

CLUSTER ANALYSIS OF VEGETATION OF SWAT DISTRICT

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For drawing a quantitative picture of Swat vegetation, 21 quadrats (stands) (10x10 m for arboreal vegetation and 2x2 m for herbs and shrubs) were studied. On the basis of importance value, twenty one plant communities were established and computerized cluster analysis of 267 species was carried out. One stand showed greatest diversity. Five stands were slightly different from each other whereas six stands were closely related.

Key words: Cluster analysis, Vegetation, Swat flora.

Introduction

Swat district covers an area of 8,788 sq. km. It lies between 34° 09 and 35° 56 north latitude and 72° 07 to 73° east longitude with an altitudinal variation of 650 to 6,200 meters. Physiographically, the area is mountainous with fairly broad and almost flat strips, which are used for crop cultivation with fertile soil conditions along both bank of Swat River from Madyan downward stream. The main hill ranges on the east as well as on the west run parallel to the river. Numerous cross-spurs run east-west and give rise to subsidiary valleys of varying lengths. Climatically, Swat is situated in humid subtropical, sub-humid subtropical, humid temperate, sub humid temperate and sub humid subalpine tract. Two rainy seasons, the winter rains from November to April and the summer monsoon mark the climate of the area rains from July to October. On the subject of Swat flora Duthie's "The Botany of the Chitral Relief Expedition of 1885 is the first paper that appeared in the first volume of Records of the Botanical Survey of India, 1898. However, this work barely touches vegetation of Swat. A book entitled "Plants of West Pakistan and Afghanistan" edited by Siro Kitamura, Kyoto University (1964) includes map and photographs of the flora of the area. Stewart (1967) published a checklist of the plants of Swat State, North West Pakistan. This checklist is quite helpful for further exploration. Beg and Samad (1974) worked on the ecology of the vegetation of Malakand and reported various ecological factors and plant groups without going into analytical composition of recognized plant communities of the area. Beg and Khan (1980, 1984) reported three plant communities in the dry oak forest zone in Swat in Swat valley. They also indicated the resource development for the area. Ecological studies on dry oak forest zone (*Quercus baloot*) in Swat valley were intimated by the same authors during 1979-80 and were continued also in 1980-81. Daubenmire (1965) published a book on

plant communities. Champion *et al* (1965) worked on Forest types of Pakistan whereas followed Cox (1967) who worked on ecology and Shah *et al* (1994) who worked on phytosociological studies of Buner, NWFP. The Flora of Pakistan series (Nasir and Ali 1970-89) alongwith Stewart checklist (1967) and Stewart Annotated Catalogue (1972) have been a major source of our knowledge about the plants of Swat district. The review of literature clearly indicates that although some sporadic information is available about the flora of Swat but little documented record is available on quantitative analysis of vegetation of Swat. The present studies were undertaken for drawing a true quantitative picture of the vegetation of the area and for serving as guidelines for future studies in the field of plant ecology.

Materials and Methods

The arboreal vegetation was sampled in 10x10 m quadrats while herbs and shrubs were sampled in 2x2 m quadrats. The quadrats were laid systematically on sites as indicated on the map (Fig 1). The attributes like density, frequency and canopy coverage, were measured in all stands (Muller-Dombois and Ellenburg 1974). The importance value was calculated after Curtis and McIntosh (1950). Collected plants were identified with the help of existing literature (Stewart 1972; Nasir and Ali (1970-1989) and herbarium specimens of National Herbarium at National Agricultural Research Council, Islamabad, Herbarium at Quaid-e-Azam University, Islamabad and Pakistan Museum of Natural History, Islamabad (PMNH).

Data on plant communities was alphabetically arranged using MS Word programme, while data on importance values of plant species of various established plant communities was analyzed with the help of MS Excel.

