International Journal of Biosciences (IJB)
ISSN: 2220-6655 (Print) 2222-5234 (Online)
Vol. 2, No. 10(2), p. 80-88, 2012
http://www.innspub.net

RESEARCH PAPER OPEN ACCESS

Present status of moist temperate vegetation of Thandiani forests district Abbottabad Pakistan

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Received: 24 September 2012
Revised: 16 October 2012
Accepted: 17 October 2012

Key words: Abbottabad, altitudinal zones, ethnobotanical.

Abstract

The moist temperate vegetation of Thandiani forests District Abbottabad were studied for phytosociological analysis. Fifteen plant communities were recorded in the study area. Sum of 90 plant species including 44 herbs and 23 each shrub and trees along with their ethnobotanical uses were studied. The soil of the study area was loamy clay with pH ranging from 6.5 to 8.75. Variation in altitude and soil composition had played significant role in the establishment of plant communities. The lower altitudinal zone shows heavy deforestation, soil erosion, human disturbance, livestock herding, overgrazing, trampling and uprooting of medicinal plants disturb the plant communities. The higher altitudinal zones are reserve and protected by the government.

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Introduction

Thandiani is one of the best moist temperate forests in Pakistan with a diversity of valuable plant and animal species (Champion et al., 1965). It is situated at 35 km in the Northeast of Abbottabad District between 34°-17 to 34°-10 North latitude and 73°-23 to 73 °-17 East longitudes with an altitude varying between 1191-2626 meters. Thandiani Forest is bounded on the east by Muzaffarabad, on the west by Siren Forest, on the north by River Kunhar and Garhi Habibullah and on the South by Abbottabad Sub Forest Division. The climate of the area is moist temperate with an annual rainfall of 1424.1 mm. The area receives maximum rainfall during August (305.5mm) while minimum rainfall (33.3mm) occurs in September. The hottest months are May, June, July and August (30.5-33.5°C). The mean minimum temperature of these months varied between 10.4-16.6°C. The highest relative humidity was recorded during August (83%) whereas lowest relative humidity was recorded during May and June (50-52%). The research area falls within the moist temperate vegetation type (Khan *et al.,* 2010).

Pakistan has various types of forests and vegetational zones on the basis of temperature and altitude range (Champion *et al*., 1965). The phytosociological studies were presented by different authors from time to time, i.e. (Hussain and Illahi, 1991; Hussain , 1984; Chaudhri , 1960; Qadir *et al*., 1966; Hussain and Qadir, 1970; Shaukat and Hussain, 1970; Ahmed, 1988; Malik and Hussain, 1987; Durrani and Hussain, 2005; Khan and Shaukat, 2005). Beside these individual and localized works from a few areas of Pakistan, there are certain areas which needs comprehensive quantitative investigations to describe various types of forest communities and population structure in different climatic areas of Pakistan. One of such area is Thandiani forest. Bearing these points in mind present paper is presented to describe population structure and quantitative description of Thandiani forests District Abbottabad Pakistan.

Material and methods

The area was divided into fifteen stands on the basis of physiognomic contrast during 2009. Fifteen quadrates were laid systematically in each of the community. Herbs, shrubs and trees were respectively sampled in 0.5 x 0.5 meters, 2 x 5 meters and 2 x 10 meters quadrate. The trees were counted and the circumference of each tree was determined at breast height and converted to basal area (Cox, 1967; Malik and Hussain, 1987). Density, frequency and canopy cover/basal area measured were changed to their 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 up to the depth of 15cm and mixed to get a composite sample for each stand. Soil samples were analyzed for their physical and chemical characteristics (Richards, 1954; Jackson, 1962).

Results

The results have been summarized in the form of importance value (I.V). Following fifteen plant communities were established at Thandiani Forests during 2009. The I.V.I values are presented in table 1 and the soil data are presented in Table 2.

