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Medicinal value and taxonomic study of Euphorbiaceae from Dir upper Khyber Pakhtunkhwa Pakistan

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Twelve species and five genera of Euphorbiaceae are described and recorded. Compare all the genera and species with one another based on similarities and differences. All the species are identified with the help of morphological characters and drawn a taxonomic key based on these characters. All the species collected in the study area is a new record from District Dir. Furthermore, the medicinal value of the selected plant species was also checked through questioner from the local people of the study area. The local people use these plants for different therapeutics purposes i.e. antimicrobial, anticancer, antioxidant, antiplasmodial, antidiabetes, anthelmintic and phytotoxic activity, etc.

Keywords: Euphorbiaceae, Taxonomy, Medicinal uses, Dir Upper, Pakistan

INTRODUCTION

Euphorbiaceae (latex) family, is one of the diverse family of Angiosperms (Hazrat et al. 2016) with 300 genera and over 5,000 species in the world (Perveen & Qaiser., 2005). According to others, the family comprises of about 322 genera & 8900 species in the world. In Pakistan, 24 genera & 410 species have been reported by (Hazrat et al. 2011). Most are herbs, but some, especially in the tropics, are shrubs or trees. Some are succulents and cacti like. This family occurs mainly in the tropics, in the many types of vegetation patterns and habitats. Southwest Asia is one of the richest areas and the most important diversity centers of the genus Euphorbia (Nisar et al. 2011). Medicinal plants have an intense effect on the health of animals as well as plants and documented as the

emerging power of pharmaceutical companies. Most of the phytonutrients present in medicinal plants have antioxidant, antimicrobial, anti-inflammatory, phytotoxic and cytotoxic activities (Kotan et al. 2013). Economically many species are important for nutrition, ornamental and as soil stabilizers (Ashraf et al. 2010). The richest source of the drug is medicinal plants by carrying new therapeutic mediators (Ahmad et al. 2015). Extensive use of herbal medicines for health care has been noted and many natural products with novel healing properties are commercialized (Riaz and Rahman 2015). In many plants, a variety of bioactive molecules are produced for the making of different kinds of medicines (Shinwari et al. 2013). Medicinal properties of plants have been investigated in the light of scientific expansion all

over the world, due to their low toxicity and rich pharmacological claims (Vaquero et al. 2010). Different medicinal plants are used for the treatment of different diseases. Plant extracts and their varied formulations in the therapeutic utilization of many diseases as a traditional remedy goes back to an ancient time (Kamal *et al.* 2016). *Artemisia* is one of the diverse genus of the Asteraceae which is medicinally important with many essential oils and secondary metabolites. Different species of *Artemisia* are categorizing into different groups based on their biological activities (Ahameethunisa and Hopper 2010). Looking to the diversity of the species in the selected area and also the use of these plants by the local people for different therapeutics purposes, that's why the area is selected for such types of studies. Furthermore, it is the first attempt to document such a type of study in the history of this area.

MATERIALS AND METHODS

Field trips were conducted in the blooming season in the month of May-September. Different villages of the selected district were visited for the collection of plant specimens of the selected family to explore the total number of species and genera in the area. The tools available during the research

work are a map of the area, plant presser, notebook, pencil, old newspaper, knife, compass, polythene bags and digital camera. The plants were collected during different periods of the season. Many species were collected during the field visit and put in the newspaper, pressed in the plant presser for 2-3 days and change the newspaper daily to remove the moisture. After these processes identified the plants based on morphological characters with the help of available literature (Stewart., 1972 and Ali & Qasir., 1993-2009). Then provide the voucher number to all the species and mount on the herbarium sheet according to stander procedure of (Ali & Qasir., 2009) and placed in the herbarium of Malakand University for future reference for the researchers.

RESULTS

The study was conducted for the collection of plant species of the selected family from all the target spots in the research area. A total of 12 species belonging to 5 genera of the selected family were collected. The leading genus is *Euphorbia* having 8 species, while the genus *Andrachne*, *Chrozophora*, *Mallotus* and *Ricinus* have one specie each.

