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PRESENT STATUS OF SUBTROPICAL CHIRPINE VEGETATION OF KOTLI HILLS, AZAD JAMMU AND KASHMIR

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Abstract: There were seven plant communities viz Adiantum-Olea, Acacia modesta, Dodonaea-Acacia- Themeda, Pinus-Themeda, Imperata-Pinus, Pinus roxburghii and Pinus-Carissa-Themeda recognized in Kotli Hills during monsoon, 2000. There were 58 total plant species, out of which 9 species were woody, 13 shrubby and the remaining 36 were herbaceous. The investigated data shows heavy deforestation and overgrazing. The Vegetation belongs to Chirpine forest type.

Keywords: Chirpine, Kotli Hills, plant communities, vegetation.

INTRODUCTION

Vegetation is the outcome of the habitat, environmental condition and existing biotic influences. Some studies in the Subtropical belt of AJ&K have been carried out [Malik and Hussain 1987, 88, 90, Malik and Zandial 1996, Dastagir *et al.* 1999]. No quantitative data on phytosociology of Kotli Hills are available. The present study describes the existing vegetation structure, species diversity and soil-plant relationship. The findings will help ethno botanists, environmentalists, ecologists to work in other localities of the same area. Kotli Hills are situated at a distance of 300 km away from Muzaffarabad with an altitude varying between 675-1400 meters. The area is bounded on the north by District Poonchh; on the South by District Mirpur; on the West by District Rawalpindi and on the east by the occupied Kashmir. The climate of the area is subtropical with an annual rainfall of 1453 mm. The area receives maximum rainfall during August (405mm) while minimum rainfall (11mm) occurs in January. The hottest months are May, June, July and September (31.8-33.2^{o}C). The mean minimum temperature of these months varied between 21-22^{o}C. The highest relative humidity was recorded during December (96%) whereas lowest relative humidity was recorded during May and June (58-59%). The research area falls within the subtropical vegetation type.

MATERIALS AND METHODS

The area was divided in to seven stands on the basis of physiognomic contrast. Fifteen quadrates were laid systematically in each of the community. Herbs, shrubs and trees were respectively sampled in 0.5x0.5 meters, 2x5 meters and 2x10 meters quadrat. A species was recorded in the different strata due to its habitat. The trees were counted and the circumference of each tree was determined at breast height and converted to basal area following Cox [1967], Malik and Hussain [1987]. Density, frequency and canopy cover/basal area thus measured were

changed to relative values. These 3 parameters viz (relative density, relative frequency and relative canopy cover were added together which gave importance value (I.V.) for each of the recorded species. The leading dominants were used for naming the community [Curtis and McIntosh 1950].

Soil was sampled in duplicate upto the depth of 15cm and mixed to get a composite sample for each stand. Soil samples were analyzed for their physical and chemical characteristics following [Richards 1954 and Jackson 1962]. Vegetation was sampled during monsoon, 2000. The nomenclature used here is that of Stewarts [1972).

RESULTS AND DISCUSSION

The results have been summarized in the form of importance value (I.V). Following seven plant communities were established at Kotli hills during Monsoon 2000.

ADIANTUM- OLEA COMMUNITY

This community lies at an elevation of 675m. It was dominated by *Adiantum incisum* and *Olea ferruginea* with importance value of 57.2, 55.23. *Cyperus rotundus, Acacia modesta* and *Dicliptra roxburghiana* were the co-dominant species. *Adhatoda zeylonica, Maytenus royleanus, Themeda anathera, Cynodon dactylon* and *Boerhaavia procumbens* were the associated components. Eight species were rare (Table 1). The community seems to be of mesic nature. The area is of open type, where tree species were removed and unpalatable species were dominating. Here grazing pressure is high. Soil was loamy with acidic pH, 1.7% organic matter, phosphorus and potassium was high. The soil seems to be of fertile nature (Table 2).

ACACIA MODESTA COMMUNITY

This community was dominated at an elevation of 700m. It was dominated by *Acacia modesta* with an importance value (I.V.) of 66.13. Associated species were *Celtis eriocarpa, Olea ferruginea, Themeda anathera, Chrysopogon aucheri* and *Carissa opaca.* Eight species were rare (Table 1). Community shows xeric nature but is also protected due to low grazing pressure and cutting. Soil was loamy with 6.6pH, here the amount of organic matter, and phosphorus and potassium were very high (Table 2).

DODONAEA-ACACIA-THEMEDA COMMUNITY

This community was harbored at a height of 740 meters. *Dodonaea viscosa, Acacia arabica* and *Themeda anathera* were dominant species of the community with an importance value of 47.59, 46.71 and 41.17 respectively. *Heteropagan contortus* and *Malvastrum coromandelianum* were Co-dominant. *Brachiaria ramosa, Cynodon dactylon, Adhatoda*

zeylonica and *Microomeria biflora* were associated species. Four species were recorded as rare (Table 1). The community shows xeric nature. Soil was loamy in texture with 5.3pH; potassium and phosphorus were present in satisfactory amount.

Table 1: Importance value of 11 plant communities recorded from kotli Hills during monsoon, 2000.