Pinus – Punica – Dodonaea community: This community was recorded at an elevation of 1191 meters. The aspect was north. The GPS data for this community was N 34 08 29.7; E 73 16 23.5. This community contains 4 trees, 3 shrubs and 10 herbs. The IVI of dominant species were *Punica granatum* (35.6), *Dodonaea viscosa* (32.5) and *Pinus roxburghii* (29.4) respectively. The co-dominant species *were Themeda anathera, Berberis lycium* and *Ficus carica* with 29.3, 23.8 and 16.7 IVI respectively. The *Cannabis sativa, Cnicus argyracanthus, Medicago denticulate and Rumex nepalansis* were associated species. Soil in this community was clay loam with basic pH.

Table 1. Importance value of 15 plant communities recorded from Thandiani forests.

S. No	Name of species	Family	Importance Value (I.V)				
			Max	Min	Ave	Constancy	Class
		Tree layer					
1	*Abies pindrow* Royle.	Pinaceae	23.9	10.2	16.2	50	III
2	*Acacia nilotica* (Linn.)	Mimosoideae	13.2	13.2	0.87	60	III
3	*Aesculus indica* (Comb) Hook.	Hippocastanaceae	25.8	10.1	4.99	70	IV
4	*Cedrus deodara* Rox ex Lamb.	Pinaceae	33.2	6.3	8.97	70	IV
5	*Celtis australis* L.	Celastraceae	10.9	10.9	0.73	40	II
6	*Cornus macrophylla* Wall.	Cornaceae	13	6.2	1.28	30	II
7	*Diospyros lotus* L.	Ebenaceae	9.1	9.1	0.61	40	II
8	*Ficus carica* L.	Moraceae	16.7	4	2.37	40	II
9	*Juglans regia* (Sh) L.	Juglandaceae	8.9	8.5	1.16	40	II
10	*Melia azedarach* L.	Meliaceae	11.2	11.2	0.75	30	II
11	*Morus alba* L.	Moraceae	11.1	10.5	1.44	50	III
12	*Olea ferruginea* Royle.	Olacaceae	14.3	14.3	0.95	30	II
13	*Pinus roxburghii* Sargent.	Pinaceae	46.7	24.3	11.4	70	IV
14	*Pinus wallichiana* A.B.Jackson	Pinaceae	48.6	11.3	19.9	70	IV
15	*Pistacia integerrima* J.L.	Pinaceae	17.2	6.8	2.36	50	III
16	*Platanus orientalis* L.	Platanaceae	7.8	7.8	0.52	20	I
17	*Prunus armenica* L.	Rosaceae	16.2	9.6	1.72	50	III
18	*Prunus domestica* L.	Rosaceae	8.5	8.5	0.57	30	II
19	*Prunus padus* (Hk)f.	Rosaceae	4.11	4.11	0.27	20	I
20	*Pyrus pashia* D.Don.	Rosaceae	13.5	4.2	2.3	30	II
21	*Quercus incana* Roxb.	Fagaceae	7.3	7.3	0.49	40	II
22	*Salix angustifolia* Willd.	Salicaceae	2.7	2.7	0.18	20	I
23	*Zizyphus vulgaris* Lam.	Zingiberaceae	12.6	12.6	0.84	60	III
		Shrubs layer					
24	*Andrachne cardifolia* (Don)Muell	Anacardiaceae	11.8	11.8	0.79	60	III
25	*Berberis lycium* Royle.	Berberidaceae	27.1	6.3	15.6	80	IV
26	*Cotoneaster minuta* Klotz.	Rosaceae	2.84	2.84	0.19	10	I
27	*Dodonaea viscose* L.	Sapindaceae	34.5	13.5	9.49	70	IV
28	*Indigofera gerardiana* Wall.	Papilionaceae	23	9.5	7.74	60	III
29	*Plectranthus rugosus* Wall.	Lamiaceae	14.8	8.96	1.58	30	II
30	*Punica granatum* L.	Punicaceae	42.6	16.4	12.5	90	V
31	*Rhus punjabensis* Stewart	Rhizophoraceae	8.65	2.84	0.76	30	II
32	*Rosa moschata non* J. Herrum	Rosaceae	13.8	8.96	2.35	50	III
33	*Rubus fruticosus* (Hk)f.	Rosaceae	16.7	3.9	4.17	50	III
34	*Sarcococca saligna* (Don) Muell	Buxaceae	17.8	10.2	3.69	70	IV