Table 1: Checklist of collected plants species of Euphorbiaceae

S.No	V.No	Botanical Name	Vernacular Name	Research Area	Medicinal uses
1	371	<i>Andrachne cordifolia</i> (Wall.ex Dcne.) Muell. Arg.	Krahcai, Gulpinsa	Guldae, Kumrat, Shahoor, Dogdara, Sunderae, Lamuta	Eye swelling, inflammation, Antifungal and antibacterial activity
2	361	<i>Chrozophora tinctoria</i> (L.) Raf.	Kanti	Sunderae, Kumrat	Antimicrobial, anticancer, antioxidant, antiplasmodial, antidiabetes, anthelmintic and phytotoxic activity
3	766	<i>Euphorbia clarkeana</i> Hk. f.	Mandano	Junkae, Sunderai	Breathing disorders (asthma, bronchitis, chest infection), fever, tumors and vomiting.
4	756	<i>Euphorbia helioscopia</i> L.	Praiwatkai, Mandanroo	Common	Febrifuge, vermifuge, anthelmintic, cathartic and purgative
5	746	<i>Euphorbia hirta</i> L.	Da Zmakay Ghaz Krachae	Sheringal, Dogdara, Sheringal	Asthma, dysentery, nausea and vomiting
6	150	<i>Euphorbia hispida</i> Boiss.	Mandano	Samang, Dogdara, Sheringal	Poisonous, Anticancer, vomiting and nausea
7	139	<i>Euphorbia indica</i> Lam.	Mandano	Kumrat, Dogdara, Sheringal, Sunderae, Lamutai, Janus candio	Latex is used as a purgative and as a caustic on skin lesions, A plant decoction is taken to treat diarrhoea and dysentery
8	128	<i>Euphorbia peplus</i> L.	Mandano	Sheringal, Dogdara, Sunderae, Lamutai,	Skin cancer, expectorant, anthelmintic, antipyretic and anti-inflammatory activities
9	106	<i>Euphorbia wallichii</i> Hk. f.	Mandano	Samang, Dogdara, Sheringal, Sunderae, Lamutai	Vermifuge, anthelmintic, cathartic and purgative
10	737	<i>Euphorbia falcata</i> L.	Kach mandano	Kumrat	Antipyretic and anti-inflammatory activities
11	159	<i>Mallotus philippensis</i> (Lam.) Muell. Arg.	Kambila	Dogdara	Expelling tapeworms, Bronchitis, abdominal diseases, and spleen enlargement
12	149	<i>Ricinus communis</i> L.	Aranda Aseela Harlanda	Cham, Sheringal	Oil from the seed is a very well-known laxative, anthelmintic, cathartic, emollient and laxative, purgative

