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Status of Flora in Chinji Forest Preserves

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Abstract: The present vegetal investigations were aimed at the National Park Reserves Chinji (Talagang). The area of the park was surveyed thoroughly and three study sites were selected in the park, keeping in view the following physiogeographic factors:

Nature of vegetation cover, density, frequency and coverage of plant species, species composition, water regimes, extent of desertification, level of salinity and sodicity, soil texture and structure, soil profile, topography. Following three plant communities in Chinji were recognized on the bases of importance value.

S1/Q1 *Cynodon - Acacia - Dodonaea*

S2/Q2 *Cynodon - Dodonaea - Acacia*

S3/Q3 *Cynodon - Dodonaea - Eulaliopsis - Cymbopogon*

The community of Q1, Q2 and Q3 comprised 19, 21 and 19 plant species respectively, out of which 5 in Q1 7 in Q2 and 6 in Q3 got vanished during the second year. New colonizers were *Eulaliopsis binata* and *Asparagus adscendens* in Q1 and *Eulaliopsis binata* in Q3.

Keywords: Flora, chinji forest preserves

Introduction

Geographical area of Pakistan is 79.6 m ha, out of which 26.3% is arid and semi-arid landmass and is being used for agriculture purposes (Anwar, 1997) which has failed to meet food and feed requirements. Increase in agriculture land is a target for Government to achieve self-sufficiency in food.

Government of Pakistan on the advice and encouragement of World Wild Fund (WWF), established 19 National Park Reserves in different ecological zones of the country on experimental basis. While embarking upon these establishments much importance was given to the heterogeneity of the environments.

National Park Reserves at Chinji (Talagang, Chakwal) was chosen for the present investigations. The area of National Park Reserve Chinji is 6076 hectares (25007 acres) (Babar, 1996). Its altitude is 680 meters. It is situated in the heart of salt rang about 130 km from Islamabad in the south. Average annual rain is 537 mm out of which 308 mm during monsoon (July-September). Mean maximum temperature in the area is 27°C in June and the mean minimum in January is 2.2°C. Frost in the area is not uncommon during winter.

Maximum relative humidity percentage during monsoon is 80. Its deeply eroded landmass and is comprising of sandstone to igneous rocks, with deep torrential streams and raviness sloping sharply toward River Soan ultimately joining River Indus.

To achieve acceleration in agricultural productivity of these rangelands, one has to understand their flora particularly its density, frequency coverage and other related ecogeography, therefore, related benchmark data coupled with periodical increase or decreases in the structure of the endemic plant communities is the main aim of this investigation which can later be used by the planners, environmentalists and plant scientists.

Materials and Methods

The landscape of the National Park Chinji (Talagang) was physically surveyed to identify the desirable and appropriate study areas. To earmark these study areas the following physiographic factors were considered in detail before actually establishing the quadrates.

- | | |
|-----------------------------------|------------------------|
| 1. Nature of vegetation cover | 2. Species composition |
| 3. Density of plant species | 4. Canopy cover |
| 5. Frequency of plant species | 6. Water regime |
| 7. Extent of desertification | 8. Soil texture |
| 9. Level of salinity and sodicity | 10. Soil structure |

- | | |
|------------------------------|----------------|
| 11. Soil profile | 12. Topography |
| 13. Special features, if any | |

To investigate the vegetation aspects in detail of the National Park Reserve (Chinji) three study sites (S1, S2 and S3) were selected at three different ecogeographical places. Because of inaccessibility, dangers involved and other factors it was planned to establish one large quadrat in each study site further subdividing that into five sub-quadrates as fallow.

Sites	S1	S2	S3
Quadrat	Q1	Q2	Q3
Sub-Quadrates			
North	q1	q6	q11
West	q2	q7	q12
South	q3	q8	q13
East	q4	q9	q14
Central	q5	q10	q15

S1 (Site 1) was chosen in the south-eastern side of Thatti Rest House at a distance of 2.0 km. On road of Jaba (5 km. south-east of Chinji) for establishing Q1.

