.	-	+	-	-	-	-	-	+	+	-	+	+	-	-	+	-
56	*Datura alba* Nees	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
57	*Desmostachya bipinnata* (L.) Stapf.	-	+	-	-	-	-	+	-	-	-	-	+	-	-	+	-
58	*Dichanthium annulatum* (Forssk.) Stap f.	-	-	+	-	-	-	+	-	-	-	-	-	+	+	-	-
59	*Dicleptera bupleuroides*	-	+	-	-	-	-	-	+	+	-	+	-	-	+	-	-
60	*Digeria muricata*	-	+	-	-	-	-	-	+	+	-	+	-	-	+	-	-
61	*Dinebra retroflora*	-	+	-	-	-	-	-	+	+	-	+	-	-	+	-	-
62	*Disteria cilians*	-	+	-	-	-	-	-	+	+	-	+	-	-	+	-	-
63	*Echinochloa colona* (L.) Link.	-	-	+	-	-	-	-	+	+	-	-	+	-	-	+	-
64	*Echinops echinatus* D.C	-	-	+	-	-	-	-	+	+	-	+	-	-	+	-	-
65	*Eleocharis palastris*	-	-	+	-	-	-	-	+	+	-	+	-	-	+	-	-
66	*Eragrostis minor* Host	-	-	+	-	-	-	-	+	+	-	+	-	-	+	-	-
67	*Equisetum arvense* L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
68	*Euphorbia hirta*	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
69	*Euphorbia helioscopia* L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

70	*Euphorbia prostrate* Ait.	-	-	-	-	-	+	+	-	-	-	+	-	-	+	-	-
71	*Fagonia indica* var. schwein furthii Hadidi	-	-	-	-	+	-	-	-	-	+	+	-	-	+	-	-
72	*Filago* arenaria (Smoljan.) Chrtek & Holub	-	+	-	-	-	-	-	-	+	-	-	+	-	+	-	-
73	*Filago hunclwarica*	-	+	-	-	-	-	-	-	+	-	-	+	-	+	-	-
74	*Foeniculum valgare* Mill.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
75	*Fumaria indica* (Hausskn.) Pugsley	-	+	-	-	-	-	-	+	-	-	-	-	-	-	+	+
76	*Galium aparine*	-	-	-	+	-	-	-	+	+	-	+	-	-	+	-	-
77	*Galium tricorne*	-	-	-	+	-	-	-	+	+	-	+	-	-	+	-	-
78	*Heliotropium elipticum* Ledeb.	-	+	-	-	-	-	+	-	-	-	-	+	-	-	+	-
79	*Heliotropium europaeum* L.	-	+	-	-	-	-	-	-	+	-	+	-	-	+	-	-
80	*Hordeum vulgare* L.	-	-	+	-	-	-	+	+	+	-	+	-	-	+	-	-
81	*Hyosyamus niger*	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
82	*Hyosyamus insanus*	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
83	*Imperata cylindrica* L.	-	+	-	-	-	-	-	+	-	-	+	-	+	-	-	-
84	*Iphiona scabra* DC.k	-	-	-	-	-	+	-	-	-	+	+	-	-	+	-	-
85	*Kickxia incana* (Wall) Penn.	-	+	-	-	-	-	-	-	+	-	+	-	-	+	-	-

86	*Lactuca serriola* L.	-	-	+	-	-	-	+	+	+	-	+	-	-	+	-	-
87	*Lactuca sativa* L.	-	-	+	-	-	-	+	+	+	-	+	-	-	+	-	-
88	*Launaea nudicaulis* (L.) Hook.f.	-	+	-	-	-	-	-	+	-	-	-	-	+	+	-	-
89	*Launaea procumbens* Roxb.	-	+	-	-	-	-	-	+	-	-	-	-	+	+	-	-
90	*Lepidium draba*	-	+	-	-	-	-	-	+	-	-	-	-	+	+	-	-
91	*Lindenbergia indica*	-	+	-	-	-	-	-	+	-	-	-	-	+	+	-	-
92	*Lolium temulentum* Linn.	-	+	-	-	-	-	-	+	-	-	-	-	+	+	-	-
93	*Luffa clyndrica* (L.) Roem	-	+	-	-	-	-	-	+	+	-	+	-	-	-	+	-
94	*Lycopersicom esculentum* Mill.	-	+	-	-	-	-	-	+	+	-	+	-	-	-	+	-
95	*Malcolmia scorpioides* (Bunge) Boiss.	-	+	-	-	-	-	-	-	+	-	-	+	-	-	+	-
96	*Malcolmia africana* (L.) R. Br.	-	+	-	-	-	-	-	-	+	-	-	-	+	+	-	-
97	*Malvastrum coromandelianum* (L.) Garcke	-	+	-	-	-	-	-	+	-	-	+	-	-	-	+	-
98	*Medicago laciniata* (L.)Mill.	-	+	-	-	-	-	+	-	+	-	+	-	-	+	-	-
99	*Melilotus indica* (L.) All.	-	-	+	-	-	-	-	-	+	-	-	-	+	+	-	-
100	*Melilotus longifolia* Desr.	-	+	-	-	-	-	+	-	+	-	-	-	+	-	+	-
101	*Mentha arvensis* L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

119	*Pulicaria crispa* (Forssk.) B. H.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
120	*Raphanus sativus* L.	-	+	-	-	-	-	-	+	+	-	+	-	-	-	+	-	
121	*Ranunculus muricatus* L.	-	+	-	-	-	-	-	-	+	-	-	-	+	-	-	+	
122	*Reseda odorata* L.	-	-	-	-	+	-	+	-	-	-	-	+	-	+	-	-	
123	*Rumex dentatus* L.	-	+	-	-	-	-	+	-	-	-	+	-	-	+	-	-	
124	*Rumex hastatus*	-	+	-	-	-	-	+	-	-	-	+	-	-	+	-	-	
125	*Saccharum munja* Roxb.	-	+	-	-	-	-	+	-	-	-	-	+	-	-	+	-	
126	*Saccharum bengalense* Retz	-	+	-	-	-	-	+	-	-	-	-	-	+	-	+	-	
127	*Salvia aegyptiaca* L.	-	+	-	-	-	-	+	-	-	-	+	-	-	+	-	-	
128	*Saponaria vaccaria*	-	+	-	-	-	-	+	-	-	-	+	-	-	+	-	-	
129	*Saussurea heteromalla* (D.Don.) Hand	-	+	-	-	-	-	+	-	-	-	+	-	-	+	-	-	
130	*Setaria vercillata* (L.)	-	+	-	-	-	-	-	-	+	-	-	-	+	+	-	-	
131	*Sisymbrium irio* L.	-	+	-	-	-	-	-	-	+	-	-	+	-	-	+	-	
132	*Solanum melangena*	-	+	-	-	-	-	-	+	+	-	+	-	-	-	+	-	
133	*Solanum surattense* Burm.f	-	+	-	-	-	-	-	-	+	-	-	-	+	+	-	-	
134	*Solanum tuberosum*	-	+	-	-	-	-	-	+	+	-	+	-	-	-	+	-	
135	*Sonchus asper* (L.) Hill	-	+	-	-	-	-	-	+	-	+	+	-	-	+	-	-	

136	*Sonchus oleraceus* L.	-	+	-	-	-	-	-	-	-	+	+	-	-	+	-	-
137	*Sorghum vulgare* (L.) Pers.	-	+	-	-	-	-	-	+	+	-	+	-	-	+	-	-
138	*Stellaria media* L. Vill	-	+	-	-	-	-	-	+	+	-	+	-	-	-	+	-
139	*Taraxacum officinale* F.H. Wigg.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
140	*Torilis japonica* (Houtt.) DC.	-	+	-	-	-	-	-	+	-	-	-	-	+	+	-	-
141	*Trianthema portulacastrum* L.	-	+	-	-	-	-	-	+	+	-	-	-	+	+	-	-
142	*Tribulus terrestris* L.	-	-	+	-	-	-	-	-	+	-	+	-	-	+	-	-
143	*Trifolium alexandrianum* L.	-	-	+	-	-	-	+	-	-	-	-	-	+	+	-	-
144	*Trigonella mcisa*	-	+	-	-	-	-	-	-	+	-	+	-	-	+	-	-
145	*Triticum aestivum* L.	-	-	+	-	-	-	+	+	+	+	-	-	+	+	-	-
146	*Thymelaea passerine*	-	+	-	-	-	-	-	-	+	-	+	-	-	+	-	-
147	*Typha latifolia* L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
148	*Typha minima* Funck er Hoppe	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
149	*Utrica pilulifera* L.	-	-	-	-	-	+	-	+	-	-	+	-	-	-	+	-
150	*Verbena hybrid*	-	+	-	-	-	-	-	-	+	-	+	-	-	+	-	-
151	*Verbena officinale*	-	+	-	-	-	-	-	-	+	-	+	-	-	+	-	-

152	*Veronica aquatica Bern.*	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
153	*Vicia sativa* L.	-	-	-	-	+	-	-	+	-	-	-	+	-	-	+	-
154	*Xanthium strumarium* L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
155	*Zea mays* L.	-	-	+	-	-	-	+	+	+	+	-	-	+	+	-	-
156	*Zelays petendra* (L.) C. Jeffery	-	+	-	-	-	-	-	-	+	+	+	-	-	+	-	-
Total		52 ((24.4%)	105 (49.2%)	23 10.7%)	06 (2.8%)	14 (6.5%)	13 (6%)	47 (22%)	98 (46%)	92 (43.2 %)	36 (17%)	102 (47.8%)	24 (11.2%)	36 (17%)	91 (42.7 %)	64 (30%)	03 (1.4%)

Key: Np =Non palatable; P = Palatable; H= Highly palatable; M=Moderatly palatable L= Low palatable; R = Rarely palatable; W= Whole plant; L= leaves; I= Inflorescence.

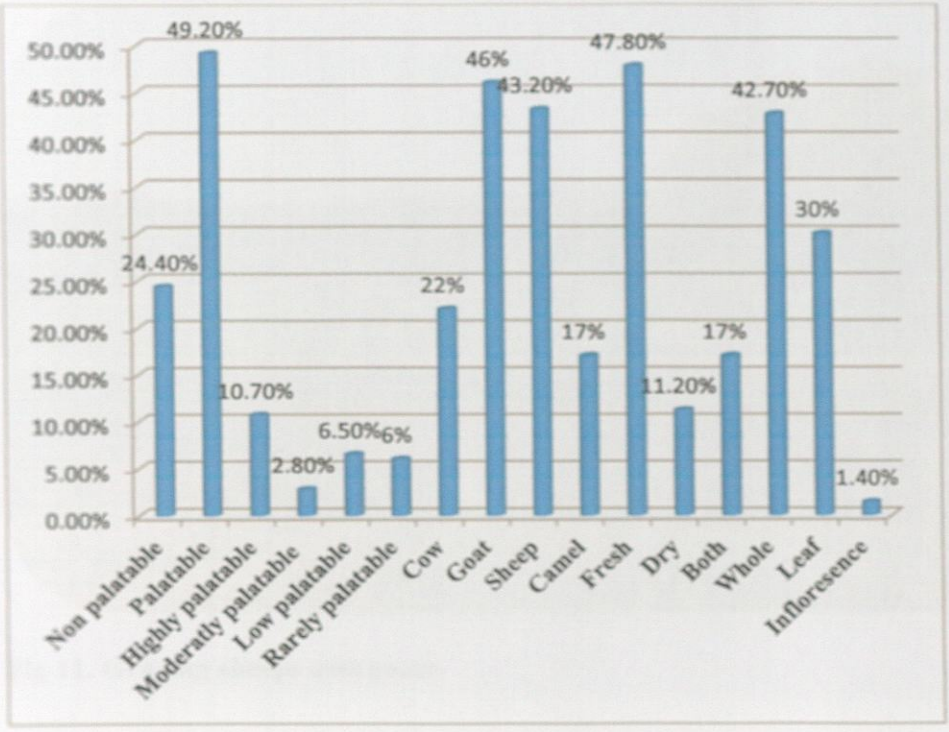


Fig 10. Graphical representation of Palatability status of plants of Darazinda



Fig 11. Grazing sheeps and goats



Fig 12. Goats browsing *Accacia modesta*



Fig 13. Shepherd depends upon plants directly and indirectly for income



Fig 14. Cow eating plant

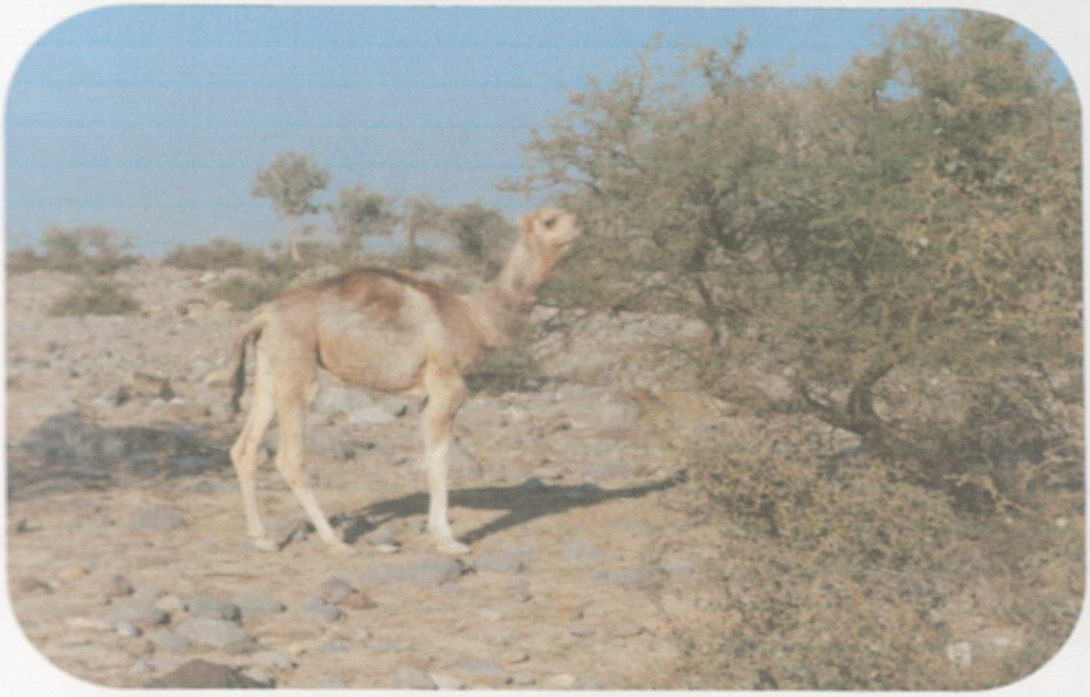


Fig 15. Camel browsing *Accacia modesta*

CHEMICAL COMPOSITION OF SOME PLANTS

CHEMICAL EVALUATION OF SOME PLANTS:

No previous work has been reported from Darazinda on the nutritional and mineral composition of forage plants. This gap of knowledge is being filled during this study.

A. Macronutrients

Macronutrients are important constituents of body fluids acting as electrolytes in order to protect and maintain the structural components of the body organs and tissues. In growth, reproduction, health and proper functioning of the animal's body, minerals play a vital role. Millions of herds of livestock are supported by rangelands, which play an important role in Pakistan annual GDP and export income (Anon., 2006). In the present study some important plants of the area were analyzed for important and essential macro and micro nutrients as given below;

1. Calcium (Ca)

Calcium provides support, rigidity and strength to the cell wall. Quantitatively, important function of Ca is the participation in the formation of bone sisits. The analysis showed that at three phonological stages. Various plants have reasonable Ca contents, as e-g *Convunvulus Prostratus* L. (0.91ppm), *Portulaca quadrifida* L., (0.19ppm), *Taraxacum officinale* (0.40ppm) while woody plants like *Albizia lebbeck* L. (0.46ppm), *Olea ferruginea* Royle (0.45ppm), *Salvadora oleoides* (1.15ppm), *Suaeda fruticosa* Forssk. (0.56ppm) and *Vitex negundo* L. had 0.31ppm of Ca (Table 12). Statistical analysis (t. test) of herb and woody at all three phonological stages showed non significance as $P>0.005$ (Table 13).

Similar studies were conducted by Seiler & Campbell (2004), who reported adequate Ca contents in forages plants which were more during the flowering stages than young stages. These results were similar to Hussain & Durrani (2008), who stated that with the maturity of forage plants certain elements decreased. Bahadur *et al.* (2011) evaluated the elemental composition of some fodder plant by using Atomic Absorption Spectrophotometer (AAS). Tahira *et al.* (2012) evaluated elemental values from aerial

part of five medicinal plants of District Swabi Khyber Pakhtoon Khwa, Pakistan. Present study showed that Ca concentration increases with maturity this agreed with Ashraf *et al.*, (2005); Khan *et al.* (2005) studied significant increased Ca concentration in mature plants. While, in woody plants with advancing age of plants the Ca contents decreased.

2. Potassium (K)

Many enzyme systems are activated by Potassium element. Plant growth and metabolism adversely affected by the deficiency of Potassium (Rahim *et al.*, 2008). At least 0.5ppm potassium requires for physiological functions by live stock (Anon. 1985). Generally the herbs had higher K contents as compared to woody plants (Table 12). Hussain & Durrani (2008) and Akhtar *et al.* (2007) also conducted similar work that showed that at early growing stages herbaceous plants and grasses are nutritionally rich. Results of the present elemental analysis of plants at three phonological stages with average contents (ppm) are presented in *Convunvulus Prostratus* L. has 0.05 ppm K contents, while K contents of the other plants are *Portulaca quadrifida* L., (0.90 ppm), *Taraxacum officinale* (0.84 ppm) while woody plants like *Albizia lebbeck* L. (0.11ppm), *Olea ferruginea* Royle (0.45ppm), *Salvadora oleoides* (0.04 ppm), *Suaeda fruticosa* Forssk. (0.63ppm) and *Vitex negundo* L. was 0.18ppm (Table 12). Statistical analysis (t.test) of both herbs and woody at all the three phonological stages showed non significance i-e value of P>0.005 (Table 13).

Similar work were carried out by Ahmad *et al.* (2008 c) who studied different plants parts at their phonological stage and found variation in K concentration. This is also in accordance with our study. Statistical analysis showed non significant differences between herbs and woody species and among three growth stages. Jan *et al.* (2011) noticed large quantity of K in *Cichorium intybus*. Similarly Ravi *et al.* (2011) studied 19.2 % potassium/mg in the seeds of *Gloriosa superba*. Bahadur *et al.* (2011) evaluate the elemental analysis of some fodder plant species by using Atomic Absorption Spectrophotometer (AAS). Tahira *et al.* (2012) evaluate the elemental values from aerial part of five medicinal plants of District Sawabi Khyber Pakhtoon Khwa, Pakistan. Ghani

et al. (2014) evaluate mineral contents of four medicinal plants of Khushab Valley, Pakistan.

3. Sodium (Na)

Sodium effects the water relations of plants and often enables sugar beet and other crops to withstand drought conditions. Sodium is an important element for regulation of blood and body fluids, heart activity and certain metabolic functions e.g. blood pressure and blood volume regulation, also play important role in transmission of nerve impulses and regulate the balance of acid/base in the body. Present study showed that *Portulaca quadrifolia* L., (0.30ppm), *Taraxacum officinale* (0.21ppm) while woody plants like *Suaeda fruticosa* (0.40ppm) and *Vitex negundo* L. was 0.34ppm (Table 12). Statistical analysis of herbs and woody at three phonological stages showed non significance as value of P>0.005 (Table 13).

Similar studies were carried out by Ahmad *et al.* (2008 b) reported that most forage plants of Punjab had sufficient amount of Na contents but showing its concentration vary in different plants parts and phonological stages. Availability of Na+ in some medicinal plants also described by Hussain *et al.* (2011b) of Khyber Pukhtoon Khwa, Pakistan. Bahadur *et al.* (2011) evaluate the elemental analysis of some fodder plant species Elemental composition of aerial parts was determined by using Atomic Absorption Spectrophotometer (AAS). *Convunvulus Prostratus* have no sodium so this result show similarity with Khan *et al.* (2006 b, 2007 a & b). Tahira *et al.* (2012) evaluate the elemental values from aerial part of five medicinal plants of District Sawabi Khyber Pakhtoon Khwa, Pakistan. Ghani *et al.* (2014) evaluate mineral contents of four medicinal plants like of Khushab Valley, Pakistan.

4. Phosphorous (P)

Plants need phosphorus for normal growth and maturity. Phosphorus play an important role in photosynthesis, respiration, transfer of energy, cell division, cell enlargement and several other processes in plants. Phosphorous is an important element

for improving blood plasma, fats protein synthesis, strengthening the skeleton, teeth, assimilation of carbohydrates and necessary for enzyme activation. Poor growth and development of animals occur due to deficiency of Phosphorous. The most limiting mineral to productivity of grazing animals is Phosphorous throughout the world because of low availability to range plants and loss through soil erosion (Akhtar *et al.*, 2007: Hussain & Durrani, 2008). The average P contents in herbs and woody plants 0.01ppm (*Convunvulus Prostratus*), 0.05ppm (*Portulaca quadrifida*), 0.20ppm (*Taraxacum officinale*) while woody plants like *Albizia lebbeck* (0.05ppm), *Olea ferruginea* (0.01ppm), *Salvadora oleoides* (0.02ppm), *Suaeda fruticosa* (0.03ppm) and *Vitex negundo* was 0.03ppm (Table 12). The present study showed that phosphorous contents of the tested plants were generally in the range of Phosphorous limits. However, our findings agree with Akhtar *et al.* (2007), who studied P deficiency in forage plants. Statistical analysis (t.test) showed non significant difference among the herbs and woody plants value of P>0.005 (Table 13). This result also agrees with the study of Chaturvedi *et al.* (2006), who studied slight seasonal variations occur in P concentration in range lands community. Hussain & Durrani (2008) determined presence of K, P, Cu, Mn, Fe, and Zn of grasses and shrubs from Harboi rang land, Kalat, Baluchistan. Enyisi *et al.* (2014) also reported high concentration of Mg, P, and K in maize products. Bahadur *et al.* (2011) evaluate elemental analysis of some fodder plant species. Tahira *et al.* (2012) evaluate the elemental values from aerial part of five medicinal plants of District Sawabi Khyber Pakhtoon Khwa, Pakistan.

5. Total Nitrogen (N)

Nitrogen is an important nutritional element for plants. It is a major component of all amino acids, enzymes, which control all biological processes of living organisms (Brady & Weil, 1999). Present results showed that the average Nitrogen content 2.21ppm (*Convunvulus Prostratus*), 5.19ppm (*Portulaca quadrifida*), 3.93ppm (*Taraxacum officinale*) while woody plants like *Albizia lebbeck* (3.82ppm), *Olea ferruginea* (3.72ppm), *Salvadora oleoides* (5.95ppm), *Suaeda fruticosa* (4.11ppm) and *Vitex*

negundo was 2.67ppm (Table 12). Statistical analysis (t.test) showed non significance in different phonological stagesvalue of P>0.005 (Table 13).

Similar studies were carried out by Abbasi *et al.* (2009) who studied that highest Nitrogen contents in legumes than others plants. Total nitrogen contents Increase or decrease without any trend at different phonological stages was observed. Bignami *et al.* (2005) reported that in leaf N contents exist during the growing seasons. Starks *et al.* (2004) and Coskun *et al.* (2004) also reported N concentration in forage plants.

6. Magnesium (Mg)

Magnesium play important role in the photosynthesis process, because Mg is a building block of the Chlorophyll, due to which leaves appear green. One of the most vital mineral components of the cell is Magnesium which is a structural constituent of skeletal system also play important role in an enzyme activator, catalyses different enzyme reaction which take part active role in ion transport in the nerve cell and in neuro muscular maintenance and excitation in human being and animal. Present study showed that Mg content 0.09ppm (*Convunvulus Prostratus*), 0.34ppm (*Portulaca quadrifida*), 0.18ppm (*Taraxacum officinale*) while woody plants like *Albizia lebbeck* (0.20ppm), *Olea ferruginea* (0.18ppm), *Salvadora oleoides* (0.23ppm), *Suaeda fruticosa* (0.60ppm) and *Vitex negundo* was 0.13ppm (Table 12). Statistical analysis showed that no significant differences in Mg contents between herbs and woody species among various stages value of P>0.005 (Table 13). Similar results obtained by Canali *et al.* (2005) studied high concentration of Mg in forage plants. Kallah *et al.* (2000) reported that Mg contents were sufficient in the forages for ruminant production in tropics. Tahira *et al.* (2012) evaluate the elemental values from aerial part of five medicinal plants of District Sawabi Khyber Pakhtoon Khwa, Pakistan.

7. Aluminium (Al)

Visible symptom of Al toxicity is Inhibition growth of root and shoot. The earliest symptoms appear on roots. Shoots with Al observed are less affected for Mn toxicity (Chang *et al.*, 1999). Root with a consequence of Al-induce the elongation of root. Roots are usually become strong and brittle and tips of root and lateral roots become thick and turn to brown (Mossor-Pietraszewska *et al.*, 1997). Al does not affect the seed germination, but impair the growth of new roots and establishment of seedling (Nosko *et al.*, 1988). The common responses of shoots to Al are: ultrastructural and cellular changes in leaves, increased resistance in rates of diffusion, stomatal aperture reduction, chlorosis and necrosis of leaves, total decrease in size and number of leaf and shoot biomass decrease (Thornton *et al.*, 1986). Yamamoto *et al.* (2001) reported that lipids per oxidation is relatively early event following by exposure to Al and appears partly influence the production of callose, but not the inhibition of root elongation. Recent studies showed that average Al content in tested plants 0.1ppm (*Convunvulus Prostratus*), 0.09ppm (*Portulaca quadrifida*), 0.19ppm (*Taraxacum officinale*) while woody plants like *Albizia lebbeck* (0.06ppm), *Olea ferruginea* (0.10ppm), *Salvadora oleoides* (0.09ppm), *Suaeda fruticosa* (0.07ppm) and *Vitex negundo* was 0.17ppm (Table 12). Statistical analysis (t.test) showed that pre-reproductive stages of herbs and woody were significant ($P<0.005$) while the reproductive and post reproductive stages were non significant $P>0.005$ (Table 13). Our work strengthen by Bahadur *et al.* (2011) evaluate the elemental analysis of some fodder plant species. Tahira *et al.* (2012) evaluate the elemental values from aerial part of five medicinal plants of District Sawabi Khyber Pakhtoon Khwa, Pakistan.

8. Sulphur (S)

Sulphur is an important element, which take active part in protein forming nutrients. Sulphur deficiency can also result in Nitrogen deficiency. Due to S deficiency cereals and forage grasses; yellowing of newly emerging leaves occur. S deficiency also leads to cupping and purpling of leaves (Sahota, 2005). Recent results showed that the

sulphur content in tested species were 0.05ppm (*Convunvulus Prostratus*), 0.06ppm (*Portulaca quadrifida*), 0.38ppm (*Taraxacum officinale*) while woody plants like *Albizia lebbeck* (0.06ppm), *Olea ferruginea* (0.1ppm), *Salvadora oleoides* (0.44ppm), *Suaeda fruticosa* (1.14ppm) while in *Vitex negundo* 0.07ppm (Table 12). Statistical analysis showed non significance at three phenological stages of herbs and woody species $p>0.005$ (Table 13). Bahadur *et al.* (2011) evaluate the elemental analysis of some fodder plant species. Tahira *et al.* (2012) evaluate the elemental values from aerial part of five medicinal plants of District Sawabi Khyber Pakhtoon Khwa, Pakistan.

Micronutrients

1. Chlorine (Cl)

The nutritional disease due to chlorine deficiency in plants is yellowing of the leaves (chlorosis) and finally death (necrosis) of leaf tissue. Growth was exceedingly restricted due to chlorine deficiency and plants fails to set fruit (Perry *et al.*, 1956). Johnson *et al.* (1957) suggested that the average contents of chlorine in plants are in the range of 2–20 g/kg dry matter (DM) which is the content of macronutrients. Marschner (1995) reported that mostly for optimal plant growth the chlorine requirement, however, is in the range of 0.2–0.4 g kg−1 dry matter. Resent of the present study showed that Cl was present 0.07ppm in *Convunvulus Prostratus*, 0.1ppm in *Portulaca quadrifida*, 0.35ppm in *Taraxacum officinale* while in woody plants like *Albizia lebbeck* (0.1ppm), *Olea ferruginea* (0.04ppm), *Salvadora oleoides* (0.86ppm), *Suaeda fruticosa* (0.21ppm) while in *Vitex negundo* chlorine was absent (Table 12). Statistical analysis showed non significance at three phenological stages of herbs and woody species as value of $P>0.005$ (Table 13). Our work supported by Bahadur *et al.* (2011) who evaluate elemental analysis of some fodder plant species.

2. Silicon (Si)

Plants typically absorb bio available silicon in the form of silicate known as mono silicic or ortho silicic acid. Silicon in plants can stimulate plant photosynthesis, nutrient uptake, decrease susceptibility to disease and insect damage, alleviate water and various mineral stresses and also decrease the toxic effects of aluminium. "Silicon is taken up by plants as silicic acid through the root system and moves upwards in the transpiration stream and then move to sites of strong evapotranspiration where it is transformed into insoluble polymers" (Smith and Nutrifert 2011). Present results of our study showed that Si contents 0.15% in *Convunvulus Prostratus*, 0.20% in *Portulaca quadrifida,* 0.59% in *Taraxacum officinale* while woody plants like *Albizia lebbeck* (0.18%), *Olea ferruginea* (0.26%), *Salvadora oleoides* (0.18ppm), *Suaeda fruticosa* (0.14ppm) while in *Vitex negundo* had 0.54ppm (Table 12). Statistical analysis showed non significance at three phenological stages of herbs and woody species value os P>0.005 (Table 13). Present work supported by Bahadur *et al.* (2011) who evaluate the elemental analysis of some fodder plant species.

3. Iron (Fe)

Iron is an important element for plant because without iron plant can't produce chlorophyll. Iron is an important constituent of muscle protein, blood pigment (hemoglobin), myoglobbulin and different enzymes. The deficiency of iron causes serious diseases and decreases resistance against diseases. High levels of iron cause nutritional problems by decreasing phosphate absorption. Present results showed that the iron was absent in tested species except, in *Albizia lebbeck* have 0.083ppm (Table 12). Similar studies were carried out by Hussain & Durrani (2008), who studied Fe concentration in plants of Harboi rangeland. Gonzalez *et al.* (2006) reported that with maturity of plants Fe contents decreased. Our results are also strengthened by Aremu *et al.* (2008), Bakhsh *et al.* (2007) and Hameed *et al.* (2008) who reported that iron was in very low concentration than the normal permissible limit plants. Similar elemental analysis has also been carried out by Tahira *et al.* (2012) evaluate the elemental values

from aerial part of five medicinal plants of District Sawabi Khyber Pakhtoon Khwa, Pakistan. Ghani *et al.* (2014) evaluate mineral contents of four medicinal plants of Khushab Valley, Pakistan.

4. Copper (Cu)

Copper play an important role in activation of some enzymes in plants which are involved in lignin synthesis. Cu also play important role in the process of photosynthesis, respiration and plant metabolism. Copper is an important element because it is required in red cell maturation and for normal bone formation. Present results showed that fluctuation occurred in Cu concentration between herbs and woody plants and among different phenological stages (Table, 12). Results showed that 0.01 ppm (*Convunvulus Prostratus*) at pre reproductive stage, *Portulaca quadrifida* and *Taraxacum officinale* have no copper while woody plants like *Albizia lebbeck* (0.1ppm), *Olea ferruginea* (0.13ppm), *Salvadora oleoides* (0.05ppm), *Suaeda fruticosa* (0.06ppm) while *Vitex negundo* 0.12ppm (Table 12). Statistical analysis showed that two stages (pre and post reproductive) had insignificant ($P>0.005$) content of Cu while the post reproductive stages showed significance content $P<0.005$ (Table 13). Our results agreed with the Gonzalez *et al.* (2006) who studied that Cu concentration decreased with maturity in legumes and grasses. In the present case all plants to possessed Cu. Akhtar *et al.* (2007) and Khan *et al.* (2006 a) also evaluated Cu deficiency in forage plants. Similar studies were also carried by Bahadur *et al.* (2011) evaluate the elemental analysis of some fodder plant species.