Legends : V.N= Voucher Number

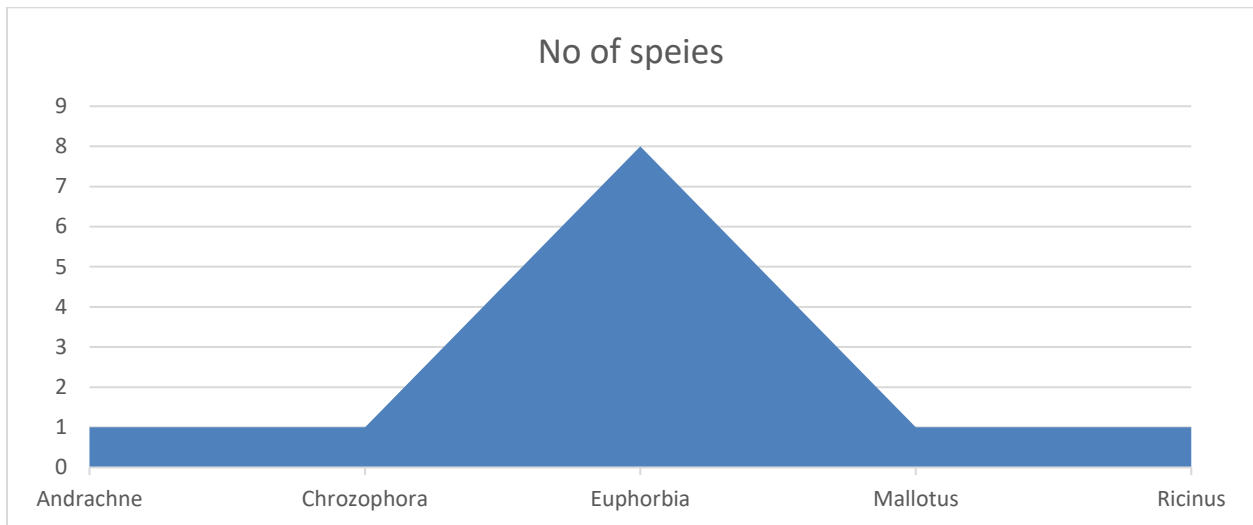


Figure1: Number of genera and species

Key to the genera

- 1 Female & male flowers in cyathia-----*Euphorbia*
- + Female & male Flowers not as above-----2
- 2 Plant dioecious ----- *Mallotus*
- + Plant monocious-----3
- 3 Male flower with 5 stamens----- *Andrachne*
- + Male flower with many stamens -----4
- 1 Leaves simple subentire, stamens up to-15----- *Chrozophora*
- + Leaves peltate palmately lobed, stamens up to-100----- *Ricinus*

Genus: *Euphorbia* L, Sp. Pl. 1753.

Key to the species

- 1 Stipules present-----2
- + Stipules absent-----5
- 2 Cyathia aggregated together into clusters-----3
- + Cyathia axillary solitary-----4
- 3 Leaves, rhombic hairs multicellular yellow-----*Euphorbia hirta*
- + Leaves, oblong hairs mostly unicellular white----- *Euphorbia indica*
- 4 Glands with prominent white appendages-----*Euphorbia hispida*
- + Gland-appendages minute or absent-----*Euphorbia clarkeana*
- 5 Glands rounded on the outer edge-----6
- + Glands truncate, crescentic horned-----7
- 6 Annual herbacious-----*Euphorbia helioscopia*
- + Perennial herbacious-----*Euphorbia wallichii*
- 7 Stem-leaves petiolate; fruits 2-ridged on the keels-----*Euphorbia peplus*
- + Stem-leaves sessile; fruits with rounded keels-----*Euphorbia falcate*



Chrozophora tinctoria (L.) Raf.



Euphorbia clarkeana Hk. f.

Figure 02: Selected species photo gallery



Euphorbia peplus L.



Euphorbia wallichii Hk. f.

Figure 03: Selected species photo gallery



Mallotus philippensis (Lam.) Muell. Arg.



Ricinus communis L.

Figure 04: Selected species photo gallery

Furthermore, plant species are widely distributed in the research area. The plant species were identified with the help of keys in the form species keys and genera keys are listed below (Figure: 1)

The species checklist is available in the form Voucher number, Botanical Name, Vernacular name and research area in table 01.

DISCUSSION

Dir, Kohistan is floristically rich particularly for various medicinal plants of the selected family. About 6000 plant species of Angiosperms and Gymnosperms have been reported from different climatic regions of the country (Nasir and Ali 1972). Out of the number of medicinal plants 700 species with medicinal properties were estimated in the early trips conducted by Stewart (1967). The assessment of medicinal properties of plants in the early inventories was not attempted correctly. Though, interest in the ethnobotany, was developed and a number of medicinal plants, with respect to their local uses were measured mostly focused in northern areas (Shinwari *et al.*, 2003). The present research work is carried out in the categories of Taxonomy and ethnobotany/ medicinal resources in order to fill the gaps left by the previous researchers. The only focus is on medicinal and ethnobotany and ignore the identification based on key characters for a one family only. The need of medicinal plants increases with the increase in population of the area. That's why the study is conducted for among the single family. The people of the area use the plants of the selected family for various diseases like Breathing disorders (asthma, bronchitis, chest

infection), fever, tumors, vomiting, Antimicrobial, anticancer, antioxidant, antiplasmodial, antidiabetes, anthelmintic and phytotoxic activity.

CONCLUSION

A total of 12 plant species is collected, identified with the help of keys. And also identified the medicinal uses of the selected plant species for different diseases. These plant species are reported for the first time from the study area. This study will be helpful for future researchers working on Pharmaceutical, Phytochemistry, Biological activities and Medicinal/Ethnobotanical studies. These plants are widely used for the health care by local peoples in District Dir upper. Some species of forest area are vulnerable to over-collection and deforestation. It is suggested to control the local people should restrict deforestation in the selected area for the next two to three eras for the conservation of plant biodiversity.

CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

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AUTHOR CONTRIBUTIONS

All the authors contributed in this research work **AH, GR, AR** designed and performed the experiments and also wrote the manuscript. **II, ZA, TJ,** and **WK** performed experiments and data analysis. **BN, HS, ZF** and **MAN** designed experiments and **AH, SB, AU, MN** reviewed the

manuscript and identification of plant specimens
All authors read and approved the final version.

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