35	*Skimmia laureola* D.C.	Rutaceae	7.9	2.34	0.97	20	I
36	*Sorbaria tomentosa* (Lindl.)	Sonneratiaceae	7.2	7.2	0.48	40	II
37	*Viburnum cotinifolium* D.Don.	Caprifoliaceae	29.5	29.5	1.97	100	V
38	*Viburnum grandiflorum* Wallich	Caprifoliaceae	32.3	10.7	9.27	70	IV
39	*Zanthoxylum alatum* Roxb.	Rutaceae	12.4	12.4	0.83	50	III
40	*Zizyphus jujuba* Lam.	Zingiberaceae	35.9	10.6	5.17	80	IV
	Herbs layer						
41	*Achillea millefolium* L.	Compositeae	8.1	7.3	1.02	30	II
42	*Ajuga bracteosa* Wall.	Labiateae	15.8	9.9	0.66	60	III
43	*Androsace rotendifolia* Hardw.	Primulaceae	10.9	10.9	0.73	50	III
44	*Aquilegia pubiflora* Wall.ex.R.	Ranunculaceae	17.3	15	3.17	40	II
45	*Arisaema flavum* Forrsk.	Araceae	18.1	4.42	1.50	30	II
46	*Arisaema jacquemontii* Blume.	Araceae	7.4	7.3	0.98	20	I
47	*Artemisia absinthium* L.	Compositeae	15	10.7	1.71	40	II
48	*Arundo donax* L.	Poaceae	17	17	1.13	30	II
49	*Bergenia ciliata* (Haw) Sternb.	Saxifragaceae	34	15	3.27	50	III
50	*Bistorta amplexicaule* (D.Don)	Polygonaceae	20.6	11.5	3.14	60	III
51	*Cannabis sativa* L.	Cannabiaceae	16.2	12.1	2.83	60	III
52	*Chenopodium* album	Chenopodiaceae	12.4	11.5	1.59	40	II
53	*Chrysanthimum cenarifolium* Trey	Chenopodiaceae	12.4	5.1	1.16	30	II
54	*Clematis amplexicaulis* Edgew.	Ranunculaceae	6.3	3.3	0.64	10	I
55	*Cnicus argyracanthus* (DC) Hk.f	Asteraceae	30.9	3.5	10.3	40	II
56	*Cynodon dactylon* L.	Poaceae	47.3	21.1	6.58	90	V
57	*Cyperus rotundus* L.	Cyperaceae	8.7	8.7	0.58	30	II
58	*Daphne mucronata* Royle.	Passifloraceae	12.6	12.6	0.84	50	III
59	*Duchesnea indica* (Andr.) Fock.	Rosaceae	16.5	13.2	1.98	60	III
60	*Euphorbia helioscopia* L.	Euphorbiaceae	12.5	8.1	2.16	40	II
61	*Euphorbia wallichii* Hk. F.	Euphorbiaceae	22	7.9	2.57	30	II
62	*Frageria nubicola* L.	Rosaceae	36.3	9.2	8.6	70	IV
63	*Galium aparine* L.	Rubiaceae	14.3	7.4	2.17	40	II
64	*Malva neglecta* Wallr.	Malvaceae	5.1	5.1	0.34	20	I
65	*Medicago denticulate* Willd.	Paplionaceae	22.6	8.7	8.39	60	III
66	*Micromeria biflora* Benth.	Lamiaceae	12.3	12.3	0.83	50	III
67	*Nepeta erecta* Bh Bth.	Lamiaceae	14.7	9.36	3.27	60	III
68	*Oenethra rosea* L.	Rosaceae	11.8	11.8	0.79	50	III
69	*Oxalis corniculatus* L.	Onagraceae	13.3	6.9	4.27	40	II
70	*Plantago major* L.	Plantaginaceae	15.2	9.97	1.68	30	II
71	*Poa annua* L.	Poaceae	15.3	15.3	1.02	60	III
72	*Podophylum amodi* Wall.ex Ro.	Berberidaceae	14.7	6.25	2.08	30	II

