

PHYTOSOCIOLOGICAL STUDIES OF AYUB NATIONAL PARK
RAWALPINDI

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Abstract: *Phytosociological studies of the Ayub National Park Rawalpindi, were carried out during summer of 1977. Vegetation was sampled at 25 different locations for delimiting densities, dominances and frequencies. Five plant communities i.e., Depression community (indicated by Acacia modesta-Cannabis sativa), Level ground community (Acacia modesta-Cynodon dactylon), Foot hill community (Acacia modesta-Themeda anathera), Hill slopes community (Acacia modesta-Dodonaea viscosa) and Hill tops community (Acacia modesta-Lantana camara) were recognized on the basis of physiognomy, floristic composition and Importance value of tree species and Summation value of herbs and shrubs. The ubiquitous presence of regeneration of Acacia modesta in all the habitats indicates least effect of topography and the highest Summation values of the regeneration of Acacia modesta, Lantana camara, Ehretia obtusifolia, Dodonaea viscosa and Zizyphus nummularia indicates future trend of the vegetation with the probable chances of elimination of Olea cuspidata and Sageretia brandrethiana.*

Introduction: Hussain, 1969 carried out a vegetational survey of Ayub National Park, Rawalpindi and gave a list of the plants found in the Park. The list included 45 families and 133 species. The present studies are aimed at to study the phytosociology of the Ayub National Park. For this purpose, Importance value has been used as a criteria for determining the Importance of the species for controlling the naturally occurring plant community under the sub-tropical semi-arid climate.

Ayub National Park is situated at the southeast corner of Rawalpindi at a distance of 4.5 Kilometres from the city on the Shahrah-e-Pakistan and located between 33° - 33' and 33° - 35' N latitudes and 73° - 04' and 73° - 05' E longitudes at an altitude of 503 metres, with a total area of 931 hectares containing seven perennial ponds spread over 25 hectares. The climate of the area is subtropical continental low-lands, subhumid Pothowar plateau (Ahmad, 1951) with a mean annual precipitation of 93.98 cms. The climate is characterized by extremes of temperatures with January being the coldest (mean min. temp. 0.61°C) and June the hottest (means maximum temp. 45°C). Frost is of common occurrence during winter. Highest relative humidity is found in December (83%) and lowest in May (33%). Wind blows comparatively stronger in the months of March-June as compared to the rest of the year and it blows North-West through out the year but for monsoon its direction is generally southeast. The land is undulating and

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average height of the hillocks is 16 metres which are composed of tertiary sandstones and alluvial deposits. The western portion of the park is plain with clayed loamsoil. The soil is deep, well-drained, medium textured sandy loam and is about 15 cms thick and pH is 8 (Ali, 1967).

Material and Method: The park was divided into five stands depending upon the topography, i.e., Depression (Stand-I), Level ground (Stand-II), Foot-hills (Stand-III), Hill slopes (Stand-IV) and Hill tops (Stand-V). In each stand five quadrats of 10 x 10 metres were laid. The number of trees of various species were counted as well as diameter at breast height recorded. As such 25 quadrats were evaluated for delimiting densities, dominances, frequencies. The Importance value was obtained by adding relative density, relative dominance and relative frequency values of each species (Cox, 1967, Alizai and Naqvi, 1976).

For sampling herbs and shrubs, small quadrats of 2 x 2 metres were laid in the opposite corners of each main quadrat (Cain and Castro, 1959). In this way 125 quadrats were laid out. Frequency and percentage canopy cover was calculated for the determination of Summation Values. Species with highest Importance and Summation values in each stand were considered as dominants and the communities were named after them. The studies were completed during 1976-77.

Results and Discussion: Table-I shows the summary of the Importance value of all the tree species and Table-II shows the summary of the Summation value of the leading dominant shrubs and herbs in all the five stands, while the Summation value of the regeneration of trees and shrubs depicting future trend of the vegetation has been presented in Table-III. Species with highest Importance and Summation values were considered as leading dominants on the basis of which the following communities were recognized:

Stand-I.	<i>Acacia modesta-Cannabis sativa</i> community.
Stand-II.	<i>Acacia modesta-Cynodon dactylon</i> community.
Stand-III.	<i>Acacia modesta-Thamada anathera</i> community.
Stand-IV.	<i>Acacia modesta-Dodonaea viscosa</i> community.
Stand-V.	<i>Acacia modesta-Lantana camara</i> community.

The regeneration of *Acacia modesta* was found to be coming up in considerable number as compared to any other species indicating that the species is likely to gain still greater dominance in future and the absence of regeneration of *Olea cuspidata* suggested its possible elimination in due course of time. Seedlings of *Sageretia brandrethiana* was not found in any stand. However, it was found occasionally in shrubby form in stand No. II, III and V with Summation values 4.0, 4.0 and 12.46 respectively with the probability that this species is on

the verge of extermination by more aggressive species like *Dodonaea viscosa* and *Adhatoda visica*. *Celtis australis* regeneration was found only in stand IV appearing to gain foothold in the area.