Results and Discussion

Acacia modesta-Calendula arvensis-Allium cepa community established in stand No.1 from Totalai old graveyard of Buner

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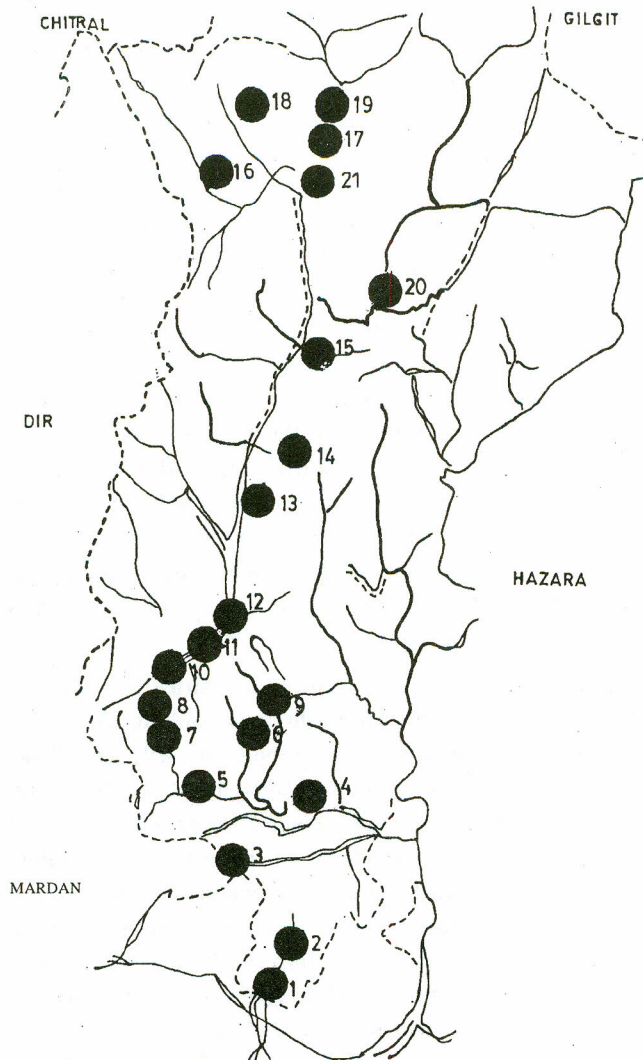


Fig 1. Stands (from 1 to 21) for vegetation analysis in Swat Area.

Sub-division, with importance values of 102.63, 25.507 and 23.825, respectively. A total of 26 plant species and 276 individual plants were recorded in an area of about 2400 sq. m. *Acacia modesta*-*Medicago polymorpha*-*Olea ferruginea* community with importance values of 36.15, 18.772 and 14.07 respectively, were recognized in stand no.2 from Ghorghushto area at an altitude of 370 m of Buner Sub-division. A total of 36 plant species were collected from this stand. Habitat of this stand was xeric i.e. small leaves and rapidly growing root system and ability to survive in variable soil characteristics, have made *Acacia modesta* adaptable to diverse habitats. Old graveyards were recorded as the remnants of the original vegetation of *Acacia modesta* with *Olea ferruginea*. These observations are in conformity with the findings of Chaghtai *et al* (1978, 1983, 1984) but it is not true in some graveyards of Upper Swat.

Pinus roxburghii - *Mallotus phillipensis*- *Ziziphus numularia* community was recognized in stand no. 3 situated in Ambella pass of Buner Sub-division. *Olea ferruginea* - *Phoenix dactylifera* - *Poa annua* community was recognized in stand no. 4 from Diwana Baba area of Buner Sub-division. *Olea ferruginea* - *Fumaria indica* - *Galium aparine* community was recognized in stand no. 5 from old graveyard of Thorwarsak of Buner Sub-division. *Mallotus phillipensis*-*Celtis australis* - *Notholirion thomsonianum* community was established in stand no. 6 of Pir Baba of Buner Sub-division. Generally vegetation of the shrines is believed to be protected but in this stand the habitat was relatively unprotected and disturbed due to human interference. This community falls in sub-tropical broad-leaved forest.

Pinus roxburghii-*Olea ferruginea*-*Mallotus phillipensis* community was established in stand no.8 of Marghazar Palace area of Swat sub division. *Pinus roxburghii*-*Olea ferruginea*-*Mallotus phillipensis* community was established in stand no.9 of Gokand area of Chirpine subtropical zone in Buner Sub division at an altitude of 1050 m. A total of 141 plants belonging to 37 plant species were recorded in this stand. *Pinus roxburghii*- *Olea ferruginea*-*Justicea adhatoda* -*Vitex negundo* community was recognized in stand no.10 from Batora old graveyard in Saidu Sharif of Middle Swat at an altitude of 1000 m. *Cynodon dactylon*-*Vitex negundo*-*Olea ferruginea* community was recognized in stand no.11 from Mingora old graveyard in Middle Swat at an altitude of 650 m. *Olea ferruginea*-*Justicea adhatoda* - *Vitex negundo* community was recognized in stand no.10 from Batora old graveyard in Saidu Sharif of Middle Swat at an altitude of 1000m.