Q1 with its 5 subquadrates, was demarcated in the site 1 (S1) near the road side on left hand side of Talagang-Sargodha road. It had a characteristic topography. The central most part of this quadrat was its highest point topographically and was gradually losing height in all directions. Reddish brown had stony pan formed the main bed of this quadrat where some narrow and shallow gullies were present. The largest number of fossilized parts of the trees were seen littered around on the surface as well as in the profiles of the rocks.

S2 (Site 2) was nearly 300 m deep gully in the east of Thatti Rest House and comprised a sharp sloping slippery and dangerous trail above the gully (water course). A piece of this quadrat was hummocked in the centre and was gradually sloping on all sides. In the south-west a rather flat piece of land lay there with sandy top.

Q2 (with five subquadrates) was ear marked in S2 towards the east of Thatti Rest House. It was bordered by badly eroded hillocks from all the four sides. Its bottom comprised 17.0 m wide dry water coarse and the meeting point of two small ditches with bedded sand. A 15.0 m high hillock slightly away from its centre formed the most vegetated part of this quadrat.

S3 (Site 3) was selected in an open unfenced area on the right

side of Talagang-Sargodha Road about 500 m in the western side of Thatti Rest House. The flat soil surface was rocky to sapstony with some minor land sliding here and there. It was the pasture closest to the locality therefore, the utilization of the plant resources was the maximum. This area was highly elevated than other two sides, and a watch tower was erected by the wild life department.

Q3 quadrat was earmarked in S3, 100 m. away from TalagangSargodha road. It was slowly sloping and eroded surface facing north-east and south-east sides with some trapped soil and sand particles including sandstones. The soil was sandy, compact and hard, just like compacted cement. A pool of rain water lay close to the border of this quadrat serving as a water point in this water scarcity area for the grazier. This quadrat was further divided into five subquadrats.

Collection of Data: Data on quantitative phytosociological attributes such as frequency, density and plant cover were recorded in each subquadrat periodically, these three characteristics of the community are necessary for complete analysis of vegetation. Where vegetation offers difficulty in measuring density then reliance may be made upon the remaining two criteria (Hussain, 1989). Relative frequency, relative density, relative cover, importance value and status of the species were calculated by following method described by Mueller-Dombois and Ellenberg (1974) and Babar (1996).

Difference among the sites and habitats: Variations among the sites such as sloe, topography, water regime, soil texture and structure, apparent salinity and sodacity, decertification and soil profile levels were recorded visually. Altitude of the quadrats was

noted with altimeter. Special features of sites and vegetation were also recorded where necessary.

Results

Data were recorded thrice in a year but the ones were recorded after the monsoon appeared important thus are listed below. The following three plant communities were recognized in National Forest Reserve Chinji at three study sites (S1, S2 and S3) in both the years.

S1/Q1	1st Year	<i>Cynodon-Acacia-Dodonaea</i>
	2nd Year	<i>Cynodon-Dodonae-Acacia</i>
S2/Q2	1st Year	<i>Cynodon-Dodonaea-Acacia</i>
	2nd Year	<i>Cynodon-Dodonaea-Acacia</i>
S3/Q3	1st Year	<i>Cynodon-Moss-Dodonaea</i>
	2nd Year	<i>Cynodon-Eulalopsis-Cymbopogon</i>
S1/Q3 (First Year)		<i>Cynodon-Acacia-Dodonaea</i> Community

Cynodon dactylon, *Acacia modesta* and *Dodonaea viscosa* having importance values of 82.81, 52.16 and 42.41 emerged as the dominant species in Q1 (Table 1). Moss, *Olea cuspidata* and *Gymnosporia royleana* with importance value as 29.83, 26.84 and 22.53 respectively were found frequent.

