

Research Article



Taxonomic and Medicinal Study of Papilionaceae of District Upper Dir, Khyber Pakhtunkhwa, Pakistan

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Abstract | Twenty seven plant species of the Papilionaceae were collected from Dir Upper, with elevation ranges from 1200–4000 meters during 2015–2017. They were taxonomically determined with the help of key characters, the uses of these native plants were recorded such type of study was concluded for the first time in the selected area of Dir (Upper). In view of the fact that these plant species are scarcely distributed, hence struggle should be made to protect them. The key objective of the present study was to file the taxonomic knowledge and the local and medicinal uses of the root juice of *Desmodium elegans* DC, combined with the bark juice of *Bauhinia malabarica* for the treatment of cholera, branches of the *Indigofera heterantha* Wal. ex Brands vari; *gerardiana* used in basket making, twig bridges making, soil cover for preventing erosion. Similarly, *Astragalus* genus used as a fodder, fuel wood, miswak, fatigue, tooth ache, *Crotalaria juncea* forage for goats and cattle and also toxic alkaloids, particularly in the seeds and pods, *Lathyrus cicera* is used as a green manure, soil cover for preventing erosion and in breeding program for the plant species, *Medicago minima* is rich source of vitamins A, C, and E, green manure and fixes atmospheric nitrogen, *Robinia pseudo-acacia* is astringent, diuretic, emetic, emollient, laxative, poison, purgative, sedative, tonic, emetic and for toothache, *Sophora mollis* is seed destroying verm, wood used as fuel, *Trifolium repens* antirheumatic tonic and ointment, *Trigonella emodi* flowers and leaves are dried and powdered. One spoon of powder is taken twice a day for one week to cure jaundice, *Vicia faba* can be eaten before it is fully ripened in the same way as broad beans, fully ripened seed requires overnight soaking to soften it before cooking. All the species of the selected family are reported for the first time and studied for medicinal purposes.

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Introduction

The investigation was completed in Dir upper. The zone is situated between 34° 10' N, latitude and 72° 20' E, longitudes in a subtropical dry temperate bit of Hindu Kush range. Region Dir (Upper) is among the 26 districts of KP region and spreads a territory of 3699 Km². Kohistan valley begins with its portal

called “Khawgo Ooba” and reached out to Kumrat around 120km. According to the forest division the area of Dir Kohistan is 645 square miles. Out of this a zone of 1, 40351 sections of land were secured by coniferous/pine forest (Hazrat *et al.*, 2010; Hazrat, 2020). The relative humidity is very high consistently, while most extreme humidity has been recorded in the month of Jan; to February. The zone gives natural

habitat to the development of an expansive number of plants. It has a rich diversity of plant resources (Bhatti *et al.*, 2010).

Papilionaceae usually known as of the pea family is comprised of herbs and shrubs of about 375 genera and 500 species found extremely varied soil and climatic conditions. The family is cosmopolitan and rank second among the dicot families including other two sub families of Leguminosae (Philcox, 1990) carry out a preliminary study of the flora of Hindukush Range and published a checklist of 144 medicinal plants from the selected region. Furthermore, the floristic and Ethnobotanical study from some parts of this area (Bhatti *et al.*, 2010). Since, Papilionaceae on this name is poorly known and not so far published from this area; an effort has been made to report the members of the Papilionaceae from the study area. The present paper is the only source of systematic account of the Papilionaceae from the selected area.

Materials and Methods

Field trips were arranged in the whole areas of Dir upper in different seasons of 2015-2017. The area information was collected with respect to the plant species from locals through individual meetings questionnaires and dialogs and so on. The indigenous knowledge incorporates the local name of the plant sample, blooming and fruiting seasons, flower color, lifetime and so forth. The identification of the scientific names of the plants was made with the assistance of authentic literature of various authors (Ali and Nasir, 1989-1992; Ali and Qaiser, 1993-2018; Nasir and Ali, 1980-1989; Jafri, 1966; Philcox, 1990; Hazrat *et al.*, 2020). The plant samples have been housed in the herbarium of Botany Department; SBB University, Wari Campus and the University of Malakand Chakdara for future research exercises of BS to Ph.D. level.