Dicliptera roxburghiana-*Olea ferruginea*-*Ficus carica* (I.V 27.48) community was recognized in stand no. 13 Asala old graveyard situated near Charbagh in Swat sub division on way to Madyan from Saidu Sharif of Middle Swat at an altitude of 1000 m. *Pinus wallichiana*-*Abies pindrow*-*Cedrus deodara* community was established in stand no. 15 from Uthror area of Swat Kohistan. *Pinus wallichiana*-*Potentilla gerardiana*-*Cedrus deodara* community was established in stand no. 16 from Gabral aread of Swat Kohistan. *Quercus dilatata*-*Agrostis canina*-*Cedrus deodara* community was established in stand no. 17 from Ushu area of Swat Kohistan. *Picea smithiana*-*Fragaria nubicola*-*Abies pindrow* community was established in stand no. 18 from Uthror area of Swat Kohistan.

Pinus wallichiana- *Sorbaria tomentosa* - *Indigofera heterantha* community was established in stand no.19 from Gabral area of Swat Kohistan of temperate coniferous zone of Swat Kohistan. *Pinus wallichiana* -*Viburnum cotinifolium* -

Potentilla gerardiana community was established from stand no.20 from Alpuri area of Swat Kohistan. *Cedrus deodara* pure community was established in stand no.21 from Alpuri area of Swat Kohistan.

According to cluster analysis (Fig 2) great diversity of 69 plant species were recorded from stand 14 at an altitude of 1800 m in Miandam area of Swat sub-division which was due to exposure of vegetation to sun, better soil condition and protection from overgrazing and human interference, while stands 13, 18, 15, 19, 9 etc. are slightly different from each other. Stands 3, 5, 11, 8, 6, 10, 12, 21 are closely related with each other (Fig 2). Statistical analysis i.e. mean and standard deviation of 267 plant species of 21 stands with respect to importance values were calculated with the help of computer and it was found that standard deviation of *Acacia modesta* (23.16792) was highest as compared to mean (7.69971). Out of 21 stands *Acacia modesta* has highest importance value being 102.63 in stand 1, 36.151 in stand 2, 4.29 in stand 7, 5.596 in stand 10, 8.235 in stand 11 and 4.793 in stand 13 while in others it is zero (Table 1). Thus it is clear from Table 1 that stands 7, 10, 11 & 13 are closely related with each other.

These stands belong to thorn tropical forest and great variation in the distribution of this plant in these stands was recorded. In case of *Agrostis canina* its mean value is 1.33648 and standard deviation is 6.124503. Out of 21 stands, it was recorded from stand no.17 only but with very high importance value, which might be due to better climatic conditions. Great variation in the distribution of *Abies pindrow* was recorded in stand nos.15, 17 & 18; its mean value is 3.16295 where as standard deviation is 10.32654 (Table 1). This may be due to exposure of the stands to sun. *Berberis lycium* has the mean

value of 2.88057 and standard deviation of 8.211675. Maximum abundance of various 57 plant species was recorded from stand no.14 in Miandam locality of Swat sub-division at an altitudinal range between 1850-2215 meters. The community was dominated by *Berberis lycium* with importance value 37.31 followed by *Poa nemoralis* with importance value of 24.039, *Cetrach delhousiae* with importance value of 20.73 and *Juglans regia* of 17.342; total number of plants was 1540. This community falls in dry temperature coniferous zone. *Cedrus deodara* had also great variation in distribution in various stands but its importance value was very high in stand no.21, at an altitude of about 3215 meters, near Bank Rest House Area, Kalam; it might be due to exposure to sun and other edaphic factors including microclimate. Maximum abundance of *Quercus baloot* was recorded in stand no.17 with importance value of 96.49, mean value 5.96652 and standard deviation 21.11343 which may be due to better protection from biotic interference. Other species had slight variation in various stands.

