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Kishwar Sultana

*PMAS-Arid Agriculture University, Rawalpindi*

Afsar Mian

*Institute of Natural and Management Sciences (INAM), Rawalpindi, Pakistan*

Asad Ghufuran

*International Islamic University, Islamabad, Pakistan*

Sabiha Shamim

*Malaysia University of Science and Technology, Selangor, Malaysia, sabihashamim@outlook.com*

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## DISTRIBUTION OF GYMNOSPERMS IN PIR LASURA NATIONAL PARK

KISHWAR SULTANA<sup>1</sup>, AFSAR MIAN<sup>2</sup>, ASAD GHUFRAN<sup>3</sup>, SABIHA SHAMIM<sup>4\*</sup>

<sup>1</sup>PMAS-Arid Agriculture University, Rawalpindi

<sup>2</sup>Institute of Natural and Management Sciences (INAM), Rawalpindi, Pakistan

<sup>3</sup>International Islamic University, Islamabad, Pakistan

<sup>4</sup>Malaysia University of Science and Technology, Selangor, Malaysia

\*Corresponding author: sabihashamim@outlook.com

### ABSTRACT

Survey carried out in June-July 2009 recorded a minimum of 159 plant species with 48 species of trees. Out of these only two species are of gymnosperms; *Pinus roxburghii* and *Pinus wallichiana*. One species of trees, *Pinus roxburghii* is widely distributed. It is present in all communities, and can be found in different combinations with different other species. Both of these species have ethnobotanical value and are used by local population for different purposes.

**Keywords:** gymnosperms, *Pinus roxburghii*, *Pinus wallichiana*, Azad Jammu and Kashmir

**Abbreviations:** PLNP: Pir lasura national park,

### INTRODUCTION

The State of Azad Jammu and Kashmir (AJK, 33-36o N, 73-75o E; area around 13,200 km<sup>2</sup>) occupies the western extremities of the Himalayan range with altitudes ranging between 500 m above sea level (asl.) in southern latitudes gradually rising to some 6,500 m (asl.) in the northern flanks. The area is famous for its scenic beauty and fascinating landscape, having permanent snowfields with alpine and sub-alpine vegetation, coniferous forests, and scrub forests, temperate plantations, dotted with rain-fed agriculture and limited rivarian forests.

Gymnosperms have a considerable ecological and economic value and have drawn much attention from the scientific community (Xiao and Ran, 2014). Pakistan hosts 17 known species of wild Gymnosperms. The Northern Hilly areas of Pakistan reportedly host mainly coniferous plants consisting of *P. roxburghii*, *P. wallichiana*, *Picea smithiana*, *Taxus baccata*, *Abies pindrow* and *Abies spectabilis* (Chaudhri, 1963).

*P. wallichiana*, frequently exploited as timber wood for the construction of building and preparation of furniture. *P. wallichiana* is the most valuable timber, only second to *Cedrus deodara*, which fetches very high price. The branches of *P. roxburghii* and *P. wallichiana* are used for preparation of sweeping material and making roof of huts and houses. It is abundant from Chitral eastward from 1800 to 3500 metres. Its wood is used for preparation of body of trucks and for construction purposes, i.e. doors, windows, etc. It is also used for furniture and fuel purposes.

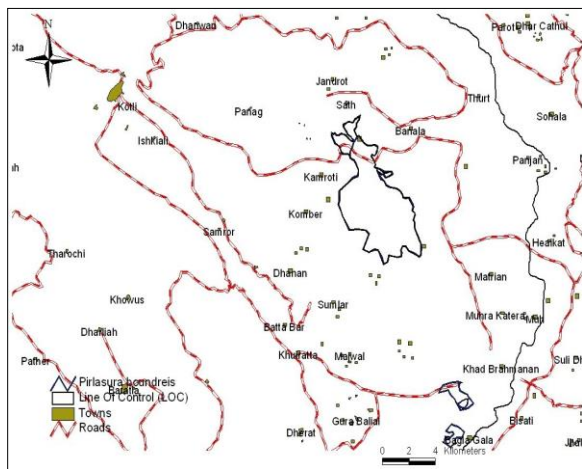
*Pinus roxburghii* also known as The Himalayan spruce, is found in Kurram, Dir, Chitral, Swat, Gilgit eastwards and Kaghan but is rare in the Murree hills. A few at Nathia Gali and the northern slope on Mokshpuri. Its wood is used for timber, fuel and furniture. Its resin cleans blood and is used against several toxins. No previous report on gymnosperm diversity of PLNP is available.

