

VASCULAR PLANT DIVERSITY IN LANDI KOTAL VALLEY, KHYBER AGENCY, PAKISTAN

ASAD ULLAH¹ AND SAFEER ULLAH²

¹Centre of Plant Biodiversity, University of Peshawar, ²Department of Botany, Islamia College Peshawar

²Corresponding author e-mail: asadbotanist@yahoo.com

Abstract

The present study recorded the vascular Flora of Landi Kotal Valley, Khyber Agency. The whole area was surveyed during the year 2012-2013 and a total of 94 plant species distributed in 85 genera and 48 families were recorded from the research area. Out of 94 species, 5 species belonging to 5 genera and 4 families were Monocots while the rest of the 89 species belonging to 80 genera and 44 families were Dicots. Maximum genera and species were in case of Asteraceae i.e. 10 genera being (11.76 %) and 12 species being (12.77 %) of the total genera and species. Asteraceae is followed by Lamiaceae with 7 genera being (8.24 %) and 7 species being (7.45 %) and Papilionaceae having 5 genera (5.88 %) and 6 species (6.38 %), which is then followed by Solanaceae having 4 genera (4.71 %) and 6 species (6.38 %). Solanaceae is followed by Mimosaceae with 3 genera (3.53 %) and 4 species (4.25 %) followed by Boraginaceae and Zygophyllaceae represented by 3 genera and 3 species each. The habit of plant species showed that 53.19 % were herbs, 23.40 % shrubs, 2.12 % subshrubs, 13.82 % trees, 1.06 % corms, 1.06 % bulbs, 2.12 % succulents, 1.06 % grass and 2.12 % climbers. According to life form observed, the perennials were 47.87 %, deciduous 10.63 %, evergreen 8.51 %, annuals 31.91 % and biennials were 1.06 %.

Introduction

The reason for the name of Khyber Agency is the historical Khyber Pass, which is known worldwide. The Khyber Pass is a source of connection of Central Asia and Afghanistan. The importance of this Pass is recognized worldwide and historians are taking interest in this Pass due to its geographical location and importance. Khyber Agency is located in FATA covering an area of 2576 km² with a population of 546,730. The administrative headquarter of agency is situated in Peshawar. It is stretched from 33° 45' to 34° 20' North latitudes and 70° 27' to 71° 32' East longitudes. Topographically most part of the area is consisting of hills with sporadic valley floorings.

The ranges of Kohe-Suafid, which are extensions of Hindukush range are meeting here and it is the lower end of Pamir in the upper limits. Although the Rivers of Kabul and Bara are flowing in Khyber Agency but due to unavailability of irrigation the area is not fit for cultivation purposes and the hills are without thick vegetation. River Kabul is demarcating the Northern limitation with Mohmand Agency and forming a deep and narrow valley around it. The area is at about 1,180 m starting from the Fort of Jamrud. It is a canyon running inside mountains proceeding towards Afghanistan by crossing the Range of Kohe- Suafid.

A town of Khyber Agency viz. Landi Kotal can be located at 34° 6' 4" N latitude and 71° 8' 44" E longitude and lies on the Khyber Pass at a 1072 m altitude. Landi Kotal is a tourist destination due to historic Khyber Pass. It is accessible by road from elsewhere in Pakistan or from the Afghanistan border just five km to the west. Landi Kotal is the main shopping centre for both the Shinwari and Afridi tribes. The mountains found in the Research area are Kunastar, Sor Wut, Gagra Sar, Shahid Sar, Johar Kandao Sar, Zaman Tsapparai, Bargholi Sar, Abdul Haq Sar, Spera and Sandan Sar. In some areas like Sadu Khel, Niki khel and Sheikhwai a thick forest of *Monotheca buxifolia* is present which give a beauty to these areas, along with providing wood for fuel to the inhabitants of the area. Some common plants found in Landi Kotal are, *Monotheca buxifolia*, *Acacia modesta*, *Acacia nilotica*, *Prosopis juliflora*, *Calotropis procera*, *Withania coagulans*, *Withania somnifera*, *Nerium oleander*, *Dodonea viscosa*, *Artemisia scoparia*, *Olea ferruginea*, *Jasminum humile*, *Eucalyptus lanceolata*, *Carduus edelbergii*, *Chenopodium album*, *Chenopodium murale*, *Conyza Canadensis*, *Calendula arvensis* and *Cersium arvense*.