Mining for small extensive marble industries and emerald mines were noted to be serious threat not only to the natural vegetation of the area but also to the entire wild life. *Pinus wallichina* (blue pine) was found to be infected with mistletoes (*Arceuthobium minutissimum*) especially in Swat Kohistan area. *Pinus gerardiana* was recorded in open sunny places of Uthror, Janshey valley, Gabral etc. *Quercus baloot* was also found dominant in the gorge above Bahrein and in Ushu areas. Few *Fraxinus xanthoxyloides* and *F. excelsior* were recorded in Ushu area while *Quercus dilatata* was also found in small number in Kalam area. The vegetation in some areas of Swat district was considerably damaged during the last few years by local inhabitants and Afghan Refugees who were living in the camps like Koga Afghan Refugees Camp in Lower Swat and in the border regions. These people use trees, shrubs, herbs etc for meeting their shelter/fuel requirement and as fodder for their livestock, resulting in accelerated soil erosion, especially in the upper and lower Swat areas of the hilly torrent and tributaries of the rivers like Ushu, Uthror, Swat etc.

Overall vegetation is influenced by edaphic and biotic factors such as soil, altitude, temperature, overgrazing, human interference etc. Cultivation and establishment of temporary huts for cattle led to the destruction of the vegetation, with the result that on clearing, the floor is covered with luxuriant herbaceous vegetation in Desan and Janshey areas. It was observed that the dry temperate coniferous forests were proportionally less affected as compared to their original extension which is due to the decreasing land use pressure above the permanent settlement area; this particularly applies to the

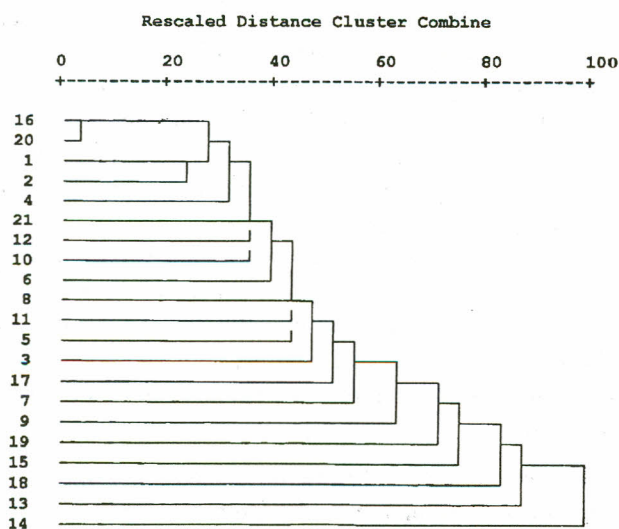


Fig 2. Dendrogram using average linkage (between groups).

Table 1
Importance values of various plant species of Swat district, NWFP, Pakistan