### MATERIAL AND METHODS

### Area:

PLNP is located in Tehsil Nekyal of Kotli. The national park area falls in east of Kotli town (a district headquarters) at a distance of some 30 km. General area is known by the name of a saint (Pir), known as Pir Lasura. Total area under PLNP, as determined by the satellite mapping comes to 37.44 km<sup>2</sup> (3,744 ha. = 9,251.6 acres).

### Sample collection:



**Figure 1: Map explaining the location of PLNP near line of control (LOC) (source: Arc View 3.3 and Google Earth 2010)**

The survey was conducted from June – July, 2009. The PLNP area was physically visited and the boundaries were marked with the help of Local Forest Guard, posted in the area. Important points on boundaries were marked using digitized GPS data on coordinates of such points placed on satellite imagery of the area using GIS (Geographic Information System). Available information on expected biota was collected through literature search and those available with field staff of the Department of Wildlife and Fisheries and the Forest Department. Attempts were made to collect/record all the plant species present under different microhabitat variation. Using such data list of

the plant species in PLNP area was developed.

The classification of plants was done using visual observation, comparison of field samples with available literature (Nasir and Ali, 1970-2008; Stewart, 1972; Toshiyuki and Malik, 1992, 1993) and samples accessible at Herbaria of Quaid-e-Azam University Islamabad, and Pakistan Museum of Natural History (PMNH), Islamabad.

Data from the quadrates was used to establish the relative distribution of the species found in each stand. Stand data was processed using TWINSpan to develop vegetation types, based upon the stand similarities in the vegetative composition. The probable uses of the species found were confirmed by previously published literature and from the indigenous people.

### RESULTS AND DISCUSSION:

Association analysis of vegetative cover occupied by different plant species in different stands was conducted using Ward's method (as a linkage method) and Euclidian methods (as a measure of distance). Four main vegetative types were identified, based upon Ward's similarity index, occupying different parts of PLNP. The general distribution of these vegetation types in the area was mapped (Figure 4). *Pinus roxburghii*, *Pyrus pashia*, *Glochidion velutinum*, (trees), *Carrissa opaca*, *Justicia adhatoda L.* and *Berberis lyceum* (shrubs) were present in all vegetative types, contributing to different vegetative covers.

Available data on distribution of plant species in different stands suggested that 96 species appeared in transect sampling. Only two species, i.e., a tree (*Pinus roxburghii*, constancy of appearance = 76.7%), and an herb (*Berberis lyceum*, constancy 71.7 %) could be placed in constancy class IV indicating their wider distribution. The list made using this study, included 2 species of gymnosperms, which are widely distributed

with a good coverage on all mountain slopes,  
 and are usually exploited for timber.

**Table 1: Vegetative biodiversity of gymnosperms of PLNP**

S #	Scientific Names	Family	Remarks	Usage
1	<i>Pinus roxburghii</i> <i>Roxb</i> (Chir)	Pinaceae	Up to 30 m with a soft flaky bark; leaves in clusters of 3, male cones 1.5 cm long, yellowish, in dense terminal clusters, female cones solitary or 2-3 at the tips of branches mature ones woody; bract and scale distinct, beaked, wing 2-3 times longer than seed.	Leaves for mud roof thatching, anti-racking agent in mud plasters, for construction and furniture, resin extract for varnishes and turpin.
2	<i>Pinus wallichiana</i> (Biar, Blue pine)	Pinaceae	Major timber, flower April to June and fruit ripening October to November	Wood for construction and furniture, timber.

**Table 2: Relative vegetative cover (% ±) of gymnosperms shared between different plant species in different vegetative types established in PLNP by Ward's method.**

