

Taxonomic study of Family Papilionaceae from ShishiKoh Valley, District Chitral, Pakistan

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Abstract: A total of 31 species belonging to 17 genera of family Papilionaceae were collected and identified from the research area. *Astragalus* was the dominant genus with 11 (35.48%) species followed by *Oxytropis*, with 3 species (9.67%), *Medicago*, *Trifolium* and *Vicia* with 2 (6.45%) species each. The rest of genera i.e *Cicer*, *Colutea*, *Galega*, *Glycyrrhiza*, *Hedysarum*, *Lathyrus*, *Melilotus*, *Pisum*, *Robinia*, *Trigonella* and *Westeria* were represented by single (3.22%) species each. The family was dominated by wild herb 16 (83.87%) species followed by cultivated 5 (16.12%) species. Habit-wise the reported species were classified into Annual herb 16 (51.61%), Perennial herb 12 (38.7%), Biennial herb 1 (3.22%), shrubs 1 (3.22%) species and trees with 1 species (3.22%) respectively. Hemicryptophytes was represented by dominant life-form with 21 (67.77%) species, Chaemophyte 6 (19.35%), Phanerophyte 3 (9.67%) and Therophytes with 3 (9.67%) species respectively. Based on Zonation, the Dry stream zone showed maximum number of species with 8 (25.8%) followed by Residential Zone 7 (22.58%) species, Mix Vegetation Zone 6 (19.35%) species, Sub Alpine Zone 5 (16.12%) species, Alpine Zone 3 (9.67%) species, Stony Slope Zone with 2 (6.45%) species respectively. The species of said family were represented in maximum number that is why the research work was initiated. The anthropogenic activities of the study area show the main threats to the plant. Conservation study of Shishikoh valley should be implementing to protect the plant resources.

Index Terms: Papilionaceae, Taxonomic studies, *Astragalus*, ShishiKoh,, District Chitral Pakistan.

I. INTRODUCTION

The taxonomic revision and distributed of plant species (cultivated as well as wild plant) in a specific research area is called flora [1]. Due to excess floristic variability and high arid region express the exceptional and extreme nature of Chitral District, Khyber Pakhtunkhwa, Pakistan [2]. The autotrophic organism represents highly dominant in the Biosphere. The main parts are Flower and fruits play important role in evolutionary succession [3; 4]. Anyway, the major developmental activities and its plants diversity may precede endangered [5]. Taxonomy is the field of science of plant classification is considerable decline [6;7]. About 3500 sq. km covered area of Hindukush-Himalaya is a highly elevated region of plant diversity on the biosphere located between five international floristic regions [8; 9]. Pakistan represents 6000 plant taxa till now [10, 11]. Floristic explorations were conceded out in the different areas of Pakistan viz. Abbottabad, Azad Jammu and Kashmir, Buner, Dir Upper, Chitral, Dir Lower, Koh-i-Suleman range, Kurum valley, Mansehra, Malakand, Waziristan (North and South) and Gilgit Baltistan etc. [10].