Table - I
Summary (Importance Values)

Sl. No.	Species	Relative density	Relative dominance	Relative frequency	Importance Value.
I. (DEPRESSION)					
	<i>Acacia modesta</i> Wall.	88.39	96.26	100	284.65
	<i>Prosopis juliflora</i> swartz.	7.14	1.68	20	28.82
	<i>Olea cuspidata</i> wall.	7.46	1.49	20	25.95
II. (LEVEL GROUND)					
	<i>Acacia modesta</i> Wall.	87.67	83.56	100	271.23
	<i>Prosopis juliflora</i> Swartz.	12.32	16.43	20	48.75
III. (FOOT-HILLS)					
	<i>Acacia modesta</i> Wall.	88.02	92.85	100	280.87
	<i>Prosopis juliflora</i> swartz.	11.97	7.14	20	39.11
IV. (HILL SLOPES)					
	<i>Acacia modesta</i> wall.	83.33	92.30	100	275.63
	<i>Prosopis juliflora</i> swartz.	11.16	5.38	20	36.54
	<i>Olea cuspidata</i> wall.	3.35	1.53	20	24.86
V. (HILL TOPS)					
	<i>Acacia modesta</i> wall.	85.51	87.5	100	273.01
	<i>Olea cuspidata</i> wall.	10.40	10.93	20	41.33
	<i>Prosopis juliflora</i> swartz.	4.08	1.56	20	25.64

Table - II

Summary (Summation Value)

Sl. No.	Species	Frequency %	Coverage %	Summation Value.
I. (DEPRESSION)				
	<i>Cannabis sativa</i> Linn.	40	5.2	45.2
	<i>Lantana camara</i> Linn.	40	1.38	41.38
	<i>Ehretia obtusifolia</i> Hochst ex Dc.	40	1.32	41.32
II. (LEVEL GROUND)				
	<i>Cynodon dactylon</i> L.) Pers.	40	3.26	43.26
	<i>Cenchrus ciliaris</i> Linn.	36	3.74	39.74
	<i>Inula vestita</i> wall ex Dc.	32	1.95	33.95
III. (FOOT-HILLS)				
	<i>Themeda anathera</i> (Nees) Hack.	48	3.84	51.84
	<i>Lantana camara</i> Linn.	40	2.4	42.4
	<i>Ehretia obtusifolia</i> Hochst ex Dc.	36	1.54	37.54
IV. (HILL SLOPES)				
	<i>Dodonaea viscosa</i> (I.) Jacq.	48	1.94	49.94
	<i>Cenchrus pennisetiformis</i> Hochst and Steud.	44	3.5	47.5
	<i>Themeda anathera</i> (Nees) Hack.	40	2.14	42.14
V. (HILL TOPS)				
	<i>Lantana camara</i> Linn.	44	3.5	47.5
	<i>Ehretia obtusifolis</i> hochest ex Dc.	44	1.8	45.8
	<i>Themeda anathera</i> (Nees) Hack.	36	3.46	39.46

Table - III
Regeneration Table

Sl. No.	Species.	Summation Values Stand Numbers.					Average summation value in all the five stands
		I	II	III	IV	V	
1.	<i>Acacia modesta</i> Wall.	33.6	29.5	34.3	12.7	29.8	27.98
2.	<i>Lantana camara</i> Linn.	21.7	8.6	17.26	8.7	29.4	17.13
3.	<i>Ehretia obtusifolia</i> . Hochst ex DC.	4.24	4.3	25.5	4.2	8.6	9.36
4.	<i>Dodonaea viscosa</i> (L.) Jacq.	12.6	12.6	13.0	8.02	—	9.24
5.	<i>Ziziphus nummularia</i> (Burm. F) White and Arn.	17.5	—	12.8	4.6	8.5	8.68
6.	<i>Carissa opaca</i> Stap ex Haines.	—	4.3	—	4.1	8.6	3.4
7.	<i>Adhatoda vasica</i> Nees	12.7	—	—	—	—	3.38
8.	<i>Gymnosporia royleana</i> (Wall) Lawson	8.3	—	4.1	—	—	2.48
9.	<i>Celtis australis</i> Linn.	—	—	—	4.7	—	0.94
10.	<i>Prosopis juliflora</i> Swartz.	—	4.2	—	—	—	0.84

Recommendations. On the basis of the findings, it is suggested that *Acacia-modesta*, *Prosopis juliflora* and *Olea cuspidata* on hill tops, slopes and foothills should be encouraged whereas the broadleaved deciduous and ever-green trees may be planted around the perennial ponds.

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Table I

Painting techniques and treatment given to leodar containers

Container	Paint applied	Treatments
A	Outside	Open sun
B	Inside	Open sun
C	Outside	Open sun
D	Outside	Open sun
E	Outside	In the room
F	Inside	In the room
G	Unpainted	Open sun