Sr. No.	Species	Importance Value (I.V.)			No. of Stand Present
		Maximum	Minimum	Average	
A	**Tree layer**				
1	Acacia arabica willd	46.71	46.71	6.67	1
2	Acacia modesta wall	66.13	21.84	12.56	1
3	Celtis eriocarpa DCNe	9.99	9.99	1.42	
4	Dalbergia sisoo Roxb	5.35	5.35	0.76	
5	Flacourtia indica (Burm. F) Merr	10.03	10.03	1.43	
6	Mallotus philippensis Muell	5.79	5.79	0.82	
7	Olea ferruginea Royle	55.23	26.74	11.71	1
8	Pinus roxburghii sargent	126.48	56.08	46.39	4
9	Zizyphus jujuba Miller	7.38	7.38	1.05	
B	**Shrub layer**				
1	Adhatoda zeylonica Nees	13.96	10.24	52.35	
2	Berberis lycium Royle	0	0	0	
3	Carissa opaca Stapf ex Hains.	59.17	3.07	18.60	1
4	Celtis eriocarpa DCNe	27.25	5.23	4.64	
5	Colebrookea oppositifolea. Sm	15.57	15.57	2.22	
6	Debregesia salisifolia (D.Don) Rendle	0	0	0	
7	Dodonaea viscosa (Linn) Jacq	47.59	12.19	16.13	1
8	Flacourtia indica (Burm.f) Mur	2.81	2.87	0.40	
9	Mallotus philippensis Muell	14.37	2.00	3.35	
10	Maytenus royleanus Wall	46.2	2.81	10.39	
11	Olea ferruginea Royle	16.50	6.89	4.68	
12	Punica granatum Linn.	11.04	11.04	1.58	
13	Zanthoxylum alatum Roxb.	2.00	2.00	0.28	
C	**Herb layer**				
1	Abutilon indicum (L) Sweet	65.24	65.24	9.23	
2	Acacia modesta Wall	2.31	2.31	0.33	
3	Adiantum incisum Forssk	57.29	17.24	10.64	1
4	Adiantum capilis veneris Linn	15.21	9.12	3.47	
5	Asparagus graciles Royle	4.57	3.21	1.11	
6	Avena barbata Don ex link	9.39	9.39	1.34	
7	Ajuga bracteosa wallich ex Benth	5.86	1.87	6.13	
8	Boerhaavia procumbens Bank ex Roxb.	6.53	6.53	0.93	
9	Brachiaria ramosa (Linn) Stapf	45.71	7.07	10.72	
10	Carissa opaca Stapf ex Haines	3.48	3.48	0.49	
11	Chrysopogan serrulatus Trin	14.93	14.93	2.13	
12	Commelina benghalensis Linn	10.27	2.75	1.86	
13	Convolvulus arvensis Linn	9.20	9.20	1.31	
14	Conyza canadensis (L) Hook	2.65	2.65	0.37	
15	Cynodn dactylon (L) Pers.	20.55	15.67	5.17	
16	Cyperus rotundus Linn.	25.22	6.95	4.59	
17	Cynoglosum lanceolatum Forssk	1.81	1.81	0.25	
18	Dicliptera roxburghiana Nees	1.34	0.95	0.32	
19	Eriophorum comosum (Wall ex Roxb). Nees	30.12	9.29	7.19	
20	Euphorbia helioscopia Linn	2.65	2.65	0.37	
21	Heteropogam contortus (L) P. Beauv	39.30	11.65	13.73	
22	Imperata cylindrica (Linn) Raeuscnec	63.29	63.29	9.04	1
23	Juncus serotinus Clarke.	20.57	20.57	2.93	
24	Lespedeza juncea (L.F) Pers.	34.50	34.50	4.92	
25	Medicago lanceolata (L.) Mill	8.57	2.85	1.63	

26	Malva sylvestris Linn.	1.29	1.29	0.18	
27	Malvastrum coromandelianum (Linn) Garke	34.04	1.81	5.57	
28	Micromeria biflora (Buch-Ham ex D. Don) Benth	18.73	4.22	6.60	
29	Oxalis corniculata Linn.	3.59	3.26	0.97	
30	Physalis divaricata D. Don.	3.21	3.21	0.45	
31	Phyllanthus niruri Linn.	1.34	1.34	0.19	
32	Plantago lanceolata Linn.	0	0	0	
33	Solanum nigrum linn.	0	0	0	
34	Sida cordata (Bum. F) Bioss.	2.81	2.81	0.40	
35	Taraxacum officinale Weber.	1.29	1.29	0.18	
36	Themeda anathera (Ness ex steud) Hack	62.22	15.15	35.99	3

Table 2: Soil analysis of 7 plant communities recorded from Kotli Hills during Monsoon, 2000.