Results and Discussion

Floristic survey of the district was conducted with regular intervals in summer and spring in the years of 2015-2017 for collection of plant samples. Twenty seven plant species distributed across eleven genera of the selected family have been identified. Their serial number (S.N), Voucher number (V.N), Botanical name, Vernacular name (Vern; N) Research area and Local/Medicinal uses are given Table 1.

Key to the genera

1. Shrub, tree---2
+ Herbs---5
2. Stamens free---*Sophora*
+ Stamens not free ----3
3. Leaf trifoliolate---*Desmodium*
+ Leaf not trifoliolate ----4
4. Tree with stipular spines----*Rubinia*
+ Shrub without stipular spines----*Indigofera*
5. Leaves with tendrils-----6
+ Leaves without tendrils -----7
6. Staminal tube with truncate mouth----*Lathyrus*
+ Staminal tube with oblique mouth-----*Vicia*
7. Leaf simple----*Crotalaria*
+ Leaf compound-----8
8. Fruit, spirally, coiled----*Medicago*
+ Fruit otherwise----9
9. Leaf trifoliolate -----10
+ Leaf pinnate-----*Astragalus*
10. Fruit 1-2 seeded----- *Trifolium*
+ Fruit many seeded----*Trigonella*

Genus: *Desmodium* DC. 1825.

Key to the species

1. Fruit stipe and bent at right angles to it's stalk-----
Desmodium podocarpum
+ Fruit usually sessile, not bent at right angles to its stalk-----*Desmodium elegans*

Genus: *Indigofera* L., 1753.

Key to the variety

1. Fruit 1-1.6 cm long---*Indigofera heterantha* var. *heterantha*
+ Fruit 2-5.0 cm long ----*Indigofera heterantha* var. *gerardiana*.

Genus: *Lathyrus* L., 1753.

Key to the species

1. Leaflets, absent-----*Lathyrus aphaca*
+ Leaflets, present-----2
2. Leaflets -----*Lathyrus humilis*
+ Leaflets 2-----3
3. Inflorescence 5-12 flowered----*Lathyrus pratensis*
+ Inflorescence one flowered-----4
4. Fruit upper suture broadly wing; 3-5 seeded----
Lathyrus sativus
+ Fruit upper suture flattened, with two narrow lateral keels; 2-6 seeded----*Lathyrus cicera*

Table 1: Check list of *Papilionaceae* plant species collected from the selected research area.