Table 12. Elemental composition of some plants of Darazinda

Plant Species	Phenological stages	C (ppm)	N (ppm)	O (ppm)	Na (ppm)	Mg (ppm)	Si (ppm)	Al (ppm)	P (ppm)	S (ppm)	Cl (ppm)	K (ppm)	Ca (ppm)	Cu (ppm)	Fe (ppm)
A. Herbs															
1.Convunvulus Prostratus L.	Pre-Rep	66.85	2.21	30.17	-	0.12	0.10	0.07	0.01	-	0.10	0.06	0.23	0.10	-
	Reproductive	64.65	2.23	32.43	-	0.09	0.18	0.11	0.01	0.05	0.05	0.04	0.15	-	-
	Post-Rep	66.20	2.21	30.84	-	0.08	0.18	0.12	0.01	-	0.07	0.07	0.21	-	-
	Mean	**65.9**	**2.21**	**31.14**		**0.09**	**0.15**	**0.1**	**0.01**		**0.07**	**0.05**	**0.91**	**-**	-
2. Portulaca quadrifida L.	Pre-Rep	54.90	6.11	36.69	0.24	0.50	0.16	0.16	0.07	0.06	0.08	1.05	0.13	-	-
	Reproductive	51.0	5.46	41.55	-	0.16	0.31	-	0.03	0.09	0.07	0.67	0.23	-	-
	Post-Rep	59.67	4.0	33.95	0.37	0.36	0.14	0.12	0.05	0.05	0.15	1.03	0.21	-	-
	Mean	**55.19**	**5.19**	**37.39**	**0.30**	**0.34**	**0.20**	**0.09**	**0.05**	**0.06**	**0.1**	**0.90**	**0.19**		-
3. Taraxacum officinale	Pre-Rep	60.29	4.24	31.35	0.21	0.21	0.75	0.18	0.02	0.96	0.15	0.84	0.68	-	-
	Reproductive	58.63	5.13	32.26	0.25	0.16	0.18	0.21	0.51	0.06	0.29	0.93	0.54	-	-
	Post-Rep	61.70	2.43	32.17	0.19	0.17	0.84	0.20	0.08	0.14	0.63	0.77	-	-	-
	Mean	**60.20**	**3.93**	**31.92**	**0.21**	**0.18**	**0.59**	**0.19**	**0.20**	**0.38**	**0.35**	**0.84**	**0.40**		
B. Woody Plants															
4. Albizia lebbeck L.	Pre-Rep	62.28	4.16	32.50	-	0.27	0.12	-	0.06	0.07	0.06	0.14	0.26	0.07	0.06
	Reproductive	61.52	4.53	32.49	-	0.18	0.29	0.06	0.05	0.07	0.09	0.10	0.52	0.10	0.11
	Post-Rep	63.05	2.78	32.74	-	0.17	0.14	-	0.06	0.06	0.15	0.10	0.61	0.13	0.08
	Mean	**62.28**	**3.82**	**32.57**		**0.20**	**0.18**	**0.06**	**0.05**	**0.06**	**0.1**	**0.11**	**0.46**	**0.1**	**0.083**
5. Olea ferruginea Royle.	Pre-Rep	62.56	1.91	33.81	-	0.18	0.23	0.09	0.01	0.12	0.03	0.37	0.46	0.09	-
	Reproductive	59.37	4.60	34.34	-	0.14	0.24	0.11	0.02	0.09	0.05	0.37	0.42	0.16	-
	Post-Rep	60.63	4.65	32.46	-	0.22	0.33	0.12	0.02	0.09	0.04	0.63	0.49	0.16	-
	Mean	**60.85**	**3.72**	**33.53**		**0.18**	**0.26**	**0.10**	**0.01**	**0.1**	**0.04**	**0.45**	**0.45**	**0.13**	-
6.Salvadora oleoides	Pre-Rep	60.92	5.28	29.93	-	0.29	0.18	0.10	0.01	0.59	1.07	0.07	1.49	0.07	-
	Reproductive	60.17	10.8	27.27	-	0.18	0.16	0.07	0.01	0.20	0.51	-	0.59	-	-
	Post-Rep	66.44	1.78	28.20	-	0.23	0.20	0.10	0.05	0.53	1.01	0.06	1.37	0.08	-
	Mean	**62.51**	**5.95**	**28.46**		**0.23**	**0.18**	**0.09**	**0.02**	**0.44**	**0.86**	**0.04**	**1.15**	**0.05**	-
7. Suaeda fruticosa Forssk.	Pre-Rep	51.0	5.14	37.91	0.43	0.53	0.13	-	0.02	0.92	0.23	0.56	0.44	0.10	-
	Reproductive	50.0	3.71	39.86	0.44	0.71	0.17	0.07	0.03	1.42	0.21	0.74	0.66	-	-
	Post-Rep	54.27	3.50	38.57	0.35	0.57	0.14	-	0.04	1.09	0.20	0.61	0.58	0.09	-

	Mean	**51.75**	**4.11**	**38.78**	**0.40**	**0.60**	**0.14**	**0.07**	**0.03**	**1.14**	**0.21**	**0.63**	**0.56**	**0.06**	-
8.Vitex negundo L.	Pre-Rep	62.0	3.17	33.16	0.35	0.11	0.54	0.18	0.06	0.08	-	0.18	0.33	0.12	-
	Reproductive	61.0	2.12	34.93	0.32	0.15	0.39	0.14	0.02	0.02	-	0.12	0.06	0.08	-
	Post-Rep	62.92	2.72	32.10	0.37	0.13	0.71	0.21	0.02	0.11	-	0.25	0.54	0.17	-
	Mean	**61.9**	**2.67**	**33.39**	**0.34**	**0.13**	**0.54**	**0.17**	**0.03**	**0.07**		**0.18**	**0.31**	**0.12**	-

Table13. T.test of elemental analysis of plants species of Darazinda

Pre-Rep		Reproductive		Post-Rep	
Herbs	Woody	Herbs	Woody	Herbs	Woody
Carbon (C)					
Herbs	Woody plants	Herbs	Woody plants	Herbs	Woody plants
66.85	62.28	64.65	61.52	66.20	63.05
54.90	62.56	66.20	59.37	59.67	60.63
60.29	60.92	58.63	60.17	61.70	66.44
	51.0		50.0		54.27
	62.0		61.0		62.92
0.760 NS		0.366 NS		0.745 NS	
Nitrogen (N)					
2.21	4.16	2.23	4.53	2.21	2.78
6.11	1.91	5.46	4.60	4.0	4.65
4.24	5.28	5.13	10.8	2.43	1.78
	5.14		3.71		3.50
	3.17		2.12		2.72
0.853 NS		0.336 NS		0.663 NS	
Oxygen (O)					
30.17	32.50	32.43	32.49	30.84	32.74
36.69	33.81	41.55	34.34	33.95	32.46
31.35	29.93	32.26	27.27	32.17	28.20
	37.91		39.86		38.57
	33.16		34.93		32.10
0.545 NS		0.201 NS		0.558 NS	
Sodium (Na)					
0.24	0.43	0	0.44	0.37	0.35
0.21	0.35	0.25	0.32	0.19	0.37
0.096 NS		0.251 NS		0.570 NS	
Magnesium (Mg)					
0.12	0.27	0.09	0.18	0.08	0.17
0.50	0.18	0.16	0.14	0.36	0.22
0.21	0.29	0.16	0.18	0.17	0.23
	0.53		0.71		0.57
	0.11		0.15		0.13
0.857 NS		0.449 NS		0.967 NS	
Silicon (Si)					
0.10	0.12	0.18	0.29	0.18	0.14
0.16	0.23	0.31	0.24	0.14	0.33
0.75	0.18	0.18	0.16	0.84	0.20
	0.13		0.17		0.14
	0.54		0.39		0.71
0.581 NS		0.912 NS		0.577 NS	
Aluminum (Al)					
0.07	0.00	0.11	0.06	0.12	0.00
0.16	0.09	0.00	0.11	0.12	0.12
0.18	0.10	0.21	0.07	0.20	0.10
	0.00		0.07		0.00
	0.18		0.14		0.21
0.002 S		0.750 NS		0.187 NS	
Phosphorus (P)					
0.01	0.06	0.01	0.05	0.01	0.06
0.07	0.01	0.03	0.02	0.05	0.02

0.02	0.01	0.51	0.01	0.08	0.05
	0.02		0.03		0.04
	0.06		0.02		0.02
0.853 NS		**0.459 NS**		**0.912 NS**	
Sulphur (S)					
0.00	0.07	0.05	0.07	0.00	0.06
0.06	0.12	0.09	0.09	0.05	0.09
0.96	0.59	0.06	0.20	0.14	0.53
	0.92		1.42		1.09
	0.08		0.02		0.11
0.637 NS		**0.347 NS**		**0.287 NS**	
Chlorine (Cl)					
0.10	0.06	0.05	0.09	0.07	0.15
0.08	0.03	0.07	0.05	0.15	0.04
0.15	1.07	0.29	0.51	0.63	1.01
	0.23		0.21		0.20
	0.00		0.00		0.00
0.480 NS		**0.383 NS**		**0.499 NS**	
Potassium (K)					
0.06	0.14	0.04	0.10	0.07	0.10
1.05	0.37	0.67	0.37	1.03	0.63
0.84	0.07	0.93	0.00	0.77	0.06
	0.56		0.74		0.61
	0.18		0.12		0.25
0.232 NS		**0.310 NS**		**0.235 NS**	
Calcium (Ca)					
0.23	0.26	0.15	0.52	0.21	0.61
0.13	0.46	0.23	0.42	0.21	0.49
0.68	1.49	0.54	0.59	0.00	1.37
	0.44		0.66		0.58
	0.33		0.06		0.54
0.228 NS		**0.159 NS**		**0.186 NS**	
Copper (Cu)					
0.10	0.07	0.00	0.10	0.00	0.13
0.00	0.09	0.00	0.16	0.00	0.16
0.00	0.07	0.00	0.00	0.00	0.08
	0.10		0.00	0.00	0.09
	0.12			0.08	0.17
0.363 NS		**0.204 NS**		**0.02 S**	
Iron (Fe)					
-	0.06	-	0.11	-	0.08
-	-	-		-	-
-	-	-		-	-
	-				-

P<0.005 significant while P>0.005 showed non-significance NS= Non significant, S= Significant

Nutritional analysis

Proximate composition

Determination of range animal productivity depends upon the amount and nutritive quality of vegetation available to the grazing animal. Age and their physiological function like gestation, growth maintenance, fattening, location and determination of the nutritional in order to full fill the demands of livestock. Plant material is divided into fibrous and non fibrous contents. Due to overstocking most rangelands of Pakistan may have sufficient forage but of low palatability (Hussain & Durrani, 2009a). In the recent study of Darazinda proximate composition of some range forage has been carried out in order to evaluate its possible role in the productivity of range lands of the investigated area.

1. Moisture content

The percentage ratio of water mass in a sample to the solids mass in a sample is called moisture content. When soil moisture falls below a crop's wilting point, loss crop will be occurred. Soil moisture is critical to soil chemical processes, particularly nitrogen-fixation. Moisture content showed that herbs had 53.46% (*Convunvulus Prostratus*), 37.83% (*Portulaca quadrifida*), 73.63% (*Taraxacum officinale*) while woody plants like *Albizia lebbeck* had 58%, *Olea ferruginea* (57.2%), *Salvadora oleoides* (61.6%), *Suaeda fruticosa* (42.63%) and in *Vitex negundo* was 47.2% (Table 14). Higher moisture contents in fooder plants of the present research area will be of great significance, as the area is arid with space water resources and moisture contents in the fodder will provide reseasonable required water for body. Statistical analysis (t.test) showed that little amount of moisture content was present in both herbs and woody plants i-e nonsignificance P>0.005 (Table 15).

Our results are supported by Hussain and Durrani (2009 b) and Bahadur *et al.* (2011) who evaluated the nutritional profile of some fodder plant species by using Atomic Absorption Spectrophotometer (AAS). Ghani *et al.* (2014) evaluated nutritional

contents of four medicinal plants of Khushab Valley, Pakistan. Enyisi *et al.* (2014) also reported that moisture content was insignificant in maize products. Our results disagree with Tahira *et al.* (2012) who evaluated the nutritional values from aerial part of five medicinal plants of District Sawabi Khyber Pakhtoon Khwa, Pakistan and got moisture contents of wild medicinal plant species showing significant results this results disagree with our resent findings.

2. Ash contents

When organic material is incinerated at high temperature (500-600°C), the remaining residue is the ash which consists of salts and oxides of anions like chlorides, phosphates, sulfates and other halides and cations like iron, sodium, calcium, potassium, magnesium and manganese. These are important constituents of animal diet. Present ash analysis showed that average ash contents of herbs were 10.16% (*Convunvulus Prostratus*), 8.2% (*Portulaca quadrifida*), 7.5% (*Taraxacum officinale*) while woody plants like *Albizia lebbeck* had (10.4%), *Olea ferruginea* (9.3%), *Salvadora oleoides* (9.56%), *Suaeda fruticosa* (8.26%) while in *Vitex negundo* 08% ash content (Table 14). Statistical analysis (t.test) showed little amount of ash contents at three phenological stages of herbs and woody species i.e nonsignificant as value of P>0.005 (Table 15).

Our results are strengthened by Ghani *et al.* (2014) who evaluated nutritional contents of four medicinal plants of Khushab Valley, Pakistan. Generally, the ash contents were high at pre-reproductive stages that decrease gradually towards reproductive stage. Similarly Hussain *et al.* (2010a) also reported similar our results that ash contents decline progressively with maturity in some forages plants. However present study disagreed with Tahira *et al.* (2012) who evaluated nutritional values from aerial part of five medicinal plants of District Sawabi Khyber Pakhtoon Khwa, Pakistan and showed significant results. Hameed *et al.* (2008) and Sultan *et al.* (2010) noticed significant difference of ash contents in forage plants.

3. Crude protein (CP)

Proteins are fundamental components of all living cells because it is the building unit of enzymes, hormones, and antibodies which are necessary for the proper functioning of an organism. For growth and repair of tissue proteins are essential in the diet of animals. All the nitrogenous compounds present in forage feed is reliable source of overall nutritional status referred as crude protein. They are directly related to digestibility, calcium, vitamins and phosphorus requirements of body (Ganskopp & Bohner, 2003; Hussain & Durrani, 2009a). Present studies showed that crude proteins in herbs were 6.9% (*Convunvulus Prostratus*), 6.4% (*Portulaca quadrifida*), 10.26% (*Taraxacum officinale*), while in woody plants like *Albizia lebbeck* were 8.23%, *Olea ferruginea* (8.5%), *Salvadora oleoides* (9.6%), *Suaeda fruticosa* (10.86%) and in *Vitex negundo* 11.16% (Table 14). Statistical analysis (t.test) showed that little amount of crude protein at three phenolpgical stages of herbs and woody species i.e non significance as value of P>0.005 (Table 15).

Our results are supported by Bukhsh *et al.* (2007) who reported that crude proteins, varied with phenological stages and plant parts. Monica *et al.* (2015) reported nutritional analysis of *Moringa oleifera* from Mexico. Khan *et al.* (2002) and Dairo & Adanlawo (2007) and Hussain & Durrani (2009b) also reported high crude protein contents during early growth stages. Reduced appetite, low feed intake and poor food efficiency that in turns lead to poor growth and development of livestock, all these occur due to deficiency of protein (Anon., 1981, 1985).

4. Crude fiber (CF)

Organic residue remaining after digesting plant powder with 0.255 N H_2SO4 and 0.313 N NaOH is the crude fiber. The compounds of organic residue are predominantly starch, protein, sugar, lipids, lignin and portions of both the structural carbohydrates. In the present study crude fiber of herbs and woody species were worked out. The crude fiber of herbs were 4.06% (*Convunvulus Prostratus*), 12.16% (*Portulaca quadrifida*), 11.2% (*Taraxacum officinale*) while woody plants like *Albizia lebbeck* had 12.4%, *Olea*

ferruginea (6.93%), *Salvadora oleoides* (8.13%), *Suaeda fruticosa* (11%) while in *Vitex negundo* highest crude fiber (21.13%) (Table 14). Higher crude fibers were present in woody plants in which *Vitex negundo* have high crude fiber 21.13%. Crude fiber contents differed between herbs and woody and among various growth stages insignificantly (P>0.005) (Table 15). High crude fibers were present in mature plants as compared young plants. Similar results are reported by Sultan *et al.* (2009) who noticed low crude fibers contents in herbaceous plants. The content of crude fibers was greater in woody plants as compared to forages plant species (Bukhsh *et al.*, 2007; Sultan *et al.*, 2007).

5. Fat contents

Complex organic material which is soluble in ether consists chiefly of fats and fatty acids. It is a measure of the fat or oil (lipid) contents present in the feed. Fats and oils are highly rich sources of energy. Present results showed that high fat contents were present in woody plants in which *Olea ferruginea* had 20.1%. Fat content of herbs showed 5.13% (*Convunvulus Prostratus*), 0.83% (*Portulaca quadrifida*), 10.16% (*Taraxacum officinale*) while, fat content of woody species like *Albizia lebbeck* were 8.13%, *Salvadora oleoides* (10.7%), *Suaeda fruticosa* (12.03%) and *Vitex negundo* with 12.46% (Table 14). There is little amount of fat in herbs and woody plants at three phonological stages statistically (t.test) showed nonsignificance as value of P>0.005 (Table 15). Our findings agree with Hussain & Durrani (2009b), Coskun *et al.* (2004), Cherney & Chenrey (2005). Other workers have also carried out this type of study e-g Ghani *et al.* (2014) evaluate nutritional contents of four medicinal plants of Khushab Valley, Pakistan. Monica *et al.* (2015) reported nutritional composition of *Moringa oleifera* from Mexico.

6. Carbohydrates

Group of organic compounds that includes starches, sugars, celluloses and gums are called carbohydrates. These are the major building material of plant body. Carbohydrates are produced by photosynthetic plants which contain carbon, hydrogen, and oxygen, in ratio 1:2:1. Carbohydrates perform many important roles in animals.

Polysaccharides serve as storage of energy e.g. starch and glycogen and as well as structural components e.g. chitin in animal and cellulose in plants. Present results of carbohydrates analysis herbaceous plants content showed that 79% (*Convunvulus Prostratus*), 73.23% (*Portulaca quadrifida*), 71.03% (*Taraxacum officinale*) while woody plants like *Albizia lebbeck* (68.96%), *Olea ferruginea* (75.2%), *Salvadora oleoides* (72.63%), *Suaeda fruticosa* (69.86%) and *Vitex negundo* 59.83% (Table 14). Statistical analysis (t.test) showed non significance (P>0.005) in both herbs and woody plants at three phonological stages (Table 15). These findings showed that in herbs high carbohydrates were present as compare to woody plants. These results agreed with the findings of Fulkerson *et al.* (2001) who reported that grasses and forbs were rich in carbohydrates than shrubs and trees. Chatterton *et al.* (2006) also studied similar trend in oats.

Table 14. Nutritional Analysis of some palatable plants of Darazinda

Plant species	Phenological stages	Moisture content (%)	Ash content (%)	Crude protein (%)	Crude fiber (%)	Fat contents (%)	Carbohydrate contents (%)
A. Herbs							
1.Convunvulus Prostratus L.	Pre-Rep	52.1	10.1	5.5	4.3	3.2	80.1
	Reproductive	53.0	11.2	7.2	3.2	5.2	78.8
	Post-Rep	55.3	9.2	8.0	4.7	7.0	78.1
	Mean	**53.46**	**10.16**	**6.9**	**4.06**	**5.13**	**79.0**
2. Portulaca quadrifida L.	Pre-Rep	35.4	8.2	7.3	11.3	0.3	73.2
	Reproductive	36.1	9.1	6.2	12.3	0.7	72.4
	Post-Rep	42.0	7.3	5.7	12.9	1.5	74.1
	Mean	**37.83**	**8.2**	**6.4**	**12.16**	**0.83**	**73.23**
3. Taraxacum officinale	Pre-Rep	72.3	7.3	11.2	11.4	9.3	70.1
	Reproductive	73.1	8.2	10.3	10.2	10.2	71.3
	Post-Rep	75.5	7.0	9.3	12.0	11.0	71.7
	Mean	**73.63**	**7.5**	**10.26**	**11.2**	**10.16**	**71.03**
B. Woody Plants							
4. Albizia lebbeck L.	Pre-Rep	56.1	10.4	9.3	12.6	7.3	67.7
	Reproductive	58.2	11.3	8.5	11.6	8.1	68.6
	Post-Rep	60.0	9.5	6.9	13.0	9.0	70.6
	Mean	**58.1**	**10.4**	**8.23**	**12.4**	**8.13**	**68.96**
5. Olea ferruginea Royle	Pre-Rep	56.1	9.5	10.5	6.5	18.2	73.5
	Reproductive	57.0	10.1	5.6	6.8	20.1	77.5
	Post-Rep	58.5	8.3	9.5	7.5	22.1	74.7
	Mean	**57.2**	**9.3**	**8.5**	**6.93**	**20.1**	**75.2**
6.Salvadora oleoides	Pre-Rep	60.1	11.1	9.7	7.3	10.2	71.9
	Reproductive	61.3	9.4	8.9	8.1	10.5	73.6
	Post-Rep	63.5	8.2	10.4	9.0	11.6	72.4
	Mean	**61.6**	**9.56**	**9.6**	**8.13**	**10.7**	**72.63**
7. Suaeda fruticosa Forssk	Pre-Rep	40.1	8.5	13.2	11.2	12.0	67.1
	Reproductive	42.3	9.0	10.2	9.8	11.1	71.0
	Post-Rep	45.5	7.3	9.2	12.0	13.0	71.5

8. Vitex negundo L.	**Mean**	**42.63**	**8.26**	**10.86**	**11.0**	**12.03**	**69.86**
	Pre-Rep	46.1	9.1	8.6	20.1	11.5	62.6
	Reproductive	47.0	8.4	11.4	21.0	12.1	59.2
	Post-Rep	48.5	6.5	13.5	22.3	13.8	57.7
	Mean	**47.2**	**8.0**	**11.16**	**21.13**	**12.46**	**59.83**

Table 15. Statistical analysis (t. test) of nutritional analysis of palatable plants

Pre-Rep		Reproductive		Post-Rep	
Herbs	Woody	Herb	Woody	Herb	Woody
Moisture content (%)					
52.1	56.1	53.0	58.2	55.3	60.0
35.4	56.1	36.1	57.0	42.0	58.5
72.3	60.1	73.1	61.3	75.5	63.5
	40.1		42.3		45.5
	46.1		47.0		48.5
0.704 NS		0.664 NS		0.746 NS	
Ash content (%)					
10.1	10.4	11.2	11.3	9.2	9.5
8.2	9.5	9.1	10.1	7.3	8.3
7.3	11.1	8.2	9.4	7.0	8.2
	8.5		9.0		7.3
	9.1		8.4		6.5
0.226 NS		0.152 NS		0.93 NS	
Crude protein (%)					
5.5	9.3	7.2	8.5	8.0	6.9
7.3	10.5	6.2	5.6	5.7	9.5
11.2	9.7	10.3	8.9	9.3	10.4
	13.2		10.2		9.2
	8.6		11.4		13.5
0.388 NS		0.798 NS		0.466 NS	
Crude fiber (%)					
4.3	12.6	3.2	11.6	4.7	13.0
11.3	6.5	12.3	6.8	12.9	7.5
11.4	7.3	10.2	8.1	12.0	9.0
	11.2		9.8		12.0
	20.1		21.0		22.3
0.967 NS		0.955 NS		0.994 NS	
Fat contents (%)					
3.2	7.3	5.2	8.1	7.0	9.0
0.3	18.2	0.7	20.1	1.5	22.1
9.3	10.2	10.2	10.5	11.0	11.6
	12.0		11.1		13.0
	11.5		12.1		13.8
0.281 NS		0.335 NS		0.353 NS	
Carbohydrate contents (%)					
80.1	67.7	78.8	68.6	78.1	70.6
73.2	73.5	72.4	77.5	74.1	74.7
70.1	71.9	71.3	73.6	71.7	72.4
	67.1		71.0		71.5
	62.6		59.2		57.7
0.526 NS		0.861 NS		0.526 NS	

P<0.005 significant while P>0.005 showed non-significance NS= Non significant, S= Significant

ETHNOBOTANY

Ethnobotanical Profile:

Plant and animal including human interaction is obligate and can never be separated right from the birth till death. Plant resources are not only essential for human and animal food needs, these also of basic importance for various daily needs of people, including medical, shelture, construction and many other basic needs. The plant wealth of an area is also the main source of food for all animals, including the domesticated livestock. Plant resources also play important role in the economic wealth of an area. The plants resources of Darazinda was explored to know their usefulness and uses by locals of the total 213 plants, 198 plants were found to be used for one or the other purpose by the locals. In these 24 trees spps, 34 shrubs and 155 herbs were used various ethnobotanical uses of the plant resources of Darazinda are given below (Table 16; Fig 16).

Fodder utilization:

The results are given in table 16 & Fig 16, which show that 128 plants (64.6%) were used as fodder. *Acacia modesta*, *Achrechne racemosa*, *Albizia lebbeck*, *Apluda mutica*, *Aristida adscensionis*, *Argyrolobium roseum*, *Astragalus psilocentros*, *Bromus japonica*, *Chenopodium album*, *Chenopodium murale*, *Convunvulus arvensis*, *Cymbopogon jwarancusa*, *Cynodon dactylon*, *Dichanthium annulatum*, *Echinochloa colona*, *Eragrostis minor*, *Hordeum vulgare*, *Iphiona grantoides*, *Lactuca serriola*, *Lepidium draba*, *Lolium temulentum*, *Morus alba*, *Pennisetum oriantale.*, *Phalaris minor*, *Plantago lanceolata*, *Saccharum bengalensis*, *Rhazya stricta*, *Salvadora persica*, *Sonchus asper*, *Stellaria media*, *Taraxacum officinale*, *Tribulus terrestris*, *Zizyphus mauritiana*, *Zizyphus oxyphylla* were used as fodder by local cattles (Goat, sheep, cow and camel), these cattle caffer meat and dairy product needs of the locals. These cattles are also source of income by selling out them their dairy products and wool. This result showed that if proper managed for range land area is suitable and can increase productivity many times and will improve economic condition of the locals. Similar studies were carried out by (Hussain *et al.*, 2004, 2006; Badshah *et al.*, 2006; Tordio *et al.*, 2006; Arenas & Scarpa, 2007; Maoe *et al.*, 2009; Ajaib *et al.*, 2010) in various parts of Pakistan.

Medicinal utilization:

Plants have been used as medicinal cures for various ailments since the earliest. Result of the present study showed that 108 (55%) plants were used medicinally by locals. These include *Acacia nilotica*, *Acacia modesta*, *Achyranthus dentatus*, *Achyranthus aspera*, *Agaricus campestris*, *Albizia lebbeck*, *Allium cepa*, *Allium sativum*, *Amaranthus viridis*, *Astragalus psilocentros*, *Artemisia scoparaia*, *Calligonum polygonoides*, *Caralluma tuberculata*, *Cannabis sativus*, *Capparis spinosa*, *Carthamus oxycantha*, *Capsicum annum*, *Chenopodium album*, *Cordia maxia*, *Coriandrium sativum*, *Cucumis sativus*, *Cucurbita maxima*, *Cucurbita pepo*, *Cuscuta reflexa*, *Dalbergia sissoo*, *Datura alba*, *Dodonaea viscosa*, *Eucalyptus globules*, *Euphorbia prostate*, *Fagonia cretica*, *Foeniculum valgare*, *Helianthus annus*, *Peganum harmala*, *Pennisetum oriantale*, *Phoenix dactylifera*, *Portulaca quardrifida*, *Raphanus sativus*, *Salvadora persica*, *Tamarix aphylla*, *Withania coagulans*, *Zizyphus oxyphylla*, *Zizyphus nummularia* were locally used as medicinal plants. *Fagonia cretica* is widely used to cure various diseases including skin diseases, while *Salvadora* is used for cureness of female diseases (Table 16; Fig 16). After fodder plants, the second major utility of plants was medicinal uses. As no earlier reference exists on medicinal aspect of this area, this study will be helpful to document the ethnobotanical profile of this remote area. However, similar studies were carried out by Wazir *et al.* (2004), Jabar *et al.* (2006), Ishtiaq *et al.* (2007), Hussain *et al.* (2008), Sardar & Khan (2009) and Taren *et al.* (2010) from other areas of Pakistan. While from other parts of the world Macia (2004), Okello & Sesgawa (2007), Miah *et al.* (2009), and Meena & Yadava (2010) investigated various plants used for traditional medicines. Medicinal uses of some important plants of the area are presented in the fork coming part of this work.

Fuel utilization:

More than 80% of the local area people depend upon the surrounding hills for collection of fuel plants. Most of the people of this area are poor and have lack the basic facilities. The local peoples solely depend upon local flora for fuel mostly and also for timber wood. The result showed that 30 (15%) plants were used as fuel in this area.

Acacia nilotica, *Acacia modesta*, *Albizia lebbeck*, *Calligonum polygonoides*, *Cymbopogon jwarancusa*, *Dalbergia sissoo*, *Desmostachya bipinnata*, *Dodonaea viscosa*, *Eucalyptus globules*, *Eucalyptus lanceolatus*, *Melia azedarach*, *Morus nigra*, *Periploca aphylla*, *Phoenix dactylifera*, *Phylla nodiflora*, *Tamarix aphylla*, *Zizyphus oxyphylla*, *Zizyphus mauritiana* and *Zizyphus nummularia* etc were used as fuel (Table 16; Fig 16). This has referred great pressure on the plant population and there is desire need to provide alternate sources of fuels to locals, which will help to preserve the flora of the area. Similar studies were carried out by Sher *et al.* (2011) reported 51 wood species used as fuel from Chagharzai Valley, Buner District, Pakistan. Similar results were reported by Ibrar *et al.* (2007) from Shangla, Khan and Khatoon (2007) from Gilgit, Hussain *et al.* (2008) from Sahiwal, Sardar & Khan (2009) from Narowal and Qasim *et al.* (2010) from Lasbela.

Vegetable utilization:

25 plants were used as a vegetable in Darazinda which amount to 13%. Cultivated vegetables were *Abelmoschus esculentus*, *Allium cepa*, *Allium sativum*, *Amaranthus viridis*, *Anagallis arvensis*, *Brassica campestris*, *Brassica olaraceae*, *Capsicum annum*, *Coriandrium sativum*, *Cucumis sativus*, *Cucurbita maxima*, *Cucurbita pepo*, *Lactuca sativa*, *Lactuca serriola*, *Lycopersicom esculentum*, *Mentha arvensis*, *Raphanus sativus*, *Solanum melangena* and *Solanum tuberosum* and wild plants used as vegetables were *Caralluma tuberculata*, *Chenopodium murale*, *Chenopodium album* (Table 16; Fig 16). These vegetables are mostly cultivated near the homes and caffer their needs to some extent. Similar work reported by other workers (Sardar & Khan, 2009; Ajaib *et al.*, 2010; Qasim *et al.*, 2010; Qureshi *et al.* 2007; Hussain *et al.*, 2004 and Shah & Hussain (2008).

Fruit yielding plants:

The results showed that 10 (5%) out of 198 plants in the area were fruit yielding. *Mengifera indica*, *Morus alba*, *Morus nigra*, *Musa paradisiaca*, *Phoenix dactylifera*, *Punica granatum*, *Vites vinifera*, *Zizyphus oxyphylla*, *Zizyphus mauritiana*, *Zizyphus nummularia* were fruit yielding plants. Most of these first plants are cultivated, while

some e.g. *Zizyphus nummularia* etc were wild (Table 16; Fig 16). Similar work reported by other workers (Sardar & Khan, 2009; Ajaib *et al.*, 2010; Qasim *et al.*, 2010; Qureshi *et al.* 2007; Hussain *et al.*, 2004 and Shah & Hussain (2008).

Timber wood utilization:

10 (5%) plants were used as a timber in this area. *Acacia nilotica, Acacia modesta, Albizia lebbeck, Dalbergia sissoo, Eucalyptus globules, Eucalyptus lanceolatus, Phoenix dactylifera, Tamarix aphylla, Zizyphus oxyphylla, Zizyphus mauritiana* etc for making doors and windows etc (Table 16; Fig 16). Similar results were reported by Ibrar *et al.* (2007) from Shangla, Khan and Khatoon (2007) from Gilgit, Hussain *et al.* (2008) from Sahiwal, Sardar & Khan (2009) from Narowal and Qasim *et al.* (2010) from Lasbela.

Agricultural tool making:

As the area is backward and poor, peoples still use conventional agricultural techniques of tools. The local people have cultivated small farmlands with the help of indigenous agricultural tools. A total 4 (2%) plants were used for making agriculture tools including *Dalbergia sissoo, Tamarix aphylla, Zizyphus oxyphylla, Zizyphus mauritiana*. Different wood species wood of *Z. mauritiana* was used for making handles of axes and ploughs (Table 16; Fig 16).

Other utilization of plant resources:

The present study showed that 07 (3.5%) plant species were used for furniture making. *Acacia modesta, Albizia lebbeck, Dalbergia sissoo, Phoenix dactylifera, Tamarix aphylla, Zizyphus oxyphylla, Zizyphus mauritiana, Zizyphus nummularia* are used for making furniture. Also 07 (4%) plants were used for fencing agricultural fields including *Acacia nilotica, Acacia modesta, Albizia lebbeck, Phoenix dactylifera, Zizyphus oxyphylla, Zizyphus mauritiana, Zizyphus nummularia* (Table 16; Fig 16).

Table 16. Ethnobotanical profile of Darazinda plants

S.No	Families/Plant species	Fodder	Medicinal	Fuel (dried plants)	Vegetables	Fruit yielding	Timber	Furniture	Fencing plants	Agriculture appliances
	A. PTERIDOPHYTA									
	1. Equisetaceae									
1	*Equisetum arvense* L.	+	-	-	-	-	-	-	-	-
	2. Adiantaceae									
2	*Adiantum capillusveneris L*	-	-	-	-	-	-	-	-	-
	B. Fungi									
	3.Agaricaceae									
3	*Agaricus campestris* L.	-	+	-	-	-	-	-	-	-
	4. Helveliaceae									
	Morchella esculenta Fries	-	-	-	-	-	-	-	-	-
	C. MONOCOTYLEDONS									
	5. Alliaceae									
4	*Allium sativum* L.	-	+	-	+	-	-	-	-	-
5	*Allium cepa* L.	-	+	-	+	-	-	-	-	-
	6. Arecaceae									
6	*Nannorrphs ritchiana* H. Wendl.	+	-	-	-	-	-	-	-	-
7	*Phoenix dactylifera* L.	+	+	+	-	+	+	+	+	-
	7. Asparagaceae									
8	*Asparagus gracilis* Royle	+	-	-	-	-	-	-	-	-
	8. Cyperaceae									
9	*Cyprus elumoids* L.	+	-	-	-	-	-	-	-	-
10	*Cyperus rotundrus*	+	-	-	-	-	-	-	-	-
11	*Eleocharis palustris* (L.)	+	-	-	-	-	-	-	-	-
	9. Poaceae									
12	*Apluda mutica*	+	-	-	-	-	-	-	-	-
13	*Achrechne racemosa*	+	-	-	-	-	-	-	-	-
14	*Aristida adscensionis* L.	+	-	-	-	-	-	-	-	-

15	*Aristida cyanantha* Nees ex Steud	+	-	-	-	-	-	-	-	-
16	*Argyrolobium roseum*	+	-	-	-	-	-	-	-	-
17	*Avena fatua* Linn.	+	-	-	-	-	-	-	-	-
18	*Arndu dedonix*	+	-	-	-	-	-	-	-	-
19	*Brachiaria ramose*	+	-	-	-	-	-	-	-	-
20	*Brachiaia reptans*	+	-	-	-	-	-	-	-	-
21	*Bromus japonica* Thunb.	+	-	-	-	-	-	-	-	-
22	*Cymbopogon jwarancusa* (Jones) Schult.	+	-	+	-	-	-	-	-	-
23	*Cynodon dactylon* (L.) Pers.	+	-	+	-	-	-	-	-	-
24	*Cenchrus ciliaris* L.	+	-	-	-	-	-	-	-	-
25	*Dinebra retroflexa*	-	+	-	-	-	-	-	-	-
26	*Disteria cilians*	-	+	-	-	-	-	-	-	-
27	*Desmostachya bipinnata (L.)* Stapf.	-	+	+	-	-	-	-	-	-
28	*Dactyloctenium carstatum*	+	-	-	-	-	-	-	-	-
29	*Dactyloctenium aegyptium* (L.) Willd.	+	-	-	-	-	-	-	-	-
30	*Dichanthium annulatum* (Forssk.) Stapf	+	-	-	-	-	-	-	-	-
31	*Eragrostis minor* L.	+	+	-	-	-	-	-	-	-
32	*Echinochloa colona* (Linn.) Link	+	-	-	-	-	-	-	-	-
33	*Hordeum vulgare* L.	+	-	-	-	-	-	-	-	-
34	*Imperata cylindrica* (Linn.) Raeuschel	+	-	-	-	-	-	-	-	-
35	*Lolium temulentum* Linn.	+	-	-	-	-	-	-	-	-
36	*Oryza sativa L.*	+	+	-	-	-	-	-	-	-
37	*Polypogon monspeliensis* (L.) Desf.	+	-	-	-	-	-	-	-	-
38	*Phragmites karka* (Retz) Trin.	-	-	+	-	-	-	-	-	-
39	*Pennisetum oriantale*	+	+	-	-	-	-	-	-	-
40	*Phalaris minor* Retz.	+	-	-	-	-	-	-	-	-
41	*Poa annua* Linn.	+	-	-	-	-	-	-	-	-
42	*Sorghum vulgare* (L.) Pers.	+	-	-	-	-	-	-	-	-
43	*Setaria vercillata* (L.)	-	+	-	-	-	-	-	-	-

44	*Saccharum bengalensis*	+	-	-	-	-	-	-	-	-
45	*Triticum aestivum* L.	+	+	-	-	-	-	-	-	-
46	*Zea mays* L.	+	-	-	-	-	-	-	-	-
					10. Typhaceae					
47	*Typha latifolia* L.	+	-	-	-	-	-	-	-	-
					Angiosperm					
					11. Acanthaceae					
48	*Dicleptera bupleuroides*	-	+	-	-	-	-	-	-	-
					12. Aizoaceae					
49	Zelays *petendra* (L.) C. Jeffery	-	-	-	-	-	-	-	-	-
50	*Trianthema portulacastrum* L.	+	-	-	-	-	-	-	-	-
					13. Amaranthaceae					
51	*Achyranthus aspera* L.	-	+	-	-	-	-	-	-	-
52	*Achyranthus dentatus*	-	+	-	-	-	-	-	-	-
53	*Amaranthus viridis* L.	+	+	-	+	-	-	-	-	-
54	*Aerva javanica* (Burn.f.) Juss	+	-	-	-	-	-	-	-	-
55	*Celosia cristata*	+	+	-	-	-	-	-	-	-
56	*Digera muricata*	+	-	-	-	-	-	-	-	-
					14. Anacardaceae					
57	*Mengifera indica*	+	+	+	-	+	-	-	-	-
					15. Apiaceae					
58	*Coriandrium sativum* L.	+	+	-	+	-	-	-	-	-
59	*Foeniculum valgare* Mill.	-	+	-	-	-	-	-	-	-
60	*Scandix pectinvenens*	-	+	-	-	-	-	-	-	-
					16. Apocyanaceae					
61	*Rhazya stratica* Decne.	-	+	+	-	-	-	-	-	-
					17. Asclepiadaceae					
62	*Caralluma tuberculata* N.E. Brown	+	+	-	+	-	-	-	-	-
63	*Calotropis procera* (Wild) R.Br.	-	-	-	-	-	-	-	-	-
64	*Calotropis Gigantea* L. R. Br.	-	-	-	-	-	-	-	-	-
65	*Periploca aphylla* Decne.	+	+	+	-	-	-	-	-	-