73	*Poeneia amodi* Wall.	Paeoniaceae	5.2	5.2	0.35	20	I
74	*Polygonum amplexicaule* D. Don	Polygonaceae	40.1	24.5	6.25	80	IV
75	*Potentilla fruticosa* Hk. f.	Rosaceae	11.3	11.3	0.75	50	III
76	*Prunela vulgaris* L.	Labiateae	6.7	6.7	0.45	20	I
77	*Ranunculus muricatus* L.	Ranunculaceae	17	8.92	6.35	50	III
78	*Rumex hastatus* L.	Polygonaceae	25.8	12.7	5.39	80	IV
79	*Rumex nepalansis* Spreng.	Polygonaceae	31.1	13.6	12.8	70	IV
80	*Scrophularia robusta* Penn.	Scheuchzeriaceae	3.5	3.5	0.23	10	I
81	*Senecio Chrysanthemoides* DC	Asteraceae	15.1	3.7	4.43	40	II
82	*Solanum nigrum* L.	Solanaceae	15.8	15.8	1.05	50	III
83	*Strobilanthes alatus* Nees.	Sterculiaceae	13.4	11.3	1.65	50	III
84	*Tagetes minuta* L.	Tamaricaceae	15.9	5.69	2.33	40	II
85	*Taraxacum officinale* Weber.	Plantaginaceae	13.2	8.5	5.35	50	III
86	*Themeda anathera* (Nes.) Hack	Poaceae	34.4	29.3	4.25	100	V
87	*Trifolium repens* L.	Papilionaceae	15.9	4.04	2.17	30	II
88	*Valeriana officinalis* Hk.f.	Valerianaceae	16.1	10.2	1.75	40	II
89	*Verbascum thapsus* L.	Schrophlariaceae	12.4	11.1	1.57	40	II
90	*Viola conescens* Wall ex Roxb.	Violaceae	16.8	10.5	8.4	50	III

Table 2. Soil analysis of 15 plant communities recorded from Thandiani forests during 2009.

S.No	Communities	Height In Meters	Soil texture	Soil Ph
1	*Pinus - Dodonaea – Punica*	1191	Clay loam	8.10
2	*Themeda - Zizyphus- Dodonaea*	1313	Loamy	8.13
3	*Punica – Dodonaea- Pinus*	1412	Sandy silt	8.26
4	*Pinus - Punica – Dodonaea*	1510	Clay loam	8.20
5	*Pinus - Zizyphus – Cynodon*	1606	Sandy loam	8.23
6	*Pinus - Punica – Rumex*	1710	Clay loam	8.27
7	*Pinus - Rumex – Cedrus*	1830	Clay loam	8.29
8	*Pinus - Cedrus – Rumex*	1919	Clay loam	8.32
9	*Pinus – Cedrus – Medicago*	2017	Clayey	8.25
10	*Rumex - Aesculus – Viburnum*	2109	Clay loam	8.42
11	*Cedrus - Cnicus – Frageria*	2205	Sandy loam	8.30
12	*Cynodon - Aesculus – Viburnum*	1315	Clayey	8.35
13	*Viburnum - Abies – Euphorbia*	1407	Clayey	8.40
14	*Pinus - Polygonum – Frageria*	2539	Clayey	8.52
15	*Polygonum - Bergenia – Viburnum*	2626	Sandy silt	8.60