Floristic inventory is a necessary prerequisite for much fundamental research in subtropical community ecology, such as modeling patterns of species diversity or understanding species distributions (Phillips *et al.*, 2003). The total number of species available on the earth is not determined yet however, it is estimated that the total number of animal and plant species could be between 13 and 14 million (Heywood, 1995). Conservation biologists warn that 25 percent of all species could become extinct during the next twenty to thirty years (Khera *et al.*, 2001). The cause for the loss of species is numerous but the most important is the loss and fragmentation of natural habitats. One of the foundations for conservation of biological diversity in forest landscapes is understanding and managing the disturbances regimes of a landscape (Spies and Turner, 1999). Qureshi and

Khan (1965 who worked on the Flora of Peshawar district and Khyber Agency. During this study they explored most of the localities and collected and documented the Flora of Khyber Agency and Malakand Division and district Peshawar. Jamshed *et al.*, (2014) reported a total of 106 ornamental tree species belonging to 83 genera and 43 families of gymnosperms and angiosperms from Hayatabad Peshawar, Pakistan. Badshah *et al.*, (2013) carried out floristic and ecological studies in District Tank, Pakistan and reported 205 plant species from the area. Many workers have collected and identified plant species from different regions of Pakistan, i.e. a total of 1572 genera and 5521 species have been identified from Pakistan, most of which are confined to mountainous regions (Ali, 2008 and Ali & Qaiser, 1986). In preliminary analysis it was concluded that in the Flora of Pakistan the number of species per genus is much lower than the global average, indicating a high diversity at gene level and almost 80 % of endemic flowering plant species are confined to northern and western mountains where war of terrorism and extremism is going on (Ali & Qaiser, 1986). Akhter *et al.*, (2013) studied the diversity and uses of some ethno-medicinal plants of Swat, North Pakistan. A flora is a compilation of all plant species growing in any geographic area. The identification of local plants along with the description of an area is very important because it can show specific species of the local area and their occurrence, growing season, species hardness, distinct species, finding new species and the effect of climatic conditions like drought and over-grazing on vegetation (Ali, 2008). It is important to update the floral diversity from time to time to know the interaction between different species and interaction with environment ((Ejtehadi *et al.*, 2005; Tastad *et al.*, 2010; Qureshi *et al.*, 2011a, 2011b & 2014; Shaheen *et al.*, 2014; Shinwari *et al.*, 2012 and 2015).

Material and Methods

Regular study tours were made to the research area during March 2012 to May 2013 in the blooming period of the plants to collect plant specimens and all the related information about the plants species. Plant specimens were collected carefully with their full structure (stem, leaves, flowers etc.) from different parts of Landi Kotal valley. During the process of collection photographs were also taken through Digital Camera. After collection specimens were placed in folded newspapers, dried and pressed for about two weeks to get them moisture free. At the same time the plants were numbered and marked with data, location and other characteristics of species. Plants identification was carried out with the help of available literature (Nasir and Ali, 1970-1989; Ali and Nasir, 1989-1991; Ali and Qaiser, 1993-2004; Stewart, 1967 & 1972; Qureshi and Khan (1971) in Flora of Peshawar District and Khyber Agency). While electronic versions of various floras were also accessed through internet for identification of species. The vouchers specimens were deposited at Herbarium of Centre of Plant Biodiversity, University of Peshawar (UPBG).

Results and Discussion

The goal of the present research was to give a detail checklist of the plant species present in the research area. A detail survey was conducted during 2012-2013 for the collection and identification of the plant species found in the research area. A total of 94 species belonging to 85 genera and 48 families were recorded from the research area. Out of 94 species 5 species belonging to 5 genera and 4 families were Monocotyledon i.e. while the rest of the 89 species belonging to 80 genera and 44 families were Dicotyledonae (Table -1). Maximum genera and species in this case were in case of Asteraceae i.e., 10 genera being (11.76 %) and 12 species being (12.77 %) of the total genera and species. Asteraceae is followed by Lamiaceae with 7 genera being (8.24 %) and 7 species being (7.45 %) and Papilionaceae having 5 genera (5.88 %) and 6 species (6.38 %), which is then followed by Solanaceae having 4 genera (4.71 %) and 6 species (6.38 %). Solanaceae is followed by Mimosaceae with 3 genera (3.53 %) and 4 species (4.25 %) followed by Boraginaceae and Zygophyllaceae represented by 3 genera and 3 species each (Fig .1).