18. Asteraceae										
66	*Artemisia scoparaia.* Waldst & Kitam	+	+	-	-	-	-	-	-	-
67	*Carthamus oxycantha* Bieb	-	+	-	-	-	-	-	-	-
68	*Conyza bonariensis*	-	-	-	-	-	-	-	-	-
69	*Conyza canadensis* (L.) Cronquist	+	-	-	-	-	-	-	-	-
70	*Dendrathema indicum*	-	+	-	-	-	-	-	-	-
71	*Filago hunclwarica*	+	-	-	-	-	-	-	-	-
72	*Filago arenaria* (Smoljan.) Chrtek & Holub	+	-	-	-	-	-	-	-	-
73	*Helianthus annus* L.	+	+	-	-	-	-	-	-	-
74	*Iphiona scabra* DC.k	+	-	-	-	-	-	-	-	-
75	*Lactuca serriola* L.	+	+	-	+	-	-	-	-	-
76	*Lactuca sativa* L.	+	-	-	+	-	-	-	-	-
77	*Launaea procumbens* Roxb.	+	-	-	-	-	-	-	-	-
78	*Leaucaena nudicaulis* (L.) Hook.	+	-	-	-	-	-	-	-	-
79	*Pulicaria crispa* (Forssk.) Oliv.	-	-	-	-	-	-	-	-	-
80	*Parthenium hysterophous* L.	-	-	-	-	-	-	-	-	-
81	*Sonchus asper* (L.) Hill.	+	+	-	-	-	-	-	-	-
82	*Sonchus oleraceus*	+	+	-	-	-	-	-	-	-
83	*Saussurea heteromalla* (D.Don.)Hand	+	-	-	-	-	-	-	-	-
84	*Taraxacum officinale* Weber	+	-	-	-	-	-	-	-	-
85	*Xanthium strumarium* L.	-	-	-	-	-	-	-	-	-
19. Boraginaceae										
86	*Cordia maxia* Linn.	+	+	-	-	-	-	-	-	-
87	*Cynoglossum lanceolatum* Forssk	+	-	-	-	-	-	-	-	-
88	*Ehrctia obtusifolia*	+	-	-	-	-	-	-	-	-
89	*Heliotropium europaeum* L.	+	+	-	-	-	-	-	-	-
90	*Heliotropism elipticum* Ledeb.	+	+	-	-	-	-	-	-	-
20. Brassicaceae										
91	*Arabidoptis thaliana*	+	-	-	-	-	-	-	-	-
92	*Brassica rapa* L.	+	-	-	-	-	-	-	-	-
93	*Brassica olaraceae* L.	+	-	-	+	-	-	-	-	-

102	*Mentha longifolia* (L.)	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
103	*Morchella esculenta* Fries	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
104	*Oligomeris linifolia* (Vahl.) Macbride	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
105	*Oryza sativa* L.	-	-	+	-	-	-	+	+	+	+	-	-	+	+	-	-	
106	*Parthenium hysterophous* L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
107	*Papaver somniferum* L.	-	+	-	-	-	-	+	+	+	-	+	-	-	+	-	-	
108	*Peganum harmala* L.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
109	*Pennisetum oriantale* L.	-	+	-	-	-	-	+	+	+	-	+	-	-	+	-	-	
110	*Portulaca quadrifida* L.	-	+	-	-	-	-	-	-	-	+	+	-	-	+	-	-	
111	*Phalaris minor* Retz.	-	+	-	-	-	-	-	+	-	-	-	+	-	+	-	-	
112	*Phragmites karka* (Retz.) Trin.ex Steud.	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
113	*Plantago lanceolata* L.	-	+	-	-	-	-	-	-	+	-	-	-	+	+	-	-	
114	*Plantago major* L.	-	+	-	-	-	-	-	-	+	-	-	-	+	+	-	-	
115	*Polypogon monspeliensis* (L.) Desf.	-	+	-	-	-	-	+	-	-	-	-	-	+	-	+	-	
116	*Poa annua* L.	-	-	+	-	-	-	-	-	+	-	-	-	+	+	-	-	
117	*Poa infirma* H. B. K.	-	-	+	-	-	-	-	-	+	-	-	-	+	+	-	-	
118	*Polygonum plebejum* R.Br.	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

94	*Brassica campestris*	+	-	-	+	-	-	-	-	-
95	*Coronopus didymus* (L) Smith.	+	-	-	-	-	-	-	-	-
96	*Lepidium draba*	+	-	-	-	-	-	-	-	-
97	*Raphanus sativus* L.	+	+	-	+	-	-	-	-	-
98	*Sissymbrium irrio* L.	+	+	-	-	-	-	-	-	-
21. Buxaceae										
99	*Buxus wallichiana* Bail	+	-	-	-	-	-	-	-	-
22. Capparidiaceae										
100	*Capparis spinosa* L.	+	+	+	-	-	-	-	-	-
23. Cleomaceae										
101	*Cleome brachycarpa* Vahl ex DC.	-	-	-	-	-	-	-	-	-
24. Caryophyllaceae		-	+	-	-	-	-	-	-	-
102	*Saponaria vaccaria*	-	+	-	-	-	-	-	-	-
103	*Stellaria media* L. Vill	-	+	-	-	-	-	-	-	-
25. Cannabinaceae										
104	*Cannabis sativus* L.	-	+	-	-	-	-	-	-	-
26. Chenopodiaceae										
105	*Chenopodium album* L	+	+	-	+	-	-	-	-	-
106	*Chenopodium murale* L.	+	+	-	+	-	-	-	-	-
107	*Chenopodium nepalense* Colla	+	+	-	+	-	-	-	-	-
108	*Chenopodium ambrosioides* L.	+	+	-	+	-	-	-	-	-
109	*Suaeda fruticosa* Forssk. Ex J.F. Gmelin	+	+	-	-	-	-	-	-	-
27. Convolvulaceae										
110	*Convunvulus arvensis* L.	+	+	-	-	-	-	-	-	-
28. Cucurbitaceae										
111	*Cucumis sativus* Linn.	-	+	-	+	-	-	-	-	-
112	*Cacumis propheterum*	-	-	-	-	-	-	-	-	-
113	*Cucurbita pepo L.*	-	+	-	+	-	-	-	-	-
114	*Cucurbita maxima* Duchesne.	-	+	-	+	-	-	-	-	-
115	*Legenaria siceraria*	+	-	-	-	-	-	-	-	-
29. Cuscutaceae										

116	*Cuscuta reflexa* Roxb	-	+	-	-	-	-	-	-	-
30. Euphorbiaceae										
117	*Euphorbia hirta*	+	+	-	-	-	-	-	-	-
118	*Euphorbia helioscopia* L.	-	+	-	-	-	-	-	-	-
119	*Euphorbia prostrate* Ait.	+	+	-	-	-	-	-	-	-
120	*Echinops echinatus* D.C	+	-	-	-	-	-	-	-	-
121	*Ricinus communis* L.	-	+	-	-	-	-	-	-	-
31. Fumaraceae										
122	*Fumariai ndica* (Hausskn.) Pugsley	+	-	-	-	-	-	-	-	-
32. Lamiaceae										
123	*Salvia aegyptiaca* Wall	-	+	-	-	-	-	-	-	-
124	*Mentha longifolia*	-	+	-	+	-	-	-	-	-
125	*Mentha arvensis* L.	-	+	-	+	-	-	-	-	-
126	*Ocimum bascillicum* L.	-	+	-	-	-	-	-	-	-
33. Malvaceae										
127	*Abelmoschus esculentus* (L.)	-	-	-	+	-	-	-	-	-
128	*Hibiscus trionum*	-	+	-	-	-	-	-	-	-
129	*Malvastrum coromandelianum* (L.) Gareke.	+	+	+	-	-	-	-	-	-
34. Meliaceae										
130	*Melia azedarach L.*	-	+	+	-	-	-	-	-	-
35. Mimosaceae										
131	*Acacia nilotica* (L) Delice.	+	+	+	-	-	+	-	+	-
132	*Acacia modesta* Wall.	+	+	+	-	-	+	+	+	-
133	*Albizia lebbeck* (L.) Benth.	+	+	+	-	-	+	+	+	-
36. Moraceae										
134	*Ficus palmate*	+	+	+	-	+	-	-	-	-
135	*Morus alba* L.	+	+	+	-	+	-	-	-	-
136	*Morus nigra* L.	+	+	-	-	-	-	-	-	-
37. Myrtaceae										
137	*Eucalyptus globules* L.	+	+	+	-	-	+	-	-	-
138	*Eucalyptus lanceolatus*	+	+	+	-	-	+	-	-	-

139	*Syzygium cuminii* (L.) Skeels	+	+	-	-	-	-	-	-	-
	38. Musaceae									
140	*Musa paradisiaca L.*	+	+	-	-	+	-	-	-	-
39. Nyctaginaceae										
141	*Mirabilis jalapa L.*	-	-	-	-	-	-	-	-	-
	40. Papilionaceae									
142	*Astragalus psilocentros* Fisch.	+	+	+	-	-	-	-	-	-
143	*Cicer arietinum* L.	+	-	-	-	-	-	-	-	-
144	*Dalbergia sissoo Roxb.*	+	+	+	-	-	+	+	-	+
145	*Medicago laciniata* (L.) Mill.	+	-	-	-	-	-	-	-	-
146	*Melilotus longifolia (L.)*	-	+	-	-	-	-	-	-	-
147	*Melilotus indicus (L.) All.*	-	+	-	-	-	-	-	-	-
148	*Trigonella mcisa*	+	-	-	-	-	-	-	-	-
149	*Vicia sativa L.*	+	-	-	-	-	-	-	-	-
	41. Papaveraceae									
150	*Papaver somniferum*	-	+	-	-	-	-	-	-	-
	42. Plantaginaceae									
151	*Plantago lanceolata L.*	+	-	-	-	-	-	-	-	-
152	*Plantago minor L.*	+	-	-	-	-	-	-	-	-
	43. Portulacaaeae									
153	*Portulaca quardrifida L.*	+	+	-	-	-	-	-	-	-
	44. Polygonaceae									
154	*Calligonum polygonoides* L.	+	+	+	-	-	-	-	-	-
155	*Polygonum plebeium* R. Br	+	-	-	-	-	-	-	-	-
156	*Rumex dentatus* L.	+	+	-	-	-	-	-	-	-
157	*Rumex hastatus*	+	+	-	-	-	-	-	-	-
158	*Rumex vesicarius*	+	+	-	-	-	-	-	-	-
	45. Primulaceae									
159	*Anagallis arvensis*	+	-	-	+	-	-	-	-	-
	46. Punicaceae									
160	*Punica granatum L.*	+	+	+	-	+	-	-	-	-

47. Ranunculaceae										
161	*Ranunculus muricatus* L.	-	+	-	-	-	-	-	-	-
48. Resedaceae										
162	*Reseda odorata* L.	+	-	-	-	-	-	-	-	-
163	*Oligomeris linifolia* (Vahl.) Macbride	-	-	-	-	-	-	-	-	-
49. Rosaceae										
164	*Rosa indica* L.	+	+	-	-	-	-	-	-	-
50. Rhamnaceae										
165	*Zizyphus nummularia.* (Burm.f) *W.&A*	+	+	+	-	+	-	+	+	-
166	*Zizyphus oxyphylla* Edge.	+	+	+	-	+	+	+	+	+
167	*Zizyphus mauritiana*	+	+	+	-	+	+	+	+	+
51. Rubiaceae										
168	*Galium aparine*	-	+	-	-	-	-	-	-	-
169	*Galium tricorne*	-	+	-	-	-	-	-	-	-
52. Salvadoraceae										
170	*Salvadora oleoides* Decne.	+	+	-	-	-	-	-	-	-
53. Salicaceae										
171	*Populus alba* L	-	-	-	-	-	-	-	-	-
54. Sapindaceae										
172	*Dodonaea viscosa L.*	-	+	+	-	-	-	-	-	-
55. Sapotaceae										
173	*Monotheca buxifolia* (Falc.) A. DC.	+	-	-	-	-	-	-	-	-
56. Scrophulariaceae										
174	*Veronica aquatica* Bern	-	-	-	-	-	-	-	-	-
175	*Lindenbergia indica*	-	-	-	-	-	-	-	-	-
176	*Kickxia incana* (Wall) Penn.	-	+	-	-	-	-	-	-	-
57. Solanaceae										
177	*Capsicum annum* L.	-	+	-	+	-	-	-	-	-
178	*Datura alba* Nees	-	+	-	-	-	-	-	-	-
179	*Datura innoxia*	-	+	-	-	-	-	-	-	-
180	*Hyosyamus niger*	-	+	-	-	-	-	-	-	-

181	*Hyoscyamus squarrosus* Griffith.	-	-	-	-	-	-	-	-	-
182	*Hyosyamus insanus*	-	+	-	-	-	-	-	-	-
183	*Lycopersicom esculentum* Mill.	+	-	-	+	-	-	-	-	-
184	*Solanum surattense* Burm.f.	+	+	-	-	-	-	-	-	-
185	*Solanum melangena*	+	+	-	+	-	-	-	-	-
186	*Solanum tuberosum*	+	+	-	+	-	-	-	-	-
187	*Withania coagulans* Dunal.	-	+	-	-	-	-	-	-	-
188	*Withania somnifera* (L.) Dunal.	-	+	+	-	-	-	-	-	-
	58. Tamaricaceae									
189	*Tamarix aphylla* (L.) Karst.	+	+	+	-	-	+	+	-	+
	59. Thymelaceae									
190	*Thymelaea passerine*	-	-	-	-	-	-	-	-	-
	60. Verbenaceae									
191	*Verbena hybrida* Briq.	-	-	-	-	-	-	-	-	-
192	*Verbena officinalis*	-	-	-	-	-	-	-	-	-
193	*Vitex negundo* L.	+	+	-	-	-	-	-	-	-
194	*Phylla nodiflora* L. (Greene)	-	-	+	-	-	-	-	-	-
	61. Vitaceae									
195	*Vites vinifera* L.	+	+	-	-	+	-	-	-	-
	62. Zygophyllaceae									
196	*Fagonia cretica* L.	+	+	-	-	-	-	-	-	-
197	*Peganum harmala* L.	-	+	+	-	-	-	-	-	-
198	*Tribulus terrestris* L.	+	+	-	-	-	-	-	-	-
	Total	**128(64.6**	**108(55%)**	**30(15%**	**25(13%)**	**10(5%)**	**10(5%)**	**8(4%)**	**7(3.5%)**	**4(2%)**

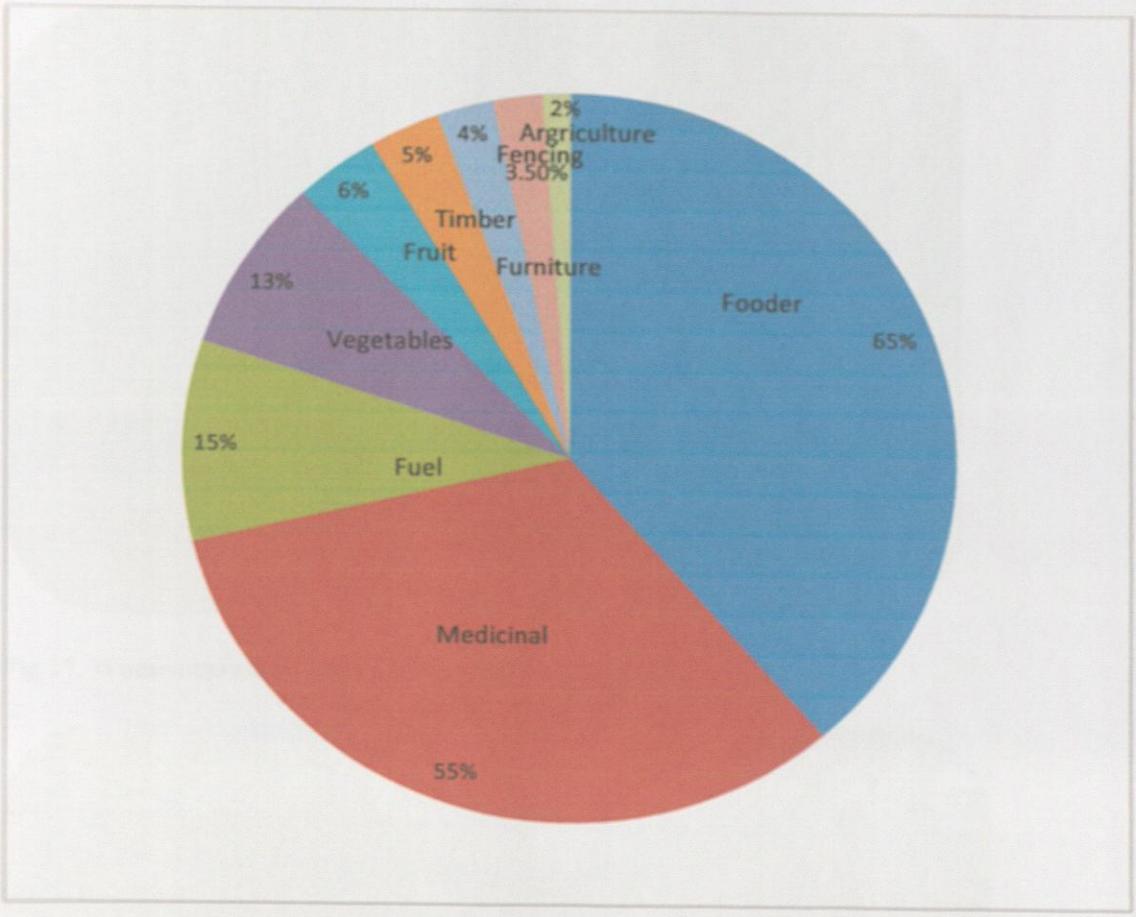


Fig 16. Graphical representation of ethnobotanical profile of Darazinda Vegetation



Fig 17. Women carring wood for fuel purpose on donkey



Fig 18. Storage of wood for fuel purpose

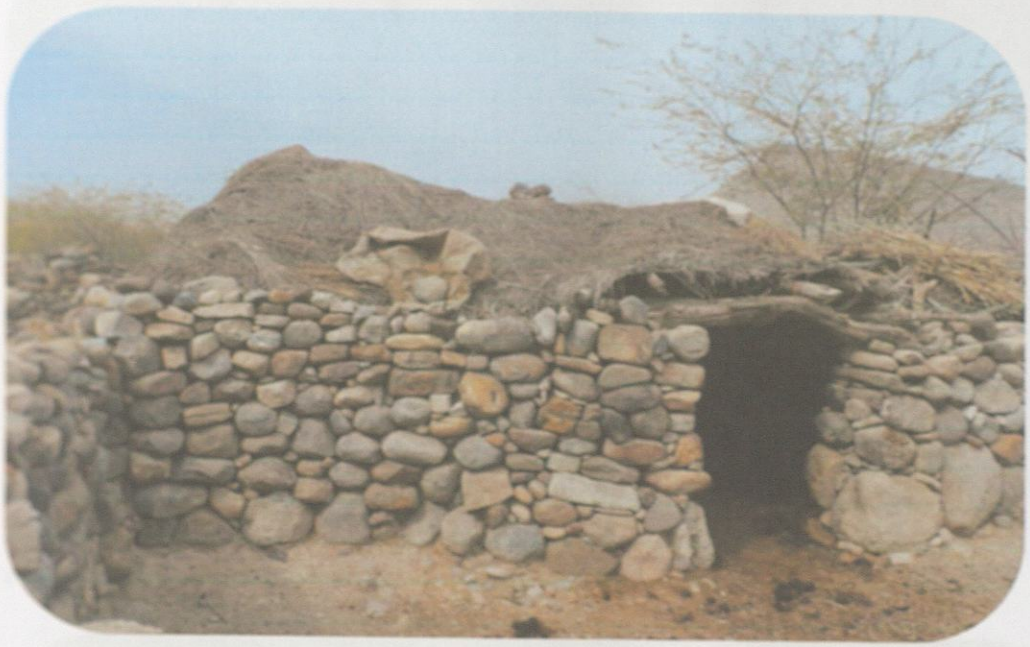


Fig 19. Wood used as timber



Fig 20. Wood used for cooking cobs



Fig 21. Boys caring *Olea ferruginea* plants for fodder and fuel puposes



Fig 22. Bird's nest in plant (Habitat for local birds)



Fig 23. *Caralluma tuberculata*



Fig 24. *Iphiona scabra*



Fig 25. *Cistanche tubulosa*

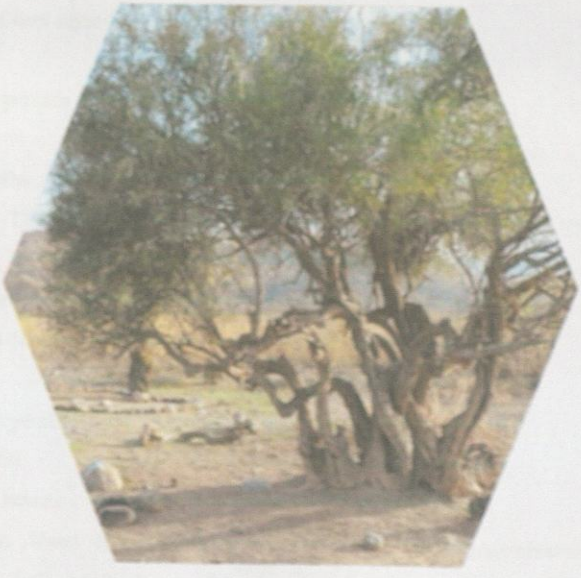


Fig 26. *Salvadora oleoide*

Medicinal Plants:

A. PTERIDOPHYTES

1. Family : Adiantaceae

1. **Botanical Name:** *Adiantum capillusveneris* L.

Local Name: Simbal

Habit: Perennial herb

Habitat: Moist and shady places

Part used: The fronds (petiole and leaflets)

Ethnobotanical uses: The plant was used as expectorant, demulcent, diuretic, febrifuge as well as hair tonic and for sore throat. Women also used its fronds for washing utensils.

2. Family : Equisetaceae

2. **Botanical Name:** *Eqiusetum arvense* L.

Local Name: Obo botai

Habit: Moist places

Part used: Shoot

Ethnobotanical uses: The juices extract from shoot was used as antilice, anti-acidic, tonic, diuretic and also used for expelleing kidney stones.

C. Angiosperms (Monocotyledon)

3. Family: Alliaceae

3. **Botanical Name:** *Allium cepa* L.

Local Name: Piaz

Habit: A cultivated vegetable

Habitat: Cultivated

Part used: Leaves, Bulbs

Ethnobotanical uses: The bulbs are used in salads, spices and condiments. The bulbs also used as stimulant, flavoring agent, antiseptic, its juice is applied to soothe the irritation caused by scorpion bite. The leaves are used as an expectorant and diuretic.

4. **Botanical Name:** *Allium sativum* L.

Local Name: Ooza

Habit: A cultivated vegetable

Habitat: Cultivated soil

Part used: Bulbs and leaves

Ethnobotanical uses: Used in cooking as a flavoring agent, carminative, aromatic, condiment as well as in heart diseases, for hypertension, diuretic, diaphoretic, expectorant and antiseptic. A decoction prepared is effective in flatulence, hysteria, asthma and whooping cough and also effective in epilepsy.

4. Family: Cyperaceae

5. **Botanical Name:** *Cyperus rotundus* L.

Local Name: Della

Habit: Herb

Habitat: Cultivated field

Part used: Rhizome

Ethnobotanical uses: The rhizome used for the treatment of vomiting, irregular menstruation and diarrhea. It is also used as stimulant diuretic and anthelmintic.

5. Family: Liliaceae

6. Botanical Name: *Asparagus officinalis* L.

Local Name: Tandorai

Habit: Perennial herb

Habitat: Dry places

Part used: Young shoots and tubers

Ethnobotanical uses: The plant used as a demulcent and tonic locally. Tuber mixed with milk and sugar is used for dysentery and diarrhea.

6. Family: Poaceae

7. Botanical Name: *Cynodon dactylon* (L.) Pers.

Local Name: Aam washa

Habit: Rhizomatic prostrate herb

Habitat: Lawns and waste places

Part used: Whole plant

Ethnobotanical uses: The plant used as diuretic, astringent and tonic, also useful in skin diseases, burning sensation, leprosy, as refrigerant and dysentery. Locally women used to wash utensils and used as a fresh fodder.

8. Botanical Name: *Cymbopogon jwarancusa* (Jones) Schult.

Local Name: Sargaray

Habit: Perennial herb (Grass)

Habitat: Dry soil

Part used: Whole plant

Ethnobotanical uses: It is used as stimulant, carminative, in cholera, intermittent fever and for curing cough. It is also used as hey fodder.

9. Botanical Name: *Avena fatua* L.

Local Name: Jawdar

Habit: Annual weed of cereal crops

Habitat: Cultivated wheat field

Part used: Whole plant, seeds

Ethnobotanical uses: The seeds used as refrigerant, emollient and diuretic, it is used as fresh and dry fodder.

10. Botanical Name: *Hordeum vulgare* L.

Local Name: Verbashy

Habit: Annual herb

Habitat: Cultivated field

Part used: Whole plant, grains

Ethnobotanical uses: The grains are used refrigerant, digestive, astringent, diuretic, tonic, gastropathy, fever and asthma. The shoot is used as fodder both in fresh and dry form.

DICOTYLEDON

7. Family: Amaranthaceae

11. Botanical Name: *Achyranthes aspera* L.

Local Name: Gheshai

Habit: Perennial herb

Habitat: Waste land

Part used: Whole plant

Ethnobotanical uses: The decoction of leaves and roots of this plant is used for toothache and for curing abdominal pain, as diuretic, astringent and to reduce appetite. The seeds and leaves of this plant are emetic, used in hydrophobia and snake bites, as laxative, stomachic for piles. The juice of the leaves is used in dysentery. The macerated roots in water are applied to relieve pain of scorpion's sting, cough, asthma and internal organs inflammation. It is also used as a fodder in fresh form.

12. Botanical Name: *Achyranthes bispentata* Blume.

Local Name: Spay butay

Habit: Herb

Habitat: Stony places

Part used: Whole plant

Ethnobotanical uses: The plant is used as antirheumatic, purgative, diuretic and roots are used as expectorant, analgesic, antipyretic and antispasmodic. The plant is also used as vegetable and fodder in fresh form.

13. Botanical Name: *Amaranthus spinosus* L.

Local Name: Khuryassa

Habit: Herb

Habitat: Waste land.

Part used: Whole plant

Ethnobotanical uses: Locally it is used as a fodder for cattle and vegetable. Medicinally this plant is used for piles, colic, snakebites, expectorant and diuretic. The root is used to cure rheumatism.

8. Family: Apiaceae (Umbelliferae).

14. Botanical Name: *Foeniculum vulgare* Mill.

Local Name: Saunf

Habit: Herb

Habitat: Cultivated field

Part used: Fruit, leaves, seeds

Ethnobotanical uses: The plant is used as stimulant, carminative, leaves are used as a diuretic and digestive, seeds are used as laxative and aphrodisiac; fruit juice is used to improve eyesight.

15. Botanical Name: *Coriandrum sativum* L.

Local Name: Darhya

Habit: Annual herb

Habitat: Cultivated field

Part used: Leaves, fruit

Ethnobotanical uses: Locally used as carminative, aromatic agent, tonic, diuretic, stomachic, stimulant, digestive and fragrance. The leaves used as vegetable and salad. Fruit decoction is given in colic.

9. Family: Apocynacae

16. Botanical Name: *Nerium indicum* Mill.

Local Name: Gandirai

Habit: Large shrub

Habitat: Along dry water cources

Part used: Root, bark, leaves

Ethnobotanical uses: The root is used as diuretic, anti-inflammatory and anthelmintic. Root powder is rubbed to the head in headache; paste of the root, root-bark and leaves is used for curing ringworms and other skin diseases. Leaves decoction is applied externally to reduce swellings.

9. Family: Asclepiadaceae

17. Botanical Name: *Calotropis procera* (Willd.) R. Br.

Local Name: Spulmay

Habit: Shrub

Habitat: Dry and exposed places

Part used: Whole plant

Ethnobotanical uses: Crushed plant parts are mixsed with raw sugar to make a paste, which is applied to dog bites. The milky juice is used for different skin diseases. Flowers powdered are used in cold cough. The root bark is used in dysentery, as expectorant and diaphoretic. This plant is a poisonous plant.

18. Botanical Name: *Periploca aphylla* Dcne.

Local Name: Barrara

Habit: Branched shrub

Habitat: Rocky places

Part used: Milky latex, branches

Ethnobotanical uses: Used as antiseptic and purgative. The dried plant is used as fuel.

11. Family: Asteraceae (Compositae)

19. Botanical Name: *Artemisia scoparia* Waldst & Kit.

Local Name: Jaukay

Habit: Herb

Habitat: Dry places

Part used: Shoot, leaves, seeds

Ethnobotanical uses: The plant is used as purgative, respiratory stimulant and anthelmintic.

20. Botanical Name: *Conyza canadensis* (L.) Corgn.

Local Name: Malochai

Habit: Herb

Habitat: Moist waste places

Part used: Vegetative parts

Ethnobotanical uses: The plant is used as diuretic, stimulant, astringent, anti diarrhea and anti dysenteric. Used by cattle as fresh fodder.

21. Botanical Name: *Sonchus asper* (L.) Hill.

Local Name: Shauda pai botai

Habit: Herb

Habitat: Moist waste places

Part used: Young shoots, flowers

Ethnobotanical uses: The decoction of plant is used as diuretic and tonic, curing of jaundice and constipation. In fresh form this plant is used as fodder.

22. Botanical Name: *Carthamus oxyacantha* M. B.

Local Name: Kareza

Habit: Under shrub

Habitat: In cultivated wheat field

Part used: Whole plant

Ethnobotanical uses: Young plant is used as fodder. Oil extracted from the seeds is used as diaphoretic laxative and for ulcer curing. Medicinally the seeds are used to reduce excretion urination and stomach pain.

23. Botanical Name: *Xanthium strumarium* L.

Local Name: Ghishkai

Habit: Shrub

Habitat: Humus rich soil

Part used: Whole plant

Ethnobotanical uses: The root powder is used as tonic and to treat cancer. Fruit is used as diuretic, refrigerant, demulcent and for smallpox treatment. Decoction of leaf is recommended for long standing malarial fever. This plant is used in fresh form as fodder and in dry form used as a fuel.

24. Botanical Name: *Taraxacum officinale* Weber.

Local Name: Ziar gulai

Habit: Herb

Habitat: Waste places

Part used: Root stock, leaves

Ethnobotanical uses: The root used as diuretic, mild laxative, bitter tonic, stimulant, for kidney and liver disorders. The young leaves are used as vegetable. The plant is used as a fodder.

12. Family: Boraginaceae

25. Botanical Name: *Cynoglossum lanceolatum* Forssk.

Local Name: Pachy

Habit: Herb

Part used: Leaves, branches

Ethnobotanical uses: This plant is used as anti-inflammatory, demulcent and narcotic, also used as fodder

13. Family: Brassicaceae (Cruciferae)

26. Botanical Name: *Brassica campestris* L.

Local Name: Sharshum

Habit: Cultivated vegetable and oil seed crop

Habitat: Cultivated soil

Part used: Leaves, flowering tops, seeds

Ethnobotanical uses: The flowering tops and leaves are used as vegetable and green fodder. Oil extracted from seeds is used for cooking and hair massage. Seeds cakes are used as fodder called "Kahl".

27. Botanical Name: *Brassica rapa* L.

Local Name: Tipar

Habit: A cultivated vegetable

Habitat: Cultivated soil

Part used: Roots, leaves

Ethnobotanical uses: Locally the leaves and root are used as vegetable.

28. Botanical Name: *Raphanus sativus* L.

Local Name: Moolai

Habit: Herb

Habitat: Cultivated soil

Part used: Tuberous roots, young leaves

Ethnobotanical uses: Locally this plant is used as vegetable and salad.

29. Botanical Name: *Sisymbrium irio* L.

Local Name: Oorai

Habit: Herb

Habitat: Dry, cultivated soil.

Part used: Seeds and shoot

Ethnobotanical uses: The decoction of seeds is used to treat flatulence in livestock. The seeds are also used in preparation of pickles and shoot used is as a fodder.

14. Family: Cannabaceae

30. Botanical Name: *Cannabis sativa* L.

Local Name: Bhung botai

Habit: Wild harbaceous

Habitat: Humus rich waste places

Part used: Leaves, inflorescence tops

Ethnobotanical uses: Leaves Juice mixed with sugar, milk, crushed with almonds, opium seeds, walnuts to make a solution which is used as anti spasmodic, refrigerant and narcotic. Leaves of plant are used to prepare a narcotic drug called "Chars". Dry plants used by some people for burning purposes.

15. Family: Chenopodiaceae

31. Botanical name: *Chenopodium album* L.

Local Name: sag botai

Habit: Herb

Habitat: Waste places

Part used: Whole plant

Ethnobotanical uses: This plant is used as anthelmintic, laxative, diuretic and blood purifier. The seeds and roots are used as purgatives. The roots are very effective for rheumatism, jaundice and urinary diseases. Roots and fruits are used as antidotes for snake poison. The local people used the plant as a vegetable, pot herb and fodder for cattle.

32. Botanical Name: *Chenopodium ambrosioides* L.

Local Name: zangali sag

Habit: Herb

Habitat: Waste places

Part used: Whole plant

Ethnobotanical uses: Plant used as anthelmintic, the volatile oil of the plant is used as carminative, antispasmodic and stimulant.

33. Botanical Name: *Chenopodum murale* L.

Local Name: washa

Habit: Herb

Habitat: In cultivated field

Part used: Whole plant

Ethnobotanical uses: Pot herb and fresh fodder.

34. Botanical Name: *Suaeda fruticosa* Forssk. Ex J.F. Gmelin

Local Name: Zamai

Habit: Herb

Habitat: Dry, wild places

Part used: Whole plant

Ethnobotanical uses: Locally powdered plant is used as anti-lice. This plant is also used for washing clothes.

16. Family: Convolvulaceae

35. Botanical Name: *Convolvulus arvensis* L.

Local Name: Pirwathay

Habit: Herb

Habitat: Cultivated field

Part used: Roots, Shoots

Ethnobotanical uses: Root is used as laxative and purgative. The extract juice of this plant is used as anti-dandruff and also for skin diseases, also used as fodder.

17. Family: Cucurbitaceae

36. Botanical Name: *Cucumis sativus* L.

Local Name: Badrung

Habit: Climbing herb

Habitat: Maize fields and Gardens

Part used: Fruits

Ethnobotanical uses: The fruit of this plant is used as salad and refrigerant.

37. Botanical Name: *Cucurbita maxima* Duch. ex Lamb.

Local Name: Painta Kadoo

Habit: Prostrate and climbing herb

Habitat: Cultivated soil

Part used: Young shoots, leaves, flowers, fruits, seeds

Ethnobotanical uses: The young shoots, leaves and flowers are used as vegetable called "Sag", used to cure stomach disorders. The seeds of this plant used as anthelmintic. The fruits also used in pudding preparation called "Kadoo halva".

38. Botanical Name: *Luffa cylindrica* (L.) Roem.

Local Name: Torai

Habit: Climbing herb

Habitat: Cultivated

Part used: Fruits

Ethnobotanical uses: The local people cultivate this plant for its fruit as vegetable. It is refrigerant, good for stomach and ulcer problems. The dried fruit used for washing utensils called "Shora".

18. Family: Cuscutaceae

39. Botanical Name: *Cuscuta reflexa* Roxb.

Local Name: Ziara Zeelai

Habit: Parasitic herb

Habitat: Parasite on other plants

Part used: Shoots

Ethnobotanical uses: The fresh shoots are collected, crushed and extracted juice is used for blood purification, also used as diuretic, anthelmintic, anti-diabetes, jaundice and anti-emetic.

19. Family: Euphorbiaceae

40. Botanical Name: *Euphorbia hirta* L.

Local Name: Skha butay

Habit: Herb

Habitat: Waste land

Part used: Whole plant

Ethnobotanical uses: Paste is prepared and applied on external wounds in the form of poultice. A decoction of shoot is used as expectorant and for curing respiratory tract diseases.

41. Botanical Name: *Euphorbia helioscopia* L.

Local Name: Parparai

Habit: Herb

Habitat: Cultivated field, waste places

Part used: Roots, shoots, seeds

Ethnobotanical uses: Roots of this plant is used as anthelmintic, shoots for constipations, seeds for curing cholera.

42. Botanical Name: *Ricinus communis* L.

Local Name: Randan

Habit: A perennial herbaceous shrub

Habitat: Waste places

Part used: Leaves, seeds, oil, barks, roots

Ethnobotanical uses: Bark used for healing wounds and sores. Medicinally root is used for sciatica and rheumatism. The root bark used as a purgative and leaves as narcotic and emetic, a paste of leaves is used for swelling. Oil of fruit is given to children and cattle in constipation; it is used also as purgative and lubricant. The seeds are poisonous.