Chitral District show richest plant diversity with 1500 (25%) taxa of the total Flora of Pakistan. Phytogeographically the land is positioned in Eastern Irano-Turanian region because of its unique floristic diversity [12]. Various type of documentation were carried out by researcher within Chitral such as [13; 14; 15; 16; 17; 18; 19; 20; 21; 22]. *Delphinium nordhagenii* is an endemic plant collected from Chitral and categorized as Critically endangered [23]. Papilionaceae is a family of dicotyledonous plants nearly like family Leguminosae and considered to be sub family of Leguminosae by represents 480 genera and 12000 species while in Pakistan the family is represented by 82 genera and 600 species Gundersen [24]. A cosmopolitan plant distributes in worldwide except Antarctica and Arctic region. The family shows herbs, sub-shrubs, shrubs, trees and climbers Ali and Nasir [25]. Cowen [26] described that the trees are repeatedly found in tropical areas, but the tropical warm temperate regions show herbaceous plants and shrubs. Leaf was simple or compound modified into tendrils, alternate as well as stipulate. Inflorescence may be racemose or solitary; paniculate or umbellate. The flowers are usually bisexual, complete, irregular, zygomorphic and pedicellate. Calyx was gamosepalous and Corolla was polypetalous in nature. Papilionaceae (butterfly shaped) separated into upper vexillum, two lateral wings and two innermost fused into boats like structure called keel. Stamen was 10, hardly fewer, fused or free, typically diadelphous. Anther was uniform and basifixed. Ovary show some character of unicarpellary, superior, unilocular, ovules numerous. Fruit is legume by 2 or 1 indehiscent or sutures or jointed and contravention up into 1-seeded part. Seed always arillate, with endosperm [27; 28]. No comprehensive study of Papilionaceae was carried out from Shishikoh Valley therefore, the current work was initiated.

STUDY AREA

The largest District of Khyber Pakhtunkhwa (KP), Chitral, Pakistan, Chitral is positioned along with 20% of the local landscape. The land is internationally renowned due to its beauty and recreation value in the Hindukush Mountain of province Khyber Pakhtunkhwa. Shishikoh valley is placed in the northeast of Drosh Tehsil and associated to Azordam Drosh (3.1Km away) from Drosh. A rough link of jeepable road is joined Azordam to the Shishikoh along with the coordinate of 35°36. 256' N and 71°47. 465' E longitude. Administratively the Shishikoh Valley, is the Union Council of Drosh and further divided into 33 villages, which are dispersed along the valleys. The estimated population of the valley are 14, 925 [29]. Map of Chitral is shown in Figure 1.

