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ETHNOBOTANICAL IMPORTANCE AND RELATIVE ABUNDANCE OF THE MULBERRY FAMILY FROM TEMPERATE HIGHLANDS, PAKISTAN

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ABSTRACT

Five protected areas from temperate highlands of Pakistan were gauged for biodiversity of the Moraceae family. The National Park in Pir Lasura was studied from June to July 2009, in Banjosa from May to June 2009, in Pir Chanasi from April to May 2010, in Dhirkot (February 2008) and in Tolipir from April to May 2008. From the five protected areas surveyed, only three had species belonging to the family Moraceae. Three species were observed from Banjosa Game Reserve, two from Tolipir Nature Reserve and six from Pir Lasura National Park. The species commonly found were *Ficus carica*, *Ficus Palmate*, *Ficus religiosa*, *Ficus bengalensis*, *Ficus* spp., *Ficus virens* and *Morus* spp.

Keywords: Fig, mulberry, *Ficus* sp., gymnosperm, biodiversity

INTRODUCTION

There are 295,383 known and accepted flowering plants in the world with a total of twelve gymnosperms (Christenhusz and Bying, 2016). The family Moraceae belongs to the order Rosales and is reported to have 38 genera with 1180 species. This family is majorly distributed in tropical and temperate areas (Leite et al., 2018). Species from this family have been previously researched for phenolic compounds (Venkataraman, 1972; Nomura et al., 1998). The mulberry and fig species from this family are commonly known with much importance in daily lives of people.

The Mulberry sp. is now widely distributed across most of the continents through introduction by trade over time. A considerable number of the species belonging to genus *Morus* are indigenous to Asia. *indica*, *alba*, *serrata* and *laevigata* are the common varieties found in India amongst which the *indica* and *alba* species have been found to be the most ubiquitous.

A highly coveted feature of this species is its contribution using silkworms to produce silk worldwide. During 2016 to 2017, India produced more than twenty thousand metric tonnes of raw silk using mulberry silkworm (Gurjar et al., 2018). The fruit from the *alba* species is both used for consumption and for the health benefits that it provides (Yuan and Zhao, 2017). Wood from the mulberry tree has a high value for making woodwork items such as cabinets and barrels (Golpayegani et al., 2014; Mansour et al., 2015). These plants grow fast and don't need much water, this makes them a good candidate for landscaping purposes (Tipton, 1994). This study was carried out to determine the relative abundance of the species belonging to the Moraceae family and their ethnobotanical importance in temperate highlands of Pakistan.

MATERIALS AND METHODS

Five protected areas from temperate highlands of Pakistan were gauged for biodiversity of the Moraceae family. The

National Park in Pir Lasura was studied from June to July 2009, in Banjosa from May to June 2009, in Pir Chanasi from April to May 2010, in Dhirkot (February 2008) and in Tolipir from April to May 2008.

The flora of the area was studied through unbiased staged sampling. Each stand represented zones with comparable habitation settings. The coordinates and elevation of different transect locations. Transect sampling of the flora was done. The plants were identified in their own habitat. For the species that could not be identified in the field, they were then given a code number. Samples of all the representative species were preserved and identified by using literary sources such as Flora of Pakistan (Nasir and Ali, 1970-2008; Stewart, 1972; Toshiyuki and Malik, 1992, 1993).

The transect data was used to develop the vegetative cover occupied by different plant species. The stand data was subjected to computer-based ordination to develop communities based upon the stand similarities in the vegetative composition. The relative distribution of plant communities and major species of plants were mapped. The possible use of the plant

species was determined through the information from the local population and through the literature searched.

Plant cover occupied by each species was calculated by dividing the total length shared by each plant species by the length of the transect line (50 m) and converted into the percentage. The constancy appearance of each species was calculated by the number of transects having the species divided by the total number of transects studied in each stand and expressed in percentage. Each species was assigned one of the five constancy classes (class I = < 21 %, II = 21 - 40, III = 41-60, IV = 61-80, V = > 80) following Muller-Dombois and Ellenberg (1974).

The data on the absolute cover occupied by different species was analyzed through Cluster Analysis (CA), using PC - ORD version 4.16, 1999 software. The groups of transects, having reasonable similarity in the species composition and cover, were identified using ordination achieved through Cluster Analysis. Each of the groups was recognized as a plant community and was named after the plant species contributing the significant cover.