Species	Stands																					Mean	SD
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21		
<i>Abies pindrow</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45.12	0	4.31	16.997	0	0	0	3.16295	10.32654
<i>Acacia modesta</i>	102.63	361.51	0	0	0	0	4.291	0	0	5.596	8.235	0	4.793	0	0	0	0	0	0	0	0	7.69971	23.1697
<i>Acer caesium</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.741	0	0	0	0.46386	2.12566
<i>Achillea millefolium</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1.799	0	0	0	0	4.577	0	0	0.30362	1.054738
<i>Achyranthus aspera</i>	0	0	0	0	0	0	0	0	0	6.594	0	9.038	4.967	8.677	0	0	0	0	0	0	0	1.3941	3.035739
<i>Aconitum heterophyllum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.736	0	0	0	0	0	0	0.32076	1.469916
<i>Adiantum cappillus-veneris</i>	0	0	0	0	0	0	0	0	6.413	0	0	0	0	0	0	0	0	0	0	0	0	0.30538	1.399431
<i>Adiantum incisum</i>	0	0	0	0	0	0	0	0	0	0	1.368	0	0	1.794	0	0	0	0	0	0	0	0.15057	0.4803
<i>Adiantum venustum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	2.386	0	0	0	0	0	0	0	0.11362	0.520668
<i>Aegopodium alpestre</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0.14286	0.654654
<i>Agrostis canina</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28.07	0	0	0	0	1.33648	6.124503
<i>Ailanthus altissima</i>	0	0	0	3.645	0	0	3.669	0	0	0	22.1	0	3.388	1.28	0	0	0	0	0	0	0	1.62281	4.862295
<i>Ajuga bracteosa</i>	0	2.064	0	2.481	6.876	0	2.086	0	0	0	0	0	3.367	0	0	0	0	0	0	0	0	0.80352	1.729512
<i>Allium cepa</i>	23.825	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.13452	5.199041
<i>Allium griffithianum</i>	0	0	0	0	8.374	0	0	0	0	0	0	0	0	0	0	2.86	0	0	0	8.968	0	0.962	2.639073
<i>Alopecurus acqualis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.135	0	0	0	0.05405	0.247677
<i>Amaranthus spinosus</i>	0	0	0	0	0	0	0	0	0	9.729	5.718	15.52	38.6	0	0	0	0	0	0	0	0	3.31267	9.021362
<i>Amaranthus viridis</i>	0	0	0	0	0	0	0	0	0	0	3.818	0	6.746	0	0	0	0	0	0	0	4.547	0.71957	1.869323
<i>Anaallis arvensis</i>	9.374	0	8.207	5.564	6.876	5.58	0	6.85	0	2.077	0	0	0	0	0	0	0	0	0	0	0	2.12052	3.32753
<i>Androsace rotundifolia</i>	0	0	0	0	6.876	11.26	6.132	0	6.363	0	0	0	0	1.095	0	11.7	0	0	0	11.7	0.932	2.66952	4.349696
<i>Angelica glauca</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0.895	0	0	0	0	3.509	0	0	0.20971	0.780722
<i>Apluda mutica</i>	0	3.247	0	0	0	0	11.67	0	6.56	0	0	0	0	0	0	0	0	0	0	0.932	1.06719	2.887594	
<i>Arenaria leptocladus</i>	0	11.527	7.618	0	0	0	0	14.1	0	0	0	0	0	4.547	0	0	0	0	3.758	0	0	1.97929	4.139249
<i>Arenaria serpyllifolia</i>	0	0	7.618	0	10.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.85314	2.727616
<i>Aristida adscensionis</i>	0	0	0	0	0	0	0	0	9.776	0	0	0	0	0	0	0	0	0	0	0	0	0.46552	2.133298
<i>Aristida cyanantha</i>	0	0	0	0	0	0	11.67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.55581	2.547039
<i>Artemisia indica</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.717	0	0	0	0	0	0	0.177	0.811116
<i>Artemisia maritima</i>	0	0	0	0	0	0	0	0	0	0	0	0	6.903	4.535	3.717	0	12.75	0	3.538	0	0	1.49729	3.240637
<i>Artemisia scoparia</i>	0	0	0	5.151	0	0	4.975	4.66	0	2.681	7.587	5.35	0	0	0	0	0	0	0	0	0	1.44757	2.47306
<i>Asparagus gracilis</i>	0	0	1.46	0	4.506	0	0	1.46	0	0	0	0	0	0	0	0	0	0	0	0	0	0.35362	1.047408
<i>Asphodelus tenuifolius</i>	0	14.009	7.075	5.559	6.876	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.59614	3.6680954
<i>Asplenium dalhousiae</i>	0	0	1.454	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.06924	0.317289
<i>Asplenium trichomanes</i>	0	0	1.846	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0879	0.40283
<i>Astragalus graveolens</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.218	0	0	0	0	0	0	0.24848	1.138661
<i>Astragalus psilocentros</i>	2.517	0	0	8.496	0	11.27	0	0	0	3.189	0	0	0	0	0	0	0	0	0	0	4.744	1.43886	3.120328
<i>Barlaria cristata</i>	0	0	0	0	0	0	0	0	2.262	0	0	0	0	0	0	0	0	0	0	0	0	0.10771	0.493609
<i>Berberis lycium</i>	0	0	2.043	0	0	0	0	4.1	5.06	0	0	0	3.515	37.31	0	0	0	8.464	0	0	0	2.88057	8.211675
<i>Bergenia stracheyi</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.68	0	0	0.50848	2.330131
<i>Betula utilis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.869	3.003	0	0	0	0.27962	0.883381
<i>Boerhaavia procumbens</i>	0	0	0	0	0	0	0	0	0	4.756	0	3.515	0	0	0	0	0	0	0	0	0	0.39386	1.259309
<i>Bowlesia incana</i>	4.461	11.347	2.231	8.683	9.672	0	0	9.87	0	0	0	0	5.942	0	0	0	0	0	0	0	0	2.48581	4.033952
<i>Brachiarra ramosa</i>	0	0	0	0	0	0	0	0	0	0	4.756	5.568	3.376	0	0	0	0	0	0	0	0	0.65238	1.674543
<i>Brassica campestris</i>	0	0	2.867	0	29.55	9.139	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.979	6.644078
<i>Bromus japonicus</i>	0	0	0	0	0	0	0	0	0	0	0	0	8.096	0	0	0	0	0	0	0	0	0.38552	1.766692
<i>Bromus ramosus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.457	11.53	0	0	0.90414	2.927292