20. Family: Fumariaceae

43. Botanical Name: *Fumaria indica* (Hausskn.) H.N. Pugsley

Local Name: Shatara botai

Habit: Herb

Habitat: Cultivated wheat field

Part used: Shoots

Ethnobotanical uses: Extracts of shoots and leaves are used as blood purifier, diaphoretic, refrigerant, antipyretic, malarial treatment, for whooping cough and sore throat. It is also used as fodder for cattle.

21. Family: Lamiaceae

44. Botanical Name: *Mentha arvensis* L.

Local Name: Pudina

Habit: Herb

Habitat: Moist places

Part used: Leaves

Ethnobotanical uses: The green and dried leaves used as refrigerant, antispasmodic, stimulant, aromatic and diuretic. The decoction prepared from leaves and lemon grass is used as febrifuge in fever.

45. Botanical Name: *Mentha longifolia* (L.) Huds.

Local Name: Venalay

Habit: Herb

Habitat: Moist places, paddies field

Part used: Leaves

Ethnobotanical uses: This plant is used as carminative, antiseptic and stimulant. Shoot decoction is used in fever. The leaves are used in rheumatic pains and leaves decoction is given to children for curing emosis, also used as carminative in gas trouble eaten in the form of chutney. The pregnant women mixed the dried leaves mixed with green tea for the treatment of vomiting.

46. Botanical Name: *Ocimum basilicum* L.

Local Name: Babrai

Habit: Herb

Habitat: Gardens, pots

Part used: Whole plant

Ethnobotanical uses: Locally this plant is grown as ornamental and used as flavoring agent for confectionary baked goods, pickles and meats. It is used as for insect repellent, anthelmintic, carminative and stimulant. Juice of leaves is used to expel ringworms. Seed are used as diuretic, demulcent and cure piles.

22. Family: Malvaceae

47. Botanical Name: *Abelmoschus esculentus* (L.) Moench

Local Name: Bhindai

Habit: Under shrub

Habitat: Cultivated vegetable

Part used: Fruits, stem

Ethnobotanical uses: This plant is cultivated, fruits used as vegetable extensively. It is demulcent and diuretic.

48. Botanical Name: *Malva sylvestris* L.

Local Name: Panerak sag

Habit: Herb

Habitat: Humus rich soil

Part used: Leaves

Ethnobotanical uses: Used as pot herb. Decoction of leaf is used as antispasmodic.

23. Family: Meliaceae

49. Botanical Name: *Melia azedarach* L.

Local Name: Bikyara

Habit: A medium sized wild/cultivated tree.

Habitat: Dry soil

Part used: Whole plant

Ethnobotanical uses: Bark of this plant is used as emetic, cathartic and vermifuge. The fruit is used as sexual tonic and anthelmintic. The leaf decoction is used for curing hysteria and skin diseases. The extract of leaf and fruit are used to cure night blindness, liver complaints, vomiting in fever and anthelmintic. The leaves are used as fodder for goats and sheep. The stem and branches are used for making roofs.

24. Family: Mimosaceae

50. Botanical Name: *Acacia modesta* Wall.

Local Name: Palosa

Habit: Tree

Habitat: Dry, rocky places

Part used: Whole plant

Ethnobotanical uses: The gum is used for as demulcent, tonic and anti-dysenteric. Wood is used as fuel and for making agricultural tools while branches are used for hedge. The young shoots are used as fodder for goats, sheep and camel.

51. Botanical Name: *Acacia nilotica* (L.) Delile

Local Name: Kikar

Habit: Medium sized tree

Habitat: Dry soil

Part used: Whole plant

Ethnobotanical uses: The bark is astringent and used as tonic and for backache. The extract of bark (boiled in water) is used for toothache and septic gums. Pods are used as expectorant. The branches are also used in making walking sticks.

52. Botanical Name: *Albizia lebbeck* (L.) Bth.

Local Name: Sreen

Habit: Tree

Habitat: Open places

Part used: Stem, flowers, bark, seeds

Ethnobotanical uses: The bark and seeds are used as astringent, for piles, dysentery and diarrhea. Flowers are used in swellings and skin diseases. The stem and branches are also used as fodder and as fuel wood.

25. Family: Moraceae

53. Botanical Name: *Ficus palmata* Forssk.

Local Name: Inzarai

Habit: Medium sized tree

Habitat: Dry places

Part used: Fruit, wood, leaves

Ethnobotanical uses: The fruits are edible, medicinally used as laxative, demulcent and tonic. The leaves used as fodder and the wood as fuel.

54. Botanical Name: *Morus alba* L.

Local Name: Spin Toot

Habit: Tree

Habitat: Open, sunny places.

Part used: Stem, leaves, branches, fruits, bark

Ethnobotanical uses: The fruits are used medicinally as laxative and purgative. The leaves are astringent and anthelmintic. The bark is used vermifuge and diaphoretic. The leaves are also as fresh fodder for goats and sheep. Wood is used as timber, fire wood and for making furniture.

55. Botanical Name: *Morus nigra* L.

Local Name: Toor toot

Habit: Tree

Habitat: Open, sunny places.

Part used: Fruits, wood, leaves

Ethnobotanical uses: The fruits are edible, medicinally used as laxative and refrigerant, for curing cough and sore throat. The leaves used as fodder for cattle and wood used as timber and making furniture.

26. Family: Myrtaceae

56. Botanical Name: *Eucalyptus globulus* Labill.

Local Name: Lachai

Habit: Cultivated tree

Habitat: Dry, rocky soil and water logged soil

Part used: Leaves, stems

Ethnobotanical uses: The leaves are medicinally used as antiseptic, as mouthwash to relieve toothache and are also used as mosquitoes repellent. The wood is used for furniture making, while the stem and branches used for thatching roofs and also as fuel.

27. Family: Oleaceae

57. Botanical Name: *Olea ferruginea* Royle

Local Name: Zaitun

Habit: Evergreen tree

Habitat: Dry places, specifically in graveyards.

Part used: Stems, leaves, fruits

Ethnobotanical uses: The fruits are used as antidiabetic and refrigerant. The extract of leaves is used for common colds, soar throat, antiseptic, diuretic and as a tonic. Oil extracted from seeds is also used as laxative and emollient. The branches and leaves are also used as fodder for goats and sheep. The branches used for making walking sticks, agricultural implements, birds cages and handles.

28. Family: Papaveraceae

58. Botanical Name: *Papaver somniferum* L.

Local Name: Khash Khash, Afun

Habit: A tall herb

Habitat: Cultivated

Part used: Latex, seeds, capsules

Ethnobotanical uses: The dry latex of (opium) is used for bronchitis, relieve toothache, cure vomiting and cough, sedative narcotic, in diarrhea and dysentery. Seeds are used as demulcent, nutritive and in confectionary.

29. Family: Papilionaceae

59. Botanical Name: *Dalbergia sissoo* Roxb.

Local Name: Sawa

Habit: Tree

Habitat: Cultivated field's borders, road side

Part used: Whole plant

Ethnobotanical uses: The decoction of leaves is used as stimulant and in acute stage of gonorrhea. The bark and leaves are used as astringent, refrigerant and in bleeding piles. The green leaves are used as fodder for cattle. The wood is used for making sports goods, furniture, agricultural implements, doors, cupboards, windows and tables. The wood branches is also used as fuel wood.

60. Botanical Name: *Melilotus officinalis* (L.) Desr.

Local Name: Lewanay sag

Habit: Herb

Habitat: Cultivated fields

Part used: Green leaves, flowering tops

Ethnobotanical uses: The plant is used as anticoagulant.

30. Family: Plantaginaceae

61. Botanical Name: *Plantago lanceolata* L.

Local Name: Ghwa Jabai

Habit: Herb

Habitat: River bank

Part used: Leaves, seeds

Ethnobotanical uses: Extract of leaves is used for sore throat and curing of wounds. The seeds are used as laxative, dysentery and for mouth ulcers.

31. Family: Polygonaceae

62. Botanical Name: *Rumex dentatus* L.

Local Name: Shalkhay

Habit: Herb

Habitat: Humus rich, moist places

Part used: Leaves

Ethnobotanical uses: The plant is a pot herb used as demulcent and diuretic. The leaves used for washing utensils also grazed by cattle as fodder.

32. Family: Portulaceae

63. Botanical Name: *Portulaca oleracea* L.

Local Name: Khaporay sag

Habit: Herb

Habitat: Maize field

Part used: Shoot, leaves

Ethnobotanical uses: Medicinally this plant is used as refrigerant and for kidney, liver, urinary bladder problems. The young fresh shoots and leaves are used as vegetable and cattle grazed as fodder.

33. Family: Punicaceae

64. Botanical Name: *Punica granatum* L.

Local Name: Anar

Habit: Small tree

Habitat: Rocky soil

Part used: Fruit, rind of fruit, bark, leaves

Ethnobotanical uses: The juice of fruit is used as refrigerant, the pulp useful in cardiac and stomachic problems. The pericarp of fruit is used for whooping cough. Locally the dried seeds called "Tarvi" is used as flavoring agent and in spices. The extracts of fresh leaves are used in dysentery and skin diseases. Bark is used as expectorant, anthelmintic and as mouth washes. Fruit rind grinds into powder mixed with sugar and used for diarrhea and dysentery. Leaves are used as fodder for cattle. The plant is also used as a fuel wood.

34. Family: Ranunculaceae

65. Botanical Name: *Ranunculus muricatus* L.

Local Name: Ziar gulay

Habit: Herb

Habitat: River/ stream bank

Part used: Whole plant

Ethnobotanical uses: Plant decoction is used for asthma, fever and as purgative.

35. Family: Rhamnaceae

66. Botanical Name: *Ziziphus mauritiana* Lam.

Local Name: Bera

Habit: Small tree

Habitat: Dry places

Part used: Whole plant

Ethnobotanical uses: The bark is used to cure diarrhea. Dried leaves are burnt and smoke inhaled to cure coughs and colds. Leaves are used to cure diabetes. Roots powder is used as poultice wounds, ulcers and in fever. Fruit used for purification of blood and as carminative. The wood is used as fuel and leaves are used as fodder.

67. Botanical Name: *Ziziphus numularia* (Burm. f.) Wight

Local Name: Karkara

Habit: Shrub

Habitat: Dry places

Part used: Whole plant

Ethnobotanical uses: The fruits are edible, which are used as refrigerant and astringent. Paste of leaves applied on boils and scabies externally. The branches used as fodder and wood for burning.

36. **Family: Rosaceae**

68. **Name:** *Rosa indica* L.

Local Name: Sur Gulab

Habit: Climbing to prostrate shrub

Habitat: River bank

Part used: Flowers, branches

Ethnobotanical uses: The flowers are used to cure piles and as refrigerant. The leaves and twigs grazed by cattle as fodder. The plants cultivated for ornamental purposes.

37. **Family: Rubinciaceae**

69. **Botanical Name:** *Cistanche tubulosa* (Schrenk) Hook. F.

Local Name: Khar ghar

Habit: Parasitic herb

Habitat: Marshy places

Part used: Whole plant

Ethnobotanical uses: Locally this plant is dried and used to cure infertility.

38. **Family: Rutaceae**

70. **Botanical Name:** *Citrus sinensis* (L.) Osbeck

Local Name: Malta

Habit: Small tree

Habitat: Cultivated in Gardens

Part used: Fruits, wood

Ethnobotanical uses: The fruits are edible, rich in vitamin-C. The fruit's pericarp used to control vomiting. This plant used as a fuel-wood

39. **Family: Salvadoraceae**

71. **Botanical name:** *Salvadora oleoides* Decne.

Local Name: Pleman

Habit: Shrub

Habitat: Dry

Part used: Whole plant

Ethnobotanical uses: Locally branches and roots are used as a maswak for cleaning teeth. Leaves are used medicinally for relieving pain of pregnant women during delivery.

40. **Family: Sapindaceae**

72. **Botanical Name:** *Dodonaea viscosa* (L.) Jacq.

Local Name: Ghoraskai

Habit: Shrub

Habitat: Dry, sunny places

Part used: Whole plant

Ethnobotanical uses: Leaves of this plant are used in burns, swellings, wounds washing and also chewed as stimulant. The bark is used as astringent. The plant is used as a fuel, in roofs making, wood also used for making walking sticks and tool handles. It is also cultivated as hedge in lawns.

41. Family: Sapotaceae

73. Botanical Name: *Monotheca buxifolia* (Falc.) A. DC.

Local Name: Gurgura

Habit: Medium sized spiny tree

Habitat: Dry, exposed, sunny places

Part used: Whole plant

Ethnobotanical uses: Fruits are edible, astringent, refrigerant and also to improve digestion. The plant grazed by goats as a fodder, wood is used as fuel and as hedge plant.

42. Family: Solanaceae

74. Botanical Name: *Capsicum annum* L.

Local Name: Sheen marchakai

Habit: Herb

Habitat: Cultivated

Part used: Fruits

Ethnobotanical uses: Fruits used as condiment spike, flavoring agent and as salads. Medicinally this plant is also used as stimulant and against common cold.

75. Botanical Name: *Datura stramonium* L.

Local Name: Randa wana

Habit: Herb

Habitat: Waste places

Part used: Dried leaves, seeds

Ethnobotanical uses: The plant is used for softening the boil. Leaves are used for narcotic and antispasmodic purposes. Seeds are used for narcotic action, as astringent, bowels complaint, fever and also for skin diseases.

76. Botanical Name: *Solanum surattense* Burm. F.

Local Name: Aghazai

Habit: Spiny prostrate herb

Habitat: Waste places

Part used: Whole plant

Ethnobotanical uses: Medicinally this plant is used as anti-asthmatic, expectorant, diuretic and carminative. The berries (fruits) are used for curing toothache.

77. Botanical Name: *Withania somnifera* (L.) Dunal

Local Name: Karghwaza

Habit: Shrub

Habitat: Dry places

Part used: Roots, leaves, fruits

Ethnobotanical uses: Leaves and roots of this plant are used as narcotics and for joints pain. The fruits are used as diuretic.

78. Botanical Name: *Withania coagulans* Dunal.

Local Name: Khamazora

Habitat: Dry places

Part used: dried fruits

Ethnobotanical uses: Locally a spoon of dried fruits is used to cure stomache. Two or three seeds are used for gastric trouble treatment.

43. Family: Tamaricaceae

79. Botanical Name: *Tamarix aphylla* (L.) Karst.

Local Name: Ghaz

Habit: Tree

Habitat: Dry

Part used: Leaves and young branches

Ethnobotanical uses: Decoction and infusion is used externally for curing wounds and relieving swelling. Also used as an antiseptic.

44. Family: Verbenaceae

80. Botanical Name: *Verbena officinalis* L.

Local Name: Shomakai

Habit: Herb

Habitat: Moist rocks

Part used: Roots, leaves

Ethnobotanical uses: Roots of this plant are used for curing scorpion stings and snake bites curing, while leaves as tonic and febrifuge.

81. Botanical Name: *Vitex negundo* L.

Local Name: Marmandai

Habit: Shrub

Habitat: Graveyards

Part used: Whole plant

Ethnobotanical uses: The fresh leaves are used as bandage to remove chest and back pains. The leaves are vermifuge, aromatic, diuretic and astringent. Fresh leaf juice is used to treat ulcers. Dry branches of this plant are used as fuel.

45. Family: Vitaceae

82. Botanical Name: *Vitis vinifera* L.

Local Name: Angur

Habit: Climber, Shrub

Habitat: Climber

Part used: Whole plant

Ethnobotanical uses: The leaves are used to cure mouth sores. Roots induce milk secretion in feeding mother. The fruits are used as diuretic, curing small pox and as tonic.

46. Family: Zygophylaceae

83. Botanical Name: *Tribulus terrestris* L.

Local Name: Markondai

Habit: Herb

Habitat: Waste dry land

Part used: Roots, fruits, leaf

Ethnobotanical uses: The roots and fruits are used for urinary disorders, as aphrodisiac and the fruits with seeds used for curing impotence, diabetes and as antianthelmintic (vermicides). Used as a fodder.

84. Botanical Name: *Fagonia cretica* L.

Local Name: Giz Aghazai

Habit: Herb

Part used: Whole plant

Ethnobotanical uses: Local hakims use this plant for curing gastric and abdominal troubles. Also used as wormicidal (Table 17; Fig 27).

1	*Abelmoschus esculentus* (L.) Moench	Bhindai	Fruit	It is demulcent and diuretic.
2	*Acacia modesta* Wall.	Palosa	Gum	The gum is used as curing demulcent, tonic and anti dysentery.
3	*Acacia nilotica* (L.) Delile	Kikar	Bark, fruit	The bark is astringent and used as tonic and for backache. The extract of bark (boiled in water) is used for toothache and septic gums. Pods are used as expectorant.
4	*Adiantum capillus-veneris* L.	Simbal	Fronds	The plant was used as expectorant, demulcent, diuretic, febrifuge as well as hair tonic and for sore throat.
5	*Albizia lebbeck* (L.) Bth.	Sreen	flowers, bark and seeds	The bark and seeds are used as astringent, for piles, dysentery and diarrhea. Flowers are used in swellings and skin diseases.
6	*Allium cepa* L.	Piaz	Leaves, bulbs	The bulbs are used in salads, spices and condiments. The bulbs also used as stimulant, flavoring agent, antiseptic, its juice is applied to soothe the irritation caused by scorpion bite. The leaves are used as a expectorant and diuretic.
7	*Allium sativum* L.	Ooza	Leaves, bulbs	Used in cooking as a flavoring agent, carminative, aromatic, condiment as well as in heart diseases, for hypertension, diuretic, diaphoretic, expectorant and antiseptic. A decoction prepared is effective in flatulence, hysteria, asthma and whooping cough and also effective in epilepsy.
8	*Achyranthes aspera* L.	Gheshai	Whole plant	The decoction of leaves and roots of this plant is used for toothache and for curing abdominal pain, as diuretic, astringent and to reduce appetite. The seeds and leaves of this plant are emetic, used in hydrophobia and snake bites, as laxative,

				stomachic, for piles. The juice of the leaves is used in dysentery. The macerated roots in water are applied to relieve pain of scorpion's sting, cough, asthma and internal organs inflammation.
9	*Achyranthes bidentata* Blume.	Spay butay	Whole plant	The plant is used as antirheumatic, purgative, diuretic. Roots are used as expectorant, analgesic, antipyretic and antispasmodic.
10	*Amaranthus spinosus* L.	Khuryassa	Whole plant	Medicinally this plant is used for piles, colic, snakebites, expectorant and diuretic. The root is used to cure rheumatism.
11	*Artemisia scoparia* Waldst & Kit.	Jaukay	Leaves, seeds	The plant is used as purgative, respiratory stimulant and anthelmintic.
12	*Asparagus officinalis* L.	Tandorai	tubers	The plant is used as a demulcent and tonic locally. Tuber mixed with milk and sugar is used for dysentery and diarrhea.
13	*Avena fatua* L.	Jawdar	seeds	The seeds used as refrigerant, emollient and diuretic.
14	*Calotropis procera* (Willd.) R. Br.	Spulmay	Whole plant	Crushed plant parts are missed with raw sugar to make a paste, which is applied to dog bites. The milky juice is used for different skin diseases. Flower powdered is used in cold cough. The root bark is used in dysentery, as expectorant and diaphoretic.
15	*Cannabis sativa* L.	Bhung botai	Leaves, inflorescence top	Leaves Juice mixed with sugar, milk, crushed with almonds, opium seeds, walnuts to make a solution which is used as anti spasmodic, refrigerant and narcotic. Leaves are used to prepare a narcotic drug called "Chars". Dry plants used by some people for burning purposes.
16	*Capsicum annum* L.	Sheen marchakai	Fruits	Medicinally fruit is also used as stimulant and against common cold.

17	*Carthamus oxyacantha* M. B.	Kareza	Seed, oil	Oil extracted from the seeds is used as diaphoretic laxative and for ulcer curing. Medicinally the seeds are used to reduce excretion urination and stomach pain.
18	*Chenopodium album* L.	Sag botai	Whole plant	This plant is used as anthelmintic, laxative, diuretic and blood purifier. The seeds and roots are used as purgative, the roots are very effective for rheumatism, jaundice and urinary diseases. Roots and fruits are used as antidotes for snake poison.
19	*Chenopodium ambrosioides* L.	Zangali sag	Whole plant	Plant used as anthelmintic, the volatile oil of the plant is used as carminative, antispasmodic and stimulant.
20	*Cistanche tubulosa* (Schrenk) Hook. F.	Khar ghar	Whole plant	Locally this plant is dried and used to cure infertility.
21	*Citrus sinensis* (L.) Osbeck	Malta	Fruit	The fruits are edible, rich in vitamin-C. The fruit's pericarp used to control vomiting.
22	*Convolvulus arvensis* L.	Pirwathay	Shoots, roots	Root is used as laxative and purgative. The extract juice of this plant is used as anti dandruff and also for skin diseases.
23	*Coriandrum sativum* L.	Darhya	Leaves, fruits	Locally used as carminative, aromatic agent, tonic, diuretic, stomachic, stimulant, digestive and fragrance. Fruit decoction is given in colic.
24	*Cucumis sativus* L.	Badrung	Fruit	The fruits of this plant is used as salad and refrigerant.
25	*Cucurbita maxima* Duch. ex Lamb.	Painta Kadoo	Young leaves, fruits, seeds	The young shoots, leaves and flowers are used as vegetable called "Sag", used to cure stomach disorders. The seeds of this plant used as anthelmintic. The fruits also used in pudding preparation called "Kadoo halva".

26	*Cuscuta reflexa* Roxb.	Ziara Zeelai	Shoots	The fresh shoots are collected, crushed and extracted juice is used for blood purification, also used as diuretic, anthelmintic, anti-diabetes, jaundice and anti-emetic.
27	*Cymbopogon jwarancusa* (Jones) Schult.	Sargaray	Whole plant	It is used as stimulant, carminative, in cholera, intermittent fever and for curing cough.
28	*Cynoglossum lanceolatum* Forssk.	Pachkay	Leaves	This plant is used as anti-inflammatory, demulcent and narcotic.
29	*Cynodon dactylon* (L.) Pers.	Aam washa	Whole plant	The plant used as diuretic, astringent and tonic, also useful in skin diseases, burning sensation, leprosy, as refrigerant and dysentery.
30	*Cyperus rotundus* L.	Della	Rhizome	The rhizome used for the treatment of vomiting, irregular menstruation and diarrhea. It is also used as stimulant diuretic and anthelmintic.
31	*Dalbergia sissoo* Roxb.	Sawa	Leaves, bark	The decoction of leaves used as stimulant and in acute stage of gonorrhea. The bark and leaves used as astringent, refrigerant and in bleeding piles.
32	*Datura stramonium* L.	Randa wana	Dried leaves, seeds	Leaves are used for narcotic and antispasmodic purposes. Seeds are used for narcotic action, as astringent, bowels complaint, fever and also for skin diseases.
33	*Dodonaea viscosa* (L.) Jacq.	Ghoraskai	Leaves, bark	Leaves of this plant are used in burns, swellings, wounds washing and also chewed as stimulant. The bark is used as astringent.
34	*Eqiusetum arvense* L.	Obo botai	Shoot	The juices extract from shoot was used as antilice, anti-acidic, tonic, diuretic and also used for expelling kidney stones.
35	*Eucalyptus globulus* Labill.	Lachai	Leaves	The leaves are medicinally used as antiseptic, as mouthwash to relieve toothache and are also used as mosquitoes repellent.
36	*Euphorbia hirta* L.	Skha butay	Whole plant	Paste is prepared and applied on external wounds in the form of poultice. A decoction of shoot is

				used as expectorant and for curing respiratory tract diseases.
37	*Euphorbia helioscopia* L.	Parparai	Roots, seeds	Roots of this plant is used as anthelmintic, shoots for constipations, seeds for curing cholera.
38	*Fagonia cretica* L.	Spelagzai	Whole plant	Local hakims use this plant for curing gastric and abdominal troubles.Also used as wormicidal.
39	*Ficus palmata* Forssk.	Inzarai	Fruit	The fruits are edible, medicinally used as laxative, demulcent and tonic.
40	*Foeniculum vulgare* Mill.	Saunf	Fruit, leaves, seeds	The plant is used as stimulant, carminative, leaves are used as a diuretic and digestive, seeds are used as laxative and aphrodisiac; fruit juice is used to improve eyesight.
41	*Fumaria indica* (Hausskn.) H.N. Pugsley	Shatara botai	Shoots	Extracts of shoots and leaves are used as purifier blood diaphoretic, refrigerant, antipyretic, malarial treatment, for whooping cough and sore throat.
42	*Hordeum vulgare* L.	Verbashy	Grains	The grains are used refrigerant, digestive, astringent, diuretic, tonic, gastropathy, fever and asthma.
43	*Luffa cylindrica* (L.) Roem.	Torai	Fruits	The local people cultivate this plant for fruit as vegetable. It is refrigerant, good for stomach and ulcer problems.
44	*Malva sylvestris* L.	Panerak sag	Leaves	Decoction of leaf is used as antispasmodic.
45	*Melia azedarach* L.	Bikyara	Bark, leaves	Bark of this plant is used as emetic, cathartic and vermifuge. The fruit is used as sexual tonic and anthelmintic. The leaf decoction is used for curing hysteria and skin diseases. The extract of leaf and fruit are used to cure night blindness, liver complaints, vomiting in fever and anthelmintic.
46	*Mentha arvensis* L.	Pudina	Leaves	The green and dried leaves used as refrigerant, antispasmodic, stimulant, aromatic and diuretic. The decoction prepared from leaves and lemon grass is used as febrifuge in fever.

47	*Mentha longifolia* (L.) Huds.	Venalay	Leaves	plant is used as carminative, antiseptic and stimulant. Shoot decoction is used in fever. The leaves are used in rheumatic pains and leaves decoction is given to children for curing emosis, also used as carminative in gas trouble eaten in the form of chutney. The pregnant women mixed the dried leaves mixed with green tea for the treatment of vomiting.
48	*Morus alba* L.	Spin Toot	Leaves, fruits, bark	The fruits are used medicinally as laxative and purgative. The leaves are astringent and anthelmintic. The bark is used vermifuge and diaphoretic.
49	*Morus nigra* L.	Toor toot	Fruits	The fruits are edible, medicinally used as laxative and refrigerant, for curing cough and sore throat.
50	*Monotheca buxifolia* (Falc.) A. DC.	Gurgura	Fruits	Fruits are edible, astringent, refrigerant and also to improve digestion.
51	*Nerium indicum* Mill.	Gandirai	Root, bark, leaves	Root is used as diuretic, anti-inflammatory and anthelmintic. Root powder is rubbed to the head in headache; paste of the root, root-bark and leaves is used for curing ringworms and other skin diseases. Leaves decoction is applied externally to reduce swellings.
52	*Ocimum basilicum* L.	Babrai	Whole plant	It is used as for insect repellent, anthelmintic, carminative and stimulant. Juice of leaves is used to expel ringworms. Seed are used as diuretic, demulcent and cure piles.
53	*Olea ferruginea* Royle	Zaitun	Leaves, fruits	The fruits are used as antidiabetic and refrigerant. The extract of leaves is used for common colds, soar throat, antiseptic, diuretic and as a tonic. Oil extracted from seeds is also used as laxative and emollient.

54	*Papaver somniferum* L.	Khash Khash, Afun	Latex, seeds	Dry latex of (opium) is used for bronchitis, relieve toothache, cure vomiting and cough, sedative narcotic, in diarrhea and dysentery. Seeds are used as demulcent, nutritive and in confectionary.
55	*Periploca aphylla* Dcne.	Barrara	Milky latex	Used as antiseptic and purgative.
56	*Plantago lanceolata* L.	Ghwa Jabai	Leaves, seeds	Exract of leaves is used for sore throat and curing of wounds. The seeds are used as laxative, dysentery and for mouth ulcers.
57	*Portulaca oleracea* L.	Khaporay sag	Leaves	Medicinally this plant is used as refrigerant and for kidney, liver, urinary bladder problems.
58	*Punica granatum* L.	Anar	Fruits, rind of fruits, bark, leaves	The juice of fruit is used as refrigerant, the pulp useful in cardiac and stomachic problems. The pericarp of fruit is used for whooping cough. Locally the dried seeds called "Tarvi" is used as flavoring agent and in spices. The extracts of fresh leaves are used in dysentery and skin diseases. Bark is used as expectorant, anthelmintic and as mouth washes. Fruit rind grinds into powder mixed with sugar and used for diarrhea and dysentery.
59	*Ranunculus muricatus* L.	Ziar gulay	Whole plant	Plant decoction is used for asthma, fever and as purgative.
60	*Ricinus communis* L.	Randan	Leaves, oil, bark, roots	Bark used for healing wounds and sores. Medicinally root is used for sciatica and rheumatism. The root bark used as a purgative and leaves as narcotic and emetic, a paste of leaves is used for swelling. Oil of fruit is given to children and cattle in constipation; it is used also as purgative and lubricant.

61	*Rosa indica* L.	Sur Gulab	Flowers	The flowers are used to cure piles and as refrigerant.
62	*Rumex dentatus* L.	Shalkhay	Leaves	The plant is a pot herb used as demulcent and diuretic.
63	*Salvadora oleoides* Decne.	Pleman	Leaves	Leaves are used medicinally for relieving pain of pregnant women during delivery.
64	*Solanum surattense* Burm. F.	Aghazai	Whole plant	Medicinally this plant is used as anti-asthmatic, expectorant, diuretic and carminative. The berries (fruits) are used for curing toothache.
65	*Sonchus asper* (L.) Hill.	Shauda pai botai	Young shoots, flower	The decoction of plant is used as diuretic and tonic, curing of jaundice and constipation.
66	*Tamarix aphylla* (L.) Karst.	Ghaz	Leaves, young branches	Decoction and infusion is used externally for curing wounds and relieving swelling. Also used as an antiseptic.
67	*Taraxacum officinale* Weber.	Ziar gulai	Root stocks	The root used as diuretic, mild laxative, bitter tonic, stimulant, for kidney and liver disorders.
68	*Tribulus terrestris* L.	Markondai	Roots, fruits	The roots and fruits are used for urinary disorders, as aphrodisiac and the fruits with seeds used for curing impotence, diabetes and as antianthelmintic (vermicides).
69	*Verbena officinalis* L.	Shomakai	Root, leaves	Roots of this plant are used for curing scorpion stings and snake bites curing, while leaves as tonic and febrifuge.
70	*Vitex negundo* L.	Marmandai	Leaves	The fresh leaves are used as bandage to remove chest and back pains. The leaves are vermifuge, aromatic, diuretic and astringent. Fresh leaf juice is used to treat ulcers.
71	*Vitis vinifera* L.	Angur	Whole plant	Leaves are used to cure mouth sores. Roots induce milk secretion in feeding mother. The fruits are used as diuretic, curing small pox and as tonic.
72	*Withania somnifera* (L.) Dunal	Karghwaza	Root, leaves, fruits	Leaves and roots of this plant are used as narcotics and for joints pain. The fruits are used as diuretic.

73	*Withania coagulans* Dunal.	Khamazora	Dried fruits	Locally a spoon of dried fruits is used to cure stomache. Two or three seeds are used for gastric trouble treatment.
74	*Xanthium strumarium* L.	Ghishkai	Whole plant	The root powder is used as tonic and to treat cancer. Fruit is used as diuretic, refrigerant, demulcent and for smallpox treatment. Decoction of leaf is recommended for long standing malarial fever.
75	*Ziziphus mauritiana* Lam.	Bera	Whole plant	The bark is used to cure diarrhea. Dried leaves are burnt and smoke inhaled to cure coughs and colds. Leaves are used to cure diabetes. Roots powder is used as poultice wounds, ulcers and in fever. Fruit used for purification of blood and as carminative.
76	*Ziziphus numularia* (Burm. f.) Wight	Karkara	Fruits, leaves	The fruits are edible, which are used as refrigerant and astringent. Paste of leaves applied on boils and scabies externally.



Fig 27. Local Hakim of Darazinda making medicines from plants

CONSERVATION STATUS OF PLANTS

CONSERVATION STATUS OF PLANTS

The use of techniques to protect rare and scarce plants or plant declination, know their causes is called plant conservation. Conservation Biology is a field that includes the biodiversity conservation and whole ecosystems, as compared to the individual species conservation (Soule, 1985). The present study deals with conservation status of 156 species belonging to 57 families (Table 18). The data was collected for different conservation parameters following method of IUCN (2001).

Results showed that 49 plant species (31.4%) were vulnerable, 49 species (31.4%) were endangered, 33 (21.1%) species were rare and 25 species (16%) were infrequent (Table 18; Fig 18). *Acacia modesta, Capparis decidua, Zizyphus, Rhazya stricta* and *Periploca calophylla* were become endangered because of their slow growth, slow regeneration and their multiple uses. These plants are heavily grazed and used for medicinal purposes, as a fuel wood and also used as timber wood. Harsh climatic and habitat conditions adversely affect natural of these plants regeneration. Due to which these plants have become endangered. *Saccharum bengalense* and *Saccharum munja* etc are extensively used for thatching and other basketry materials. Other categories like fuel wood species like *Phoenix dactylifera, Capparis decidua* and *Acacia modesta* are used for fuel purposes. Due to heavy grazing annual plants like *Cynoglossum lanceolatum, Malcolmia scorpioides* and *Imperata cylindrica, Echinochloa colona, Saccharum bengalense* and *Vicia faba* (perennials) have became endangered or vulnerable. Medicinal plant collection and lack of suitable habitat has adversely effected their regeneration and lead to endanger or vulnerable category. These plants are used for different purposes e-g timber wood, fuel wood, fodder or forage and medicinal uses for health care.

Similar results are reported by Hamayun *et al.* (2006), who reported that due to over collection and deforestation most of the local flora is threatened. Among the herbaceous species *Astragalus amherstianus, Pulicaria crispa, Polypogon monspeliensi, Echinochloa colona* etc were seriously threatened in this area while, among the shrubs *Dodonaea viscose, Rhazya stratica, Capparis spinosa, Periploca aphylla, Nannorrphs ritchiana and Calligonum polygonoides* etc were threatened. In trees *Acacia modesta* and *Bombix ceba* may become endangered if these plants were not conserved. Hamilton (2004) and Heywood & Iriondo (2003) noticed that *ex-situ* conservation should be encouraged for medicinal plants for their livehood. The woody plants are cut down for different purposes so these are facing conservational problems.

Sayer *et al.* (2004) noticed that in the establishment of tree plantation large investments are being made on degraded area in Asia. However, in the present case for conservation of forest/vegetation no project or programs is operating. In Pakistan twenty one flowering plants are reported to be threatened (Ali & Qaiser, 2010). Alam & Ali (2009, 2010) noticed that proper conservation programs are almost negligible in Pakistan.

Similarly, Kim (2006) noticed that due to the high population density and speedy industrialization since the early sixties the plant resources of Korea are threatened, with the unlawful cutting of wild plants used for decorative, remedial, food, timber fuel and fodder purposes. Same in the case of investigated area. In present area *Cyprus elunoidis*, *Cyprus rotundus*, *Desmostachya bipinnata* and *Typha latifolia* were infrequent species (Table 18; Fig 18).

These plants were probably secure because of their non palatable nature by morphological adaptation. Similar results were obtained by Ahmad *et al.* (2007) who noticed that in mountainous region of Pakistan the plants survived due to adaptation of some morphological, anatomical and physiological character to the environment.