S.N	V. N	Botanical name	Vern; N	Research area	Local/Medicinal uses
1	415	<i>Astragalus pyrrhotrichus</i> Boiss.	Mamol	Sheringal, Dogdara, Sunderae	Diarrhea, fatigue, infections, heart disease, hepatitis and therapy for cancer
2	434	<i>Astragalus anisacanthus</i> Boiss.	Mamol	Kumrat, Dogdara	Fodder and fuel wood
3	695	<i>Astragalus graveolens</i> Buch.-Ham. ex Bth.	Kachmamol	Sheringal, Sunderae, Lamutai, Janus candio	Miswak, fodder and fuel wood
4	425	<i>Astragalus psilocentros</i> Fisch.	Mamol	Kumrat, Sunderae, Lamutai, Janus candio	Flue and tooth ache
5	395	<i>Crotalaria juncea</i> L.	Nil	Sunderai , Dogdara, Sheringal	Forage for goats and cattle and also toxic alkaloids, particularly in the seeds and pods
6	692	<i>Desmodium elegans</i> DC.	Chamkat	Thall, Dogdara, Sunderae	Roots are diuretic, carminative and tonic, also used in the treatment of bilious complaints, juice of the root combine with the bark juice of <i>Bauhinia malabarica</i> , for the treatment of cholera
7	443	<i>Desmodium podocarpum</i> DC.	Chamra	Dojanga, Dogdara, Sunderae, Lamutai, Janus candio	Whole plant used for reducing fever, malaria, coughs, bleeding wounds, treating dysentery, rheumatism, anti-inflammatory and antipyretic.
8	715	<i>Indigofera heterantha</i> Wal. ex Brands vari; <i>gerardiana</i> (Wal. ex Bker) Ali	Ghwaraja	Shahoor , Dogdara, Sheringal, Sunderae, Lamutai, Janus candio	Branches are used in basket making, making twig bridges and fuel
9	725	<i>Indigofera heterantha</i> Wal. Ex Brands var; <i>Heterantha</i>	Ghwaraja	Common	Branches are used in basket making, making twig bridges and fuel
10	414	<i>Lathyrus cicera</i> L.	Wara Chilo	Thall, shahoor	Used as a green manure, soil cover for preventing erosion and used in breeding program for the species.
11	862	<i>Lathyrus humilis</i> (Ser.) Fischer ex Sprengel.	Juga	Shahoor, Dogdara	Ripe seeds are said to be antibacterial and narcotic
12	842	<i>Lathyrus aphaca</i> L	Sperabota	Kumrat	For the treatment of toothache
13	672	<i>Lathyrus sativus</i> L.	GhataChilo	Kumrat, Dogdara	Seed oil is powerful and dangerous cathartic
14	682	<i>Lathyrus pratensis</i> L.	Ziara Chilo	Thall, Patiobanda	Used to repel mice
15	735	<i>Medicago laciniata</i> (L.) Mill. Var <i>laciniata</i>	Shpeshtarae	Sheringal, Dogdara	Used in condiment for tea, or is mixed with boiled water and sugar to form a beverage
16	745	<i>Medicago lupulina</i> L.	Shepesther	Sheringal, Dogdara, Sunderae, Lamutai	Leaves are antibacterial
17	755	<i>Medicago minima</i> (L.) Grufb.	Kachspeter	Sheringal, Kumrat	Rich source of vitamins A, C, and E, green manure and fixes atmospheric nitrogen
18	404	<i>Medicago polymorpha</i> L.	Nil	Siasheringal, Dogdara	Rich source of vitamins A, C, and E
19	850	<i>Robinia pseudo-acacia</i> L.	Kikar	Patrak, Dogdara	Astringent, diuretic, emetic, emollient, laxative, Poison, purgative, sedative, tonic, emetic and for toothache
20	384	<i>Sophora mollis</i> (Royle) Baker ssp <i>mollis</i>	Badaga	Shahoor, Dogdara, Lamutai, Janus candio	Seed destroying verm, wood hard used is fuel
21	364	<i>Trifolium repens</i> L.	Shaftal	Sheringal, Dogdara	Antirheumatic tonic and ointment
22	931	<i>Trifolium resupinatum</i> L.	Shaftalkach	Shahoor	Antirheumatic, detergent and tonic
23	921	<i>Trigonella emodi</i> Both.	Nil	Sheringal	Flowers and leaves are dried and prepare powder. One spoon of powder is taken twice a day for one week to cure jaundice
24	911	<i>Trigonella foenum-graecum</i> L.	Malkhuzay	Sheringal, Dogdara	Antidiabetic, anti-inflammatory, antitumor, carminative, demulcent, emollient, expectorant and febrifuge,

25	891	<i>Vicia faba</i> L.	Marghai Khpa	Sheringal, Dogdara, Sunderae, Lamutai, Janus candio	It can be eaten before it is fully ripe in the same way as broad beans, fully ripe seed requires overnight soaking to soften it before cooking.
26	344	<i>Vicia monantha</i> Retz.	Maregkpa	Sheringal, Dogdara, Sunderae,	The seed can be dried, ground into a powder and mixed with cereal flour to make bread, biscuits, cakes and rich source of protein.
27	354	<i>Vicia hirsuta</i> (L.) S.F.Grey	Mardikakh	Shahoor, Dogdara, Sheringal, Sunderae, Lamutai, Janus candio	The seeds, leaves, and stem can be cooked and also be used as a cover crop to add nitrogen to the soil, which can then be used by other plants.