Grewia tenax was ommon with importance value 15.74, *Otostegia limbata*, *Desmotachya bipinnata*, *Eragrostis tremula*, *Lichen*, *Cymbopogon jwarancusa* and *Salvia aegyptiaca* were infrequent with importance values 7.20, 5.40, 5.30, 4.50, 4.37 and 3.12 while *Chrysopogon plumulosus* and *Argyrolobium roseum* were rare with the importance values of 2.82 and 2.51 however, the rarest species was *Periploca aphylla* showing a value of 2.46.

Table 1: Species composition and their phytosocioloical values in Q1 (Fenced) at National Park Chinji

Species	Density	Frequency	Coverage	*R.D.	R.F.	R.C.	Importance value	Status
<i>Cynodon dactylon</i>	613.00	100	33.00	63.57	11.90	6.63	82.81	sd
	**880.00	100	22.50	85.08	11.11	5.13	101.32	d
<i>Acacia modesta</i>	9.60	100	190.00	2.03	11.90	38.30	52.16	sd
	8.00	100	56.40	0.77	11.11	12.87	24.75	f
<i>Dodonaea viscosa</i>	64.20	100	118.12	6.65	11.90	23.76	42.41	a
	47.80	100	217.15	4.62	11.11	49.43	65.16	sd
<i>Moss</i>	240.00	40	0.90	24.89	4.76	0.18	29.83	f
	-	100	-	-	-	-	-	-
<i>Olea cuspidata</i>	4.60	100	71.94	0.47	11.90	14.47	26.84	f
	3.20	100	27.39	0.30	11.11	6.25	17.66	c
<i>Gymnosporia royleana</i>	8.60	80	48.46	0.89	11.90	9.74	22.53	f
	5.00	80	52.95	0.48	8.88	12.08	21.44	f
<i>Grewie tenax</i>	7.60	80	27.14	0.76	9.52	5.46	15.74	c
	7.60	60	30.39	0.73	8.88	6.88	16.49	if
<i>Otostegia limbata</i>	0.40	40	0.12	0.04	7.14	0.02	7.20	if
	0.40	40	0.16	0.03	4.44	0.02	4.50	if
<i>Desmotachya bipinnata</i>	3.20	40	1.56	0.33	4.76	0.31	5.40	if
<i>Eragrostis tremula</i>	4.40	40	0.46	0.45	4.76	0.09	5.30	if
	3.00	20	1.20	0.29	2.22	0.27	2.78	r
<i>Lichen</i>	20.00	20	0.25	2.07	2.38	0.05	4.50	if
<i>Cymbopogon jwarancusa</i>	18.00	20	0.68	1.86	2.38	0.13	4.37	if
	25.20	40	4.50	2.43	6.66	1.02	10.11	c
<i>Salvia aegyptiaca</i>	0.60	20	3.39	0.06	2.38	0.68	3.12	if
<i>Chrysopogon plumulosus</i>	3.00	20	0.68	0.31	2.38	0.31	2.82	r
<i>Argyrolobium roseum</i>	1.00	20	0.15	0.10	2.38	0.03	2.51	r
<i>Periploca aphylla</i>	0.60	20	0.14	0.06	2.38	0.02	2.46	r
	0.60	40	10.46	0.05	4.44	0.33	4.82	if
<i>Cenchrus ciliaris</i>	49.60	100	15.00	4.79	11.11	3.42	19.32	c
<i>Eulaliopsis bloats</i>	-	-	-	-	-	-	-	-
	3.60	60	8.00	0.34	6.66	1.82	8.82	if
<i>Asparagus adscendens</i>	-	-	-	-	-	-	-	-
Total	0.20	20	1.32	0.01	2.22	0.30	2.53	r

*R.D = Relative density; R.F = Relative frequency, R.O = Relative coverage **Values in Italics pertain to second year

Table 2: Species composition and their Phytosociological values in Q2 (Fenced) at National Park Chinji