(Cont'd)

(Table 1 cont'd)

<i>Bunium persicum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.485	0	0	0	0	0	0	0.07071	0.324054	
<i>Bupleurum candollei</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.787	0	0	0	0	0	0	0.0851	0.389955	
<i>Bupleurum kohistanicum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.37	2.445	0	0	0	0.61014	2.298431	
<i>Calebrookea oppositifolia</i>	0	0	0	0	0	0	0	0	3.813	0	0	0	0	0	0	0	0	0	0	0	0	0.18157	0.832065	
<i>Calendula arvensis</i>	25.507	0	0	0	0	0	0	0	0	4.157	0	0	0	0	0	0	0	0	0	0	0	1.41257	5.594574	
<i>Campanula colorata</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.738	0	0	0.178	0.815698	
<i>Cannabis sativa</i>	0	2.064	0	0	10.55	2.98	0	0	4.849	9.606	14.35	10.38	2.026	11.2	0	0	0	0	2.975	0	0	3.37957	4.755197	
<i>Capsella bursa-pastoris</i>	0	0	0	0	0	0	6.538	0	5.024	0	0	0	0	2.089	0	9.539	0	0	0	9.539	0	1.55852	3.188464	
<i>Cardiospermum macrospermum</i>	0	0	0	0	0	0	0	0	0	4.26	0	0	0	0	0	0	0	0	0	0	0	0.20286	0.929608	
<i>Carissa opaca</i>	0	4.824	0	9.106	5.487	0	0	0	3.302	14.16	0	0	0	0	0	0	6.137	0	0	1.613	0	2.12514	3.828195	
<i>Carum carvi</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.1	11.1	0.858	2.176	0	0	0.86838	2.546564	
<i>Cedrella serrata</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0.967	0	0	0	0	0	0	0	0.04605	0.211017	
<i>Cedrus deodara</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42.2	12.98	27.48	4.859	7.251	12.98	129.3	11.2863	29.13781
<i>Celtis australis</i>	0	3.28	9.106	9.106	5.483	23.62	0	0	6.578	0	0	0	3.4	0.904	0	0	6.137	0	1.613	0	0	3.29648	5.622399	
<i>Centaurea iberica</i>	0	0	0	9.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.44524	2.040337	
<i>Cerastium dichotomum</i>	0	0	0	0	6.876	2.953	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.46805	1.603109	
<i>Cerastium saginoides</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15.87	0	0.75571	3.463118	
<i>Ceterach dalhousiae</i>	0	0	0	0	0	0	0	0	0	0	1.434	0	3.44	1.568	0	0	0	0	0	0	0	0.30676	0.847715	
<i>Chenopodium album</i>	0	0	0	0	0	0	0	0	0	0	1.396	0	0	0	0	0	0	0	0	0	10.63	0.57262	2.324206	
<i>Chenopodium botrys</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18.16	0	8.254	0	0	0	1.25805	4.271179	
<i>Clematis grata</i>	0	0	1.706	0	0	0	0	0	2.281	0	0	0	0	0.9	0	0	0	0	0	0	0	0.23271	0.623944	
<i>Clematis graveolens</i>	0	0	0	0	0	0	0	0	0	0	0	0	4.414	0	0	0	0	0	0	0	0	0.21019	0.963214	
<i>Cleome gynandra</i>	0	0	0	0	0	0	0	0	0	0	0	13.09	0	5.047	0	0	0	0	0	0	0	0.86357	3.009212	
<i>Cleome viscosa</i>	0	0	0	0	0	0	0	0	0	0	0	0	3.367	0	0	0	0	0	0	0	0	0.16033	0.73474	
<i>Clinopodium umbrosum</i>	0	0	0	0	0	0	4.35	0	5.034	0	1.368	0	0	0	6.06	7.868	9.581	4.747	6.518	7.868	17.56	3.37857	4.64751	