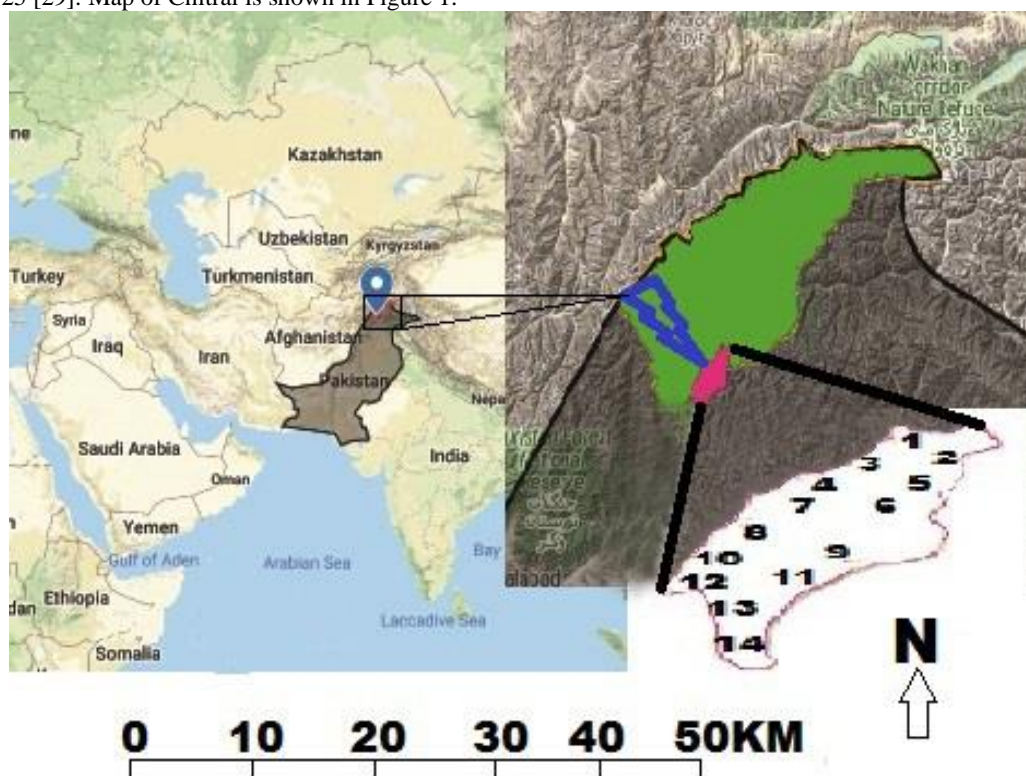


Figure. 1 Map of study area; 1. Madaklasht, 2. Tangalgor, 3. Balpanch, 4. Kawash, 5. Tingel Gol, 6. Goren gol, 7. Kashendel, 8. Birga nisar, 9. Purgal, 10. Istroom, 11. Pursat, 12. Muzdeh, 13. Huzoor Begandeh, 14. Shishi,

II. MATERIALS AND METHODS

Field survey and collections: Throughout 2020-2021, the Shishikoh Valley is surveyed several times for the purpose of plant collection. Plant specimens were collected from research area (Shishikoh Valley). The material of plant specimens was collected in polythene bags. After that the plant specimen were processed for drying and placed within newspaper under the wooden pressers for proper pressing.

Plant processing: After dried by following the Forman and Bridson procedure [30], the plants materials were poisoned. Later on, the specimen were mounted on standard Herbarium sheath. The mounted specimen was properly identified through morphological observation with reference to available literature and Flora of Pakistan 10; 31; 1) as well as by following available literature and plant material placed in the Herbarium. After identification the voucher of plant specimen were deposited in the Herbarium of Hazara University for permanent record.

III. RESULT

A total of 31 species belonging to 17 genera of family Papilionaceae were collected and identified from the research area. *Astragalus* was the dominant genus with 11 (35.48%) species followed by *Oxytropis*, with 3 species (9.67%), *Medicago*, *Trifolium* and *Vicia* with 2 (6.45%) species each. The rest of genera i.e *Cicer*, *Colutea*, *Galega*, *Glycyrrhiza*, *Hedysarum*, *Lathyrus*, *Melilotus*, *Pisum*, *Robinia*, *Trigonella* and *Westeria* were represented by single (3.22%) species each. The family was dominated by wild 26 (83.87%) species followed by cultivated 5 (16.12%) species. These reported species were also classified into Annual herb 16 (51.61%), Perennial herb 12 (38.7%), Biennial herb 1 (3.22%), shrubs 1 (3.22%) species and trees with 1 species (3.22%) respectively. In the life form classification, the Hemicryptophytes represented dominant life form with 21 (67.77%) species followed by Chaemophyte 6 (19.35%) species, Phanerophyte 3 (9.67%) species and Therophytes 3 (9.67%) species respectively. The area was classified into different zone on the basis of elevation, the dominant species were found in Dry stream zone with 8 (25.8%) species, next was Residential Zone 7 (22.58%), Mix Vegetation Zone 6 (19.35%), Sub Alpine Zone 5 (16.12%), Alpine Zone 3 (9.67%), Stony Slope Zone with 2 (6.45%) respectively, (Table 1, Figure 2-3).

Table 1. Check list of Family Papilionaceae of Shishikoh Valley, District Chitral, Pakistan