Themeda - Zizyphus - Dodonaea community: The elevation of this community was 1313 meters. The aspect was east. The GPS data for this community was N 34 11 09.5; E 73 16 21.2. This community contains 3 trees, 3 shrubs and 11 herbs. The IVI of dominant species *were Themeda anathera* 34.4, *Zizyphus jujuba* 31.1 *and Dodonaea viscosa* 30 respectively. The co-dominant species *were Pinus*

roxburghii, Punica granatum and Rumex nepalansis with 29.77, 27.9 and 17.7 IVI respectively. *The Cannabis sativa, Cnicus argyracanthus, Medicago denticulata* and *Euphorbia helioscopia* were associated species. Soil in this community was loamy with basic pH.

Punica - Dodonaea - Pinus community: There were 18 species in this community. The elevation of this community was 1412 meters. The aspect was east. The GPS data for this community was N 34 11 25.5; E 73 16 46.9. This community contains 4 trees, 4 shrubs and 10herbs. The IVI of dominant species were *Punica granatum* 42.6, *Dodonaea viscosa* 32.1 and *Pinus roxburghii* 24.3 respectively. The co-dominant species were *Berberis lycium, Cynodon dactylon, Cannabis sativa* and *Ajuga bracteosa* with 21.5, 21.1, 16.2 and 15.8 IVI respectively. The *Melia azedarach, Rosa moschota, Rumex nepalansis* and *Euphorbia helioscopia* were associated species. Soil in this community was sandy silt with basic pH.

Pinus - Punica - Dodonaea community: This community was recorded at an elevation of 1510 meters. The aspect was west. The GPS data for this community was N 34 11 37.5; E 73 17 56.1. This community contains 4 trees, 4 shrubs and 9herbs. The IVI of dominant species were *Pinus roxburghii* 40.3, *Punica granatum* 35.2 and *Dodonaea viscose* 34.3 respectively. The co-dominant species were *Berberis lycium, Rumex hastatus* and *Rumex nepalansis* with 27.1, 179 and 16.8 IVI respectively. The *Viola conescens, Rubus fruticosus, Taraxacum officinale* and *Gallium aparine* were associated species. Soil in this community was clay loam with basic pH.

Pinus - Zizyphus - Cynodon community: The elevation of this community was 1606 meters. The aspect was southern east. The GPS data for this community was N 34 11 30.5; E 73 17 55.3. This community contains trees, shrubs and herbs. The IVI of dominant species were *Pinus roxburghii* 46.7, *Zizyphus jujube* 35.2 and *Cynodon dactylon* 30.9 respectively. The co-dominant species were *Indigofera gerardiana, Pistacia integerrima,* and *Rubus fruticosus* with 21.4 17.2 and 16.7 IVI respectively. The *Solanum nigrum, Artemisia absinthium Oxalis corniculatus* and *Viola conescens* were associated species. Soil in this community was sandy loam with basic pH.

Pinus - Punica - Rumex community: This community was comprised of 19 species; the elevation of this community was 1710 meters. The aspect was south. The GPS data for this community was N 34 11 47.2; E 73 18 33.0. This community contains 4 trees, 5 shrubs and 10 herbs. The IVI of dominant species were *Pinus wallichiana* 41.6, *Punica granatum* 30 and *Rumex hastatus* 24.4 respectively. The co-dominant species were *Indigofera gerardiana, Berberis lycium, Rumex nepalansis* and *Ajuga bracteosa* with 23, 21.7, 16.6 and 13.1 IVI respectively. The *Acacia nilotica, Daphne mucronata, Zizyphus vulgaris* and *Dodonaea viscosa* were associated species. Soil in this community was clay loam with basic pH.