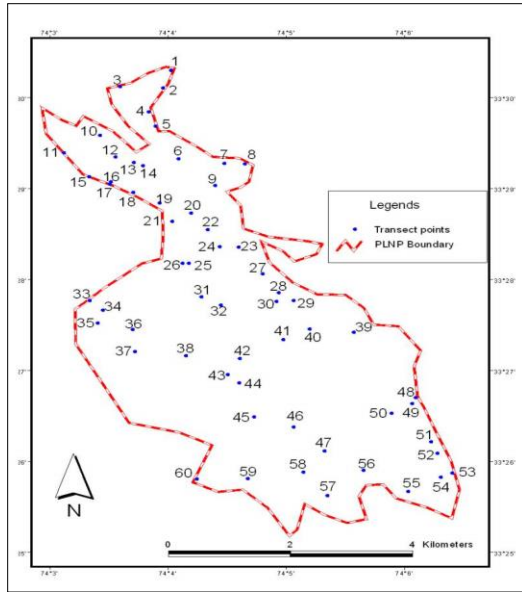
S. No	Names	A (1, 3, 19, 33-35, 36, 38, 46, 47, 48, 49, 50, 56, 57, 60, 68)	B (4,5, 7, 8, 9, 10, 12,13, 17, 21, 22, 23, 25, 26, 29, 31, 32, 37, 40, 41, 42, 43, 44, 52, 54)	C (2,16, 18, 28, 30, 45, 53, 59)	D (6,11, 14, 15, 20, 24, 27, 39, 55)	Constancy (%) /class
		Mean ± S.E	Mean ± S.E	Mean ± S.E	Mean ± S.E	
<b>Trees</b>	<b>13.14</b>	<b>21.56</b>	<b>46.58</b>	<b>29.08</b>		
1	<i>Pinus roxburghii</i>	1.6±0.94	12.60±0.9	38.8±3.2	26.1±0.8	77/(IV)
1.	<i>Pinus wallichiana</i>	3.1±1.5	0.5±0.37	0.0±0.0	0.0±0.0	13.3/ (I)



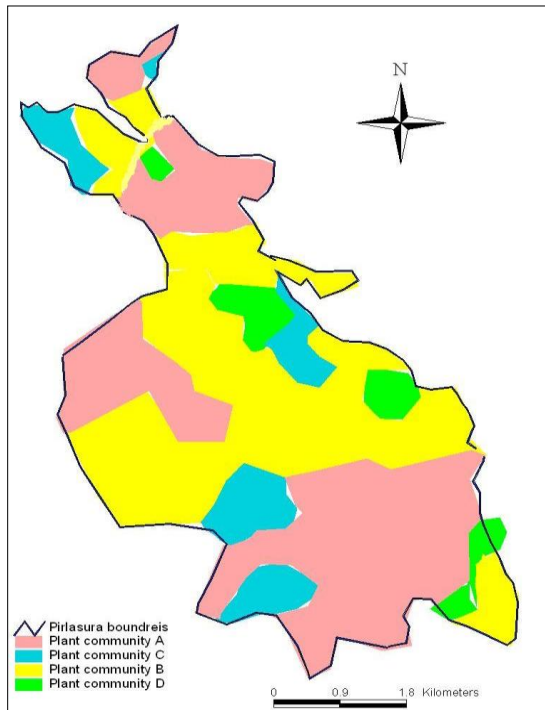
A.

B.

**Figure 2 A. *Pinus roxburghii*; B. *Pinus wallichiana***



**Figure 3: Map of PLNP showing location of different stands established for the vegetative analysis (for GPS coordinates of different point refer Table 2) (source: Arc View 3.3 and Google Earth Pro 4.2)**



**Figure 4: Map showing distribution of different vegetative types in PLNP (source: Arc View 3.3 and Google Earth 2010), A: *Pinus wallichiana* B: *Pinus roxburghii*- *Berberis lyceum*, C: *Pinus roxburghii*- *Glochidion velutinum*, D: *Pinus roxburghii***

**Plant community A:** The vegetation type characterized an association of 34 species. Although *P. wallichiana* was found to have a larger population compared to other species, it was found to be present in association with *P. roxburghii*, *U. villosa*, *C. opaca* and *O. limbata*.

**Plant community B:** Thirty-nine species were recorded from this vegetation type and occurred in four separate patches. The highest tree cover was observed in this community, with a 68% vegetative cover.

**Plant community C:** This community had approximately 54% vegetative cover of 6 different species. *P. roxburghii*, *Glochidion velutinum* (6%) was more dominant compared to other species.

**Plant community D:** This community had approximately 38% vegetative cover of 23 different species. *P. roxburghii* was the more dominant species in this community.

## CONCLUSION

Under the heterogeneity of the habitat, PLNP area has high plant diversity. The data available on distribution of plant species in different stands suggested that 96 species appeared in transect sampling. Only two species, *Pinus roxburghii* (Chir) and *Pinus wallichiana* (Blue pine) from the clade gymnosperm were observed. However, the analysis of transect data indicated that the relative coverage of these species was high when compared to others.

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