RESULTS

Table 1: Species of Family Moraceae recorded from Banjosa Game Reserve

Scientific Names	Remarks	Usage
<i>Broussonetia papyrifera</i> (L) L'Herit. ex. Vent (Jungli Toot)	Small to medium with milky latex, papery densely haired leaves. Origin: Japan, China and South- East Asia. Flowering March- August, roadside tree.	Bark in manufacturing paper (China and Japan), Tapa Cloth (Polynesia).
<i>Ficus carica</i> L. (Phagwar)	Small deciduous, spreading branches from a short rough trunk, smooth grey or dull white bark, young twigs glabrous or softly hairy. Flowering & fruiting July –October.	Phagwala” (un-ripen fruit) as a vegetable, piles treatment.
<i>Morus spp</i>	-	-

A total of 116 different species of plants were recorded from Banjosa Game Reserve from which only three species belonged to the Moraceae Family.

Table 2: Relative vegetative cover of trees (% ±) shared between different plant species in different vegetative types established in BGR

Names	Vegetative layer (Trees)						e	%	Class
	A	B	C	D	E	F			
	(10, 40-41, 44-45)	(5, 11, 13, 16, 19, 22, 24, 48)	(25, 35, 43)	(2-3, 6-7, 17-18, 20, 27-29, 31-32, 36, 46)	(8, 12)	(1,4, 9, 14-15, 21, 23, 26, 30, 33, 34, 37-39, 42, 47, 49-51)			
	AV ± S.E	AV ± S.E	AV ± S.E	AV ± S.E	AV ± S.E	AV ± S.E			
<i>F. carica</i>	0.04 ± 0.03	0.05 ± 0.02	-	-	1.44 ± 1.44	0.02 ± 0.01	15.69	I	
Vegetative layer (Herbs)									
<i>B. papyrifera</i>	0.09 ± 0.08	-	-	-	-	0.91 ± 0.83	5.88	I	
<i>Morus spp</i>	-	1.23 ± 1.09	27.2 ± 1.24	0.37 ± 0.25	-	3.15 ± 1.02	33.33	II	

Table 3: Species of Family Moraceae recorded from PLNP

Scientific Names	Remarks	Usage
<i>Ficus carica</i> Linn. (Phagwar)	Small, deciduous, spreading branches from a short, rough trunk, bark smooth, grey or dull white.	Fruits used with Lasi as vegetable and for treatment of piles.
<i>Ficus palmate</i> Forssk. (Phaghwar, Anjir)	Large deciduous, up to 10 m, trunk and branches without aerial roots bark smooth.	Fruits demulcent and laxative, used in lungs and bladder diseases.
<i>Ficus religiosa</i> L (Pipal)	Medium sized, evergreen or deciduous tree, 6-15 m, spreading branches, without aerial roots, bark grey, fissured; young twig pubescent.	Leaves and twigs lopped for cattle/ goats, wood for packing cases.
<i>Ficus</i> spp.	Monoecious, adventitious roots, leaves simple, alternate or rarely opposite, entire or serrate, palmately lobed, obtuse or acute or acuminate, deciduous or persistent; stipules connate (single) or free lateral closing terminal bud, caducous, leaving annular scars	Syrup mild laxative, fruit pulp relieves pain/inflammation, tumors, swellings, gums abscess.
<i>Ficus bengalensis</i>	Produces propagating roots which grow downwards as aerial roots, growing into woody trunks when they reach ground	Used to treat bacterial infections such as diarrhea, latex applied on skin for treating infections.
<i>Ficus virens</i> Dryand. in Ait. (Jangli Pipit)	Up to 15 m, deciduous, branches spreading with aerial roots, bark grey, young twigs brown, glabrous; lowering & fruit October-March.	Shade tree

Table 4: Relative vegetative cover (% ±) shared between different plant species in different vegetative types established in PLNP