Species	Density	Frequency	Coverage	*R.D.	R.F.	R.C.	importance value	SR
<i>Cynodon dactylon</i>	584.00	100	35.03	82.36	11.11	6.76	100.23	d
	1117.00	80	39.24	86.80	10.52	8.51	105.83	d
<i>Dodonaea viscosa</i>	83.40	100	123.67	11.70	11.11	23.88	46.69	a
	51.20	100	130.48	3.97	13.15	28.32	45.44	a
<i>Acacia modesta</i>	2.40	60	140.41	0.33	6.66	27.11	24.10	f
	2.00	80	135.00	0.15	10.52	29.31	39.98	a
<i>Lantana camara</i>	8.60	80	30.23	1.21	8.88	5.83	15.92	c
	0.80	40	5.63	0.06	5.26	1.22	6.54	if
<i>Gymnosporia royleana</i>	3.60	80	21.42	0.50	8.88	4.23	13.51	c
	0.20	20	5.80	0.01	2.63	0.04	2.68	r
<i>Grewia tenax</i>	1.60	80	21.85	0.22	8.88	4.22	13.32	c
	1.20	60	25.98	0.09	7.89	5.64	13.62	c
<i>Prosopis cineraria</i>	1.60	60	19.42	0.22	6.66	3.75	10.63	c
	0.40	20	35.35	0.34	2.63	7.67	10.64	c
<i>Olea cuspidata</i>	2.40	20	37.71	0.33	2.22	7.28	9.83	if
	0.60	40	36.75	0.04	5.26	9.97	13.27	c
<i>Acacia nilotica</i>	1.20	40	24.89	0.16	4.44	4.80	9.40	if
	0.40	20	5.97	0.03	2.63	1.29	3.95	if
<i>Tamarix troupii</i>	2.60	20	33.83	0.36	2.22	6.52	9.11	if
	2.20	20	35.00	0.17	2.63	7.59	10.39	c
<i>Eragrostis tremula</i>	5.00	40	3.40	0.70	4.44	0.65	5.79	if
<i>Dichanthium annulatum</i>	1.60	20	13.57	0.22	0.22	2.62	5.06	if
<i>Otostegia limbata</i>	0.40	40	0.39	0.05	0.05	0.07	4.56	if
	1.60	60	0.23	0.12	0.12	1.25	9.26	if
<i>Taverniera cuneifolia</i>	2.00	20	7.85	0.28	2.22	1.51	4.01	if
<i>Fagonia cretica</i>	6.00	20	0.05	0.84	2.22	0.01	3.07	if
	1.00	20	0.12	0.34	2.63	0.02	2.99	r
<i>Saccharum munja</i>	0.40	20	1.57	0.05	2.22	0.30	2.57	r
	0.20	20	1.04	0.01	2.63	0.22	2.86	r
<i>Zizyphus jujuba</i>	0.40	20	1.57	0.05	2.22	0.30	2.57	r
	0.20	20	0.12	0.01	2.63	0.02	2.66	r
<i>Plantago ovata</i>	1.00	20	0.24	0.14	2.22	0.04	2.40	r
	-	-	-	-	-	-	-	-
<i>Asparagus adscendens</i>	0.40	20	0.25	0.05	2.22	0.04	2.31	r
	-	-	-	-	-	-	-	-
<i>Diclyptra roxbergii</i>	0.20	20	0.05	0.02	2.22	0.01	2.25	r
	-	-	-	-	-	-	-	-
<i>Saussuria candidous</i>	0.20	20	0.05	0.02	2.22	0.01	2.25	r

Second Year

Cynodon-Dodonaea-Acacia Community: During in its species composition as well as their importance values *Cynodon dactylon*, *Dodonaea viscosa* and *Acacia modesta* respectively having 101.32, 65.16 and 24.75 importance values were dominating in the fenced area. *Gymnosporia royleana* was frequent with 21.44 importance value. *Cenchrus pennisetiformis*, *Olea cuspidata*, *Grewia tenax* and *Cymbopogon jwarancusa* were common with 19.32, 17.66, 16.49 and 10.11 importance values respectively. *Eulaliopsis binata*, *Periploca aphylla* and *Otostegia limbata* were infrequent with importance values 8.82, 4.82, 4.50. *Eragrostis tremula* and *Asparagus adscendens* were the rarest members with importance values as 2.78 and 2.53 respectively.