Table 18. Conservation status of Darazinda Flora

S. No	Division / Family / Species	Collection status	Growth behavior	Part used	Availability of class	Total score	Conservation status
A. PTERIDOPHYTA							
1. Equisetaceae							
1	*Equisetum arvense* L.	3	3	0	0	7	Vulnerable
2. Adiantaceae							
2	*Adiantum capillusveneris L*	1	1	0	0	2	Endangered
B. Fungi							
3.Agaricaceae							
3	*Agaricus campestris* L.	1	1	0	0	2	Endangered
4. Helveliaceae							
4	*Morchella esculenta* Fries	1	1	0	0	2	Endangered
C. MONOCOTYLEDONS							
5. Asphodelaceae							
5	*Asphodelus tenufolius L.*	3	3	0	3	0	Rare
6. Arecaceae							
6	*Nannorrphs ritchiana* H. Wendl.	1	1	0	1	2	Endangered
7	*Phoenix dactylifera* L.	2	2	0	3	7	Vulnerable
7. Asparagaceae							
8	*Asparagus gracilis Royle.*	3	3	0	3	9	Rare
8. Cyperaceae							
9	*Cyprus elunoidis*	3	4	4	2	13	Infrequent
10	*Cyperus rotundrus*	3	4	4	2	13	Infrequent
11	*Eleocharis palustris* (L.)	3	4	4	2	13	Infrequent
9. Poaceae							
12	*Apluda mutica*	2	4	0	2	8	Vulnerable
13	*Aristida adscensionis L.*	2	3	0	2	7	Vulnerable
14	*Aristida cyanantha Nees ex Steud*	2	3	0	2	7	Vulnerable
15	*Argyro lobiumroseum*	2	3	0	2	7	Vulnerable

16	*Avena fatua* Linn.	3	3	0	4	10	Rare
17	*Arnsbu deslonix*	2	3	0	2	7	Vulnerable
18	*Brachiaria ramose*	2	4	0	2	8	Vulnerable
19	*Brachiaia reptans*	2	4	0	2	8	Vulnerable
20	*Bromus japonica* Thunb.	2	3	0	2	7	Vulnerable
21	*Cymbopogon jwarancusa (Jones) Schult.*	2	4	0	2	8	Vulnerable
22	*Cynodon dactylon (L.) Pers.*	2	4	0	2	8	Vulnerable
23	*Cenchrus ciliaris*	2	3	0	2	7	Vulnerable
24	*Dinebra retroflexa*	2	3	0	2	7	Vulnerable
25	*Disteria cilians*	2	4	0	2	8	Vulnerable
26	*Desmostachya bipinnata (L.) Stapf.*	3	4	4	2	13	Infrequent
27	*Dactyloctenium carstatum*	2	2	0	0	4	Endangered
28	*Dactyloctenium aegyptium* (L.)Willd.	2	2	0	0	4	Endangered
29	*Dichanthium annulatum* (Forssk.) Stapf	3	4	4	3	14	Infrequent
30	*Eragrostis minor*	1	4	0	3	8	Vulnerable
31	*Echinochloa colona* (Linn.) Link	2	2	0	0		Endangered
32	*Imperata cylindrica* (Linn.) Raeuschel	2	2	0	0	4	Endangered
33	*Lolium temulentum* Linn.	3	3	0	3	9	Rare
34	*Polypogon monspeliensis (L.) Desf.*	2	2	0	0	4	Endangered
35	*Phragmites karka (Retz) Trin.*	2	1	1	1	5	Vulnerable
36	*Phalaris minor* Retz.	1	4	0	3	8	Vulnerable
37	*Poa annua* Linn.	2	3	0	1	6	Vulnerable
38	*Poa infirma H. B. K.*	2	3	0	1	6	Vulnerable
39	*Setaria vercillata (L.)*	2	1	1	1	5	Vulnerable
40	*Saccharum bengalensis*	2	2	0	0	4	Endangered

42	*Typha latifolia L.*	2	4	4	3	13	Infrequent
43	*Typha minima Funck er Hoppe*	3	3	4	1	11	Rare
C. Angiosperm							
11. Acanthaceae							
44	*Dicleptera bupleuroides*	3	3	4	1	11	Rare
12. Aizoaceae							
45	Zelays *petendra (L.) C. Jeffery*	3	3	4	1	11	Rare
46	*Trianthema portulacastrum L.*	2	2	0	0	4	Endangered
13. Amaranthaceae							
47	*Achyranthus aspera L.*	2	1	1	1	5	Vulnerable
48	*Achyranthus dentatus*	2	1	1	1	5	Vulnerable
49	*Amaranthus viridis L.*	2	1	1	1	5	Vulnerable
50	*Aerva javanica* (Burn.f.) Juss	3	3	4	1	11	Rare
51	*Celosia cristata*	2	3	4	1	10	Rare
52	*Digera muricata*	3	3	4	1	11	Rare
14. Apiaceae							
53	*Torilis japonica* (Houtt.) DC.	2	2	0	0	4	Endangered
15. Apocyanaceae							
54	*Rhazya stratica Decne.*	2	2	0	0	4	Endangered
55	*Nerium indicum* Mill.	3	3	4	3	12	Rare
16. Asclapidiaceae							
56	*Caralluma tuberculata* N.E. Brown	1	2	0	0	3	Endangered
57	*Calotropis procera(Wild) R.Br.*	3	3	4	3	12	Rare
58	*Periploca aphylla* Decne.	2	0	2	2	4	Endangered
17. Asteraceae							
59	*Carthamus oxycantha*Bieb	3	3	4	3	12	Rare
60	*Conyza canadensis (L.) Cronquist*	3	3	4	1	12	Rare

61	*Filago arenaria (Smoljan.) Chrtek&Holub*	2	2				
62	*Iphiona scabra DC.k*	2	2	4	2	10	Rare
63	*Leaucaena nudicaulis* (L.) Hook.	1	1	1	4	7	Vulnerable
64	*Pulicaria crispa* (Forssk.) Oliv.	1	1	0	0	2	Endangered
65	*Parthenium hysterophous L.*	3	4	4	3	14	Infrequent
66	*Sonchus asper (L.) Hill.*	2	2	4	2	10	Rare
67	*Sonchus oleraceus*	1	1	0	0	2	Endangered
68	*Saussurea heteromalla (D.Don.)Hand*	2	2	4	2	10	Rare
69	*Taraxacum officinaleWeber*	2	4	4	2	12	Rare
70	*Xanthium strumariumL.*	1	1	3	0	5	Vulnerable
18. Bambooceae							
71	*Bombix ceba*	1	1	0	2	2	Endangered
19. Boraginaceae							
72	*Cordia myxa L.*	1	1	3	0	5	Vulnerable
73	*Cynoglossum lanceolatumForssk*	1	1	0	0	2	Endangered
74	*Ehrctia obtusifolia*	1	1	3	0	5	Vulnerable
75	*Heliotropiumeuropaeum*L.	3	0	4	0	7	Endangered
76	*Heliotropism elipticum Ledeb.*	3	0	4	0	7	Endangered
20. Brassicaceae							
77	*Arabidoptis thaliana*	2	4	4	2	12	Rare
78	*Coronopus didymus (L) Smith.*	1	1	0	0	2	Endangered
79	*Lepidium draba*	2	4	4	2	12	Rare
80	*Malcolmia scorpioide s*(Bunge)Boiss.	1	1	0	0	2	Endangered
81	*Malcolmia africana* (L.)R. Br.	1	1	0	0	2	Endangered
82	*Sissymbrium irrio L.*	3	4	4	2	13	Infrequent
21. Buxaceae							
83	*Buxus wallichiana Bail.*	1	1	0	0	2	Endangered

84	*Capparis spinosa L.*	1	1	0	0	2	Endangered
85	*Cleome brachycarpa Vahl ex DC.*	3	5	0	0	8	Vulunerable
23. Caryophyllaceae							
86	*Saponaria vaccaria*	1	1	3	0	5	Vulnerable
87	*Stellaria media L. Vill*	1	1	3	0	5	Vulnerable
24. Chenopodiaceae							
88	*Chenopodium album L*	3	4	4	2	13	Infrequent
89	*Chenopodium murale L.*	3	4	4	2	13	Infrequent
90	*Chenopodium nepalense* Colla	3	3	2	1	9	Rare
91	*Chenopodium ambrosioides* L.	3	4	4	2	13	Infrequent
92	*Suaeda fruticosa* Forssk. Ex J.F. Gmelin	3	4	4	3	14	Infrequent
25. Convolvulaceae							
93	*Convunvulus arvensis L.*	3	4	4	3	14	Infrequent
94	*Convunvulus prostrate* Forssk	3	4	4	3	14	Infrequent
26. Cucurbitaceae							
95	*Cacumis propheterum*	3	4	4	3	14	Infrequent
27. Cuscutaceae							
96	*Cuscuta reflexa* Roxb	1	0	0	1	2	Endangered
28. Euphorbiaceae							
97	*Euphorbia hirta*	3	4	4	3		Infrequent
98	*Euphorbia helioscopia L.*	3	4	4	3		Infrequent
99	*Euphorbia prostrateAit.*	2	3	0	0		Vulunerable
100	*Echinops echinatus D.C*	1	0	0	1	2	Endangered
101	*Ricinus communis*	1	4	0	1	5	Vulnerable
29. Fumaraceae							
102	*Fumariai ndica* (Hausskn.) Pugsley	0	0	0	1	2	Endangered

104	*Mentha arvensis L.*	0	4	0	1	5	Vulnerable
31. Malvaceae							
105	*Malvastrum coromandelianum* (L.) Gareke.	1	4	4	0	9	Rare
33. Mimosaceae							
106	*Acacia nilotica* (L) Delice.	3	4	4	2	14	Infrequent
107	*Acacia modesta Wall.*	1	0	4	0	5	Engangered
108	*Albizia lebbeck* (L.) Benth.	1	0	4	0	5	Engangered
109	*Prosopis farcta* (Banks & Sol.) Macbride	3	4	4	2	14	Infrequent
34. Moraceae							
110	*Ficus palmate*	3	2	2	0	7	Vulnerable
36. Oleaceae							
111	*Olea ferruginea* Royle.	1	4	4	0	9	Rare
37. Papilionaceae							
112	*Astragalus psilocentros* Fisch.	3	0	4	3	10	Rare
113	*Dalbergia sissoo Roxb.*	1	2	2	0	5	Vulnerable
114	*Medicago laciniata* (L.) Mill.	1	0	3	1	5	Vulnerable
115	*Melilotus longifolia (L.)*	1	4	3	0	8	Vulnerable
116	*Melilotus indicus (L.) All.*	1	3	3	0	7	Vulnerable
117	*Trigonella mcisa*	1	4	4	0	9	Rare
118	*Vicia sativa L.*	0	0	2	0	2	Endangered
38. Plantaginaceae							
119	*Plantago lanceolata L.*	0	0	2	0	2	Endangered
120	*Plantago minor L.*	0	0	2	1	3	Endangered
39. Portulacaeae							
121	*Portulaca quardrifida L.*	2	3	0	0	5	Vulnerable
40. Polygonaceae							
122	*Calligonum polygonoides* L.	1	0	2	0	3	Endangered
123	*Polygonum plebeium* R. Br	2	0	2	1	5	Vulnerable

41. Primulaceae							
126	*Anagallis arvensis*	1	0	2	0	3	Endangered
42. Ranunculaceae							
127	*Ranunculus muricatus* L.	3	3	3	0	9	Rare
43. Resedaceae							
128	*Reseda odorata* L.	0	0	2	1	3	Endangered
129	*Oligomeris linifolia* (Vahl.) Macbride	0	0	2	1	3	Endangered
44. Rhamnaceae							
130	*Zizyphus nummularia.* (Burm.f) W.&A	1	1	2	0	4	Endangered
131	*Zizyphus oxyphylla* Edge.	1	2	3	2	8	Vulnerable
132	*Zizyphus mauritiana*	1	2	2	2	7	Vulnerable
45. Rubiaceae							
133	*Galium aparine*	3	0	2	1	3	Endangered
134	*Galium tricorne*	3	0	2	1	3	Endangered
46. Rubinciaceae							
135	*Cistanche tubulosa*	3	0	2	1	3	Endangered
47. Salvadoraceae							
136	*Salvadora oleoides* Decne.	3	4	2	2	11	Infrequent
48. Salicaceae							
137	*Populus alba* L.	3	4	2	2	11	Infrequent
49. Sapindaceae							
138	*Dodonaea viscosa L.*	1	1	2	0	4	Endangered
50. Sapotaceae							
139	*Monotheca buxifolia* (Falc.) A. DC.	3	4	2	2	11	Infrequent
51. Scrophulariaceae							
140	*Veronica aquatica Bern*	1	1	2	0	4	Endangered
141	*Lindenbergia indica*	3	4	2	2	11	Infrequent

143	*Datura alba Nees*	1	1	2	0	4	Endangered
144	*Datura innoxia*						Endangered
145	*Hyoscyamus squarrosus Griffith.*	1	1	2	0	4	Endangered
146	*Solanum surattense Burm.f.*	3	3	2	2	10	Rare
147	*Withania coagulans Dunal.*	3	3	2	2	10	Rare
148	*Withania somnifera (L.) Dunal.*	3	1	2	1	7	Vulnerable
53. Tamaricaceae							
149	*Tamarix aphylla (L.)* Karst.	2	3	0	3	8	Vulnerable
150	*Tamarix dioica* Roxb-ex-Roth	2	3	0	3	8	Vulnerable
54. Thymelaceae							
151	*Thymelaea passerine*	3	3	2	2	10	Rare
55. Utricaceae							
152	*Utrica pilulifera L.*	1	3	4	1	9	Rare
56. Verbenaceae							
153	*Vitex negundoL.*	1	3	4	1	9	Rare
57. Zygophyllaceae							
154	*Fagonia cretica L.*	1	3	0	2	6	Vulnerable
155	*Peganum harmala L.*	1	3	4	1	9	Rare
156	*Tribulus terrestris L.*	1	3	4	1	9	Rare

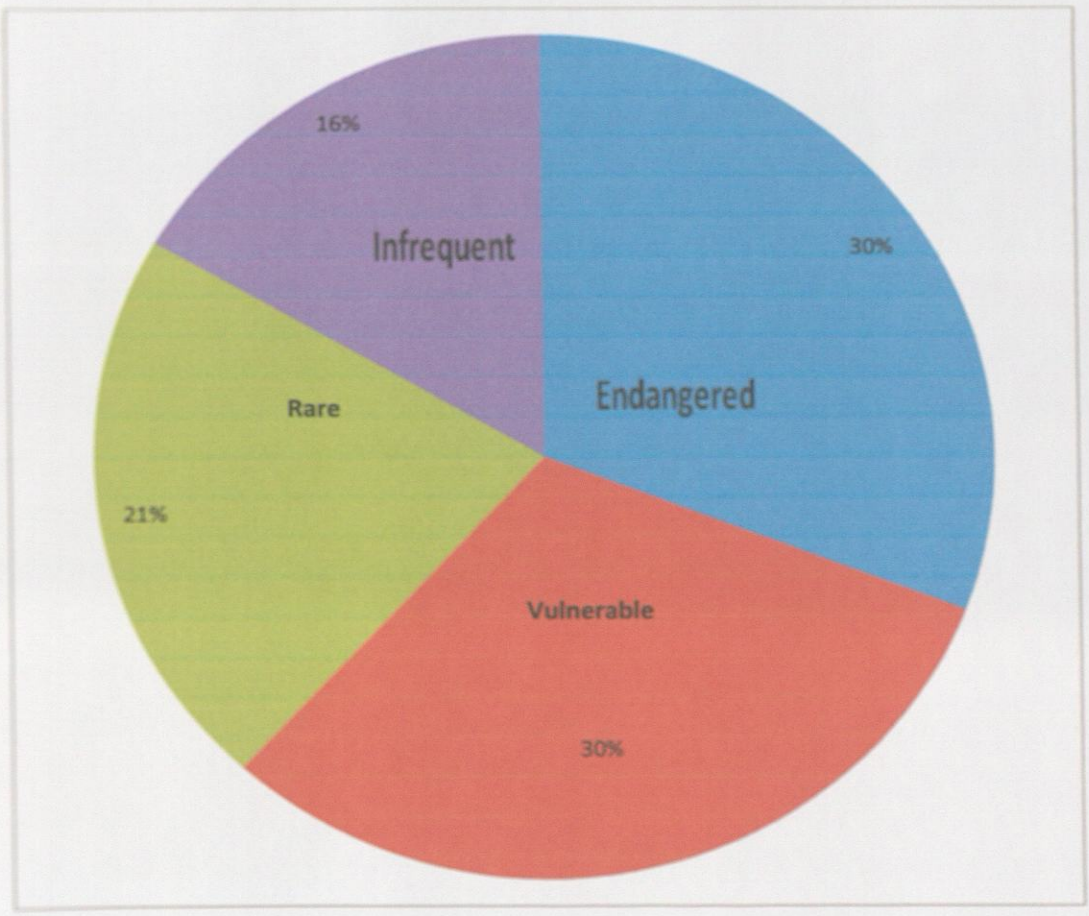


Fig 28. Graphical representation of conservation status of Darazinda Vegetation

CONCLUSIONS

General Conclusions

1. This study was conducted during 2013-2014 in order to light up the floristic composition, vegetation structure, productivity, condition of range lands, chemical compositions and interaction among plant and people of a Frontier region of KPK, Darazinda.

2. The study revealed that flora of Darazinda comprised of 213 species belonged to 68 families. In which 46 species were monocot and 163 species were Dicot. *Equisetum* and *Adiantum capillusveneris* were Pteridophyte, *Agaricus campestris* and *Morchella esculenta*were belongs to Fungi.

3. Based on number of species, Poaceae (37Spp), Asteraceae (19Spp), Solanaceae (12 Spp), Brassicaceae (10Spp), Papilionaceae (9 Spp) were the leading families. Family Amaranthaceae had 6 species followed by Boraginaceae, Chenopodiaceae, Cucurbitaceae and Euphorbiaceae with 5 Spps each. Apiaceae, Lamiaceae, Myrtaceae, Mimosaceae and Polygonaceae were with 4 spps each while Cyperaceae, Asclepiadaceae, Malvaceae, Moraceae, Rhamnaceae, Scrophulariaceae, Verbenaceae and Zygophyllaceae have 3 species each. Eleven families like Alliaceae, Arecaceae, Typhaceae, Aizoaceae, Apocyanaceae, Caryophyllaceae, Convolvulaceae, Plantaginaceae, Rubiaceae, Resedaceae and Tamaricaceae had 2 species each while 30 families had 1 spp each.

4. The flora was dominated in life form by therophytic, hemicryptophytic, microphanerophytes, geophytic, chamaephytic and nanophanerophytes, while in leaf size nanophyllous, leptophyllous, microphyllous and mesophyllous species were conspicuous.

5. The month of March had the peak flowering season. The relation of flowering depends upon nature of rainfall. The peak fruiting season was in the month of April to June, while the dormant months were October to November.

6. Ethnobotanical study of 198 plants indicated that the plants are primarily used as plants are used for agriculture applications (2%), fodder (65%), as a fuel (15%), for making

furniture (4%), fruit yielding (6%), as medicinal (55%), as timber (5%), as vegetable (13%) and fencing plants (4%). This shows the major utility of the area as rangeland.

7. Timber and fuel wood usage promoted deforestation in the area.

8. Total 213 species belonging to 68 families were reported in which 52 (24.4%) were non-palatable, 105 (49.2%) palatable, 23 (10.7%) highly palatable, 6 (2.8%) moderate palatable, 14 (6.5%) low palatable while 13 (6%) were rarely palatable. Plant condition used showed that fresh form of plant 100 (47%), dry form 24 (11.2%) and both fresh and dry form 36 (17%) were grazed. Part used showed that whole plant 89 (42%), leaf 64 (30%) and inflorescence 3 (1.4%) were used.

9. Phytosociological study and Ordination approach showed 20 plant communities arranged in 4 main associations (association of wood land halophytes, association of xero-sere herbaceous, association of thorny woody plants and degraded woody associations).

10. The physico-chemical analysis of habitat features revealed that the soil texture of Bargholi hill had clay loamy soil with grey color. The pH of Bargholi soil was 7.3, Pasta hill have clay loamy soil with red color. The pH of Pasta soil was 7.8, Anghar ghara have clay loamy soil with grey color. The pH of Anghar ghara soil was 7.8, Spin ghar had gravel sandy soil with grey and white color. The pH of Spin ghar soil was 8.1 and Sur ghar had loamy soil with red and grey color. The pH of Sur ghar soil was 7.3.

11. Chemical analysis of forage plants showed that with few exceptions sufficient amount of macro and micro minerals and nutrients were present. So, there is no need of supplement minerals and nutrients in feed to the ruminants. There fodders species are under stress and require measures for sustainable utilization of the rangelands.

12. Based on IUCN conservation criteria, it was noticed that 49 plant species (31.4%) were vulnerable, 49 species (31.4%) endangered, 33 (21.1%) species were rare and 25 species (16%) were infrequent. This is due to over grazing, excessive collection and other human influences in the investigated parts of Darazinda.

13. The findings of this study could be of great interest and importance for botanists, ethnobotanists, taxonomists, ecologists, medicinal plant researchers and conservationists at home and abroad and for making pouty eleviation and economic important of people in this neglected area.

RECOMMENDATIONS

Recommendations and Suggestions

1. Management of moderate and rotational grazing be enforced to reduce the regeneration of primary producer (vegetation).

2. There is severe deforestation of woody and shrubby species especially *Acacia modesta* ssp. and *Tamarix aphylla* for large quantity of extraction of wood, for fuel and timber. In order to promote vegetation cover alternate source of fuel/timber should be provided and the area must be protected for a period of at least 10 years.

3. There is a need to promote principles for conservation and development of natural vegetation, soil and land management. Due to low vegetation cover soil is being eroded very fast.

4. There is a need of exploration of research activities for knowing the seed production, germination and growth pattern for propagation of fodder, fuel wood timber and medicinal plants.

5. Local people cooperation and participation is essential in order to impose effective management plan inthe area.

6. As no policies of marketing exists in the investigated area therefore livestock and medicinal plants marketing should be streamlined and regulated.

7. Equilibrium should be maintained between food, input of nutrient, hybrid livestock population and influences of human which will be essential for long life sustainability of rangeland vegetation.

8. Linkages among regional, sub-regional and international research and developmental programs should be required for appliance and management plans so that socioeconomic and ecological conditions could be appropriately addressed.

9. In order to improve the overall sustainable biological productivity of this area, long term plans are needed for degraded habitats by introducing of fast growing fodder

species, low yielding livestock replacement by improved breeds, rotational and mixing grazing. Such long terms efforts should be done in order to reduce pressure on the existing resources of the area and allow the flora and fauna to revert to original position.

10. The investigated area is less productive and need rehabilitation through ecological management therefore, this would be possible that the participation local people and government and NGOs in under to make the resources of plant sustainable. It is recommended that the government should help in the conservation of this area of Darazinda for the vegetation improvement and rangeland condition.

REFERENCES

REFERENCES

Abbas, H., M. Qaiser and J. Alam. 2010. Conservation status of *Cadaba heterotricha* Stocks (Capparaceae): an endangered species in Pakistan. *Pak. J. Bot.*, 42 (1): 35-46.

Abbasi, M. K., M. M. Tahir, A. H. Shah and F. T. Batool. 2009. Mineral nutrient composition of different ecotypes of white clover and their nutrient credit to soil at Rawalakot Azad Jammu and Kashmir. *Pak. J. Bot.*, 41 (1): 41-51.

Abd El-Ghani, M. M. and W. M. Amer. 2003. Soil-vegetation relationships in a coastal desert plain of southern Sinai, Egypt. *J. Arid Environment*, 55: 607-628.

Adam, F. B and G. E. Crow. 2010. The Flora and vegetation of timber Island, Lake Winnipesaukee, New Hampshire, U.S.A. *Rhodora*, 112 (950): 156-190.

Ahmad, E., M. Arshad, M. M. Saeed and M. Ishaque. 2004. Ethnopharmacological survey of some medicinally important plants of Galliyat areas of NWFP, Pakistan. *Asian J. Pl. Sciences (Pakistan)*, 3 (4): 410-415.

Ahmad, H., S. M. Khan, S. Ghafoor and N. Ali. 2009a. Ethnobotanical study of upper Siran. *J. Herbs, Spices & Medicinal Plants*, 15 (1): 86-97.

Ahmad, S. S., S. Fazal, E. E.Valeem, Z. I. Khan, G. Sarwar and Z. Iqbal. 2009 b. Evaluation of ecological aspects of roadside vegetation around Havalian city using multivariate techniques. *Pak. J. Bot.*, 41 (1): 53-60.291.

Ahmad, K., M. Hussain, M. Ashraf, M. Luqman, M. Y. Ashraf and Z. I. Khan. 2007. Indigenous vegetation of Soone Valley: at the risk of extinction. *Pak. J. Bot.*, 39(3): 679-690.

Ahmad, I., M. Hussain, M. Sajid, A. Ahmad and M. Hameed. 2008a. Spatio-temporal effects on association of plant species in Soone valley of Pakistan. *Pak. J. Bot.*, 40(5): 1865-1876.

Ahmad, K., Z. I. Khan, M. Ashraf, M. Hussain, M. Ibrahim and E. E. Valeem. 2008b. Status of plant diversity at Kufri (Soone Valley) Punjab, Pakistan and prevailing threats therein. *Pak. J. Bot.*, 40 (3): 993-997.

Ahmad, K., M. Ashraf, Z. I. Khan and E. E. Valeem. 2008c. Evaluation of macro-mineral concentrations of forages in relation to ruminants" requirements: a case study in Soone Valley, Punjab, Pakistan. *Pak. J. Bot.*, 40 (1): 295-299.

Ahmad, M., T. Husain, A. H. Sheikh, S. S. Hussain and M. F. Siddiqui. 2006. Phytosociology and structure of Himalayan forests from different climatic zones of Pakistan. *Pak. J. Bot.*, 38 (2): 361-383.

Ahmad, S. S. 2007. Medicinal wild plant knowledge from Lahore-Islamabad motorway, (M-2). *Pak. J. Bot.*, 39 (2): 355-377.

Ahmad, S. S. and S. Z. Husain. 2008. Ethno medicinal survey of plant from salt Range (kallar kahar) of Pakistan. *Pak. J. Bot.*, 40 (3): 1005-1011. `292

Ahmad, S. S., A. Wahid and K. F. Akbar. 2010a. Multivariate classification and data analysis of vegetation along Motorway (M-2), Pakistan. *Pak. J. Bot.*, 42 (2):1173-1185.

Ahmad, M., S. S. Shoukat and D. Khan. 2010b. Status of vegetation analysis in Pakistan. *Int. J. Biol. Biotech.*, 7 (3): 147-158.

Ahmad, S., N. Khan, M. Wahab and K. Nazim. 2010c. Vegetation studies of selected graveyards of upper Swat. *J. Biol. Biotech.*, 7 (3): 221-217.

Ahmad, S. S., T. Ahmad and K. F. Akbar. 2004. Baseline study of roadside vegetation of Lahore- Islamabad Motorway (M-2) and its fertility status. *J. of Applied Science*,4: 266-270.

Ahmed E., M. Arshad, A. Saboor, R. Qureshi, G. Mustafa, S. Sadiq and S. K. Chaudhari. 2013. Ethnobotanical appraisal and medicinal use of plants in Patriata, New Murree, evidence from Pakistan. *Journal of Ethnobiology and Ethnomedicine*. 9:13.

Ajaib, M, Z. U Khan, N. Khan and M. Wahab. 2010. Ethnobotanical studies on useful shrubs of District Kotli, Azad Jammu & Kashmir, Pakistan. *Pak. J. Bot.*, 42 (3):1407-1415.

Akbar, G., S. Khatoon, M. Imran, N. Rizwan, M. Z. Khan and S. Islam. 2010. Floristic and phytosociological assessment of vegetation of Keenjhar Lake and surrounding area (Thatta, Sindh) Pakistan. *Int. J. Biol. Biotech.*, 7 (3): 147-158.

Akhtar, M. Z., A. Khan, M. Sarwar and A. Javaid. 2007. Influence of soil and forage minerals on buffalo (*Bubalus bubalis*) haemoglobinaria. *Asian-Australian J. Ani. Sci.*, 20: 393-399.

Akhtar, N. and S. Begum. 2009. Ethnopharmacological important plants of Jalala, District Mardan, Pakistan. *Pak. J. Pl. Sci.*, 15 (2): 95-100.

Akram, M., M. A. Kahlown and Z. A. Soomro. 2009. Desertification control for sustainable land use in the Cholistan Desert, Pakistan. *Earth & Envm. Science*, 6:483-492.

Alam, J. and S. I. Ali. 2009. Conservation Status of *Astragalus gilgitensis* Ali (Fabaceae): A critically endangered species in the Gilgit District, Pakistan. *Phyton. (Horn, Austria)*, 48 (2): 211-225.

Alam, J. and S. I. Ali. 2010. Conservation status of *Androsace russellii* Y. Nasir: a critically endangered species in Gilgit district, Pakistan *Pak. J. Bot.*, 42 (3): 1381-1393.293.

Ali, H. and M. Qaiser. 2010. Contribution to the Red List of Pakistan. A case study of *Astragalus gahiratensis* Ali (Fabaceae-Papilionoideae). *Pak. J. Bot.*, 42 (3): 1523-1528.

Ali, S. M and R. N. Malik. 2010. Vegetation communities of urban open spaces: Green belts and parks in Islamabad city. *Pak. J. Bot.*, 42 (2): 1031-1039.

Ali, H., J. Sannai, H. Sher and A. Rashid. 2011. Ethnobotanical profile of some plant resources in Malam Jabba valley of Swat, Pakistan. *J. Med. Pl. Res.*, 5 (18): 4676-4687.

Amjad, M. S., M. A. S. Fatima and N. Mumtaz. 2014. Palatability and Animal Preferences of Plants in Tehsil Nikyal, District Kotli, Azad Jammu and Kashmir Pakistan. *Annual Research & Review in Biology.* 4(6): 953-961.

Amjad M. S. 2015. Ethnobotanical profiling and floristic diversity of Bana Valley, Kotli (Azad Jammu and Kashmir), Pakistan. *Asian Pac J Trop Biomed*; 5(4): 292-299.

Andrew, M. H., I. R. Noble, R. T. Lange and A. W. Johnson. 1981. The measurement of shrub forage weight: three methods compared. *Aust. Rangeland J.*, 3 (1): 74-82.

Anonymous, 2005. Community-based Natural Resource and Land Management. Kingdom Of Swazil and Supplement to NEPAD-CAADP Implementation. TCP/SW, Vol. IV of V, Mbabane.

Anonymous. 1981. Nutrient requirements of domestic animals. Number 15. Nutrient requirements of goats. *Nat. Acad. Sci., Nat. Res. Council*, Washington, DC.

Anonymous. 1982. Manual for Feed Analytical Laboratory. PARC, Islamabad.

Anonymous. 1985. Nutrient requirements of domestic animals. No. 5. Nutrient requirements of sheep. *Nat. Acad. Sci., Nat. Res. Council*, Washington, DC.

Anonymous. 1998. District Censes Report, Statistical Department, Islamabad, Pakistan.

Anonymous. 2006. Economic Survey. Government of Pakistan, Finance Division, Islamabad, Pakistan.

AOAC. 1984. Official Methods of Analysis. 11thed. Association of Official Analytical Chemists, Washington, DC.

AOAC.1990. Official Methods of Analysis (15th Ed.). Association of Official Analytical Chemists, Washington, DC, USA. 5: 3-10.

AOAC (Association of Official Analytical Chemists). 2000. Official methods of analysis. Gaithersburg, MD, Washington, USA.

Aremu, M. O., A. Olonisakin, D. A. Bako and P. C. Madu. 2008. Compositional Studies and Physicochemical Characteristics of Cashew Nut (*Anarcadium occidentale*) Flour. *Pak. J. Nutr.,* 5 (4): 328-333.

Arenas, P. and G. F. Scarpa. 2007. Edible wild plants of the Chorote Indians, Gran Chaco, Argentina. *Botanical J. Linn. Society*, 153 (1): 73-85.

Arshad, M. and G. Akbar. 2002. Benchmark of plant communities of Cholistan desert. *Pakistan J. Biological Sciences*, 5: 1110-1113.

Arshad, M. 2003. Cholistan desert ecosystem monitoring for future management. Annual Technical Report of a project sponsored by WWF-Pakistan. (Unpublished).

Arshad, M., A. U. Hussan, M. Y. Ashraf, S. Noureen and M. Moazzam. 2008. Edaphic factors and distribution of vegetation in the Cholistan desert, Pakistan. *Pak. J. Bot.*, 40 (5): 1923-1931.

Ashraf, M. Y., K. Akhtar, G. Sarwar and M. Ashraf. 2005. Role of rooting system in salt tolerance potential of different guar accessions. *Agronomy for Sustainable Development*, 25: 243-249.

Badshah, L., F. Hussain and Z. Sher. 2013. Floristic inventory, ecological characteristics and biological spectrum of rangeland, district Tank, Pakistan. *Pak. J. Bot.*, 45(4): 1159-1168.

Badshah, L. and N. Hussain. 2008. Indigenous remedies for women and child diseases in the village Tabai South Waziristan, Pakistan. *Pak. J. Pl. Sci.,* 14 (2): 97-100.

Badshah, L., F. Hussain and N. Akhtar. 2010 a. Vegetation structure of subtropical forest of Tabai, South Waziristan, Pakistan. *Front. Agri. China*, 4 (2): 232-236.

Badshah, L., F. Hussain, G. Dastagir and T. Burni. 2006. Ethnobotany of fuel wood plants of Ladha, South Waziristan, Pakistan. *Pak. J. Pl. Sci.*, 12 (2): 193-201.

Badshah, L., M. Ibrar and F. Hussain. 2010b. An ethnobotanical study on the usage of wild medicinal herbs from Malana hills, Parachinar, Kurram Valley. *J. Biol. Biotech.*, 7 (3): 267-271.

Bahadur, A., Z. Chaudhry, G. Jan, M. Danish, A. Rehman, R. Ahmad, A. khan, S. Khalid, I. ullah, Z. Shah, F. Ali, T. Mushtaq and F. G. Jan. 2011. Nutritional and elemental analyses of some selected fodder species used in traditional medicine. *African Journal of Pharmacy and Pharmacology*., 5(8):1157-1161.

Bakhsh, A., S. M. Iqbal and I. K. Haq. 2007. Evolution of chickpea germplasm for wilt resistance, *Pak. J. Bot.*, 39 (2): 583-593.

Batalha, M. A. and F. R. Martins. 2002. Life-form spectra of Brazilian Cerrado sites. *Flora, Morphology, Distribution, Functional Ecology of Plants*, 197 (6): 452-460.

Batalha, M. A. and F. R. Martins. 2004. Floristic frequency, and vegetation life form spectra of a Cerrado site. *Braz. J. Biol.,* 64 (2): 203-209.

Bignami, C., C. Cammilli, G. Moretti and L. Sallusti. 2005. Growth analysis and nitrogen dynamics in hazelnut Tonda Gentile Romana. *Acta Hort.*, 686: 193-200.

Bocuk, H., C. Ture and O. Ketenoglu. 2009. Plant diversity and conservation of the North East Phrygia region under the impact of land degradation and desertification (Central Anatolia, Turkey). *Pak. J. Bot.*, 41 (5): 2305-2321.

Bouyoucos, G. J. 1936. Directions for making mechanical analysis of soils by the hydrometer method. *Soil Sci.*, 42: 225-228.

Brady, N. C. 1990. The Nature and Properties of Soils. 10th ed. Macmillan Publishing Co. New York, NY. 621 p.

Brady, N. C. and R. R. Weil. 1999. The Nature and Properties of Soils. Prentice Hall, Upper Saddle River, New Jersey.

Brahma., J. and B. Singh. 2014. phytochemical screening, mineral composition and nutritive analysis of the leaves of *Gonostegia hirta:* an important undershrub consumed by the bodos of Kokrajhar District, Assam. *Int. J. Curr. Res.Chem. Pharma. Sci.*, 1(2): 99-106.

Brereton, A. J., N. M. Holden, D. A. McGilloway and O. T. Carton. 2005. A model describing the utilization of herbage by cattle in a rotational grazing system. *Grass & Forage Science*, 60 (4): 367-384.

Bukhsh, E., S. A. Malik and S. S. Ahmad. 2007. Estimation of nutritional value and trace elements content of *Carthamus xyacantha*, *Eruca sativa* and *Plantago ovata. Pak. J. Bot.*, 39 (4): 1181-1187.

Bulut, Z. and H. Yilmaz. 2010. The current situation of threatened endemic flora in Turkey: Kemaliye (Erzincan) Case. *Pak. J. Bot.*, 42 (2): 711-719.

Cain, S. A., G. M. Castro, and J. M. Pires. 1956. Application of some phytosociological techniques to Brazilian rain forest. Part II. *Amer. J. Botany*, 43: 915-928.

Campanella, M. V. and A. J. Bisigato. 2010. What causes changes in plants litter quality and quantity as consequence of grazing in the Patagonian Monte: Plant cover reduction or changes in species composition? Austral. Ecol., 35(7): 787-793.

Canali, S., P. Nardi, U. Neri and A. Gentili. 2005. Leaf analysis as a tool for evaluating nutritional status of hazelnut orchards in Central Italy. *Acta Hort*., 686: 291-296.