Pinus - Rumex - Cedrus community: This community was recorded at an elevation of 1830 meters. The aspect was northern east. The GPS data for this community was N 34 12 42.6; E 73 17 56.0. This community contains 5 trees, 5 shrubs and 8 herbs. The IVI of dominant species were *Pinus wallichiana* 36.6, *Rumex hastatus* 25.8 and *Cedrus deodara* 24.2 respectively. The co-dominant species were *Rumex nepalansis, Berberis lycium, Medicago denticulata, Ranunculus muricatus* and *Punica granatum* with 22.5, 19.8, 17.8, 17 and 16.4 IVI respectively. The *Pyrus pashia, Indigofera gerardiana,* and *Tagetes minuta* were associated species. Soil in this community was clay loam with basic pH.

Pinus - Cedrus - Rumex community: The elevation of this community was 1919 meters. The aspect was north. The GPS data for this community was N 34 13 14.9; E 73 17 36.9. This community contains 5 trees, 5 shrubs and 9 herbs. The IVI of dominant species were *Pinus wallichiana* 48.1, *Cedrus*

deodara 33.2 and *Rumex nepalansis* 24.3. The co-dominant species were *Berberis lycium, Rananculus muricatus* and *Medicago denticulata* with 18.2, 15.9 and 15.8 IVI respectively. The *Aesculus indica, Cnicus argyracanthus, Viburnum grandiflorum* and *Indigofera gerardiana* were associated species. Soil in this community was clay loam with basic pH.

Pinus - Cedrus - Medicago community: This community was recorded at an elevation of 2017 meters. The aspect was northern west. The GPS data for this community was N 34 13 44.1; E73 20 16.6. This community contains 5 trees, 6 shrubs and 9 herbs. The IVI of dominant species were *Pinus wallichiana* 48.6 *Cedrus deodara* 33.1 and *Medicago denticulata* 22.6 respectively. The co-dominant species were *Aesculus indica, Cnicus argyracanthus, Rananculus muricatus* and *Sarcococca saligna* with 18.1, 14.9, 14 and 13.6 IVI respectively. The *Indigofera gerardiana, Strobilanthes alatus, Oenethra rosea* and *Viburnum grandiflorum* were associated species. Soil in this community was clayey with basic pH.

Rumex - Aesculus - Viburnum community: This community consists of 19 species; the elevation of this community was 2109 meters. The aspect was southern west. The GPS data for this community was N34 13 53.4 E73 18 01.7. This community contains 5 trees, 5 shrubs and 9 herbs. The IVI of dominant species were *Rumex nepalansis* 31.1 *Aesculus indica* 20.99 and *Viburnum grandiflorum* 20.7 respectively. The co-dominant species were *Bistorta amplexicaule, Berberis lycium* and *Sarcococca saligna* with 20.6, 19.5 and 17.8 IVI respectively. The *Pinus wallichiana, Abies pindrow, Viola conescens, Aquilegia pubiflora* and *Duchesnea indica* were associated species. Soil in this community was clay loam with basic pH.

Frageria - Cnicus - Cedrus community: This community was recorded at an elevation of 2205 meters. The aspect was southern east. The GPS data for this community was N 34 15 05.1; E 73 20 25.2. This community contains 4 trees, 5 shrubs and 9 herbs. The IVI of dominant species were *Frageria nubicola* 36.3, *Cnicus argyracanthus* 30.9 and *Cedrus deodara* 30.7 respectively. The co-dominant species were *Polygonum amplexicaule, Viburnum grandiflorum* and *Valeriana officinalis* with 24.5, 24.2 and 16.1 IVI respectively. The *Pinus wallichiana, Abies pindrow, Berberis lycium* and *Sarcococca saligna* were associated species. Soil in this community was sandy loam with basic pH.