The data recorded also showed the forms of different plant species. The number of plant species of different forms were i.e. Trees, 13 (13.82%); Shrubs 22 (23.40%); Sub-shrubs 2 (2.12%); Herbs 33 (56.38%); Climbers 2 (2.12%) and Succulents 2 (2.12%). The life span of different plant species recorded showed that the dominant category was perennials with 45 plant species (47.87%), annuals with 30 plant species (31.91%), deciduous with 10 plant species (10.63%), evergreen with 7 (7.44%) and biennial with 2 (2.12%).

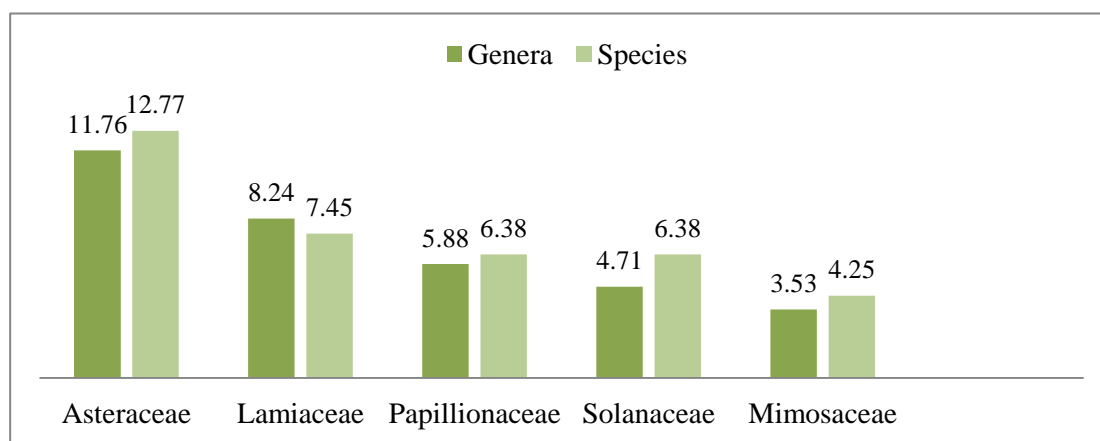


Fig. 1. Showing percentage of genera and species of dominant families.
Recommendations

Compilation of complete flora of Khyber Agency is required, which will provide a guide line for compilation of flora of Jalal Abad (Afghanistan). Restoration and reforestation projects should be launched. Further studies are required for identification of important species and their linkage with the livelihood improvement.

Table-1. Showing scientific names, families, habit, life span, flowering period and flower color of the flora of the research area.

Botanical Name	Family	Habit	Life span	Flowering period	Flower color
Monocots					
<i>Asparagus gracilis</i> Royle	Asparagaceae	Shrub	Perennial	April to July	Not known
<i>Tulipa clusiana</i> DC.	Liliaceae	Herb	Deciduous	March to May	yellow suffused with red
Dicots					
<i>Adhatoda vasica</i> Nees	Acanthaceae	Shrub	Evergreen	November to April (plains); July to October (Hills)	White
<i>Dicliptera roxberghiana</i> Nees		Herb	Annual	August to November	pink with purplish ting.
<i>Pistacia khinjuk</i> Stocks	Anacardiaceae	Shrub	Evergreen	March to April	Not known
<i>Aerva javanica</i> (Burm.f.) Juss.	Amaranthaceae	Sub-shrub	Perennial	January to June, December	Not known
<i>Nerium oleander</i> L.	Apocynaceae	Shrub	Perennial	April to October	White, pink or dark red.
<i>Calotropis procera</i> (Wight) Ali	Asclepiadaceae	Shrub	Perennial	All the year around	White, outside purplish
<i>Caralluma tuberculata</i> N.E. Brown		Succulent	Perennial	January to June	Dark purple
<i>Achillea micrantha</i> Afan.	Asteraceae	Herb	Perennial	June to August	Not known
<i>Artemisia absinthium</i> L.		Herb	Perennial	June to September	Yellow
<i>Artemisia scoparia</i> Waldst. & Kit.		Herb	Biennial	July to November	Not known
<i>Calendula arvensis</i> L.		Herb	Annual	February to April	Yellow
<i>Carduus edelbergii</i> L.		Herb	Annual	Summer–Fall (July–September)	Purple to White
<i>Cirsium arvense</i> (L.) Scop.		Herb	Annual	June to October	Purple to pink
<i>Conyza canadensis</i> (L.) Cronq.		Herb	Annual	year round, mostly summer–fall	White
<i>Lactuca serriola</i> L.		Herb	Annual	(May-Jul) & (Sep-	Yellow