Names	A	B	C	D	Constancy (%)/class
	(1, 3, 19, 33- 35, 36, 38, 46, 47, 48, 49, 50, 56, 57, 60, 68)	(4,5, 7, 8, 9, 10, 12,13, 17, 21, 22, 23, 25, 26, 29, 31, 32, 37, 40, 41, 42, 43, 44, 52, 54)	(2,16, 18, 28, 30, 45, 53, 59)	(6,11, 14, 15, 20, 24, 27, 39, 55)	
	Mean ± S.E	Mean ± S.E	Mean ± S.E	Mean ± S.E	
	13.14	21.56	46.58	29.08	
<i>F. religiosa</i>	0.0±0.0	0.3±0.19	0.0±0.0	0.2±0.2	10/ (I)
<i>F. palmate</i>	0.0±0.0	0.0±0.0	0.0±0.0	0.0±0.0	5/ (I)
<i>F. carica</i>	0.0±0.0	0.0±0.0	0.0±0.0	0.3±0.3	1.6/ (I)

Table 5: Species of Family Moraceae recorded from TNP

Names	Remarks	Use
<i>F. carica</i> Linn. (Phagwar)	Small, deciduous, spreading branches from a short, rough trunk bark; smooth, grey or dull white young twigs glabrous or softly hairy.	Fruits edible, un-ripen fruit known as “Phagwala” used with Lasi as a vegetable, fruit used for the treatment of piles.
<i>F. palmate</i> Forssk. (Phagwar, Anjir)	Large deciduous, up to 10 m tall, trunk and branches without aerial roots bark smooth.	Fruits are edible which are demulcent and laxative, used in diseases of lungs and the bladder.

Table 6: Relative vegetative cover (% ±) shared between different plant species in different vegetative types established in TNP by Ward’s method.

Names	Vegetative Type					Constancy	
	A	B	C	D	E	%	Class
	AV ± S.E	AV ± S.E	AV ± S.E	AV ± S.E	AV ± S.E		
<i>F. palmata</i>	2.53 ± 0.22	0.06 ± 0.04	-	-	0.24 ± 0.09	13.46	I