Cynodon - Aesculus - Viburnum community: The elevation of this community was 2315 meters. The aspect was northern east. The GPS data for this community was N 34 14 39.7; E 73 20 13.8. This community contains 4 trees, 5 shrubs and 12 herbs. The IVI of dominant species were *Cynodon dactylon* 247.34, *Aesculus indica* 25.8 and *Viburnum grandiflorum* 23.5 respectively. The co-dominant species were *Berberis lycium, Rumex nepalansis* and *Pinus wallichiana* with 22.12, 19.15 and 17.05 IVI respectively. The *Trifolium repens, Duchesnea indica, Nepeta erecta* and *Medicago denticulata* were associated species. Soil in this community was clayey with basic pH.

Viburnum - Abies - Euphorbia community: This community was recorded at an elevation of 2407 meters. The aspect was southern east. The GPS data for this community was N 34 14 56.1; E 73 20 21.5. This community contains 3 trees, 4 shrubs and 13 herbs. The IVI of dominant species were *Viburnum cotonifolium* 29.5, *Abies pindrow* 23.95 and *Euphorbia wallichii* 22 respectively. The co-dominant species were *Frageria nubicola, Cnicus argyracanthus, Arisaema flavum* and *Ranunculus muricatus* with 21.9, 18.7, 18.1 and 16.7 IVI respectively. The *Pinus wallichiana, Indigofera gerardiana, Viola conescens* and *Rumex nepalansis* were associated species. Soil in this community was clayey with basic pH.

Pinus - Polygonum - Frageria community: The elevation of this community was 2539 meters. The aspect was north. The GPS data for this community

was N 34 15 47.2; E 73 20 56.3. This community contains 4 trees, 4 shrubs and 14 herbs. The IVI of dominant species were *Pinus wallichiana* 43.1, *Polygonum amplexicaule* 36.6 and *Frageria nubicola* 32.95 respectively. The co-dominant species were *Berberis lycium, Abies pindrow* and *Bergenia ciliata* with 20.5, 18.66 and 15 IVI respectively. The *Cedrus deodara, Rananculus muricatus, Plectranthus rugosus* and *Viola conescens* were associated species. Soil in this community was clayey with basic pH.

Polygonum - Bergenia - Viburnum community: This community was recorded at an elevation of 2626 meters. The aspect was east. The GPS data for this community was N 34 14 54.7; E 73 20 37.8. This community contains 3 trees, 5 shrubs and 15 herbs. The IVI of dominant species were *Polygonum amplexicaule* 40.1, *Bergenia ciliata* 34 and *Viburnum grandiflorum* 32.3 respectively. The co-dominant species were *Frageria nubicola, Pinus wallichiana* and *Aquilegia pubiflora* with 28.6, 26.36 and 15.3 IVI respectively. The *Abies pindrow, Senecio Chrysanthemoides* and *Cornus macrophylla* were associated species. Soil in this community was sandy silt with basic pH.

Discussion

Phytosociology is the study of the characteristics, classification, relationships and distribution of plant communities (Dastagir, 1999). Vegetation may be defined as a unit which posses characteristics in physiogamy and structure sufficiently large enough to permit their differentiation from other such units (Khan *et al.,* 2010).

In Thandiani forests 15 plant communities were made on the bases of vegetation, altitudinal range, climate and soil factor. Each plant communities have different dominance values. *Pinus roxburghii* was dominant between an elevation of 1191 to 1606m along with *Dodonaea, Zizyphus, Punica, Themeda* and *Cynodon* species. *Dodonaea* normally prefer driest condition (Saleem and Shahid, 1973). *Pinus roxburghii* the base was dominant; it was replaced by the *Themeda* and *Punica*. The local inhabitant use *Pinus* for fuel, shelters purpose and as timber. That is why it becomes rare in the investigated communities. At the lower ridges, the grazing pressure was high which have replaced almost palatable species. *Themeda* and *Cynodon* are palatable species which increases under grazing. *Themeda* is a fine fodder grass while *Cynodon* is an allelopathy grass, which suppresses the growth of other species. The soil was clay loam and sandy silt with basic pH from 8.10 to 8.23.