				Oct)	
<i>Lactuca dissecta</i> D. Don.		Herb	Annual	June	Blue to bluish purple
<i>Tragopogon gracilis</i> D. Don.		Herb	Perennial	April to June	Yellow
<i>Sonchus oleraceus</i> L.		Herb	Annual	(April) Jul–Oct. (year-round in some regions.)	Yellow
<i>Xanthium strumarium</i> L.		Herb	Annual	July to October	Greenish
<i>Incarvillea emodi</i> (Royle ex Lindl.) Chatter.	Bignoniaceae	Herb	Perennial	April-early May	Rosey pink with a yellow throat
<i>Sisymbrium pakistanicum</i> Jaf.	Brassicaceae	Herb	Annual	April-June	Pink to white
<i>Cynoglossum glochidiatum</i> Wall.ex Benth.	Boraginaceae	Herb	Biennial	May-August	Blue to bluish white
<i>Heliotropium cabulicum</i> Bunge in Bull.Soc.Nat		Herb	Perennial	May-July	Not known
<i>Onosma khyberianum</i> I.M.Johnston		Herb	Perennial	April	Creamy white
<i>Buddleja crispa</i> Benth.	Buddlejaceae	Shrub	Deciduous	April-May	Purple
<i>Arenaria serphyllifolia</i> L.	Caryophyllaceae	Herb	Annual	In the plains March-April; at higher altitudes, July-September	White
<i>Dianthus crinitus</i> Sm.		Shrub	Perennial		White to Pinkish
<i>Cannabis sativa</i> L.	Cannabaceae	Herb	Perennial	April-September	Greenish
<i>Maytenus royeliana</i> Wall. ex Lawson	Celastraceae	Shrub	Perennial	Throughout the year but more generally during the cold season	Whitish
<i>Chenopodium murale</i> L.	Chenopodiaceae	Herb	Annual	January-July	Greenish
<i>Chenopodium botrys</i> L.		Herb	Annual	April-August	Yellow-green
<i>Colchicum luteum</i> Baker	Colchicaceae	Herb	Perennial	February to May	Yellow
<i>Rosularia adenotricha</i> (Wall.ex Edgew.) Jansson & Rech.	Crassulaceae	Succulent	Deciduous	May-June	Green or purple
<i>Hippophae rhamnoides</i> L.	Elaeagnaceae	Shrub	Deciduous	April-May	Yellow
<i>Chrozophora tinctoria</i> (L.)Raf.	Euphorbiaceae	Herb	Annual	Jan: Sept	Yellowish green
<i>Flacourtia indica</i> Burm.	Flacourtiaceae	Tree	Perennial	March April	Yellowish green
<i>Fumaria indica</i> L.	Fumariaceae	Herb	Annual	March June	White or pale pinkish
<i>Geranium rotundifolium</i> L.	Geraniaceae	Herb	Annual	March-April	Pink
<i>Ajuga bracteosa</i> Wall.ex Benth.	Lamiaceae	Herb	Annual	March-December	Pink or bluish white
<i>Eremostachys loasifolia</i> Benth.		Herb	Perennial	March-April	Yellow
<i>Mentha longifolia</i> (L.) L.		Herb	Perennial	May-November	Purple, violet or white
<i>Otostegia limbata</i> Benth.		Shrub	Perennial	April-May	Yellow to orange yellow
<i>Salvia santolinifolia</i> Boiss		Herb	Perennial	February-May (and later)	Pink to lilac
<i>Stachys sylvatica</i> L.		Herb	Perennial	June-August	Purplish pink
<i>Teucrium stocksianum</i> Boiss.		Herb	Perennial	April-June	Yellowish white with pink marks
<i>Malva parviflora</i> L.	Malvaceae	Herb	Annual	March-November	White with pink