Chang, Y.-C., Yamamoto, Y. & Matsumoto, H. 1999. Accumulation of aluminium in the cell wall pectin in cultured tobacco (Nicotiana tabacum L.) cells treated with a combination of aluminium and iron. *Plant Cell Environ*. 22:1009-1017.

Carvalho, D. and I. M. M. Saraiva. 2005. Effects of water stress on the proximate composition and mineral contents of seeds of two lupins (*Lupinus albus* and *Lupinus mutabilis*). *J. Food Quality*, 28 (4): 325-332.

Census data taken from FATA (1998).Sustainable Development Plan 2007-2015, FATA Secretariat, Peshawar, page-19.

Chatterton, N. J., K. A. Watts, K. B. Jensen, P. A. Harrison and W. H. Horton. 2006. Nonstructural carbohydrates in oat forage. *J. Nut.*, 136: 2111S-2113S.

Chaturvedi, O. H., R. Bhatta, D. L. Verma and N. P. Singh. 2006. Effect of flushing on nutrient utilization and reproductive performance of cows grazing on community rangeland. *Asian-Aust. J. Anim. Sci*., 19: 521.

Cheema, M. A., M. F. Saleem, N. Muhammad, M. A. Wahid and B. H. Baber. 2010. Impact of rate and timing of nitrogen application on yield and quality of Canola (*Brassica napus* L.) *Pak. J. Bot*., 42 (3): 1723-1731.

Cherney, J. H. and D. J. R. Cherney. 2005. Agronomic response of cool-Season grasses to low-intensity harvest management and low potassium fertility. *Agron J*., 97:1216-1221.

Chiesa, A. P. R., G. V. Kozloski, L. M. B. Sanchez, L. D. Lima, L. Oliveira, C. J. Harter, G. Fiorentini and R. L. Cadorin. 2008. Age of regrowth as a factor affecting the nutritive value of hay of kikuyu grass (*Pennisetum clandestinum*) offered to lambs. *Grass & Forage Science,* 63 (2): 193-201.

Claros, M. P. 2003. Changes in forest structure and species composition during secondary forest succession in the Bolivian Amazon1. *Biotropica*, 35 (4): 450-461.

Coskun, B., N. Gulsen and H. D. Umucalılar. 2004. The nutritive value of *Prangos ferulacea*. *Grass & Forage Science*, 59 (1): 15-19.

Costa, F. R. C. 2007. Mesoscale Gradients of herb richness and abundance in Central Amazonia. *Biotropica*, 38 (6): 711-717.

Dairo, F. A. S and I. G. Adanlawo. 2007. Nutritional Quality of *Crassocephalum crepidioides* and *Senecio biafrae*. *Pak. J. Nut.*, 6 (1): 35-39.

Dalle, G., B. L. Maass and J. Isselstein. 2006. Encroachment of woody plants and its impact on pastoral livestock production in the Borana lowlands, Southern Oromia, Ethiopia. *African J. Ecology*, 44 (2): 237-24.

Dansi, A., H. Adoukonou-Sagbadja and R.Vodouhe. 2010. Diversity, conservation and related wild species of Fonio millet (*Digitaria* spp.) in the northwest of Benin. *Genetic Resources & Crop Evolution*, 57 (6): 827-839.

Das, B. K. Pramanik and S. K. Mollay.2015. A model classical ecological report on vegetation dynamics in Gorumara National Park in West Bengal, India. *Int. J. Phar. &Biomedi.Rese.* 2 (2): 1-14.

Dasti, A. A. and S. A. Malik. 2000. A transect of vegetation and soils on the Indus Valley Slope, Pakistan. *Pakistan J. Pl. Sci*., 4: 73-84.

Dave, G. and B. Dave. 2003. Mineral concentration dynamics among 7 northern Great Basin grasses. *Journal of Range Management*, 56 (2): 174-184.

Devineau, J. L. and A. Fournier. 2007. Integrating environmental and sociological approaches to assess the ecology and diversity of herbaceous species in a Sudantype savanna (Bondoukuy, Western Burkina Faso). *Flora, Morphology, Distribution, Functional Ecology of Plants*, 202 (5): 350-370.

Dharani, N., J. I. Kinyamario and J. M. Onyari. 2006. Structure and composition of *Acacia xanthophloea* woodland in Lake Nakuru National Park, Kenya. *African J. Ecology*, 44 (4): 523-530.

Digiovinazzo, P., G. F. Ficetola, L. Bottoni, C. Andreis and E. P. Schioppa. 2010. Ecological thresholds in herb communities for the management of suburban fragmented forests. *Forest Ecology & Management*, 259 (3): 343-349.

Dondeyne, S., A. Wijffels, L. B. Emmanuel, J. Deckers and M. Hermy. 2004. Soils and vegetation of Angai forest: ecological insights from a participatory survey in South Eastern Tanzania. *African J. Ecology*, 42 (3): 198-207.

Durrani, M. J., F. Hussain and S. U. Rehman. 2005. Ecological characteristics of plants of Harboi rangeland, Kalat, Pakistan. *J. Trop. & Sub Trop. Bot.*, 13 (2): 130-138.

Dwivedi, M., A. K. Singh and P. K. Mishra. 2009. Role of cadmium in plants and animal: a review. *International J. Agriculture Environment & Biotechnology*, 2 (1): 1-4.

Ekblom, A. and L. Gillson. 2010. Hierarchy and scale: testing the long term role of water, grazing and nitrogen in savanna landscape of Limpopo National Park (Mozambique). *Landscape Ecology*, 25(10): 1529-1546.

Emad A. Al Sherif, Ahmad M. Ayesh and Sayed M. Rawi. 2013. Floristic composition, Life form and chorology of plant life at Khulais region, Western Saudi Arabia. *Pak. J. Bot.*, 45(1): 29-38.

Enright, N. J., B. P. Miller and R. Akhter. 2005. Desert vegetation and vegetation environment relationships in Kirthar National Park, Sindh, Pakistan. *J. Arid Environment*, 61 (3): 397-418.

Enujiugha, V. N. 2003. Chemical and functional characteristics of Conophor Nut. *Pak. J. Nutrition*, 2 (6): 335-338.

Enyisi., S, V.J. Umoh, C.M.Z. Whong, I.O. Abdullahi, O. Alabi. 2014. Chemical and nutritional value of maize and maize products obtained from selected markets in Kaduna State, Nigeria. *African Journal of Food Science and Technology*., 5(4): 100-104.

FATA Sustainable Development Plan 2007-2015, FATA Secretariat, Peshawar, pp 6.

FATA Development Statistics 2013 a, Bureau of Statistics, FATA Cell, Planning and Development Department, FATA Secretariat, Peshawar, pp 83-84.

FATA Development Statistics 2013 b, Bureau of Statistics FATA Cell, P&D Deptt., FATA Secretariat, Peshawar; pp111.

Fadl M. A., F. Hussein, Farrag, E. A. Al-Sherif. 2015. Floristic composition and vegetation analysis of wild legumes in Taif district, Saudi Arabia. *International Research Journal of Agricultural Science and Soil Science (IRJAS)*; 5(2):74-80.

Farag, M. El-M. 2014. Floristic Composition and Traditional Uses of Plant Species at Wadi Alkuf, Al-Jabal Al-Akhder, Libya. *Am-Euras. J. Agric. & Environ. Sci.*, 14 (8): 685-697.

Fazal, H., N. Ahmad, A. Rashid and S. Farooq. 2010. A Checklist of phanerogamic flora of Haripur Hazara, Khyber Pakhtunkhwa, Pakistan. *Pak. J. Bot*., 42 (3): 1511-1522.

Fischer, A. P. and J. C. Bliss. 2008. Behavioral assumptions of conservation policy: Conserving oak habitat on family-forest land in the Willamette Valley, Oregon. *Conservation Biology*, 22 (2): 275-283.

Frances, P. M. and M. Shahroukh. 2006. Forbs diversity and community similarity of kopjes in the Serengeti National Park, Tanzania. *African J. Ecology*, 44 (1): 38-46.

Francisco, J. C., M. D. L. Estrella, C. Aedo and M. Velayos. 2009. Checklist of Commelinaceae of Equatorial Guinea (Annobón, Bioko and Río Muni). *Botanical J. Linn. Society*, 159 (1): 106-122.

Fulkerson, W. J. and D. J. Donaghy. 2001. Plant-soluble carbohydrate reserves and senescence- key criteria for developing an effective grazing management system for ryegrass-based pasture: A review. *Austral. J. Exper. Agric.*, 41: 261-275.

Galyean, M. 1985. Techniques and Procedures in Animal Nutrition Research. New Mexico State University, Deptt. Animal & Range Conditions.

Gamoun M. 2014. Grazing intensity effects on the vegetation in desert rangelands of Southern Tunisia J Arid Land. 6(3): 324–333.

Ganskopp, D. and D. Bohnert. 2003. Mineral concentration dynamics among 7 northern Great Basin grasses. *J. Range Management*, 56: 174-184.

Garg, A. N., A. Kumar, A. G. C. Nair and A. V. R. Reddy. 2007. Analysis of some Indian medicinal herbs by INAA. *J. Radianalytical & Nuclear Chemistry*, 271 (3): 611-619.

Ghani, A., Z. Ali, T. Islam, S. Sanaullah and S. Saeed. 2014. Nutrient evaluation and elemental analysis of four selected medicinal plants of soon valley Khushab, Punjab, Pakistan., *Pak. J. Pharm. Sci.*, 27(3): 597-600.

Gillani, S. S., S. Q. Abbas, Z. K Shinwari, F. Hussain and K. Nargis. 2003. Ethnobotanical studies of Kurram agency, Pakistan through rural community participation. *Pak. J. Biol. Sci.*, 6 (15): 1368-1375.

Gimenez, E., M. Melendo, F. Valle, F. G. Mercado and E. Cano. 2004. Endemic flora biodiversity in the south of the Iberian Peninsula: altitudinal distribution, life forms and dispersal modes. *Biodiversity & Conservation*, 13 (14): 2641-2660.

Golluscio, R. A., M. Oesterheld and M. R. Aguiar. 2005. Relationship between phenology and life form: a test with 25 Patagonian species. *Ecography*, 28(3): 273-282.

Gonzalez-V, E. A., M. A. Hussey and J. A. Ortega-S. 2006. Nutritive value of desmanthus associated with Kleingrass during the establishment year. *Rangeland Ecol. Manag*., 58 (3): 308-314.

Gould, W. A., G. Gonzalez and R G. Carrero. 2006. Structure and composition of vegetation along an elevational gradient in Puerto Rico. *J. Vegetation Science*, 17:563-574.

Grubb, P. J. 1987. Plant population and vegetation in relation to habitat disturbance and competition: problems of generalization. In J. White (ed.), The population structure of vegetation (Hand book of vegetation, part III). W. Junk, Dordrecht.

Guo, Q. S., X. F. Wang, G. Bar, Y. Kang, M. Hong, S. X. Pei and F. J. Zhang. 2009. Life form spectra, leaf character, and hierarchical-synusia structure of vascular plants in *Thuja sutchuehensis* community. *Pub Med.,* 20 (9): 2057-2062.

Gunasekaran, S., K. Viswanathan and C. Bandeswaran. 2014. Selectivity and palatability of tree fodders in sheepand goat fed by Cafeteria method. *International Journal of Science, Environment and Technology*., 3 (5): 1767 – 1771.

Gutierrez, D., S. Mendoza, V. Serrano, M. Bah, R. Pelz, P. Balderas and F. Leon. 2008. Proximate composition, mineral content, and antioxidant properties of 14 Mexican weeds used as fodder. *Weed Biology & Management*, 8 (4): 291-296.

Gutkowski, B., Krowiak, M., Niedzwiecka, J. and I. K. Oklejewicz. 2002. Floristic notes from the Dynow foothills (Western Carpathians). *Fragm. F. Geobot. Polonica*, 9:43-47.

Hadi, F., P. Akhtar, S. M. Shah and F. Hussain. 2009. Graveyard of Palosi, District Peshawar, as an example of conservation of local plants. *PUTAJ Sci*., 16: 21-28.

Hameed, I., G. Dastagir and F. Hussain. 2008. Nutritional and elemental analyses of some selected medicinal plants of the family Polygonaceae. *Pak. J. Bot.*, 40 (6):2493-2502.

Hamilton, A. C. 2004. Medicinal plants, conservation and livelihoods. *Biodiversity & Conservation*, 13: 1477-1517.

Hamayun, M., S. A. Khan, E. Y. Sohn and I. J. Lee. 2006. Folk medicinal knowledge and conservation status of some economically valued medicinal plants of District Swat, Pakistan. *Lyonia*, 11 (2): 101-113.

Hazrat, A., J. Shah, S. Ahmad, M. Nisar, A. K. Jan and Sikandar. 2010. Medicinal plants of Usherai valley, Dir, KPK, Pakistan. *Pak. J. Bot.*, 42 (1): 31-34.

Heady, H. G. 1964. Palatability of herbage and animal preferences. *J. Range management*, 17: 76-82.

He, M. Z., J. G. Zheng, X. R. Li and Y. L Qian. 2007. Environmental factors affecting vegetation composition in the Alxa Plateau, China. *J. Arid Environment*, 69 (3):473-489.

Heywood, V. H. and J. M. Iriondo. 2003. Plant conservation: old problems, new perspectives. *Biological Conservation*, 113 (3): 321-335.

Hickman, K. R., D. C. Hartnett, R. C. Cochran and C. E. Owensby. 2004. Grazing management effects on plant species diversity in tall grass prairie. *Rangeland Ecol. & Management*, 57 (1): 58-65.

Hirata, M., N. Koga, H. Shinjo, H. Fujita, G. Gintzburger, J. Ishida and A. Miyazaki. 2005. Measurement of above-ground plant biomass, forage availability and grazing impact by combining satellite image processing and field survey in a dry area of north-eastern Syria. *Grass & Forage Science*, 60 (1): 25-33.

Hopkins, C., J. P. Marais and D. C. V. Goodenough. 2002. A comparison, under controlled environmental conditions, of a *Lolium multiflorum* selection bred for high dry matter content and nonstructural carbohydrate concentration with a commercial cultivar. *Grass & Forage Science*, 57: 367-372.

Hurka, A. H. 2004. Species richness and composition during sylvigenesis in a tropical dry forest in northwestern, *Costa Rica. Tropical Ecology*, 45 (1): 43-57.

Hussain, F. 1989. Field and Laboratory Manual of Plant Ecology. UGC. Islamabad.

Hussain, F. and L. Badshah. 1998. Vegetation structure of Pirghar Hills South Waziristan, Pakistan. *J. Tropical & Subtropical Bot.*, 6: 187-195.

Hussain, F., L. Badshah, P. Sanaullah and M. J. Durrani. 2004. Ethnobotany of timber wood species of South Waziristan, Pakistan. *Pak. J. Pl. Sci.*, 10 (1): 9-16.

Hussain, F., I. Iqbal and P. Akhtar. 2005. Floristic and vegetation studies of Ghalegay Hills, District Swat, Pakistan. *Inter. J. Biol. & Biotechnology (Pakistan)*, 2 (4):847-852.

Hussain, F., L. Badshah and G. Dastagir. 2006. Folk medicinal uses of some medicinal plants of South Waziristan, Pakistan. *Pak. J. Pl. Sci.*, 12 (12): 9-27.

Hussain, A., M. N. Khan, Z. Iqbal and M. S. Sajid. 2008. An account of the botanical anthelmintics used in traditional veterinary practices in Sahiwal district of Punjab, Pakistan. *J. Ethnopharmacol.*, 119 (1): 185-190.

Hussain, F. and M. J. Durrani. 2008. Mineral composition of some range grasses and shrubs from Harboi rangeland Kalat, Pakistan. *Pak. J. Bot.*, 40 (6): 2513-2523.

Hussain, F and M. J. Durrani. 2009. Seasonal availability, palatability and animal preferences of forage plants in Harboi arid range land, Kalat, Pakistan. *Pak. J. Bot.*, 41(2): 539-554.

Hussain, A., S. N. Mirza, I. A. Khan and M. A. Naeem. 2009. Determination of relative species composition and seasonal plant communities of nurpur reserved forest in scrub rangelands of District Chakwal. *Pak. J. Agri. Sci.*, 46 (1): 55-59.

Hussain, T. and M. I. Chaudhary. 2009. A Floristic Description of Flora and Ethnobotany of Samahni Valley (A. K.), Pakistan. *Ethnobotanical Leaflets*, 13: 873-99.

Hussain, F. and M. J. Durrani. 2009a. Seasonal availability, palatability and animal preferences of forage plants in Harboi arid range land, Kalat, Pakistan. *Pak. J. Bot.*, 41 (2): 539-554.

Hussain, F. and M. J. Durrani. 2009b. Nutritional evaluation of some forage plants rom Harboi rangeland, Kalat, Pakistan. *Pak. J. Bot.*, 41 (3): 1137-1154.

Hussain, M. I. and A. Perveen. 2009. Plant biodiversity and phytosociological attributives of Tiko Baran (Kirthar Range). *Pak. J. Bot.*, 41 (2): 581-586.

Hussain, J., N. U. Rehman, A. L. Khan, M. Hamayun, S. M. Hussain and Z. K. Shinwari. 2010 a. Proximate and essential nutrients evaluation of selected vegetables species from Kohat region, Pakistan. *Pak. J. Bot.*, 42 (4): 2847-2855.

Hussain, J. S., M. Ahmad, M. F. Siddiqui and M. Wahab. 2010 b. Threatened and endangered native plants of Karachi. *J. Biol. Biotech.*, 7 (3): 259-266.

Hussain F., S. M. Shah, L. Badshah and M. J. Durrani. 2015. Diversity and ecological characteristics of flora of Mastuj valley, District Chitral, Hindukush range, Pakistan. *Pak. J. Bot.*, 47(2): 495-510.

Ibrar, M, F. Hussain and A. Sultan. 2007 Ethnobotanical Studies on plant resources of Ranyal Hills, District Shangla, Pakistan. *Pak. J. Bot.*, 39 (2): 329-337.

Ilyas, M., Z. K. Shinwari and R, Qureshi. 2012. Vegetation composition and threats to the mountain forest ecosystem of Qalagai hills, Swat, Khyber Pakhtunkhwa, Pakistan . *Pak J. Bot*, 44:113-122.

Ishtiaq, M., W. Hanif, M. A. Khan, A. Ashraf and A. M. Butt. 2007. An ethnomedicinal survey and documentation of important medicinal folklore food phytonims of flora of Samahni valley, (Azad Kashmir) Pakistan. *Pak. J. Biol. Sci.*, 10 (13): 2241-2256.

IUCN. 2001. IUCN Red List Categories and Criteria: Version 3.1. IUCN Species Survival Commission. IUCN. Gland. Switzerland and Cambridge, UK. 2: 30.

Jabbar, A., M. A. Raza, Z. Iqbal and M. N. Khan. 2006. An inventory of the ethnobotanicals used as anthelmintics in the southern Punjab (Pakistan). *J Ethnopharmacol.*, 108 (1): 152-154.

Jabeen, T. and S. S. Ahmad. 2009. Multivariate analysis of environmental and vegetation data of Ayub National Park Rawalpindi. *Soil & Environm.*, 28 (2): 106-112.

Jadeja, B. A. and R. N. Nakar. 2010. Phenological studies of some tree species from girnar reserve forest, Gujarat, India. *Plant Archives*, 10 (2): 825-828.

Jafari, R., M. M. Lewis and B. Ostendorf. 2007. Evaluation of vegetation indices for assessing vegetation cover in southern arid lands in South Australia. *The Rangeland J.*, 29: 9-49.

Jan, G., M. A. Kahan, M. Ahmad, Z. Iqbal, A. Afzal, M. Afzal, G. M. Shah, A. Majid, M. Fiaz, M. Zafar, A. Waheed and F. Gul. 2011. Nutritional analysis, micronutrients and chlorophyll contents of *Cichorium intybus* L. *Jour. Med. Pl.Res.*, 5 (12): 2452-2456.

Johnson, C. M., P. R. Stout, T. C. Broyer and A. B. Carlton. 1957. Comparative chlorine requirements of different plant species. *Plant and Soil* 8: 337–353.

Jorge, R., M. C. Fandino and R. L. Chazdon. 2005. Vegetation structure, composition and species richness across a 56-year chronosequence of dry tropical forest on Providencia Island, Colombia. *Biotropica*, 37 (4): 520-530.

Kafak, S. B., A. Mataji and S. A. Hashemi. 2009. Detecting Hornbeam Trees Phenological Characteristics of Mountain Forest. *American J. Environmental Sciences*, 5 (5): 669-677.

Kallah, M. S. J. O. Bale, U. S. Abdullahi, I. R. Muhammad and R. Lawal. 2000. Nutrient composition of native forbs of semi-arid and dry sub-humid savannas of Nigeria. *Animal Feed Science & Technology*, 84: 137-145.

Kamal, M., S. M. Wazir, M. Hassan, M. Subhan, S. U. Khan, A. Muhammad and S. Taj. 2009. Ethnobotanically important plants of District Bannu, Pakistan *Pak. J. Pl. Sci.*, 15 (2): 87-93.

Karsten, W., S. Miehe and G. Miehe. 2005. Plant communities of the Gobi Gurvan Sayhan National Park (Aymak South Gobi, Mongolia). *Candollea*, 60 (1): 149-205.

Kaur R. and B.D. Vashistha. 2014. Ethnobotanical Studies on Karnal District, Haryana, India. *Int. Res. J. Biological Sci.* 3(8):46-55.

Khan, M. J., H. Steingass and W. Drochner. 2002. Nutrition evaluation of some aquatic plants for animal feeding. *Bangladesh J. Agricultural Science*, 29 (2): 317-324.

Khan, S. U., S. M. Wazir, M. Subhan, M. Zahoor, M. Kamal and S. Taj. 2009. Some of the ethnobotanically important plants of F.R. Bannu, NWFP, Pakistan. *Pak. J. Pl. Sci.*, 15 (1): 81-85.

Khan, S. W. and S. Khatoon. 2007. Ethnobotanical studies on useful trees and shrubs of Haramosh and Bugrote Valleys in Gilgit northern areas of Pakistan. *Pak. J. Bot.*, 39 (3): 699-710.

Khan, Z. I., A. Hussain, M. Ashraf, E. E. Valeem and I. Javed. 2005. Evaluation of variation in soil and forage micro-mineral concentrations in a semiarid region of Pakistan. *Pak. J. Bot.*, 37 (4): 921-931.

Khan, Z. I., M. Ashraf and E. E.Valeem. 2006b. Forage mineral status evaluation: The influence of pastures. *Pak. J. Bot.*, 38 (4): 1043-1054.

Khan, Z. I., M. Ashraf, E. E. Valeem, K. Ahmad and M. Danish. 2007a. Pasture concentration of minerals in relation to the nutrient requirements of farm livestock. *Pak. J. Bot.*, 39 (6): 2183-2191.

Khan, Z. I., M. Ashraf, K. Ahmad, I. Mustafa and M. Danish. 2007b. Evaluation of micro minerals composition of different grasses in relation to Livestock requirements. *Pak. J. Bot.*, 39 (3): 719-728.

Khan, Z. I., A. Hussain, M. Ashraf and L. R. Mcdowell. 2006a. Mineral status of soils and forages in southwestern Punjab-Pakistan: Micro-minerals. *Asian-australasian J. Animal Sciences,* 19 (8): 1139-1147.

Khan, N., M. Ahmed, M. Wahab, K. Nazim and M. Ajaib. 2010. Phytosociology, structure and physiochemical analysis of soil in *Quercus baloot* Griff. Forest District Chitral, Pakistan. *Pak. J. Bot.*, 42 (4): 2429-2441.

Kim, Y. S. 2006. Conservation of plant diversity in Korea. *Landscape & Ecological Engineering*, 2 (2): 163-170.

Kimmel, K., A. Kull, J. O. Salm and U. Mander. 2009. The status, conservation and sustainable use of Estonian wetlands. *Wetlands Ecology & Management*, 18 (4): 375-395.

Kinloch J E, Friedel M H. 2005. Soil seed reserves in arid grazing lands of central Australia. Part 1: seed bank and vegetation dynamics. Journal of Arid Environments, 60: 133–161.

Kiyani, S. A., A. Masood, A. K. Khan and S. Ambreen. 2007. Distribution of secondary metabolites in plants of Quetta-Balochistan. *Pak. J. Bot.*, 39 (4): 1173-1179.

Knoop, M. C. and N. O. Smith. 2006. Foraging ecology of roan antelope: key resources during critical periods. *African J. Ecology*, 44 (2): 228-236.

Koyama A, Y. Yoshihara, U. Jamsran & T. Okuro. 2015. Role of tussock morphology in providing protection from grazing for neighbouring palatable plants in a semi-arid Mongolian rangeland. *Plant Ecology & Diversity*, 8:2, 163-171.

Kramberger, B. and S. Klemencic. 2003. Effect of harvest date on the chemical composition and nutrient value of Ceratium holosteoides. *Grass & Forage Sci.*,58: 12-16.

Kumari. S, D. R. Batish, H. P. Singh, K. Negi and R. K. Kohli. 2013. An ethnobotanical survey of medicinal plants used by Gujjar Community of Trikuta Hills in Jammu and Kashmir, India. *Journal of Medicinal Plants Research (JMPR)*.7(28): 2111-2121.

Laidlaw, M., R. Kitching., K. Goodall., A. Small and N. Stork. 2007. Temporal and spatial variation in an Australian tropical rainforest. *Austral. Ecology*, *32* (1): 10-20.

Loeser, M. R. R., T. D. Sisk and T. E. Crews. 2007. Impact of grazing intensity during drought in Arizona Grassland. *Conservation Biology*, 21 (1): 87-97.311

Lovett, J. C., A. R. Marshall and J. Carr. 2006. Changes in tropical forest vegetation along an altitudinal gradient in the Udzungwa Mountains National Park, Tanzania. *African J. Ecology*, 44 (4): 478-490.

Lucas, R. W., T. T. Baker, M. K. Wood, C. D. Allison and D. M. Vanleeuwen. 2004. Riparian vegetation response to different intensities and seasons of grazing. *J. Range Management*, 57 (5): 466-474.

Lyon, J., and N. M. Gross. 2004. Patterns of plant diversity and plant environmental relationships across three riparian corridors. *Forest Ecology & Managemnet*, 204 (2-3): 267-278.

Macia, M. J. 2004. Multiplicity in palm uses by the Huaorani of Amazonian Eucador. *Botanical J. Linn. Society*, 144 (2): 149-159.

Maestre, F. T., M. A. Bradford and J. F. Reynolds. 2006. Soil heterogeneity and community composition jointly influence grassland biomass. *J. Vegetation Science*, 17 (3): 261-270.

Mahmood A., A. Mahmood, G. Mujtaba, M. S. Mumtaz, W. K. Kayani and M. A. Khan. 2012. Indigenous medicinal knowledge of common plants from district Kotli Azad Jammu and Kashmir Pakistan. *Journal of Medicinal Plants Research*. 6(35): 4961-4967.

Malik, N. Z. and Z. H. Malik. 2004. Present status of subtropical chirpine vegetation of Kotli Hills, Azad Jammu and Kashmir. *J. Res. Sci*., 15 (1): 85-90.

Malik, R. N. and S. Z. Husain. 2006. Classification and ordination of vegetation communities of the Lohibehr reserve forest and its surrounding areas, Rawalpindi, Pakistan. *Pak. J. Bot*., 38 (3): 543-558.312.

Malik, R. N. and S. Z. Husain. 2008. Linking remote sensing and ecological vegetation communities: a multivariate approach. *Pak. J. Bot*., 40 (1): 337-349.

Malik, R. N., S. Z. Husain and I. Nazir. 2010. Heavy metal contamination and accumulation in soil and wild plant species from industrial area of Islamabad, Pakistan. *Pak. J. Bot*., 42 (1): 291-301.

Malik, S. A., A. A. Dasti and S. Mamoona. 2000. Phytoecological studies on wasteland at Bahauddin Zakariya University, New Campus, Multan. *Sci. Khyber*, 13: 11-22.

Malik, Z. H., F. Hussain and N. Z. Malik. 2007. Life form and Leaf Size Spectra of Plan Communities Harbouring Ganga Chotti and Bedori Hills during 1999-2000. *International J. Agriculture & Biology*, 9 (6): 833-838.

Malik S, S. Ahmad, A. Sadiq, K. Alam, H. M. Wariss, I. Ahmad, M. Qasim Hayat, S. Anjum and M. Mukhtar. 2015. A comparative ethno-botanical study of Cholistan (an arid area) and Pothwar (a semi-arid area) of Pakistan for traditional medicines. *Journal of Ethnobiology and Ethnomedicine*, 11:31.

Manan, Z., Sirajuddin, A. Razzaq, M. Islam and Ikramullah. 2007. Diversity of medicinal plants in Wari sub division District Upper Dir, Pakistan. *Pak. J. Pl. Sci*., 13 (1):21-28.

Manhas, R. K., L. Singh, H. B. Vasistha and M. Negi. 2010. Floristic diversity of protected ecosystems of Kandi Region of Punjab, India. *New York Science Journal*, 3 (4): 96-103.

Maoe, A. A., T. M. Hynniewta and M. Sanjappa. 2009. Plant wealth of Northeast India with reference to ethnobotany. *IJTK*, 8 (1): 96-103.

Mapinduzi, A. L., G. Oba, R. B. Weladji and J. E. Colman. 2004. Use of indigenous ecological knowledge of the Maasai pastoralists for assessing rangeland biodiversity in Tanzania. *African J. Ecology*, 41 (4): 329-336.

Maria, G. A., R. M. Harley, D. Q. L. Paganucci, M. D. G. L. Wanderley and V. D. B. Cassio. 2005. Biodiversity and conservation of plants in Brazil. *Conservation Biology*, 19 (3): 632-639.

Mark, A., F. J. M. D. Katharine, A. Jan, S. Rob and W. J. Carol. 2001. Vegetation patterns, plant distribution and life forms across the alpine zone in southern Tierra del Fuego, Argentina. *Austral. Ecology*, 26 (4): 423-440.

Marschner, H. 1995. *Mineral Nutrition of Higher Plants*. New York: Academic Press.

Marwat, S. K., F. U. Rahman, K. Usman ,A. A. Khakwani, S. Ghulam, N. Anwar, M. Sadiq and S. J. Khan. 2011. Medico-ethobotanical studies of edible wild fruit plants species from the flora of north western Pakistan (D. I. Khan District). *Journal of Med. PL. Research*, 5(16):3679-3686.

Marwat, S. K, M. A. Khan, F. U. Rehman, M. Ahmad and M. Zafar. 2011. Biodiversity and importance of floating weeds of Dera Ismail Khan, District of KPK, Pakistan *Afr. J. Tradit Complement Altern Med.*,8 (S):97-107.

Marwat, S. K., K. Usman, R. A. Shah and E. A. Khan. 2013. Floristic account of emergent-aquatic and marshland angiosperms of D. I. Khan District, KPK, Pakistan. *Pak. J. Bot.*, 45(SI):279-288.

Meena, K. L. and B. L. Yadav. 2010. Some traditional ethnomedicinal plants of southern Rajasthan. *IJTK*, 9 (3): 471-474.

Mei,H,C,C.Lin,X.F.Wul and W.F.Goul 2012 Studyon the wild plants biodiversity and vegetation of Cheung Chau Island ,Hong Kong,*plant science Journal /30(1):40-48*

Mendez, E. 2005. The vegetation of the Laguna de Llancanelo Provincial Reserve (Mendoza, Argentina). *Candollea*, 60 (1): 123-148.

Menhinick, E. F. 1964. A comparison of some species-individuals diversity indices applied to samples of field insects. *Ecology*, 45 (4): 859-861.314

Miah, M. D., H. A. Rashid and M. Y. Shin. 2009. Wood fuel use in the traditional cooking stoves in the rural floodplain areas of Bangladesh: A socio-environmental perspective. *Biomass & Bioenergy*, 33 (1): 70-78.

Milewski, A. V. and D. Madden. 2006. Interactions between large African browsers and thorny *Acacia* on a wildlife ranch in Kenya. *African J. Ecology*, 44 (4): 515-522.

Miller, S. M. and R. P. Thompson. 2005. Seasonal patterns of diet composition, herbage intake and digestibility identify limitations to performance of weaker sheep grazing native pasture in the Falkland Islands. *Grass & Forage Science*, 60 (4):356-366.

Mizaraite, D., S. Mizaras and L. Sadauskiene. 2007. Wood fuel supply, costs and home consumption in Lithuania. *Biomass & Bioenergy*, 31 (10): 739-746.

Moe, P. W. and H. F. Tyrrel. 1976. Estimating metabolized and net energy for feed. In: Proc. 1st International Symp. On feed composition. Animal nutrient requirement and computerization of diet. (Eds.): P.V. Fonnesbeck, L. E. Harris and L.C. Kcard. Logon, Utah State Univ. pp. 232-237.

Mohandass, P. D. and D. Vijayan. 2007. Floristic inventory of woody plants in a tropical montane (shola) forest in the Palni hills of the Western Ghats, India. *Tropical Ecology*, 48 (1): 15-25.

Mónica A. V. Solana, V. Y. M. García, A. T. Valencia, G. G. Arenas, J. S. Pacheco, J. J. A. Romero and E. S. Campos. Nutritional Content and Elemental and Phytochemical Analyses of *Moringa oleifera* Grown in Mexico. *Journal of Chemistry*. Article ID 860381, 9 pages. http://dx.doi.org/10.1155/2015/860381.

Mossor-Pietraszewska, T., Kwit, M. & £êgiewicz, M. 1997. The influence of aluminium ions on activity changes of some dehydrogenases and aminotransferases in yellow lupine. *Biol. Bull. Poznañ* 34: 47-48.

Motyka, J., B. Dobrzanski and S. Zawadski. 1950. Wstepne badania nad lakami polundnlowowschodneij Lubeiszczyzny. *Ann. Univ. M. Curie-Jklodowska*, 13: 367-447 (Sec. E. 5).315.

Moussaoui, F., Alaoui, T. and Aoudry, S. (2014) Census Ethnobotanical Study of Some Plants Used inTraditional Medicine in the City of Meknes. *American Journal of Plant Sciences*, 5: 2480-2496.

Muthuramkumar, S., N. Ayyappan, N. Parthasarathy, M. Divya, S. T. R Raman, S. M. Arthur and P. L. Arul. 2006. Plant community structure in tropical rain forest fragments of the Western Ghats, India. *Biotropica*, 38 (2): 143-160.

Mwakalukwa E. E., H. Meilby and T. Treue. 2014. Floristic composition, structure, and species associations of dry miombo woodland in Tanzania. *ISRN Biodiversity*. pp, 15.

Nadaf, M. and S. M. Murtazavi. 2011. Investigation flora and life form of plants in protected region Sarigol (North Khurasan province, Iran). Pak. J. Bio.Sci., 14(1):78-81.

Nasir, E. and S. I. Ali. 1971-2007. Flora of West Pakistan Department of Botany, University of Karachi, Karachi, Pakistan.

Nasrullah K, A. Fayaz, A. Kishwar, S. Shahid. 2015. Composition, structure and regeneration dynamics of *Olea ferruginea* Royle forests from Hindukush range of Pakistan. *Journal of Mountain Science*.12 (3): 647-658.

Nath, A. J., G. Das and A. K. Das. 2008. Vegetative phenology of three bamboo species in subtropical humid climate of Assam. *Tropical Ecology*, 49 (1): 85-89.

Nawaz, T., M. Hameed, N. Naz, M. Sajid, A. Ahmad and A. A. Chaudhary. 2010. Impact of fencing on vegetation structure in Lehri and a Jindi sub mountainous open scrub forest. *J. Biol. Biotech.*, 7 (3): 227-233.

Nazir, A and Z. H. Malik. 2006. Life form and index of similarity of plant communities recorded at Sarsawa Hill District Kotri. *J. Res. Sci.*, 17 (1): 27-33.

Neal, J. E. and B. P. Miller. 2007. Livestock grazing impacts on desert vegetation, Khirthar National Park, Pakistan. *Rangeland Ecology & Management*, 60 (6): 680-684.

Nogueira, A., F. R. C. Costa and C. V. Castilho. 2011. Liana Abundance Patterns: The role of Ecological Filters during Development. Biotropica, 43(4): 442-449.