S/No	Species name	V. No	Zone	Life form	Locality	Leaf Spectra	Habit	Elevation
1.	<i>Astragalus affghanus</i> Boiss.	7914	SAP	He	Tangal Gol	Mi	A. herb	3205m
2.	<i>Astragalus amhirtianus</i> Benth ex. Karasch	5958	MVZ	He	Madak Lasht Ghari	Mi	P. Herb	2408m
3.	<i>Astragalus droshensis</i> Ali.	7913	DSZ	He	Madak Lasht Hill	Mi	P. herb	2713m
4.	<i>Astragalus edelbergianus</i> Sirj.&Rech.f.	7918	SSZ	Ch	Tangal Gol	Mi	P. herb	3000m
5.	<i>Astragalus flemingii</i> Ali in kew Bull.	5995	DSZ	He	Madak Lasht	Ne	P. Herb	2800m
6.	<i>Astragalus graveolens</i> Buch. Hum. ex Benth..	5963	DSZ	He	Madak Lasht way to Ghari	Mi	A. Heb	2510m
7.	<i>Astragalus oxyglotis</i> L.	5961	MVZ	He	MadkaLasht	Mi	A. Heb	2430m
8.	<i>Astragalus psilocentros</i> Fisch. In Bull.	5959	DSZ	He	Madaklasht	Mi	P. Herb	2831m
9.	<i>Astragalus retamocarpus</i> Boissier, Diagn.	5960	MVZ	He	Kashendel	Mi	A. Herb	2130m
10.	<i>Astragalus schremetevianus</i> B.Ftdtsch.	5962	MVZ	He	Way to Madaklasht	Mi	B. Herb	2100m
11.	<i>Astragalus stocksii</i> Bunge. ex Bunge.	7915	SAP	He	Madaklasht	Mi	P. herb	3100m
12.	<i>Cicer nuristania</i> Kitamura	5964	MVZ	He	Madak Lasht	Le	A. Herb	2134m
13.	<i>Colutea pausenii</i> Freyn ssp. <i>pausenii</i>	5969	RZ	Ch	Law hill	Mi	Shrub	1430m
14.	<i>Galega officinalis</i> L.	5967	SSZ	He	Kawash	Mi	A. Herb	1882m
15.	<i>Glycyrrhiza glabra</i> L.	5972	RZ	Ch	Shishi	Mi	Shrub	1333m
16.	<i>Hedysarum minjanense</i> Rech.f.	7844	AZ	Ch	Law mountain	Na	P. herb	4009m
17.	<i>Lathyrus pratensis</i> L.	5971	MVZ	Ch	Kawash	Mi	A. Herb	1882m
18.	<i>Medicago sativa</i> L.	5975	RZ	He	Tar	Mi	P. Herb	1580m
19.	<i>Medicago lupulina</i> L.	6078	RZ	He	Zhondosh	Mi	P. Herb	2106m
20.	<i>Melilotus indica</i> (L.) All.	6078	MVZ	Th	Madak Lasht	Na	A. Herb	2411m
21.	<i>Oxytropis lambertii</i> Pursh	7898	AZ	He	Law Hill	Mi	A. herb	3500m
22.	<i>Oxytropis neglecta</i> J.Gay. ex.ten.	7842	DSZ	He	Madak lasht Hill	Na	A. herb	2713m
23.	<i>Oxytropis mollis</i> Royle ex Benth	5966	DSZ	He	Madak Lasht	Na	A. Herb	2600m
24.	<i>Pisum sativum</i> L.	5965	DSZ	Th	Madak Lasht	Mi	A. Herb	2713m
25.	<i>Robinia pseudoacacia</i> L.	6128	RZ	Ph	Tar Shishi	Mi	Tree	1371m
26.	<i>Trifolium pratense</i> L.	5968	RZ	He	Shashi	Na	A. Herb	1505m
27.	<i>Trifolium resupinatum</i> L.	6079	RZ	He	Shishi	Na	A. Herb	1321m
28.	<i>Trigonella graecum</i> L.	6113	DSZ	He	Tangal gol	Mi	P. herb	2700m
29.	<i>Vicia faba</i> L.	6121	DSZ	Th	Madak lasht	Mi	A. Herb	2548m
30.	<i>Vicia sativa</i> L.	5970	MVZ	He	Madak Lasht	Mi	A. Herb	2135m

31.	<i>Westeria sinensis</i> (Sims) DC	6120	CF	Ph	Shishi	Me	P.Herb	1315m
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Keys; Zones; RZ; Residential Zone, SAZ; Sub Alpine Zone, SSZ; StonySlope Zone, DSZ; Dry Stream Zone, AZ; Alpine Zone, MVZ; Mix Vegetation Zone **Life Form;** Ph; Phanerophytes, He; Hemicryptophytes, Th; Therophytes, Ch; Chaemeophytes **Leaf spectra;** Mi; Microphyll. Le; Leptophyll, Na; Nanophyll **Habit;** A.Herb; Annual Herb, B.Herb; Biennial Herb, P.Herb; Perannial Herb.