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<i>Melia azadarach</i> L.	Meliaceae	Tree	Perennial	March-April	Purple
<i>Acacia modesta</i> Wall.	Mimosaceae	Tree	Perennial	March-May	Yellow/Cream white
<i>Acacia nilotica</i> (L.) Delite Roberty		Tree	Perennial	March-November	Golden yellow
<i>Leucaena leucocephala</i> (Lam.)Dt. Wit		Tree	Evergreen	June-November	Creamy white
<i>Prosopis juliflora</i> (Swartz) DC		Tree	Perennial	March- June	Greenish yellow
<i>Ficus carica</i> L.	Moraceae	Tree	Perennial	April-December	Green
<i>Morus alba</i> L.		Tree	Perennial	April-September	White to pinkish purple
<i>Jasminum humile</i> L.	Oleaceae	Shrub	Deciduous	April-June	Yellow
<i>Olea ferruginea</i> Royle		Tree	Perennial	April-May, sometimes September	Whitish
<i>Papaver dubium</i> L.	Papaveraceae	Herb	Annual	March- June	Reddish or pinkish
<i>Papaver pavoninum</i> Schrenk.		Herb	Annual	April-June	Red with black blotch
<i>Astragalus anisacanthus</i> Boiss.	Papilionaceae	Shrub	Perennial	September-April	White
<i>Astragalus coluteocarpus</i> Boiss.		Herb	Perennial	June	Yellowish
<i>Indigofera heterantha</i> (Wall.ex Baker) Ali		Shrub	Perennial	May-July	Purple or pale red
<i>Melilotus indica</i> (L.) All		Herb	Annual	March-August	Yellow
<i>Sophora mollis</i> (Royle), Baker and Hook		Shrub	Deciduous	April-September	Yellow/Greenish
<i>Vicia monantha</i> Retz.		Herb	Annual	February-April	Violet to blue
<i>Arundo donex</i> Linn.	Poaceae	Shrub	Perennial	June to December	White
<i>Saccharum benghalense</i> Retz		Herb	Perennial	October to January	Green
<i>Emex spinosa</i> (L.) Campd.	Polygonaceae	Herb	Annual	March-May	Green
<i>Polygala sibirica</i> L.		Herb	Perennial	April-May	Blue
<i>Clematis graveolens</i> Lindl. in J. Hort. Soc.	Ranunculaceae	Climber	Perennial	April-May	Pale yellow
<i>Sageretia theezans</i> (Osbeck.) M.C.	Rhamnaceae	Shrub	Perennial	July-September	Pink-white

<i>Ziziphus jujuba</i> Mill.		Shrub	Evergreen	June-July	White to greenish yellow
<i>Spiraea pilosa</i> L.	Rosaceae	Shrub	Deciduous	May-June	White
<i>Salix denticulata</i> Andersson	Salicaceae	Shrub	Deciduous	April-May	Yellow
<i>Salix tetrasperma</i> Roxb.		Tree	Deciduous	October-March	Yellowish brown
<i>Monothea buxifolia</i> (Falc.) DC	Sapotaceae	Tree	Evergreen	April-May	Yellowish
<i>Kickxia incana</i> (L.) D.	Scrophulariaceae	Herb	Perennial	March-April	Orange yellowish
<i>Misopates orontinum</i> L.		Herb	Annual	March-April	Pinkish
<i>Dodonea viscosa</i> (L.) Jacq.	Sapindaceae	Shrub	Perennial	Jan-March	Greenish yellow
<i>Ailanthus altissima</i>	Simaroubaceae	Tree	Perennial	May-June	Yellowish

(Mill.) Swingle					
<i>Datura innoxia</i> Mill.	Solanaceae	Shrub	Perennial	May-October	White
<i>Datura stramonium</i> L.		Herb	Annual	June-July	White or purple
<i>Hyoscyamus insanus</i> Stock in Hook.		Herb	Perennial	Feb.-April	White to pale
<i>Solanum nigrum</i> L.		Herb	Perennial	Mostly throughout the year	Greenish to whitish
<i>Solanum surattense</i> Burm.		Herb	Annual	Mostly throughout the year	Purple
<i>Withania somnifera</i> (L.) Dunal in DC.		Sub-shrub	Perennial	Mostly throughout the year	Greenish yellow
<i>Tamarix aphylla</i> (L.) Karst.	Tamaricaceae	Tree	Evergreen	June-October	Pinkish white
<i>Debregeasia seanab</i> (Forssk.) Hep.	Urticaceae	Shrub	Evergreen	Mar-Apr	Not known
<i>Forsykalea tenacissima</i> L.		Herb	Perennial	March-September	Yellow- Green
<i>Verbena officinalis</i> L.	Verbenaceae	Herb	Annual	June-December	Pale pink or purplish
<i>Vitis vinifera</i> L.	Vitaceae	Climber	Deciduous	May –July	Greenish
<i>Fagonia arabica</i> Hadidi	Zygophyllaceae	Herb	Annual	Almost throughout the year	Pinkish purple
<i>Tribulus terrestris</i> L.		Herb	Annual	Almost throughout the year	Yellow
<i>Peganum harmala</i> L.		Herb	Annual	April-October	Yellowish white

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