S2/Q2 (First Year): This community was characterised by the dominance of *Cynodon dactylon*, *Dodonaea viscosa* and *Acacia modesta* having 100.23, 46.69 and 24.10 as the importance values respectively in Q2 (Table 2). *Lantana camara*, *Gymnosporia royleana*, *Grewia tenax* and *Prosopis cineraria* were common showing 15.92, 13.51, 13.32 and 10.63 their importance values. *Olea cuspidata*, *Acacia nilotica*, *Tamarix troupii*, *Eragrostis tremula*, *Dichanthium annulatum*, *Otostegia limbata*, *Taverniera cuneifolia* and *Fagonia cretica* were infrequent with importance values as 9.83, 9.40, 9.11, 5.79, 5.06, 4.56, 4.01 and 3.07 respectively, while *Saccharum munja*, *Zizyphus jujuba*, *Plantago ovata*, *Asparagus adscendens*, *Diclyptra roxbergii* and *Saussuria candidous* were found to be rare members with importance values

as 2.57, 2.57, 2.40, 2.31, 2.25 and 2.25 respectively.

Second Year

Cynodon-Dodonaea-Acacia Community: During the second year in Q2, this community was characterised by the dominance of *Cynodon dactylon*, *Dodonaea viscosa* and *Acacia modesta* having importance values as 105.83, 45.44 and 39.98 respectively, *Cenchrus pennisetiformis* was associated with 37.85 importance value. *Grewia tenax*, *Olea cuspidata*, *Prosopis cineraria* and *Tamarix troupii* were common with the importance values 13.62, 13.27, 10.64 and 10.39 respectively. *Otostegia limbata*, *Lantana camara*, *Acacia jacquemontii*, *Cymbopogon jwarancusa*, *Acacia nilotica* and *Farsetia hamiltoni* were infrequent with 9.26, 6.54, 4.40, 3.95 and 3.06 importance values respectively. *Fagonia cretica*, *Saccharum munja*, *Gymnosporia royleana* and *Zizyphus jujuba* were rare members with 2.99, 2.86, 2.68 and 2.66 importance values respectively.

S2/Q3 (First year)

Cynodon-Moss-Dodonaea-Acacia Community: This community was characterised by the dominance of *Cynodon dactylon*, *Moss*, *Dodonaea viscosa* and *Acacia modesta* having importance values as 54.42, 36.39, 30.95 and 29.79 respectively in Q3 (Table 3). The frequent species were *Otostegia limbata* and *Gymnosporia royleana* with importance values as 28.57 and 26.17 *Olea cuspidata*. *Grewia tenax* and *Lantana camara* were common depicting 17.61, 12.88 and 11.13 as their importance values.

Table 3: Species composition and their phytosociological values in O3 (un-fenced) at National Park Chinji