Communities	Height (m)	Textural class	Saturation percent	pH	Organic matter (%)	P (ppm)	K (ppm)
Adiantum-Olea community	675	Loam	31	6.6	1.7	36	40
Acacia modesta	700	Loam	40	6.6	2.4	35	60
Dodonaea-Acacia-Themeda	740	Loam	40	5.3	2.7	47.5	80
Pinus-Themeda	750	Loam	35	6.7	1.0	36	40
Imperata - Pinus	800	Sandy clay loam	45	6.5	3.0	36	100
Pinus roxburghii	1300	Sandy loam	28	7.2	1.5	33	40
Pinus-carissa-Themeda	1400	Loam	40	6.5	0.2	40	40

PINUS-THEMEDA COMMUNITY

This community was recorded at an elevation of 750m. Dominant species were *Pinus roxburghii* and *Themeda anathera* with an importance value of 78.23 and 62.22, respectively. *Dodonaea viscosa, Eriophorum comosum, Olea ferruginea, Colebrookia oppositifolia* and *Mallotus phillippensis* were associated components of the community. Ten species were recorded as rare (Table 1). Community shows xeric nature. Soil was loamy with 1 % organic matter, 36ppm phosphorus, 40ppm potassium.

IMPERATA-PINUS COMMUNITY

This community was established at an elevation of 800 meters at Doongi Hills. *Imperata cylindrica* and *Pinus roxburghii* were dominant with an importance value of 63.29 and 56.08, *Carissa opaca, Themeda anathera, Oxalis corniculata, Dodonaea viscosa* and *Micromeria biflora* were associated component of the community. Nine species were recorded as rare (Table 1). Soil was sandy clay loam with circum neutral pH and high amounts of potassium and phosphorus (Table 2).

PINUS-ROXBURGHII COMMUNITY

At an altitude of 1300m Pinus roxburghii take the lead as dominant species with an importance value of 126.48. *Themeda anathera* was the co-dominant species. *Abutilon indicum* and *Heteropogan contortus* were associated species. Eight species were recorded as rare. Soil in this community was sandy loam with 33ppm phosphorus and 40ppm potassium.

***PINUS-CARISSA-THEMEDA* COMMUNITY**

This community lies at an elevation of 1400 meter. Dominant species were *Pinus roxburghii, Carissa opaca* and *Themeda anathera* with an importance value of 63.99, 59.17 and 52.84, respectively. *Micromeria biflora, Heteropogon contortus, Adiantum incisum* and *Punica granatum* were the associated components. Four species were recorded as rare (Table 1). Soil was loamy with 6.5pH, low organic matter and satisfactory amount of phosphorus and potassium.

The results show highly deteriorated condition of forests due to over-grazing, deforestation, trampling and soil erosion.

In *Adiantum-Olea* community, *Acacia modesta, Flacourtia indica, Adhatoda zelonica, Carissa opaca, Celtis eriocarpa* and *Maytenus royleanus* were present. This locality represents sub-tropical semi-ever green forest type. Due to the openness of the community *Adhatoda zeylonica, Carissa opaca, Maytenus royleanus* were increased. Allelopathy might have played some role in the spread of *Adhatoda*. There are different communities which have different degraded stages of subtropical forest.

In *Acacia* community, *Olea ferruginea* was present but it has low importance value which might be due to the deforestation.

Similarly in *Dodonaea-Acacia-Themeda* community, *Pinus-Themeda* community, *Imperata-Pinus* community *Pinus roxburghii* community and *Pinus –carissa-Themeda* community similar situation was seen.

In *Pinus-Carissa-Themeda* community, *Pinus-roxburghii* dominated in the tree layer, while *Mallotus phillippensis, Dodonaea viscosa, Otostegia limbata* makes the shrub layer in this community. *Olea* and *Acacia* were absent. Otostegia and Mallotus are unpalatable species. They increase under grazing and deforestation. The stand is representative of *Acacia-Pine* or *Olea-Pine* type. In *Pinus-Themeda* community, *Carissa opaca, Colebrookea oppositifollea, Dodonaea viscosa* and *Flacourtia indica* were present. It is a typical type of plain thorn forest which was ascended up to subtropical belt [Champion *et al.* 1965). It had maximum importance value in stand with loamy character and high organic matter (Table 2). The presence of *Acacia, Zizyphus, Maytenus, Adhatoda, Themeda, Eriophorum*, *Imperata, Chrysopogon, Heteropogon, Adiantum, Olea* community to be of sub-tropical semi evergreen forest.

In *Pinus roxburghii* community *Acacia* and *Olea* were absent in tree layers. Similarly, In *Pinus-Themeda, Imperata-Pinus, Pinus-Carissa-Themeda* community *Carissa Celtis, Dodonaea, Olea, Zizyphus, Zanthoxylum, Commelina, Micromeria, Conyza* and *Euphorbia* were present. The area needs complete protection by the forest department. *Dodonaea* spread best on dry habitat to form *Dodonaea* Scrub [Salim and Shahid 1973). Similarly *Pinus roxburghii* was sparsely distributed in the open degraded forest. Deforestation and over-grazing were the major factors in the removal of original vegetation for its degradation. The

vegetation component suggested it to be sub-tropical chir pine forest *Adhatoda, Carissa, Maytenus* increase under continuous, deforestation and overgrazing.

CONCLUSION

The area needs complete protection from biotic interferences deforestation, grazing and human influence so that original vegetation can occur again. The Government should take active action against the local inhabitants which are involved in cutting the forest for earning a lot of money.

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