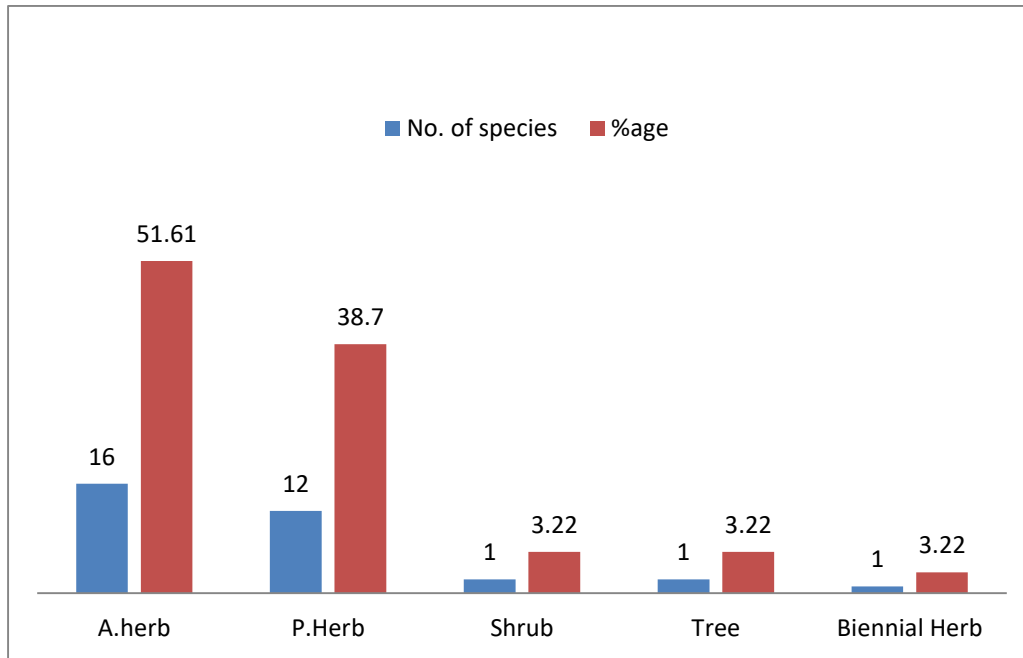


Figure. 2: Graphical representation of habit

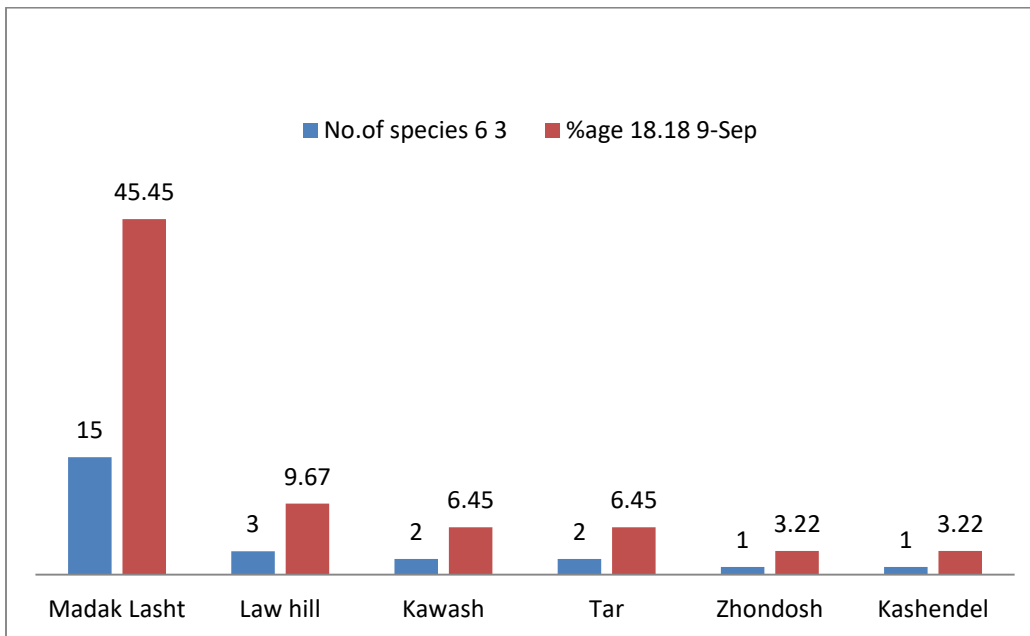


Figure. 3: Species represented in different localities of Shishikoh Valley

IV. DISCUSSION AND CONCLUSION

The Shishikoh valley represent some unique taxonomic diversity. The harsh, tough and arid environmental condition in the study area shows all the major group of plant species of Chitral District. This dominancy is the characteristics of angiosperms (dicots and monocot) and gymnosperms. The floristic composition of the valley greatly varies from site to site. The high elevated area, Madaklasht having maximum altitudinal range of 2800m show greatly diversity of plants. Sum of 31 plant species belonging to 17

genera of family Papilionaceae were collected with dominated genera *Astragalus* 11 (35.48%) species followed by *Oxytropis* 3 (9.67%), *Medicago*, *Oxytropis*, *Trifolium*, *Vicia* 2 (6.45%) species and *Cicer*, *Colutea*, *Galega*, *Glycyrrhiza*, *Hedysarum*, *Lathyrus*, *Melilotus*, *Pisum*, *Robinia*, *Trigonella* and *Westeria* 1 (3.22%) species each. The wild were dominant with 26 (83.87%) species followed by cultivated 5 (16.12%) species. The Annual herb 16 (51.61%) were dominant over Perennial herb 12 (38.7%), Biennial herb 1 (3.22%), shrubs 1 (3.22%) species and trees 1 species (3.22%). Similarly, the diversity of plant taxa was also recorded [31; 32; 33] from different districts of Pakistan. Similar results were made by [34; 35], who also explored same floristic study of these families from different region of KP, Pakistan [36]. *Astragalus* is a dominant genus with 11 species