Species	Density	Frequency Status	Coverage	*R.D.	R.F.	R.C.	Importance value	
Cynodon dactylon	116.00	60	15.60	39.48	7.31	7.63	54.42	sd
	145.00	60	4.00	52.30	5.55	1.51	59.36	sd
Moss	100.00	20	0.05	34.04	2.43	0.02	36.39	a
	-	-	-	-	-	-	-	-
Dodonaea viscosa	20.00	100	24.46	6.80	12.19	11.96	30.95	f
	18.00	80	59.52	6.49	7.40	22.47	36.36	a
Accacia modesta	2.80	80	38.17	0.95	9.75	18.67	29.79	f
	2.00	80	70.88	0.79	7.40	26.76	34.95	f
Otostegia limbata	17.00	80	26.04	5.78	9.75	12.74	28.57	f
	12.00	60	60.43	4.32	5.55	22.82	32.69	f
Gymnosporia royleana	9.00	60	32.30	3.06	7.31	15.80	26.17	f
	8.40	80	11.08	5.62	5.55	4.93	16.10	c
Olea cuspidata	3.80	60	20.47	1.29	7.31	10.01	17.61	c
	2.60	60	56.85	0.93	5.55	21.46	26.08	f
Grewia tenax	1.60	40	15.27	0.54	4.87	7.47	12.88	c
	0.60	60	13.11	0.21	5.55	4.95	10.71	c
Lantana camera	5.40	60	4.08	1.83	7.31	1.99	11.13	c
	1.80	60	16.56	0.64	5.55	6.25	12.44	c
Argyrobium roseum	10.00	40	3.14	3.40	4.87	1.53	9.80	if
	-	-	-	-	-	-	-	-
Prosopis cineraria	0.20	20	13.20	0.06	2.43	6.45	8.94	if
	0.20	20	19.64	0.07	1.85	7.41	9.33	if
Cymbopogon jwarancusa	1.80	60	1.30	0.61	7.31	0.63	8.85	if
	37.80	80	74.07	13.63	7.40	27.97	49.00	a
Capparis decidua	2.80	20	6.28	0.95	2.43	3.07	6.45	if
	-	-	-	-	-	-	-	-
Chrysopogon plumulosus	1.20	40	0.26	0.40	4.87	0.12	5.39	if
	-	-	-	-	-	-	-	-
Periploca aphylla	0.60	20	1.90	0.20	2.43	0.92	3.55	if
	1.20	40	4.80	0.43	3.70	1.81	5.94	if
Solarium incanum	0.40	20	1.63	0.13	2.43	0.79	3.35	if
	4.00	20	35.35	1.44	1.85	13.36	16.64	c
Eragrostis tremula	1.00	20	0.22	0.34	2.43	0.10	2.87	r
	-	-	-	-	-	-	-	-
Pupalia japonica	0.20	20	0.02	0.06	2.43	0.01	2.50	r
	-	-	-	-	-	-	-	-
Eulaliopsis binata	-	-	-	-	-	-	-	-
	10.40	80	102.42	3.75	7.40	38.67	49.82	a
Heteropogon centortus	-	-	-	-	-	-	-	-
	7.80	80	102.42	3.75	7.40	38.67	49.82	a
Cenchrus ciliaris	-	-	-	-	-	-	-	-
	15.60	60	13.08	5.62	5.55	4.93	16.10	c
<i>Trianthema crystallina</i>	-	-	-	-	-	-	-	-
	3.80	40	0.89	1.37	3.70	0.33	5.40	if
Aristida depressa	-	-	-	-	-	-	-	-
	3.80	20	2.89	1.37	1.85	1.09	4.31	if
Asparagus. adscendens	-	-	-	-	-	-	-	-
	0.40	40	0.55	0.14	3.70	2.20	4.04	if
Farsetia hamiltoni	-	-	-	-	-	-	-	-
	1.20	20	0.37	0.43	1.85	1.13	2.41	r
Chenopodium album	-	-	-	-	-	-	-	-
	0.20	20	0.78	0.07	1.85	0.29	2.21	r

Argyrobium roseum, *Prosopis cineraria*, *Cymbopogon jwarancusa*, *Capparis decidua*, *Chrysopogon plumulosus*, *Periploca aphylla* and *Solarium incanum* were infrequent with 9.80, 8.85, 6.45, 5.39, 3.55 and 3.35 as their importance values respectively, while *Eragrostis tremula* and *Pupalia japonica* were rare members with importance values as 2.87 and 2.50.