Nicholas Dickinson, M. Marmiroli, B. Das, D. M. Laughlin, D. Leung & B. Robinson. 2015. Endemic Plants as Browse Crops in Agricultural Landscapes of New Zealand, *Agroecology and Sustainable Food Systems*, 39:2, 224-242.

Noman A., I. Hussain, Q. Ali, A. M. Ashraf and M. Z. Haider. 2013. Ethnobotanical studies of potential wild medicinal plants of Ormara, Gawadar, Pakistan. *Emir. J. Food Agric*. 25 (10): 751-759.

Nosko, P., Brassard, P., Kramer, J.R. & Kershaw, K. A. 1988. The effect of aluminum on seed germination and early seedling establishment, growth and respiration of white spruce (Picea glauca). *Can. J. Bot.* 66:2305-2310.

Okello, J. and P. Sesgawa. 2007. Medicinal plants used by communities of Ngai Subcounty, Apac District, northern Uganda. *African J. Ecology*, 45 (1): 76-83

Pajazitaj, Q. 2012. Flora of order quercetalia pubescentis br-bl. 1932 in the forest vegetation of the Kosovo hilly area. *IIOBJ Journal*., 3(2): 31-38.

Pajazitaj, Q. 2012. Flora of the order quercetalia pubescentis br.-bl.132 in the forest vegetation of in Estonia :A comparison of two classification approaches. *Ann. Bot. Fennichi,* 45:525-540.

Pant, S. and S. S. Samanth. 2012. Diversity and regeneration status of tree species in Khokhan Wildlife Sanctuary, north-western Himalaya. *Tropical Ecology*, 53(3): 317-331.

Pandey, D. D., K. and S. S. Kumar. 2011. Phytosociological studies of grasslands in the vicinity of pataratu thermal power, Hazaribagh, Jharkhund. Journal of Phytology, 3(12): 63-66.

Patrick, O., O. Joseph and A. B. Cunningham. 2004. Regeneration, density and size class distribution of tree species used for drum making in central Uganda. *African J. Ecology*, 42 (2): 129-136.

Patel H. R., R.S. Patel. 2013. Ethnobotanical plants used by the tribes of R.D.F Poshina forest range of Sabarkantha district north Gujrat, India. *International Journal of Scientific and Research Publications*. 3(2): 2250-3153.

Pavlu, V., M. Hejcman, L. Pavlu, J. Gaisler, P. Hejcmanova-Nezerkova and L. Meneses. 2006. Changes in plant densities in a mesic species-rich grassland after imposing different grazing management treatments. *Grass & Forage Science*, 61 (1): 42-51.

Peer, T., J. P. Gruber, A. Millinger and F. Hussain. 2007. Phytosociology, structure and diversity of the steppe vegetation in the mountains of Northern Pakistan. *Phytocoenologia*, 37 (1): 1- 65.

Perry R. Stout, C. M. Johnson, and T. C. Broyer. 1956. Chlorine in Plant Nutrition experiments with plants in nutrient solutions establish chlorine as a micronutrient essential to plant growth. *C a l i f o r n i a a g r i c u l t u r e*, pp 10.

Perveen, A. and M. I. Hussain. 2007. Plant biodiversity and phytosociological attributes of Gorakh hill (Khirthar Range). *Pak. J. Bot.*, 39 (3): 691-698.

Perveen, U. B., S. Roy and A. Kumar. 2007. Traditional uses of medicinal plants among the rural communities of Churu district in the Thar Desert, India. *J. Ethnopharmacol.*, 113: 387-399.

Perveen, A., G. R. Sarwar and I. Hussain. 2008. Plant biodiversity and phytosociological attributes of Dureji (Khirthar Range). *Pak. J. Bot.*, 40 (1): 17-24.

Prakash, K. C. 2005. Indigenous uses, population density and conservation of threatened medicinal plants in protected areas of the Indian Himalayas. *Conservation Biology*, 19 (2): 368-378.

Qasim, M., S. Gulzar, Z. K. Shinwari, I. Aziz and M. A. Khan. 2010. Traditional ethnobotanical uses of halophytes from Hub, Baluchistan. *Pak. J. Bot.*, 42 (3):1543-1551.

Qureshi, R. 2008. Vegetation assessment of Sawan Wari of Nara desert, Pakistan. *Pak. J. Bot.*, (5): 1885-1895.

Qureshi, R. A., S. A. Gilani and M. A. Ghufran. 2007. Ethnobotanical studies of plants of Mianwali District Punjab, Pakistan. *Pak. J. Bot.*, 39 (7): 2285-2290.

Qureshi, R. and G. R. Bhatti. 2005. Nara Desert, Pakistan: Part II: Human Life. *Rangelands (USA)*, 27 (5): 32-35.

Qureshi, R. and G. R. Bhatti. 2006. Floristic list of monocot of Nara Desert, Sindh, Pakistan. *Hamdard Medicus*, 49 (4): 63-67.

Qureshi, R. and G. R. Bhatti. 2008 a. Ethnobotany of plants used by the Thari people of Nara Desert, Pakistan. *Fitoterapia*, 79 (6): 468-473.

Rahim, I. U., J. I. Sultan, M. Yaqoob, H. Nawaz, I. Javed and M. Hameed. 2008. Mineral profile, palatability and digestibility of marginal land grasses of trans-himalayan grasslands of Pakistan. *Pak. J. Bot.,* 40 (1): 237-248.

Rahim, S. M. A., Hussain, R. A. Shamsi and F. Jabeen. 2011. The phytosociological analysis of saline area Tehsil Ferozewala, District Sheikhupura (Punjab), Pakistan. *African J. Environ. Sci. & Technology*, 5(4): 316-326.

Raimondo, D., W. Foden, J. Victor, L. Agenbag, R. C. Turner and N. Helme. 2007. The conservation status of the South Africa's plants with a special focus on plants from the Fynbos Biome. *South African J. Botany*, 73 (2): 308-309.

Randal, D. J. and B. A. Diaz. 2006. Spring-fed wetland and riparian plant communities respond differently to alter grazing intensity. *J. Appl. Ecology*, 43 (3): 485-498.

Rashid, A., M. F. Swati, H. Sher and M. N. Al-Yemeni. 2011. Phytoecological evaluation with detail floristic appraisal of the vegetation around Malam Jabba, Swat, Pakistan. *Asian Pacific Journal of Tropical Biomedicine.* (*SI*):461-467.

Rashid, M. and S. A. Abbas. 2011. Spread of *Prosopis juliflora* on the coastal wild life sanctuary, sand spit/ hawkesbay, Karachi. *Pak. J. Weed Sci. Res.,* 17(2): 195-205.

Rashid S, M. Ahmad, M. Zafar, S. Sultana, M. Ayub, M. A. Khan, G. Yaseen. 2015. Ethnobotanical survey of medicinally important shrubs and trees of Himalayan region of Azad Jammu and Kashmir, Pakistan. *Journal of Ethnopharmacology.* 166: 340–351.

Raunkiær, C. 1934. The Life Forms of Plants and Statistical Plants Geography being the collected Papers of C. Raunkiaer. Clarendon press, Oxford.

Raunkiær, C. 1936. The Life-form Spectrum of some Atlantic Islands. *Botaniske Studier*, 4: 240-328.

Richard, L. A. 1954. Diagnoses and improvement of saline and alkali soils. Agriculture Hand Book, 60: USDA, USA.

Ross, S. M., J. R. King, J. T. O. Donovan and D. M Spaner. 2005. The productivity of oats and berseem clover intercrops. II. Effects of cutting date and density of oats on annual forage yield. *Grass & Forage Science*, 60 (1): 87-98.

Ravi, S., S. Ashokkumar, K. Mallika, P. Kabilar, P. Paneerselvam and M. Gayathri. 2011. Morphological, micro and macro nutrient analysis of the medicinal plant glory lily (*Gloriosa superba* L.). *J. Experim. Sci.*, 2 (6): 04-06.

Rayan, J. N., R. W. Harvey, D. W. Metge and J. E. Larson. 1997. Transport of bacteriophage PRD1 and silica colloids in a sewage-contaminated aquifer. Eos, Transactions of the American Geophysical Union 86, F231. Presented at the Fall Meeting of the American Geophysical Union.

Saed, M., Z. U. Khan and M. Ajaib. 2012. Some phytosociological studies of chasmophytes and epiphytes of Lahore city. *Pak. J. Bot.*, 44:165-169.

Sahota, T. S., 2005. Importance of Sulphur in crop production. *Ontario Farmer*, 38 (42):25.

Saima, S., A. A. Dasti, Q. Abbas and F. Hussain. 2010. Floristic diversity during monsoon in Ayubia National Park District Abbottabad Pakistan. *Pak. J. Pl. Sci.*, 16 (1): 43-50.

Sardar A. A and Z. U. Khan. 2009. Ethnomedicinal studies on plant resources of Tehsil Shakargarh, District Narowal, Pakistan. *Pak. J. Bot.*, 41 (1): 11-18.

Sayer, J., U. Chokkalingam and J. Poulsen. 2004. The restoration of forest biodiversity and ecological values. *Forest Ecology & Management*, 201: 3-11.

Segawa, P. and D. N. Nkuutu. 2006. Diversity of vascular plants on Ssese islands in lake Victoria, central Uganda. African J. Ecology, 44(1): 22-29.

Seiler, G. J. and L. G. Campbell. 2004. Genetic variability for mineral element concentrations of wild Jerusalem artichoke forage. *Crop Sci.*, 44: 289-292.

Seymour, C. L., S. J. Milton, G. S. Joseph, W. R. J. Dean, T. Ditlhobolo and G. S. Cumming. 2010. Twenty years of rest returns grazing potential, but not palatable plant diversity, to Karoo rangeland, South Africa. *J. Applied Ecology*, 47 (4):859-867.

Shah, M. and F. Hussain. 2009. Phytosociological study of the vegetation of Hayat Abad Peshawar, Pakistan. *Pak. J. Pl. Sci.*, 15 (2): 123-128.

Shah, S. M. and F. Hussain. 2008. Ecology of wetlands of Akbarpura, District Nowshera. *Pak. J. Pl. Sci.*, 14 (1): 47-57.

Shah, S. M., F. Hussain and M. Khan. 2013. Phytosociological studies on alpine vegetation of Mastuj Valley, Hindukush Range, Pakistan. *Int. J. Biosci.*, 3(2): 152-157.

Shaheen, H. and Z.K. Shinwari. 2012. Phytodiversity and edemic richness of Karambar lake vegetation from Chitral, Hindukush-Himalayas. *Pak. J. Bot.*, 44(1): 15-20.

Shaheen, H. and R. A. Qureshi. 2011. Vegetation types of Sheosar lake and surrounding landascape in Deosai plains of North Pakistan, Western Himalayas. Jour. Med. Pl. Research, 5(4): 599-603.

Sher, Z., F. Hussain, L. Badshah and M. Wahab. 2011. Floristic composition, communities and ecological characteristics of weeds of wheat fields of Lahore, District Sawabi, Pakistan. *Pak. J. Bot.*, 43(6): 2817-2820.

Sher, Z. and Z. U. Khan. 2007. Floristic composition, life form and leaf spectra of the vegetation of Chagharzai Valley, District Buner. *Pak. J. Pl. Sci.,* 13 (1): 57 - 66.

Sher, H., Midrarullah, A. U. Khan, Z. U. Khan, F. Hussain and S. Ahmad. 2003. Medicinal plants of Udigram, District Swat, Pakistan. *Pakistan J. Forestry*, 53 (1): 65-74.

Sher Z, Khan ZD, Hussain F (2011). Ethnobotanical studies of some plants of Chagharzai valley, District Buner, Pakistan. *Pak. J. Bot.* 43(3):1445-1452.

Sher, Z., F. Hussain and L. Badshah. 2013. Phytosociology of summer vegetation of Sudan Galli hills, District Bagh, Azad Kashmir, Pakistan. *Pak. J. Bot.,* 45(1): 1-9.

Shukla, C.P., and K. N. Mishra. 2006. Floristic composition, biological spectrum and plant diversity of burnt and unburnt grazing lands of Dewghat forest, Koraon range (u.p). *National Academy Science Letters*, 29 (9-10): 345-349.

Siddiqui, M. F., M. Ahmad, N. Khan and I. A. Khan. 2010. Quantitative description of moist temperate conifer forests of Himalayan region of Pakistan and Azad Kashmir. *Int. J. Biol. Biotech.*, 7 (3): 175-85.

Singh KP and C. P. Kushwaha. 2005. Emerging paradigms of tree phenology in Dry Tropics. *Current Sci;* 89: 964-975.

Smet, M. and Ward, D. (2005). A comparison of the effects of different rangeland management systems on plant species composition, diversity and vegetation structure in a semi-arid savanna. *African Journal of Range and Forage Science*. 22 (1): 59-71.

Simpson, E. H. 1949. Measurement of diversity. *Nature*, 163: 688.

Smith, A. & Nutrifert. 2011. Silicon's key role in plant growth. *Australian Grain*, pp, 35.

Smit, C., J. D. Ouden and H. Muller-Scharer. 2006. Unpalatable plants facilitate tree sapling survival in wooded pastures. *J. Appl. Ecology*, 43 (2): 305-312.

Smith, R. L. and T. M. Smith. 1998. Elements of Ecology 4th Ed: The Bonjamin Pub. Co. Inc. Menlo Park, CA.

Smith, T., V. Mlambo, J. L. N. Sikosana, V. Maphosa, I. Mueller-Harvey and E. Owen. 2005. *Dichrostachys cinerea* and *Acacia nilotica* fruits as dry season feed supplements for goats in a semi-arid environment: Summary of a DFID funded project in Zimbabwe. *Animal Feed Science & Technology*, 122 (1-2): 149-157.

Singh, V., R. D. Gaur and B. Bohra. 2008. A Survey of fodder plants in mid-altitude Himalayan rangelands of Uttarakhand, India. *J. Mountain Science*, 5 (3): 265-278.

Sorensen, T. 1948. A method of establishing groups ofequal amplitudes in plant sociology based on similarity of species content and its application to analyze the vegetation of Darnish commons. *Biol. Skr.*, 5: 1-34.

Soule, M. 1985. What is Conservation Biology? *Bioscience*, 35: 727-734.

Staaland., H., I. Brattbakk, K. Ekern and K. Kildemo. 2006. Chemical composition of reindeer forage plants in Svalbard and Norway. *Ecography*, 6 (2): 109-122.

Starks, P. J., D. Zhao, W. A. Phillips and S. W. Coleman. 2006. Development of canopy reflectance algorithms for real-Time prediction of Bermuda grass pastures biomass and nutritive values. *Crop Sci.*, 46: 927-934.

Starks, P. J., S. W. Coleman and W. A. Phillips. 2004. Determination of forage chemical composition using remote sensing. *J. Range Management*, 57 (6): 635 - 640.

Storeheier, P., V, S. D. Mathiesen, J. C. Tyler, N, I. Schjelderup and M. A. Olsen. 2002. Utilization of nitrogen- and mineral-rich vascular forage plants by reindeer in winter. *J. Agricultural Science*, 139 (2): 151-160.

Strobach, B. J. and W. J. Jankowitz. 2012. Phytosociology of the farm Haribes in Nama-Karoo biome of southern Namibia. *Koedoe*, 54(1): 1-13.

Sultan, J. I., I. U. Rahim, A. Javaid, M. Q. Bilal, P. Akhtar and S. Ali. 2010. Chemical composition, mineral profile, palatability and in vitro digestibility of shrubs. *Pak. J. Bot.*, 42 (4): 2453-2459.

Swati S. and V. K. Kanungo. 2014. Ethnobotanical Survey of Surguja District with Special Reference to Plants Used By Uraon Tribe in Treatment of Diarrhea. *International Journal of Herbal Medicine*; 1 (5): 19-22.

Tabanez, A. A. J. and V. M. Viana . 2000. Patch structure within Brazilian Atlantic Forest fragments and implications for conservation. *Biotropica*, 32 (4): 925-933.

Tahira, M., A. Bahadur, Z. Shah, M. Danish, S. Khalid. 2012. Elemental and Nutritional analysis and Ethnomedicinal Study of Selected Wild Plants Species of District Swabi, Khyber Pakhtunkhwa, Pakistan. *Journal of Pharmacy Research.*, 5(9): 4910-4913.

Taj, S., S. M. Wazir, M. Subhan, M. Hassan, S. U. Khan and M. Kamal. 2009. Some of the ethnobotanically important plants of Godi khel & its outskirts hilly areas, District Karak, Pakistan. *Pak. J. Pl. Sci.*, 15 (1): 39-43.

Tandon, P. Kumaria, S. Nongrum and Laibadaiahun. 2009. Conservation and management of plant genetic resources of Northeast India. *IJTK*, 8 (1): 29 - 34.

Tardío, J., M. P. D. Santayana and R. Morales. 2006. Ethnobotanical review of wild edible plants in Spain. *Botanical J. Linn. Society*, 152 (1): 27-71.

Tareen R. B., T. Bibi, M. A. Khan, M. Ahmad and M. D. Zafar. 2010. Indigenous knowledge of folk medicine by the women of Kalat and Khuzdar regions of Balochistan, Pakistan. *Pak. J. Bot.*, 42 (3): 1465-1485.

Thornton, F. C., Schaedle, M. & Raynal, D. L. 1986. Effect of aluminum on the growth of sugar maple in solution culture. *Can. J. For. Res.* 16:892-896.

Tripathi, S. and R. P. Shukla. 2007. Effect of clipping and grazing on various vegetational parameters of grassland communities of Gorakhpur, U.P. *Tropical Ecology*, 48 (1): 61-70.

Ture, C. and H. Bocuk. 2007. An investigation on the diversity, distribution and conservation of *Poaceae* species growing naturally in Eskişehir Province (Central Anatolia–Turkey). *Pak. J. Bot.*, 39 (4): 1055-1070.

Wahab, M., M. Ahmad and N. Khan. 2008. Phytosociology and dynamics of some pine forests of Afghanistan. *Pak. J. Bot.*, 40 (3): 1071-1079.

Wahab, M., M. Ahmad, N. Khan, and A. M. Sarangzai. 2010. A phytosociological study of Pine forest from District Dir, Pakistan. *J. Biol. Biotech.*, 7 (3): 219-226.

Waldern, D. E. 1971. A rapid micro-digestion procedure for neutral and acid detergent fiber: *Can. J. Anim. Sci.*, 51: 67-69.

Walpole, M. J., N. Moriaso and M. Charles. 2004. Status of the Mara woodlands in Kenya. *African J. Ecology*, 42 (3): 180-188.

Wang, R. Z. 2004. Responses of Leymus *chinensis* (*Poaceae*) to long-term grazing disturbance in the Songnen grasslands of north-eastern China. *Grass & Forage Science*, 59 (2): 191-195.

Wazir, S. M., A. A. Dasti and J. Shah. 2004. Common medicinal plants of Chapursan Valley, GojalIi, Gilgit Pakistan. *J. Res. Sci.,* 15 (1): 41-43.

Wazir, S. M., A. A. Dasti, S. Saima, J. Shah and F. Hussain. 2008. Multivariate analysis of vegetation of Chapursan Valley: an alpine meadow in Pakistan *Pak. J. Bot.*, 40 (2): 615-626.

Wazir, S. M., S. Saima, A. A. Dasti and M. Subhan. 2007. Ethnobotanical importance of Salt Range species of District Karak Pakistan. *Pak. J. Pl. Sci.*, 13 (1): 29-31.

Xianping, Z., M. Wang, B. She and Y. Xiao. 2006. Quantitative classification and ordination of forest communities in Pangquangou National Nature Reserve. *Acta Ecologica Scsinica*, 26 (3): 754-761.

Yadav, A. S. and S. K. Gupta. 2007. Effect of micro-environment and human disturbance on the diversity of herbaceous species in Sariska Tiger Project. *Tropical Ecology*, 48 (1): 125-128.

Yadav, R. K. and A. S. Yadav. 2008. Phenology of selected woody species in a tropical dry deciduous forest in Rajasthan, India. *Tropical Ecology*, 49 (1): 25-34.

Yamamoto, Y., Kobayashi, Y. & Matsumoto, H. 2001. Lipid peroxidation is an early symptom triggered by aluminum, but not the primary cause of elongation inhibition in pea roots. Plant Physiol. 125, 199.208.

Zabihullah, N. Akhtar and A. Rashid. 2007. A Checklist of plants in Manzaray Baba Valley Malakand Agency, Pakistan. *Pak. J. Pl. Sci.*, 13 (2): 111-117.

Zahoor, M., S. M. Wazir, A. Muhammad and S. F. Muhammad. 2009. Ethnobotany of some plants from Darra"e Pezo, District Lakki Marwat, Pakistan. *Pak. J. Pl. Sci.*, 15 (1): 75-80.

Zangiabad, S., A. Pourmirzaie, F. Naseri and A. Ahmadimoghadam. 2012. Floristic status of Galoochar *juniper* forest reservoit, Iran *Midle –East Journal of Scientific Research* ,12(2):141-144.

Zarnowski, R. and Y. Suzuki. 2004. Expedient Soxhlet extraction of resorcinolic lipids from wheat grains. *Jour. Food Comp. & Anal.*, 17 (5): 649-663.

Zereen, A., Z. D. Khan and A. A. Sardar. 2013. Ethnobotanical studies of wild herbs of central Punjab, Pakistan. *Bangladesh J. Plant Taxon*. 20(1): 67-76.

Zhao, D., P. J. Starks, B. K. Kindiger and C. T. Mackown. 2008. Interspecies variation of forage nitrogen and nonstructural carbohydrate concentrations in perennial coolseason grasses. *Agronomy J.*, 100 (3): 1-8.

Zheng, Z., Z. Feng, M. Cao, Z. Li and J. Zhang. 2006. Forest structure and biomass of a tropical seasonal Rain Forest in Xishuangbanna, Southwest China. *Biotropica* , 38(3): 318-327.

APPENDICES

Appendix1.Phytosociological attributes of *Achyranthus dentatus-Tamarix aphylla–Tamarix dioica* community at Bargholiarea during autumn 2013.

S.No	Plant species	Density	Cover	Frequency	RD	RC	RF	IV	Leaf Size	Life Form
	A. Trees layers									
1	*Phoenix dactylifera* L.	9.5	9.0	79.9	5.3	10.0	11.0	26.3	Mes	Mp
2	*Tamarix aphylla* (L.) Karst	14.5	15.0	98.9	8.1	16.7	13.6	38.4b	L	Mp
3	*Acacia nilotica* (L.) Delile	2.5	4.0	39.5	1.4	4.4	5.4	11.2	L	Mp
	B. Shrubs layers									
4	*Aerva javanica (Burm.f.) Juss.*	2.5	2.5	29.5	1.4	2.7	4.0	8.1	L	Ch
5	*Calligonum polygonoides*L.	0.5	0.3	9.5	0.2	0.3	1.3	1.8	L	Np
6	*Salvadora oleoides*Decne.	3.5	9.4	49.9	1.9	10.5	6.8	19.2	N	Np
7	*Rhazya stricta Decne*	2.0	0.3	9.5	1.1	0.3	1.3	2.7	N	Ch
8	*Tamarix dioica Roxb ex.Roth.*	8.9	16.9	69.0	5.0	18.8	9.5	33.3c	L	Np
	C.Herbs layers									
9	*Achyranthus dentatus*	34.5	13	98.8	19.4	14.5	13.6	47.5a	N	Th
10	*Cyprus defformis* L.	6.5	1.2	44.5	3.6	1.3	6.1	11.0	N	G
11	*Argyrolobium roseum*	3.5	0.7	25.7	1.9	0.7	3.5	6.1	N	Th
12	*Dactyloctenium carstatum*	1.5	0.3	12.5	0.8	0.3	1.7	2.8	N	H
13	*Polypogon monspeliensis* (L.) Desf.	1.6	0.3	13.5	0.9	0.3	1.8	3.0	Mic	Th
14	*Phragmites karka* (Retz.)Trin. ex Steud.	15.5	10.5	72.5	8.7	11.7	9.9	30.3	Mes	Ch
15	*Coronopus didymus (L.)Smith*	3.5	0.7	26.7	1.9	0.7	3.6	8.2	Mic	Th
16	*Imperata cylindrica* L.	6.5	5.4	45.7	3.6	6.0	6.2	15.8	N	Th
	Total	**177.0**	**89.5**	**725.6**	**65.2**	**99.2**	**99.3**	**263.7**		

Appendix2. Phytosociological attributes of *Chenopodium murale-Desmostachya bipinnata-Acacia nilotica* communityat Pasta area during autumn 2013

S.No	Plant species	Density	Cover	Frequency	RD	RC	RF	IV	Leaf Size	Life Form
				A. Trees layers						
1	*Acacia nilotica* (L.)Delile	7	9.5	70	9.4	21	15.4	26.9c	L	Mp
2	*Zizyphus mauritiana* Lam.	3.5	2.2	30	4.7	0.4	6.6	11.7	N	Mp
3	*Tamarix aphylla* (L.) Karst	2.5	3.5	50	3.3	0.7	11.0	15.0	L	Mp
				B. Shrubs layers						
4	*Capparis spinosa L. (Forssk.) Edgew.*	3.5	2.4	20	4.7	0.5	4.4	9.6	Ap	Np
5	*Periploca aphylla Decne.*	1.5	2.3	10	2.0	0.5	2.2	4.7	Ap	Np
6	*Salvadora oleoides Decne.*	4	0.5	19.5	5.4	0.1	4.2	4.7	N	Np
7	*Zizyphus nummularia* Burm. (f.) Wight &Arn.	2	1.5	10.5	2.7	0.3	2.3	5.3	N	Np
				C.Herbs layers						
8	*Chenopodium murale* L.	23	10.8	85.7	31.0	2.4	18.8	52.2a	L	Th
9	*Desmostachya bipinnata* (L.) Stap f.	20	9.5	99.5	27.0	2.1	21.9	51.0b	N	H
10	*Convolvulus arvensis L.*	4	1.5	32.3	5.4	0.3	7.1	12.8	N	Th
11	*Amaranthus viridis* L.	3	0.5	25.7	4.0	0.1	5.6	9.7	N	Th
	Total	**74**	**442**	**453.7**	**99.6**	**9.5**	**99.5**	**203.6**		

Appendix3. Phytosociological attributies of *Saccharummunja-Tribulusterristris-Capparis spinosa* community at Anghar ghara during autumn 2013

S.No.	Plant species	Density	Cover	Frequency	RD	RC	RF	IV	Leaf size	Life form
	A. Trees layers									
1	*Acacia nilotica* (L.) Delile	8.5	4.5	79.9	9.26	5.5	12.8	27.5	L	Mp
	B. Shrubs layers									
3	*Salvadora oleoides* Decne.	5.2	7.5	40	5.66	9.2	6.4	21.2	N	Np
4	*Periploca aphylla* (Wight) Falc.	3.2	5.5	32	3.47	6.7	5.1	15.2	Ap	Np
5	*Capparis spinosa L* .(Forssk.) Edgew.	5.5	9.2	50.4	5.47	11.2	8.0	24.6c	Ap	Np
6	*Suaeda fruticosa Forssk.exJ.F.Gmelin*	3.2	6	35.5	3.47	7.3	5.7	16.4	L	Ch
7	*Ficus palmate* L.	3.5	10	50	3.81	12.2	8.0	24.0	Mes	Np
	C. Herbs layers									
7	*Saccharum munja* Roxb.	18	21	70.5	19.51	25.7	11.3	56.6a	N	Ch
8	*Tribulus terristris* L.	14	10.2	85.5	15.2	12.4	13.7	41.3b	L	H
9	*Cynoglossum lanceolatum* Forssk.	6	1.0	32.3	6.5	1.2	5.1	12.8	N	H
10	*Cenchrus biflorus* Roxb.	4.5	0.5	25.5	4.8	0.6	4.00	9.4	L	H
11	*Aristida adscensionis* L.	5.5	1.5	30	5.9	1.8	4.8	12.5	Mic	H
12	*Convolvulus arvensis L.*	5.4	1.5	31.3	5.8	1.8	5.0	12.6	N	Th
13	*Plantago lanceolata L.*	2.5	1.2	10.2	2.7	1.4	1.6	5.7	N	Th
14	*Cynodon dactylon* (L.) Pers.	4	0.5	25.8	4.31	0.6	4.7	9.00	L	H
	Iphiona grantoides	3	1.6	23.4	3.2	1.9	3.7	8.8	Mes	Th
	Total	**92.00**	**81.7**	**622.3**	**98.9**	**99.5**	**99.3**	**297.5**		

Appendix4.Phytosociological attributes of *Salvadoraoleoides-Periplocaaphylla-Withaniacoagulans* community at Spin ghar during autumn 2013

S.No.	Plant species	Density	Cover	Frequency	RD	RC	RF	IV	Leafsize	Life form
	A. Trees layers									
1	*Acacia modesta* Wall.	4.5	2.7	50	6.122	3.312	9.53	18.9	L	Mp
2	*Acacia nilotica* (L.)Delile	2.5	3	70	3.40	3.68	13.34	20.4	L	MP
3	*Tamarix aphylla (L.)Karst*	3.5	2.4	60	4.76	2.94	11.43	19.13	L	Mp
	B. Shrubs layers									
4	*Salvadora oleoides* Decne.	15	32.5	90	20.4	39.87	17.15	77.42a	N	Np
5	*Periploca aphylla* Decne.	12.5	16.8	85.5	17.0	20.61	16.30	53.91b	Ap	Np
6	*Rhazya stricta Decne.*	3.5	2.9	30.5	4.76	3.55	5.81	14.12	N	Ch
7	*Calotropis procera* subsp. *Hamiltonii* (Wight) Ali	2.5	3.5	20.5	3.40	4.29	3.90	11.59	Mes	Ch
8	*Withania coagulans(Stocks)Dunal*	5	8.5	20.5	6.80	10.42	3.90	21.12c	Mic	Ch
9	*Calligonum polygonoides* L.	1.5	0.5	10.2	2.04	0.61	0.19	2.84	L	Np
10	*Tamarix dioica Roxb.ex Roth*	3.5	1.7	10.5	4..76	2.08	2.00	8.84	L	Np
	B.Herbs layers									
11	*Datura alba Nees*	6.5	2.0	30	8.84	2.45	5.71	17.00	Mic	Th
12	*Salvia aegyptiaca L.*	5	1.7	25.7	6.80	2.08	9.89	13.77	Mic	G
13	*Coronopus didymus* (L.) Smith.	4.5	1.0	10.3	6.12	3.31	1.96	11.39	Mic	Th
14	*Desmostachya bipinnata (L.)*Stapf.	3.5	2.3	10.8	4.76	2.82	2.05	9.63	N	H
	Total	**73.5**	**81.5**	**524.5**	**96.5**	**102.0**	**98.16**	**300.4**		

Appendix5.Phytosociological attributes of *Solanum surattense-Aerva javanica-Rumex hastatus* at Sur ghar during autumn 2013.

S.No.	Plant species	Density	Cover	Frequency	RD	RC	RF	IV	Leaf size	Life form
A. Tree layers										
1	*Acacia nilotica* (L.)Delile	3.2	1.5	40.3	2.6	0.8	5.8	9.2	L	Mp
2	*Tamarix aphylla* (L.) Karst	7.5	3.5	80.1	6.2	2.0	11.6	19.8	L	Mp
3	*Prosopis farcta (Banks&Sol.)Macbride*	6.2	7.8	70.3	5.1	4.5	10.2	19.8	L	Mp
B. Shrubs layers										
4	*Aerva javanica* (Burm.f.) Juss. exJ.A. Schultes	20.5	33.5	80.2	16.9	19.7	11.6	48.2b	L	Ch
5	*Suaeda fruticosa* Forssk.ex J. F. Gmelin	3.2	5.8	30.4	2.6	3.4	4.4	10.4	L	Ch
6	*Rhazya stricta Decne*	4.5	6.5	25.5	3.7	3.8	3.7	11.2	N	Ch
7	*SalvadoraoleoidesDecne.*	5.3	4.2	23.6	4.3	2.4	3.4	10.1	N	Np
8	*Vitex negundo L.*	3	38.5	20.2	2.4	22.6	2.9	27.9	N	Np
C. Herbs layers										
9	*Datura albaNees*	5.3	6.2	39.5	4.3	3.6	5.7	13.6	Mic	Th
10	*Rumex hastatus L.*	23.5	16.3	92.3	19.4	9.5	13.4	42.3c	Mic	G
11	*Solanum surattense* Burm. f.	8	2.5	27.7	6.6	1.4	4.0	72.0a	Mes	Th
12	*Polypogon monspeliensis* (L.) Desf.	10	3.5	51.3	8.2	2.0	7.4	17.6	Mic	Th
13	*Achyranthes asperaL.*	6	2.5	24.7	4.9	1.4	3.5	9.8	N	Th
14	*Euphorbia prostrate* Ait.	5	4.1	25.7	4.1	2.4	3.7	10.2	L	Th
15	*Launaea nudicaulis* (L.) Hook.f	5.5	2.8	34.3	4.5	1.64	4.9	11.0	Mes	Th
16	*Typha minima* Funck ex Hoppe	4	30.8	21.7	3.3	14.5	3.15	20.9	Mes	G
Total		**120.7**	**170.0**	**687.8**	**99.1**	**9.6**	**99.3**	**344.0**		

Appendix 6. Phytosociological attributies of *Tamarix dioca-Chenopodum album-Phoenix dactylifera* community at Bargholi area during winter 2014

S.No.	Plant species	Density	Cover	Frequency	RD	RC	RF	IV	Leafsize	Life form
A.Trees Layers										
1	*Phoenix dactylifera* L.	11.2	10.5	70	10.7	15.0	11.8	37.5c	Mes	MP
2	*Tamarix aphylla* (L.) Karst	7.5	8	50.5	7.1	11.4	8.5	27.0	L	Mp
3	*Acacia nilotica* (L.) Delile	2.5	1.5	30	2.3	2.11	5.0	9.4	L	Mp
B.Shrubs Layers										
4	*Tamarix dioica* Roxb ex.Roth.	10.5	22.4	80.5	10.0	32.0	13.5	55.5a	L	NP
5	*Zizyphus nummularia* Burm.(f.) Wight & Arn.	4	1.3	22.5	3.8	1.8	3.7	9.3	N	NP
6	*Rhazya stricta Decne.*	5	1.5	30	4.7	2.1	5.0	11.8	N	Ch
7	*Salvadora oleoides Decne.*	4	1.0	20.5	3.8	1.4	3.4	8.6	L	Ch
8	*Aerva javanica (Burm.f.) Juss.*	3	1.7	9.5	2.8	2.4	1.6	2.8	L	Ch
C.Herbs Layers										
9	*Cyprus rotundus* L.	5.2	1.6	30.3	4.9	2.2	5.1	12.2	N	G
10	*Aristida cyanantha Nees ex Steud.*	5.6	0.8	25.7	5.3	1.1	4.3	10.7	Mic	Th
11	*Typha latifolia* Edgew.	5.5	3.4	34.2	5.2	4.8	5.7	15.7	Mes	G
12	*Bromus japonica* Thunb.	3.2	1.0	20.5	3.0	1.4	3.4	7.8	N	H
13	*Chenopodum album* L.	20.5	9.5	75.5	19.6	13.c	12.7	45.8b	N	Th
14	*Setaria verticillata* (L.) P. Beauv	5.5	2.4	32.3	5.2	3.4	5.4	14.0	Mic	Th
15	*Cenchrus biflorus* Roxb.	6	2.0	30.3	5.7	2.8	5.1	13.6	L	H
16	*Cleome brachycarpa* Vahl. ex DC.	5	1.3	30	4.7	1.8	5.0	11.5	N	Th
Total		**104.2**	**69.9**	**592.3**	**98.8**	**99.2**	**99.2**	**297.2**		

Appendix7.Phytosociological attributies of *Dichanthium annulatum-Cymbopogon jwarancusa-Acacia nilotica* community Pasta during winter 2014