<i>Commelina bengalensis</i>	0	0	0	0	0	0	0	14.9	0	0	0	0	4.614	0	0	0	0	0	0	0	0	0.929	3.354297	
<i>Commelina paludosa</i>	0	0	0	0	0	0	0	4.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0.19524	0.894693	
<i>Convolvulus arvensis</i>	0	0	0	0	0	0	8.423	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4011	1.838049	
<i>Conyza bonariensis</i>	0	0	0	0	10.55	0	6.132	0	5.06	0	0	0	5.767	0	0	0	5.186	0	2.599	0	0	1.68057	3.017137	
<i>Conyza japonica</i>	0	0	0	0	0	0	8.423	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4011	1.838049	
<i>Corchorus trilocularis</i>	4.323	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.20586	0.943356	
<i>Coriandrum sativum</i>	0	0	0	0	0	0	0	0	0	0	6.071	0	0	1.083	0	0	0	0	0	0	0	0.34067	1.334031	
<i>Crotalaria medicaginea</i>	0	0	0	0	0	0	0	0	0	0	6.937	0	0	0	0	0	6.341	0	0	0	0	0.63229	1.999184	
<i>Cucumis callosus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0.894	0	0	0	0	0	0	0	0.04257	0.195087	
<i>Cymbopogon martinii</i>	0	0	0	0	0	0	8.423	0	0	0	0	0	0	0	0	0	0	0	0	0	11.33	0.94081	3.006817	
<i>Cymbopogon olivieri</i>	0	0	0	0	0	18.13	0	0	0	3.52	0	0	0	0	0	0	0	0	0	0	0	1.03114	3.993144	
<i>Cynodon dactylon</i>	0	0	9.943	5.675	0	18.13	7.475	9.36	0	6.25	27.49	19.8	1.78	10.03	7.577	0	0	9.3	0	0	9.355	6.76948	7.624674	
<i>Cynoglossum glochidiatum</i>	0	0	0	0	6.876	0	0	0	0	0	0	0	6.822	0	0	0	0	4.105	0	5.637	1.11619	2.411248		
<i>Cyperus rotundus</i>	0	0	0	0	0	0	0	0	0	0	0	0	8.149	0	0	0	0	0	0	0	0	0.38805	1.778258	
<i>Dactyloctenium aegyptium</i>	0	0	0	0	0	0	0	0	0	0	6.39	0	0	0	0	0	0	0	0	0	0	0.30429	1.394412	
<i>Dactylorhiza hatagirea</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.15	0	0	0	12.15	0	1.15724	3.654931	
<i>Daphne mucronata</i>	0	0	0	0	0	0	0	0	6.806	0	12.89	0	0	0	0	0	0	0	0	0	0	0.93771	3.113721	
<i>Debregeasia salicifolia</i>	0	0	5.121	0	0	0	0	0	12.55	0	0	0	0	0	0	0	0	0	0	0	0	0.84167	2.906468	
<i>Delphinium denudatum</i>	0	0	0	0	0	0	0	0	0	4.288	0	0	0	0	0	0	0	0	0	2.496	0.32305	1.0589		
<i>Desmostachya bipinnata</i>	0	0	14.23	0	0	0	0	0	9.895	0	0	0	0	0	0	0	0	0	0	0	0	1.14871	3.692131	
<i>Dianthus jacquemontii</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.872	0	1.404	0	0	0	0.3941	1.515488	
<i>Dianthus orientalis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.898	7.167	0	9.83	1.04262	2.730907		
<i>Dicliptera bupleuroides</i>	0	0	0	0	4.87	0	0	0	0	13.54	11.44	2.81	33.8	2.667	0	0	0	0	0	0	0	3.29171	7.961787	
<i>Digera muricata</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1.483	0	0	0	0	0	0	0	0.07062	0.323617	
<i>Digitaria ciliaris</i>	0	0	0	0	0	0	0	0	5.024	0	0	0	9.35	0	0	0	0	0	0	0	0	0.68448	2.267426	
<i>Dioscorea deltoidea</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.093	0	0	0	3.003	1.073	0.34138	0.929748	