Second Year

Cynodon-Eulaliopsis-Cymbopogon Community: During the second year this community showed a big change. *Cynodon dactylon*, *Eulaliopsis binata* and *Cymbopogon jwarancusa* having importance values 59.56, 49.82 and 49.00 respectively were dominating. *Dodonaea viscosa* was associated with a value of 36.36 importance value. *Acacia modesta*, *Otostegia limbata* and *Olea*

cuspidata were frequent with importance values as 34.95, 32.69 and 26.08 respectively.

Solarium incanum, *Heteropogon centortus*, *Cenchrus ciliaris*, *Gymnosporia royleana*, *Lantana camera* and *Grewia tenax* were common with importance values 16.64, 16.48, 16.10, 14.90, 12.44 and 10.71 respectively. *Prosopis cineraria*, *Periploca aphylla*, *Trianthema crystallina*, *Aristida depressa* and *Asparagus adscendens* were infrequent with importance values as 9.33, 5.94, 5.40, 4.31 and 4.04 respectively, while *Farsetia hamiltoni* and *Chenopodium album* were rare members having 2.41 and 2.21 importance values.

Discussions

The scenario of species in National Park Chinji is presenting a

though provoking aspect if considered habitat wise or the community wise. The species composition in each table is variable showing that the efforts made to lay down the quadrats were by and large correct. On the other hand the species status is varying from habitat to habitat as well as their status.

This is important to note that the picture of major species available in the area though remain the same but very conspicuous and varied differences are noticeable, specifically when the relative values of density, frequency or coverage are considered. Imtiaz-ul-Haq and Zia-ud-Din (1982) expressed similar views while describing the vegetation of Nowshera.

Important physiographic factors namely rain fall and its associated impacts like dryness, landslide etc. were noted on the spot but not frequently. Land sliding was quite common in O2 and O3. On the contrary, efforts were underway to check the severity of soil erosion by slowing down the speedy running off water through the construction of checkdams. Over exploitation of plant resources in O2 and O3 also changed the status of vegetation to a great extent. Perennial dominating species *Acacia modesta* was cut and consumed, got reduced in relative value in Q1. Chaghtai and Yusaf (1976) reported dominance of this species in Kohat and later met the same fate. This is quite clear to note that all the three quadrats were distinct and endemic plant communities depicted quite good differing aspects.

The community in Q1 comprised of 19 species where 4 species got vanished during the second year, particularly *Salvia aegyptiaca*, *Chrysopogon plumulosus* and *Argyrolobium roseum*. However, three species namely *Cenchrus ciliaris*, *Eulaliopsis binata* and *Asparagus adscendens* were the new colonizers, but in low densities. With the erosion of fence, grasses increase their densities; new corners were increasing at the cost of undesirable species like *Dodonaea viscosa*; but as expected they increased their coverage and importance values significantly. The change of the status from subdominant to dominant and so on was also noted among some species.

The site Q2 followed the same pattern as given above. The richness of species was higher in this quadrat numbering 21. The interesting feature of this quadrat was in line with the previous one where palatable grass *Cynodon dactylon* increased its density and importance value assuming the dominant status in both the years. This is particularly important to note that some species

disappeared from the quadrat during the second year due to land sliding and there were no new colonizer, apparently due to erosion and washing away of the seed by the speedy running off water. *Dodonaea viscosa* and *Lantana camara* etc. were reduced in their densities and importance values.

The pattern of change in O3 did not present a big departure from the above listed quadrats. All the 19 species of this quadrat showed a change over the years in their densities and importance values, though it was very minor except the *Cynodon dactylon*. Five species disappeared during the second year but the *Eulaliopsis binata* was the fresh arrival during the second year. Disappearance of *Capparis decidua* a perennial may be because of feeling by the locals from this unfenced habitat.

Since very wide and very deep gullies have now been formed, therefore small to big checkdams have become absolutely necessary for the preservation of the area particularly when the fences have been erected, this will bring about quick and desirable results over a short periods of time. Ahmed (1988) along the way of Gilgit to *Chiles* reported similar occurrences.

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