With the increase in altitude *Pinus wallichiana* become as dominant plant with *Rumex, Cedrus, Aesculus, Viburnum, Abies, Frageria* and *Bergenia* etc. *Pinus wallichiana, Viburnum, Abies* and *Aesculus* are the true characters of temperate zone from 1710meter to 2626meter with the soil Clayey, Clay loam and Sandy silt.

Deforestation and overgrazing are swear in the investigated sides, which have removed *Pinus wallichiana* up to the top 2626meter. *Viburnum* is palatable; it increases under grazing which is clear in community *Rumex - Aesculus - Viburnum* community, *Cynodon - Aesculus - Viburnum* community and *Polygonum - Bergenia - Viburnum* community. With the decrease in *Pinus wallichiana, Polygonum Bergenia, Euphorbia, Cnicus* and *Medicago* become dominant. Here swear deforestation and grazing was seen which might be the cause of decrease in *Pinus wallichiana* and *Abies*.

The study 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.

References

Ahmed M. 1988. Plant communities of some northern temperate forests of Pakistan. *Pak. J. Bot*., **38,** 33-40.

Champion HG, Seth SK, Khattak GH. 1965. Forest types of Pakistan, Forest Institute, Peshawar, p. 238.

Chaudhri II. 1960. The vegetation of Kaghan valley. Pak. J. Bot. **10:** 285-294.

Cox GW. 1967. Laboratory Manual of General Ecology, W.M.C. Brown Co, Publ. Dubuque, Lowa, U.S.A. p. 165.

Curtis JT, Mclntosh PR. 1950. The interrelations of certain analytic and synthetic phytosociological characters. Ecology **31,** 434-455.

Dastagir G, Haq IU, Malik ZH. 1999. Phytosociology of Mai Dhani Hill near Muzaffarabad, Azad Kashmir. Pak. J. Bio. Sci. **2(2),** 185-191.

Durrani M, Jan A, Hussain F. 2005. Ethno ecological profile of plants of Harboi rangeland, Kalat, Pakistan. Int. J. Bio. Biotech. **2(1):** 15-22.

Hussain F, Illahi I. 1991. *Ecology and Vegetation of Lesser Himalayan Pakistan*. Bot. Dept. Uni. of Peshawar, p. 187.

Hussain SS, Qadir SA. 1970. An Autecological study of *Euphorbia caducifolia* Haines. Vegetatio. **25(6),** 329-380.

Hussain SS. 1984. *Pakistan Manual of Plant Ecology*. National Book Foundation. Islamabad, p 255.

Jackson MC. 1962. Soil Chemical Analysis. Constable and Co. Ltd., Canada.

Khan D, Shaukat SS. 2005. Above ground standing phytomass of some grass-dominated communities of Karachi: Winter aspect. Int. J. Bio.Biotech. **2(1).** 85-92.

Khan W, Ahmad H, Shah GM. 2010. Phytosociology and Geographical distribution of Thandiani forests. M.Phil thesis Department of Botany, Hazara University, Mansehra, KPK. Pakistan.

Malik ZH, Hussain F. 1987. Phytosociological studies of the vegetation around Muzaffarabad, Azad Jammu and Kashmir. Modern Trends of Plant Sci. Res. in Pakistan. p. 13-17.

Qadir SA, Qureshi SZ, Ahmed MA. 1966. A phytosociological survey of Karachi University Campus. Vegetatio. **13(8),** 339-362.

Richards LA. 1954. Diagnosis and Improvement of Saline and Alkali soils USDA, Agric. Handbook No.60, Washington, D.C., p. 1620.

Salim KM, Shahid RG. 1973. A winter flora of the Cherat hills. Part II, Pak. J. Forest **23(3),** 267-282.

Shaukat SS, Qadir SA. 1970. Observation on the vegetation of Calcareous hills around Karachi. Agri. Pak. **21(3),** 285-299.