in our study area and the results showed resemblance with the studies of Ali [11; 37; 38; 39]. Sher and Khan [40] report plant species from District Buner, amongs 243 documented genera, the leading genera was *Astragalus* (11 species) followed by *Nepeta* (9 Spp.), *Artemisia* (6 Spp.), thus our results show harmony with their findings. However, Wali [41] documented Papilionaceae as dominant family (22 Spp.; 12 genera) for Shishikoh Valley. Badshah *et al.* [42] also reported these families to be well represented in semi-arid area of district Tank, Pakistan. Current study reveals the first ever documentation of plants taxa (Papilionaceae) from Shishikoh valley District, Chitral. According to each researcher, the Papilionaceae is dominant throughout Chitral within each spot. In the concerned area anthropogenic activities, soil erosion, over grazing and habitat destruction may play important role in plant destruction. According to previous work, recent work and current report, the area may face vegetation pressure due to the anthropogenic activities and other requirement of life resources. These species regressions may be necessary to be controlled and maintenance for their existence and conservation of their resources. It is stated that Shishikoh valley display dangerous regions particularly high-elevated valleys up to the alpine zone of Madaklasht demand nonstop efforts, as for plant investigation is considered, that more new taxa could be discovered.

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Conflict of Interest: The authors declare no conflict of interest.

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