S.No	Plant species	Density	Cover	Frequency	RD	RC	RF	IV	Leaf size	Life form
A. Trees layers										
1	*Acacia nilotica* (L.) Delile	6.5	11.5	80.5	7.1	20.5	14.2	41.8c	L	Mp
2	*Zizyphus mauritiana* Lam.	4	2.0	35.5	4.3	3.5	6.2	14.0	N	Mp
3	*Tamarix aphylla* (L.) Karst	2.5	1.5	40.2	2.7	2.6	7.1	12.4	L	Mp
B. Shrubs layers										
5	*Zizyphus nummularia* Burm. (f.)Wight &Arn.	3.5	3.8	20.5	3.8	6.7	3.6	14.1	N	Np
6	*Suaeda fruticosa* Forssk.ex J. F. Gmelin	4	2.5	40.2	4.3	4.4	7.1	15.8	L	Ch
7	*Calligonum polygonoidesl.*	2	3.2	10.5	2.1	5.7	0.6	8.4	L	Np
C.Herbs layers										
8	*Convolvulus arvensis* L.	12	8.7	85.7	13.1	15.5	15.1	28.2	N	Th
9	*Cymbopogon jwarancusa (Jones) Schult.*	23	6.5	75.8	25.1	11.6	13.4	50.1b	N	H
10	*Dichanthium annulatum* (Forssk.) Stapf.	21	8.2	86.7	22.9	14.6	15.3	52.8a	N	H
11	*Echinops echinatus D.C*	3.5	2.0	24.7	3.8	3.5	4.3	11.7	Mic	Th
12	*Polygonum plebejum* R.Br.	3	2.0	25.0	3.2	3.5	4.4	11.1	N	H
13	*Melilotus indica* (L.) All.	4.5	2.5	20.2	4.9	4.4	3.5	12.8	N	Th
14	*Reseda odorata* L.	2	1.5	20.0	2.1	2.6	3.5	8.2	N	Th
Total		**91.5**	**55.9**	**565.5**	**99.4**	**99.1**	**98.3**	**281.4**		

Appendix8. Phytosociological attributies of *Cymbopogonjwarancusa-Dichanthiumannulatum-Eleocharis palastris* community at Anghar ghara duringwinter 2014

S.No.	Plant species	Density	Cover	Frequency	RD	RC	RF	IV	Leaf size	Life form
	A. Trees layers									
1	*Acacia nilotica* (L.) Delile	8.5	6.5	80.2	8.9	9.0	11.7	29.6	L	Mp
	B. Shrubs layers									
2	*FicuspalmateL.*	5	7.8	78.8	5.2	10.8	11.5	27.5	Mes	Np
3	*Salvadora oleoides* Decne.	4.5	2.5	40.2	4.7	3.4	5.9	14.0	N	Np
4	*Periploca aphylla* (Wight) Falc.	5.3	3.2	50.1	5.5	5.5	7.3	18.3	Ap	Np
5	*Capparis spinosa L.* (Forssk.) Edgew.	3.2	4.0	30	3.3	5.5	4.4	13.2	Ap	Np
6	*Suaeda fruticosa Forssk ex J.F.Gmelin*	4.3	2.3	26.5	4.5	3.1	3.8	11.4	L	Ch
7	*Salvadora oleoides Decne.*	4.5	10.0	30.4	4.7	13.8	4.4	22.9	N	Np
	C. Herbs layers									
8	*Cymbopogon jwarancusa (Jones) Schult.*	22	13.3	86.5	23.2	18.4	12.7	54.3a	N	H
9	*Dichanthium annulatum (Forssk.) Stapf.*	12.5	7.1	87.0	13.1	9.8	12.7	35.6c	N	H
10	*Eleocharis palastris*	13	10.0	85.8	13.7	13.8	12.6	40.9b	Mic	H
11	*Echinochloa colona* (L.) Link	4	2.6	32.3	4.2	3.6	4.7	12.5	N	G
12	*Fagonia indica* var.schwein furthii Hadidi	5	2.1	25.7	5.2	2.9	3.7	11.8	L	Th
13	*Iphiona grantoides*	3	0.8	26.4	3.1	1.1	3.8	8.0	Mes	Th
	Total	**94.8**	**72.2**	**679.9**	**99.3**	**100.7**	**99.2**	**299.2**		

Appendix9. Phytosociological attributes of *Salvadoraoleoides- Datura innoxia -Withaniacoagulans* at Spin ghar during winter 2014

S.No.	Plant species	Density	Cover	Frequency	RD	RC	RF	IV	Leaf size	Life form
				A.Trees layers						
1	*Acacia modesta* Wall.	4	2.5	40	5.0	3.11	5.98	14.09	L	Mp
2	*Acacia nilotica* (L.) Delile	5	3.0	60.2	6.25	3.74	9.00	10.99	L	Mp
3	*Tamarix aphylla (L) Karst*	3	1.5	30	3.75	1.87	4.48	10.1	L	Mp
				B. Shrubs layers						
4	*Salvadora oleoides* Decne.	13	20.0	85.5	16.25	24.93	12.78	53.9a	N	Np
5	*Datura innoxia*	11	14.5	80.3	13.75	18.07	12.00	43.8b	Ap	Np
6	*Periploca aphylla* Decne.	3	0.8	20.5	3.75	0.99	3.06	7.8	Mes	Ch
7	*Withania coagulans* Dunal	12	12.1	70.2	15.0	15.08	10.49	40.5c	Mic	Ch
8	*Rhazya stricta Decne*	4	4.3	30.1	5.0	5.36	4.50	14.86	N	Ch
9	*Capparis spinosa L.* (Forssk.) Edgew.	3	2.9	35.5	3.75	3.61	5.30	12.66	Ap	Np
10	*Zizyphus nummularia* (Burm. f.) Wight & Arn.	2	3.6	20.5	2.5	4.48	3.06	10.04	N	Np
11	*Calotropis procera* ssp.*hamiltonii* (Wight) Ali	2	0.8	34.3	2.5	0.99	5.12	8.61	Mes	Ch
12	*Aerva javanica* (Burm.f.) Juss. ex J. A. Schultes	4	1.5	32.5	5.0	1.87	4.85	11.72	L	Ch
13	*Calligonum polygonoides* L.	3	2.4	33.1	3.75	2.99	4.94	11.68	L	Np
				C. Herbs layers						
14	*Convolvulus Prostratus Forssk.*	3	2.1	22.3	3.75	2.61	3.33	9.69	L	Th
15	*Desmostachya bipinnata* (L.) Stapf.	2	1.3	21.5	2.5	1.62	0.37	4.49	N	H
16	*EuphorbiaprostrataAit.*	2	3.2	20.6	2.5	3.99	0.47	6.96	L	Th
17	*Malcolmia africana (L.) R. Br.*	3	2.8	20.7	3.75	3.49	0.41	7.65	N	Th
18	*Caralluma tuberculata* N.E. Brown	1	0.9	11.0	1.25	1.122	1.64	4.01	L (44.4%)	Th
Total		**80.0**	**80.2**	**688.8**	**100.0**	**99.92**	**91.78**	**291.5**		

Appendix10. Phytosociological attributes of *Calotropis procera-Rhazya stricta-Capparis spinosa* community at Sur ghar during winter 2014

S.No.	Plant species	Density	Cover	Frequency	RD	RC	RF	IV	Leaf size	Life form
A. Trees layers										
1	*Acacia nilotica* (L.) Delile	4	3.6	60	2.6	4.3	9.6	16.5	L	Mp
2	*Prosopis farcta (Banks&Sol.) Macbride*	3	2.9	58.0	1.9	3.4	9.2	14.5	L	Mp
B.Shrubs layers										
3	*Rhazya stricta Decne*	12	19.3	80.1	7.9	23.1	12.8	43.8b	N	Ch
4	*Capparis spinosa* L.	8	22.5	70.5	5.2	26.9	11.2	43.3c	Mic	Ch
5	*Suaeda fruticosa* Forssk.ex J. F. Gmelin	5	4.5	40.5	3.3	5.3	6.4	15.0	L	Ch
6	*Withania somnifera (L.) Dunal.*	4	4.4	50.2	2.6	5.2	0.8	15.8	Mic	Ch
7	*Vitex negundo L.*	2	4.2	36.5	1.3	5.0	5.8	12.1	N	Np
8	*Calotropis procera* ssp. *Hamiltonii* (Wight) Ali	13	18.2	84.5	8.6	21.8	13.5	43.9a	Mes	Ch
C.Herbs layers										
9	*Cynodon dactylon* (L.) Pers.	5	0.7	32.3	3.3	0.8	5.1	9.2	L	H
10	*Dinebra retroflora*	4	1.2	40.2	2.6	1.4	6.4	10.4	L	H
11	*Poa annua* L.	3	0.7	25.6	1.9	0.8	4.1	6.8	L	Th
12	*Cenchrus ciliaris* L.	8	1.2	45.7	5.2	1.4	7.3	13.9	L	H
Total		**151.0**	**83.4**	**624.1**	**46.4**	**99.4**	**99.4**	**245.2**		

Appendix 11. Phytosociological attributies of *Tamarixdioica- Rhazya stricta -Salvadora oleoides* community at Bargholi during spring 2014

S.No	Plant species	Density	Cover	Frequency	RD	RC	RF	IV	Leaf size	Life form
A. Trees layers										
1	*Phoenix dactylifera*	11.2	11.7	80.1	11.3	13.9	11.1	36.3	Mes	MP
2	*Tamarix aphylla* (L.) Karst	7.8	9.1	78.0	7.9	10.9	10.8	29.6	L	Mp
3	*Acacia nilotica* (L.) Delile	2	1.2	19.0	2.0	1.4	2.6	6.0	L	Mp
B. Shrubs layers										
4	*Tamarix dioica* Roxb ex.Roth.	11	27.4	87.6	11.0	32.8	12.2	56.0a	L	NP
5	*Zizyphus nummularia* (Burm. f.) Wight & rn.	4.1	4.1	40.1	4.4	8.0	5.5	14.8	N	NP
6	*Salvadora oleoides Decne.*	12	15.6	88.1	12.1	18.6	12.2	42.9c	N	Np
7	*Capparis spinosa L. (Forssk.) Edgew.*	2	0.7	20.1	2.0	0.8	2.8	5.6	Mic	Ch
8	*Rhazya stricta Decne.*	15	4.3	78.5	30.1	5.1	10.9	46.1b	N	Ch
C. Herbs layers										
9	*Desmostachya bipinnata* (L.) Stap f.	5	0.5	26.5	5.0	0.5	3.6	9.1	N	H
10	*Aristida cyanantha Nees ex Steud.*	2	0.4	18.2	2.0	0.4	25.0	4.9	Mic	Th
11	*Datura alba* Nees	1	1.1	6.5	1.0	1.3	0.9	3.2	Mic	Th
12	*Typha latifolia* Edgew.	3	0.8	20.3	3.0	0.9	2.8	6.7	Mes	G
13	*Phragmites karka* (Retz.) Trin. ex Steud.	4	0.6	31.3	4.0	0.7	4.3	9.0	Mes	Ch
14	*Brachiaia reptan*	3	0.4	23.3	3.0	0.47	3.2	6.6	N	Th
15	*Rumex dentatus L.*	2	0.3	11.3	2.0	0.3	1.5	3.8	Mes	G
16	*Euphorbia helioscopia* L.	2	0.3	6.3	2.0	0.3	0.8	3.1	N	Th
17	*Disteria cilians*	4	0.4	20.1	4.0	0.4	20.8	25.2	L	H
18	*Heliotropium europaeum* L.	3	1.4	24.3	3.0	1.6	3.3	7.9	Mic	H
19	*Urtica piluliferaL.*	2	2.1	25.7	2.0	2.5	3.5	8.0	Mic	G
20	*Cyprus defformis* L.	3	1.2	12.3	3.0	1.4	1.7	6.1	N	G
Total		**99.1**	**83.6**	**717.6**	**114.8**	**99.1**	**117**	**330.9**		

Appendix12.Phytosociologicalattributies of *Zizyphus nummularia-Convolvulusarvesis-Lactuca serriola* community Pasta during spring 2014

S.No	Plant species	Density	Cover	Frequency	RD	RC	RF	IV	Leaf size	Life form
A.Trees layers										
1	*Acacia nilotica* (L.) Delile	8	10.2	80.3	5.8	14.4	9.9	30.1	L	Mp
2	*Zizyphus mauritiana* Lam.	3	2.0	40	2.1	2.8	4.9	9.8	N	Mp
3	*Tamarix aphylla* (L.) Karst	2	1.5	35.5	1.4	2.1	4.3	7.8	L	Mp
B.Shrubs layers										
4	*Zizyphus nummularia* (Burm. f.)Wight & Arn.	22	13	91.3	15.9	18.4	11.2	45.5a	N	Np
5	*Periploca aphylla Decne.*	3	2.2	30.4	2.1	3.1	3.7	8.9	L	Ch
6	*Salvadora oleoides Decne.*	5	3.5	20.5	3.6	4.9	2.5	11.0	N	Np
7	*Tamarix dioica Roxb.ex Roth.*	5	2.0	38.2	3.6	2.8	4.7	11.1	N	Np
C.Herbs layers										
8	*Eleocharis palastris*	4	2.5	40.1	2.9	3.5	4.9	11.3	N	G
9	*Lactuca serriola L.*	14	10.1	78.3	10.1	14.3	9.6	34.0c	N	Th
10	*Convolvulus arvesis L.*	27	6.4	90.3	19.5	9.0	11.1	39.6b	N	Th
11	*Cymbopogon jwarancusa (Jones) Schult.*	8.2	3.4	40.1	5.9	4.8	4.9	15.6	N	H
12	*Cynodon dactylon* (L.) Pers.	4.1	2.4	24.7	2.9	3.3	3.0	9.2	L	H
13	*Chenopodium ambrosioides* L.	5.0	1.8	32.3	3.6	2.5	3.9	10.0	L	Th
14	*Vicia sativa L*	4.5	1.6	25.7	3.2	2.2	3.3	8.5	L	Th
15	*Solanum surattense Burm .f.*	5.1	1.5	31.3	3.6	2.1	3.8	9.5	Mes	Th
16	*Oligomeris linifolia* (Vahl.) Macbride.	3	3.1	23.7	2.1	4.3	2.9	9.3	N	Th
17	*Melilotusi ndica* (L.) All.	6	1.6	30.3	4.3	2.2	3.7	10.2	N	Th
18	*Medicago laciniata (L.) Mill.*	7	0.7	38.0	5.0	0.9	4.6	10.5	N	Th
19	*Chenopodium album* L.	2	1.1	19.5	1.4	1.5	2.4	5.3	N	Th
	Total	**137.9**	**70.6**	**810.5**	**97.6**	**99.1**	**94.2**	**297.2**		

Appendix13.Phytosociologicalattributes of *Salvadora-Periploca-Ficus palmate* Anghar ghara during spring 2014

S.No	Plant species	Density	Cover	Frequency	RD	RC	RF	IV	Leaf size	Life form
A.Trees layers										
1	*Acacia nilotica* (L.) Delile	5	2.3	39.1	8.8	3.0	8.5	20.3	L	Mp
B.Shrubs layers										
2	*Ficus palmate*	4	4.2	55.7	7.01	3.5	12.2	24.7c	Mes	Np
3	*Salvadora oleoides* Decne.	15	32.2	88.2	26.3	42.5	19.3	88.1a	N	Np
4	*Periploca aphylla* Decne.	7	17.7	80.1	12.2	23.3	17.5	52.9b	Ap	Np
5	*Dodonaea viscosa (L.) Jacq.*	3	2.2	19.2	5.2	2.9	4.2	12.3	N	Np
6	*Zizyphus numularia* Burm. (f.) Wight & Arn.	2	3.6	17.9	3.5	4.7	3.9	12.1	N	Np
7	*Calligonum polygonoides* L.	2	1.2	30.1	3.5	1.5	6.6	11.6	L	Np
C.Herbs layers										
8	*Peganum harmala* L.	5	3.1	24.7	8.8	4.0	5.4	18.2	L	H
9	*Fumaria indica* (Hausskn.) Pugsley	2	1.7	25.7	3.5	2.2	5.6	11.3	N	Th
10	*Pulicaria crispa (Forssk.) B.H.*	4	2.1	20.1	7.01	2.7	4.4	14.1	L	H
11	*Portulaca quadrifida* L.	3	1.2	18.5	5.2	1.5	4.0	10.7	N	Th
12	*Kickxia incana (Wall) Penn.*	2	3.1	23.7	3.5	4.0	5.2	12.7	L	Th
13	*Malvastrum coromandelianum* (L.) Garcke	3	1.1	12.3	5.2	1.4	2.7	9.3	N	H
	Total	**57.0**	**75.7**	**455.3**	**99.72**	**99.2**	**99.5**	**298.3**		

Appendix14.Phytosociological attributes of *Taraxacum-Aerva javanica-Withania coagulans* community at Spin ghar during spring 2014

S.No	Plant species	Density	Cover	Frequency	RD	RC	RF	IV	Leaf size	Life form
A.Trees layers										
1	*Acacia nilotica* (L.)D elile	4	1.2	40	4.1	1.7	5.6	11.4	L	Mp
2	*Tamarix aphylla* (L.) Karst.	8	4	78.5	8.3	5.8	11.0	25.1	L	Mp
B.Shrubs layers										
3	*Aerva javanica* (Burm.f.) Juss. ex J.A. Schultes	6	8.7	60.3	6.2	12.8	8.4	27.4b	L	Ch
4	*Calotropis procera subs p.hamiltonii (Wight) Ali*	3	2.4	30.2	3.1	3.5	4.2	10.8	Mes	Ch
5	*Withania coagulans* Dunal	5	9.1	35.5	5.2	13.4	5.0	23.6c	Mic	Ch
6	*Datura innoxia*	4	2.1	32.0	4.1	3.0	4.5	11.6	Mes	Ch
C.Herbs layers										
7	*Trianthema portulacastrum* L.	7	4.6	46.5	7.2	6.7	6.5	20.4	N	Th
8	*Taraxacum officinale* F.H. Wigg.	11	10.1	78.5	11.4	14.8	11.0	37.2a	Mic	Th
9	*Imperata cylindrica* L.	4	4.5	32.3	4.1	6.6	4.5	15.2	N	Th
10	*Rumex dentatus* L.	3	2.1	24.7	3.1	3.0	3.4	9.5	Mes	G
11	*Polygonum plebejum* R.Br.	4	3.2	20.2	4.1	4.7	2.8	11.6	N	H
12	*Equsetum arvense* L.	5	4.3	40.1	5.2	6.3	5.6	17.1	Ap	G
13	*Euphorbia hirta* L.	3	1.1	12.3	3.1	1.6	1.7	6.4	L	Th
14	*Veronica aqutica* Bern.	4	3.2	32.4	4.1	4.7	4.5	13.3	N	G
15	*Ranunculus muricatus* L.	6	2.3	40.2	6.2	3.33	5.6	15.1	Mic	G
16	*Plantago lanceolata* L.	8	2.1	52.3	8.3	3.0	7.3	18.6	N	Th
17	*Malvastrum coromandelianum* (L.) Garcke	5	1.4	23.3	5.2	2.0	3.2	10.4	N	H
18	*Heliotropium elipticum* Ledeb.	6	1.5	30.3	6.2	2.0	4.2	12.6	N	Th
	Total	**96.0**	**679**	**709.6**	**99.2**	**99.1**	**99.0**	**297.3**		

Appendix15. Phytosociological attributes of *Salvadoraoleoides-Olea ferruginea-Suaedafruticosa* communityat Sur ghar during spring 2014

S.No.	Plant species	Density	Cover	Frequency	RD	RC	RF	IV	Leafsize	Life form
				A.Trees layers						
1	*Acacia nilotica* (L.) Delile	3	3.7	50	2.8	2.0	5.5	10.3	L	Mp
2	*Prosopis farcta* (Banks & Sol.) Macbride.	4	3.0	40	3.8	1.6	4.4	9.8	L	Mp
				B.Shrubs layer						
3	*Salvadora oleoides Decne*	13	38	85.5	12.5	21.4	9.4	43.3a	N	Np
4	*Capparis spinosa L.* (Forssk.) Edgew.	7	27.5	70.3	6.7	15.5	7.8	30.0	Mic	Ch
5	*Suaeda fruticosa* Forssk.ex J. F. Gmelin	12	20.1	88.5	11.5	11.3	9.8	32.6c	L	Ch
6	*Vitex negundo L.*	3	6.5	60.4	2.8	3.6	6.7	13.1	N	Np
7	*Olea ferruginea* Royle	4	47.5	58.6	3.8	26.8	6.5	37.1b	Mic	H
8	*Artemisia scoparia*	5	3.2	60.4	4.8	1.8	6.7	13.3	Mic	Th
				C.Herbs layers						
9	*Xanthium strumarium* L.	5	5.2	53.0	4.8	2.9	5.8	13.5	N	Th
10	*Euphorbia prostrata* Ait.	4	1.0	26.0	3.8	0.5	2.8	7.1	L	Th
11	*Launea nudicaulis* (L.) Hook.f.	6	2.3	32.3	5.7	1.2	3.5	10.4	Mes	Th
12	*Conyza canadensis* (L.) Cronquist	5	3.2	33.0	4.8	1.8	3.6	10.2	Mic	Th
13	*Eragrostis minor* Host	4	3.1	31.3	3.8	1.7	3.4	8.9	N	H
14	*Medicago laciniata* (L.)Mill.	7	2.5	40.3	6.7	1.4	4.4	12.5	N	Th
15	*Sonchus asper* (L.) Hill	8	3.6	52.4	7.6	2.0	5.8	15.4	Mic	Th
16	*Sonchus oleraceus L.*	9	5.3	58.7	8.6	2.9	6.5	18.0	Mic	Th
17	*Zelays petendra* (L.) C. Jeffery	5	1.4	60.0	4.8	0.7	6.6	12.1	N	Th
	Total	**104**	**177.1**	**900.7**	**99.3**	**99.1**	**99.2**	**29.6**		

Appendix16. Phytosociological attributies of *Tamarix dioica-Capparis spinosa-Phoenixdactylifera* communityat Bargholi area during summer 2014

S.No.	Plant species	Density	Cover	Frequency	RD	RC	RF	IV	Leaf size	Life form
Treeslayers										
1	*Phoenix dactylifera* L.	6	0.4	33.0	6.8	39.0	5.4	51.2c	Mes	MP
2	*Tamarix aphylla* (L.) Karst	6	5.7	80	6.8	6.7	13.1	26.6	L	Mp
3	*Acacia nilotica* (L.) Delile	3	1.7	20.5	3.4	2.0	3.3	8.7	L	Mp
B.Shrubs layers										
4	*Tamarix dioica* Roxb. ex. Roth.	13	33.1	87.9	14.9	39.1	14.4	68.4a	L	NP
5	*Capparis spinosa L. (Forssk.) Edgew*	9	20.5	78.9	10.3	24.2	12.9	47.4b	Mic	Ch
6	*Rhazya stricta Decne.*	5	3.6	20.0	5.7	4.2	3.3	13.2	N	Ch
7	*Suaeda fruticosa* Forssk. ex J. F. Gmelin	3	3.1	19.5	3.4	3.6	3.2	10.2	L	Ch
C.Herbs layers										
8	*Typha latifolia* Edgew.	14	2.1	72.3	16.0	2.4	11.8	30.2	Mes	G
9	*Phragmites karka* (Retz.) Trin. ex Steud.	6	2.5	40.3	6.8	2.9	6.6	16.3	Mes	Ch
10	*Aristida cyanantha* Nees ex Steud.	3	0.7	26.5	3.4	0.8	4.3	8.5	Mic	Th
11	*Ranunculus muricatus L.*	5	0.6	13.3	5.7	0.7	2.1	8.5	Mic	G
12	*Trifolium alexandrianum L.*	4	0.5	38.9	4.5	0.6	6.3	11.4	N	Th
13	*Amaranthus viridis L.*	10	10.0	76.9	11.9	11.8	12.6	36.3	N	Th
Total		**87.0**	**84.5**	**608.0**	**99.6**	**138.0**	**99.3**	**336.9**		

Appendix16. Phytosociological attributies of *Tamarix dioica-Capparis spinosa-Phoenixdactylifera* communityat Bargholi area during summer 2014

S.No.	Plant species	Density	Cover	Frequency	RD	RC	RF	IV	Leaf size	Life form
Treeslayers										
1	*Phoenix dactylifera* L.	6	0.4	33.0	6.8	39.0	5.4	51.2c	Mes	MP
2	*Tamarix aphylla* (L.) Karst	6	5.7	80	6.8	6.7	13.1	26.6	L	Mp
3	*Acacia nilotica* (L.) Delile	3	1.7	20.5	3.4	2.0	3.3	8.7	L	Mp
B.Shrubs layers										
4	*Tamarix dioica* Roxb. ex. Roth.	13	33.1	87.9	14.9	39.1	14.4	68.4a	L	NP
5	*Capparis spinosa L. (Forssk.) Edgew*	9	20.5	78.9	10.3	24.2	12.9	47.4b	Mic	Ch
6	*Rhazya stricta Decne.*	5	3.6	20.0	5.7	4.2	3.3	13.2	N	Ch
7	*Suaeda fruticosa* Forssk. ex J. F. Gmelin	3	3.1	19.5	3.4	3.6	3.2	10.2	L	Ch
C.Herbs layers										
8	*Typha latifolia* Edgew.	14	2.1	72.3	16.0	2.4	11.8	30.2	Mes	G
9	*Phragmites karka* (Retz.) Trin. ex Steud.	6	2.5	40.3	6.8	2.9	6.6	16.3	Mes	Ch
10	*Aristida cyanantha* Nees ex Steud.	3	0.7	26.5	3.4	0.8	4.3	8.5	Mic	Th
11	*Ranunculus muricatus L.*	5	0.6	13.3	5.7	0.7	2.1	8.5	Mic	G
12	*Trifolium alexandrianum L.*	4	0.5	38.9	4.5	0.6	6.3	11.4	N	Th
13	*Amaranthus viridis L.*	10	10.0	76.9	11.9	11.8	12.6	36.3	N	Th
Total		**87.0**	**84.5**	**608.0**	**99.6**	**138.0**	**99.3**	**336.9**		

Appendix17. Phytosociological attributes of *Salvadora-Periploca aphylla-Acacia nilotica* at Pasta during summer 2014

S.No.	Plant species	Density	Cover	Frequency	RD	RC	RF	IV	Leaf size	Life form
A. Trees layers										
1	*Acacia nilotica* (L.) Delile	6	2.0	60	10.1	2.9	12.9	25.9c	L	Mp
2	*Zizyphus mauritiana Lam.*	4	3.0	60	6.7	4.3	12.9	23.9	L	Mp
B.Shrubs layers										
3	*Salvadora oleoides* Decne.	17	42.1	90	28.8	61.6	19.4	109.8a	N	Np
4	*Periploca aphylla* Decne.	5	7.5	50	8.4	10.9	10.7	30.3b	Ap	Np
5	*Capparis spinosa L.* (Forssk.) Edgew.	4	2.1	20	6.7	3.0	4.31	14.0	Mic	Ch
6	*Zizyphus nummularia* Burm. (f.) Wight & Arn.	3	6.5	20	5.0	9.5	4.31	18.8	N	Np
7	*Calligonum polygonoides* L.	6	1.5	50	10.1	2.1	10.7	22.9	L	Np
C.Herbs layer										
8	*Apluda mutica*	5	0.7	40	8.4	1.0	8.6	18.0	Mic	H
9	*Plantago minor L.*	3	1.0	20	5.0	1.4	4.3	10.7	Mic	Th
10	*Plantago lanceolata* L.	4	1.4	33.3	6.7	2.0	7.1	15.8	N	Th
11	*Anagallis arvensis* L.	2	0.5	20	3.3	0.7	4.3	8.3	N	Th
Total		**59.0**	**68.3**	**463.3**	**99.2**	**99.4**	**99.5**	**298.1**		

Appendix18. Phytosociological attributies of *Conyza bonariensis-Fagonia indica-Acacia nilotica* community Anghar ghara during summer 2014

S.No.	Plant species	Density	Cover	Frequency	RD	RC	RF	IV	Leaf size	Life form
				A.Trees layers						
1	*Acacia nilotica* (L.) Delile	8	8.5	78.8	10.0	14.9	12.7	37.6c	L	Mp
2	*Zizyphus mauritiana* Lam.	2	1.9	58.9	2.5	3.3	9.5	15.3	N	Mp
3	*Tamarix aphylla* (L.) Karst	2	1.6	40.0	2.5	2.8	6.4	11.7	L	Mp
4	*Ficus palmate*	3	4.5	38.9	3.7	7.9	6.2	17.8	L	Mp
				B.Shrubs layres						
5	*Zizyphus nummularia* Burm.(f.) Wight & Arn.	4	2.1	20.1	5.0	3.7	3.2	11.9	N	Np
6	*Suaeda fruticosa* Forssk.ex J. F. Gmelin	8	8.5	80.0	10.0	10.6	12.9	33.5	L	Ch
7	*Salvadora oleoides Decne.*	6	3.2	28.9	7.5	5.6	4.6	17.7	N	Np
8	*Dodonaea viscosa (L.) Jacq.*	4	3.1	30.0	5.0	5.4	4.8	15.2	N	Np
				C.Herbs layers						
9	*Conyza bonariensis*	15	8.2	79.0	18.7	14.4	12.7	45.2a	Mic	Th
10	*Fagonia indica* var.schweinfurthii Hadidi	12	10.0	66.3	15.0	17.6	10.7	43.3b	L	Th
11	*Malcolmia scorpioides* (Bunge) Boiss.	3	0.3	12.3	3.7	0.5	1.9	6.1	N	Th
12	*Melilotus longifolia Des*	5	1.2	40.0	6.2	2.1	6.4	14.7	N	Th
13	*Poa infirma H.B.K*	3	2.1	13.0	3.7	7.9	2.0	13.6	L	Th
14	*Dactyloctenium carstatum*	5	1.5	33.0	6.2	2.6	5.3	14.1	N	H
	Total	**80.0**	**56.7**	**619.2**	**99.7**	**99.3**	**99.3**	**91.8**		

Appendix18. Phytosociological attributies of *Conyza bonariensis-Fagonia indica-Acacia nilotica* community Anghar ghara during summer 2014

S.No.	Plant species	Density	Cover	Frequency	RD	RC	RF	IV	Leaf size	Life form
				A.Trees layers						
1	*Acacia nilotica* (L.) Delile	8	8.5	78.8	10.0	14.9	12.7	37.6c	L	Mp
2	*Zizyphus mauritiana* Lam.	2	1.9	58.9	2.5	3.3	9.5	15.3	N	Mp
3	*Tamarix aphylla* (L.) Karst	2	1.6	40.0	2.5	2.8	6.4	11.7	L	Mp
4	*Ficus palmate*	3	4.5	38.9	3.7	7.9	6.2	17.8	L	Mp
				B.Shrubs layres						
5	*Zizyphus nummularia* Burm.(f.) Wight & Arn.	4	2.1	20.1	5.0	3.7	3.2	11.9	N	Np
6	*Suaeda fruticosa* Forssk.ex J. F. Gmelin	8	8.5	80.0	10.0	10.6	12.9	33.5	L	Ch
7	*Salvadora oleoides Decne.*	6	3.2	28.9	7.5	5.6	4.6	17.7	N	Np
8	*Dodonaea viscosa (L.) Jacq.*	4	3.1	30.0	5.0	5.4	4.8	15.2	N	Np
				C.Herbs layers						
9	*Conyza bonariensis*	15	8.2	79.0	18.7	14.4	12.7	45.2a	Mic	Th
10	*Fagonia indica* var.schweinfurthii Hadidi	12	10.0	66.3	15.0	17.6	10.7	43.3b	L	Th
11	*Malcolmia scorpioides* (Bunge) Boiss.	3	0.3	12.3	3.7	0.5	1.9	6.1	N	Th
12	*Melilotus longifolia Des*	5	1.2	40.0	6.2	2.1	6.4	14.7	N	Th
13	*Poa infirma H.B.K*	3	2.1	13.0	3.7	7.9	2.0	13.6	L	Th
14	*Dactyloctenium carstatum*	5	1.5	33.0	6.2	2.6	5.3	14.1	N	H
	Total	**80.0**	**56.7**	**619.2**	**99.7**	**99.3**	**99.3**	**91.8**		

Appendix19.Phytosociological attributes of *Capparis-Zizyphusnummularia-Datura innoxia* at Spin ghar during summer 2014.

S.No.	Plant species	Density	Cover	Frequency	RD	RC	RF	IV	Leaf size	Life form
A. Trees layers										
1	*Acacia nilotica* (L.) Delile	5	4.0	60.2	5.5	4.4	8.6	18.5	L	Mp
B.Shrubs layers										
2	*Zizyphus nummularia* (Burm.f.) Wight & Arn.	13	20.5	78.9	14.3	22.6	11.3	48.2b	N	Np
3	*Capparis spinosa L.* (Forssk.) Edgew.	9.5	28.0	80.0	10.4	30.8	11.5	52.7a	Mic	Ch
4	*Datura innoxia*	12	12.4	76.7	13.2	13.6	11.0	37.8c	Mes	Ch
5	*Tamarix dioica* Roxb.ex Roth.	3	1.3	37.8	3.3	1.4	5.4	10.1	L	Np
6	*Withania coagulans* Dunal	7	6.2	49.1	7.7	6.8	7.0	21.5	Mic	Ch
7	*Calotropis procera* sub sp. *Hamiltonii* (Wight) A.U.	9	8.1	68.9	9.9	8.9	9.9	28.7	Mes	Ch
C.Herbs layers										
8	*Cynodon dactylon* (L.) Pers.	11	1.5	66.0	12.1	1.6	9.5	23.2	L	H
9	*Poa annua* L.	4	0.7	33.2	4.4	0.7	4.7	9.8	L	Th
10	*Fumaria indica* (Hausskn.) Pugsley	5	1.5	32.0	5.5	1.6	4.6	11.7	N	Th
11	*Convolvulus arvensis L.*	4	2.4	38.9	4.4	2.6	5.6	12.6	N	Th
12	*Pulicaria crispa* (Forssk.) BH.	3	0.7	32.4	3.3	0.7	4.6	8.6	L	Th
13	*Convolvulus prostratus* Forssk.	5	3.4	38.9	5.5	3.7	5.6	14.8	L	Th
Total		**90.5**	**90.7**	**693.0**	**99.5**	**99.4**	**99.3**	**298.2**		

Appendix20. Phytosociological attributes of *Withania somnifera- Olea ferruginea –Zizyphus nummularia* Sur ghar during summer 2014

S.No.	Plant species	Density	Cover	Frequency	RD	RC	RF	IV	Leaf size	Life form
A. Trees layers										
1	*Acacia nilotica* (L.) Delile	4	1.4	50	3.3	1.4	6.7	11.4	L	Mp
2	*Tamarix aphylla* (L.) Karst	7	5.2	90	5.8	5.4	12.0	23.0	L	Mp
B.Shrubs layers										
3	*Zizyphus nummularia* (Burm.f.) Wight & Arn	8	9.1	52.3	6.7	9.5	7.0	23.3c	N	Np
4	*Withania somnifera (L.) Dunal.*	5	2.1	26.5	4.2	2.2	3.5	99.0a	Mic	Ch
5	*Olea ferruginea* Royle.	15	17.5	79.9	12.6	18.4	10.7	41.7b	Mic	Ch
6	*Vitex negundo L.*	3	0.6	24.7	2.6	0.6	3.3	6.4	N	Np
7	*Suaeda fruticosa* Forssk.ex J. F. Gmelin	6	7.2	40.0	5.0	7.6	5.3	17.9	L	Ch
C.Herbs layers										
8	*Typha minima* Funck ex Hoppe	10	7.4	42.0	8.4	7.8	5.6	21.8	Mes	G
9	*Trianthema portulacastrum* L.	11	3.3	46.0	9.2	3.4	6.1	18.7	N	Th
10	*Conyza canadensis* (L.) Cronquist	7	5.1	31.3	5.8	5.3	4.1	15.2	Mic	Th
11	*Conyza bonariensis*	6	4.0	38.9	5.0	4.2	5.2	14.4	Mic	Th
12	*Veronica aquatic Bern.*	8	4.3	56.9	6.7	4.5	7.6	18.8	N	G
13	*Taraxacum officinale* F.H. Wigg.	6	4.1	39.8	5.0	4.3	5.3	14.6	Mic	Th
14	*Amaranthus viridis L.*	4	4.5	27.1	3.3	4.7	3.6	11.6	N	Th
15	*Saponaria vaccaria*	3	2.6	40.0	2.5	2.7	5.3	10.5	L	Th
16	*Plantago minor* L.	9	3.9	26.5	7.5	4.1	3.5	15.1	Mic	Th
17	*Zelays petendra (L.) C. Jeffery*	3	2.6	40.0	2.5	2.7	5.3	10.5	N	Th
Total		**119.0**	**94.8**	**745.9**	**111.0**	**99.2**	**99.2**	**386.8**		