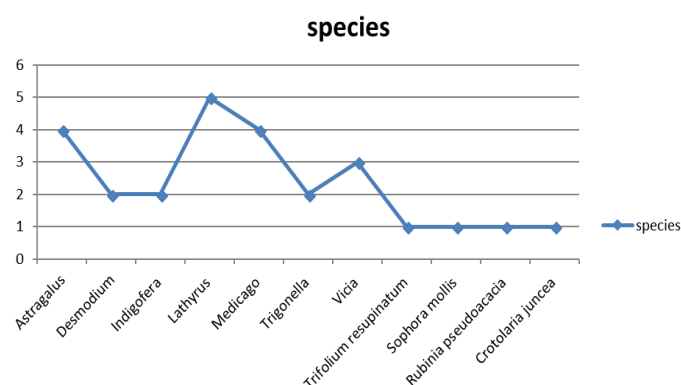


Figure 1: Number of species of each genus of the family.

Genus: *Vicia* L., 1753.

Key to the species

1. Leaf rachis terminating in a leaflet, bristle-----2
+ Leaf rachis terminating in a tendril-----*V. hirsuta*
- 2 Herbs annual legumes 50-100 × 20-30 mm: racem;
rachis short to absent-----*V. faba*
+ Herbs perenial legumes 20-50 × 5-8 mm: racem;
rachis obvious ----*V. monantha*

Genus: *Medicago* L., 1753.

Key to the species

- 1 Fruits, echinulate -----2
+ Fruits not echinulate----*Medicago lupulina*
- 2 The spine of the fruits oriented parallel to the exterior of the discs----*Medicago polymorpha*
+ The spine of the fruits oriented at right angle to the exterior of the disc-----3
3. Leaflets cuneate; pubescent on the lower surface only, spine of the fruit inserted on the dorsal sutures-----*Medicago laciniata*
+ Leaflet obovate; rarely oblanceolate; pubescent on both surface, spine of the fruits not inserted on the dorsal sutures-----*Medicago minima*

Genus: *Astragalus* L., 1753.

Key to the species

1. Fruiting calyx does not become inflating-----2
+ Fruiting calyx become inflating-*Astragalus anisacanthus*
2. Leaf imparipinnately compound-----3
+ Leaf paripinnately compound-*Astragalus psilocentros*
3. Flowers sessile or subsessile, forming a compact head-----*Astragalus graveolens*
+ Flowers pedicellate, not forming a compact head---*Astragalus pyrrhotrichus*

Genus: *Trifolium* L., 1753.

Key to the species

1. Inflorescence a peduncled head; Leaflets 7-30 mm long-----*T. resupinatum*
+ Inflorescence a globose raceme; Leaflets 1-4 cm long -----*T. repens*

Genus: *Trigonella* L., 1753.

Key to the species

1. Perennial herbs; legume linear-oblong-----*T. emodi*
+ Annual herbs; legume cylindrical or ovoid---*T. foenum-graecum*

Conclusions and Recommendations

These data showed the Papilionaceae species provide scientific basis to the local/medicinal uses. Further studies are required to find out the nature of chemical constituent and pharmacological effects of the species selected family.

Novelty Statement

All the plant species of the selected family are reported for the first time from the selected area and studied for Taxonomic and medicinal purposes.

Author's Contribution

Ali Hazrat: Designed and performed the experiments

Mohammad Nisar: Wrote the manuscript.

Khan Sher: Proofread the manuscript.

Jehandar Shah: Identification of plants.

Tour Jan: Data analysis.

Abid Ullah: Reviewed the manuscript.

Conflict of interest

The authors have declared no conflict of interest.

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