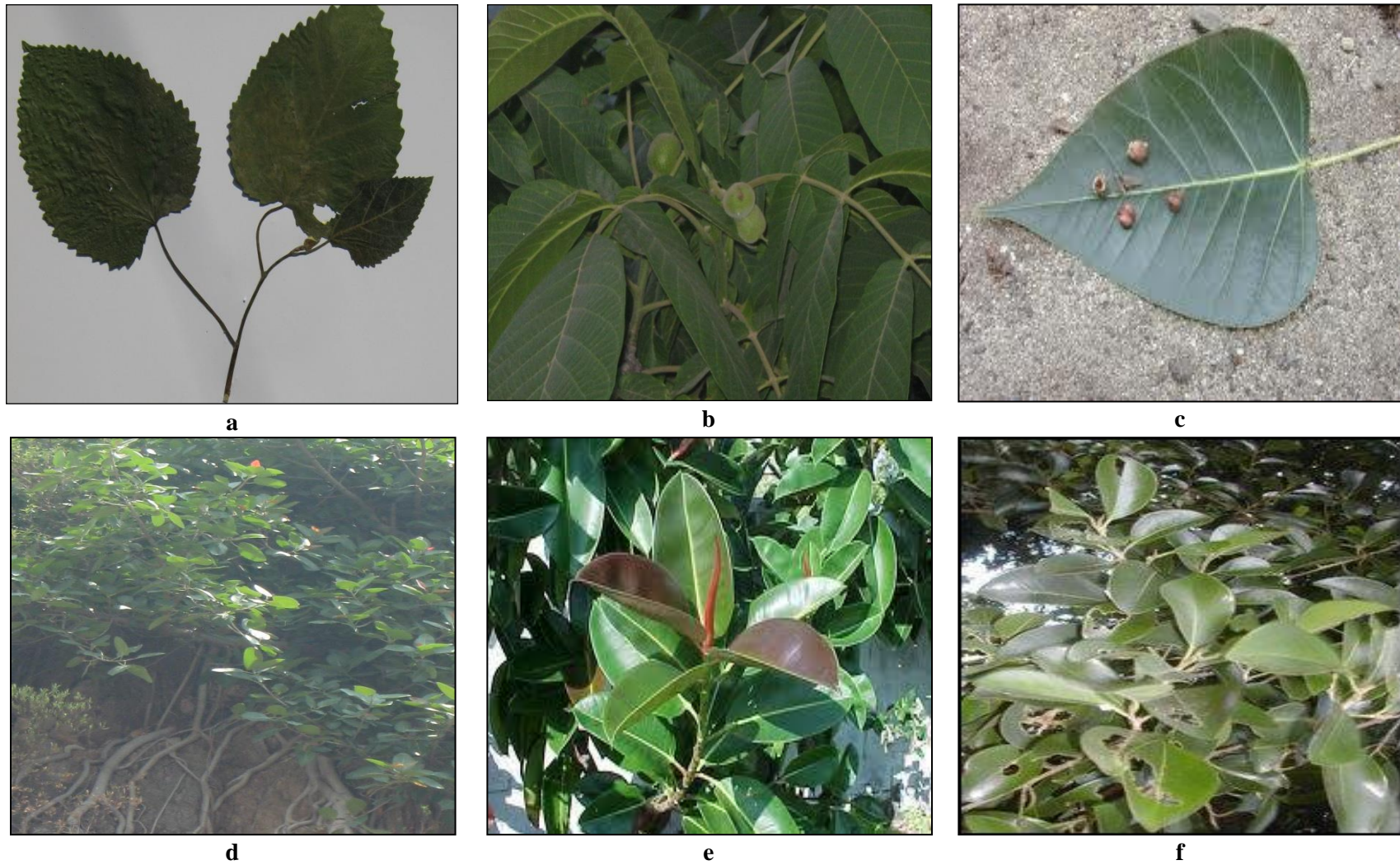


Figure 1. Species of family Moraceae from the study area (a) *Ficus carica*, (b) *Ficus Palmate* (c) *Ficus religiosa* (d) *Ficus bengalensis* (e) *Ficus* spp. (f) *Ficus virens*

DISCUSSION

Out of the five National Parks surveyed only three parks (Tolipir Nature Reserve, Banjosa Game Reserve and Pir Lasura National Park) contained species belonging to the Moraceae family. The total number of plants recorded from Banjosa Game Reserve suggested a minimum of 116 plant species out of which only three species belonged to the Moraceae family. All the three species recorded (*Broussonetia papyrifera* (L.), *Ficus carica* and *Morus* spp.) had enough density to be classified under constancy class I and II with relative abundance percentages as 15.69, 5.88 and 33.33 respectively.

Survey carried out in Pir Lasura National Park suggested a minimum of 159 plant species out of which six (*Ficus carica*, *Ficus palmate*, *Ficus religiosa*, *Ficus* spp., *Ficus bengalensis* and *Ficus virens*) belonged to the Moraceae family. Only three species (*F. religiosa*, *F. palmate* and *F. carica*) had enough density to be classified under constancy class I with relative abundance percentages as 10, 5 and 1.6 respectively.

Total of 158 plant species distributed in different parts of TNR were identified from which only two species (*Ficus carica* and *F. palmate*) belonged to the Moraceae family. However, only *F. palmate* was abundant enough to be classified under constancy class I with a relative abundance percentage of 13.46. No variety of this family was found at DNR and PCNP.

A similar study conducted by Hussain et al. (2010) in Jalalpur Jattan, Gujrat reported 88 plants from which three species (*Ficus benghalensis* L., *Ficus religiosa* L. and *Morus nigra* L.) belonged to the Moraceae family. Midrarullah (2005) reported 2 species from the Moraceae family in their study area of Udigram, Swat. A study in Nandiar Khuwar, in western Himalayas from 2008 to 2010 reported *Ficus carica*, *Ficus palmata*, *Ficus racemose* and *Morus nigra* (Haq et al., 2011). A survey conducted

in Jalala, Mardan observed trees of *Ficus religiosa*, *Ficus carica*, *Morus alba* and *Morus nigra* (Akhtar and Begum, 2009).

CONCLUSION

From the five protected areas surveyed, only three had species belonging to the family Moraceae. Three species were observed from Banjosa Game Reserve, two from Tolipir Nature Reserve and six from Pir Lasura National Park. The species commonly found were *Ficus carica*, *Ficus Palmate*, *Ficus religiosa*, *Ficus bengalensis*, *Ficus* spp., *Ficus virens* and *Morus* spp.

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