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(Table 1 cont'd)

<i>Diospyrus lotus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	8.94	0	0	0	0	0	0.42571	1.950868	
<i>Dipsacus mitis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.845	0	0.13548	0.62083	
<i>Dodonaea viscosa</i>	9.435	4.792	12.58	6.85	0	0	11.81	0	0	4.819	21.24	0	0	0	0	0	0	0	0	3.40624	5.862948	
<i>Dryopteris stewartii</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0.925	0	0	0	0	0	0.04405	0.201852	
<i>Eisholtzia superba</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1.093	0	0	0	0	0	0.05205	0.238512	
<i>Ephedra gerardiana</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.704	0	0	0	0	0.17638	0.808279	
<i>Eragrostis poaeides</i>	0	0	0	0	0	0	0	4.99	0	0	0	7.289	0	0	0	0	0	0	0	0.58471	1.882152	
<i>Eremostachys superba</i>	0	0	0	0	0	8.533	0	0	0	0	0	0	0	0	0	0	0	0	0	0.40633	1.862053	
<i>Eriophorum comosum</i>	0	0	4.025	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.19167	0.878327	
<i>Eryngium coeruleum</i>	0	0	6.361	0	0	0	11.1	4.99	6.562	0	0	0	3.544	0	0	0	0	0	0	1.5499	3.111328	
<i>Erythrina suberosa</i>	0	0	0	0	0	0	8.423	0	0	0	0	0	0	0	0	0	0	0	0	0.4011	1.838049	
<i>Euphorbia cornigera</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.812	0	0.6101	2.795808	
<i>Euphorbia helioscopia</i>	0	0	0	2.549	4.608	4.608	7.163	0	2.341	0	2.341	0	3.576	0	5.218	0	0	0	0	1.54305	2.249998	
<i>Euphorbia hirta</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.219	0	0	0	0	0.24852	1.138879	
<i>Euphorbia hispida</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	8.47	0	0	0	0	0	0.40333	1.848306	
<i>Euphorbia maddenii</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7.213	0.751	0.37924	1.574343	
<i>Euphorbia thomsonianum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13.85	0	0	0.65962	3.022754	
<i>Festuca ovina</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.89	0	0	0	0	0.28048	1.285303	
<i>Ficus carica</i>	0	2.087	3.798	0	0	0	4.35	0	0	0	0	0	14.49	0	0	0	2.399	0	0	1.29152	3.304024	
<i>Fragaria nubicola</i>	0	0	0	0	0	0	0	4.224	0	0	0	0	5.74	7.169	0	0	0	27.99	0	2.14871	6.279602	
<i>Fraxinus hookeri</i>	0	0	0	0	0	0	0	9.95	0	0	0	0	0	0	0	0	7.869	0	0	0.84848	2.699867	
<i>Fumaria indica</i>	5.8	3.885	15.18	8.73	6.876	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.927	4.028378	
<i>Funaria hygrometrica</i>	0	0	0	0	0	0	0	0	0	0	0	20.72	0	8.633	0	0	0	10.261	0	4.602	2.10552	5.182739
<i>Galium aparine</i>	6.139	7.106	0	8.683	12.51	0	4.35	10.2	7.627	0	0	0	8.167	16.41	0	0	0	0	0	3.86724	5.116148	
<i>Gentiana cachmirica</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.321	0	0.11052	0.506484	
<i>Geranium collinum</i>	0	0	0	0	7.673	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.36538	1.674386	
<i>Geranium nepalensis</i>	5.83	0	0	0	0	0	7.673	0	0	0.605	0	0	0	0	0	0	0	3.77	11.65	5.558	1.67095	3.282652
<i>Geranium rotundifolium</i>	0	0	0	0	7.67	0	0	0	6.219	0	0	0	0	0	0	0	5.786	0	0	0.9369	2.372225	
<i>Gnaphalium affine</i>	0	4.961	3.232	0	0	0	0	3.2	0	0	0	0	0	0	0	0	0	0	0	0.54267	1.398791	
<i>Hedera nepalensis</i>	0	0	0	0	0	0	0	0	0	0	0	0	1.988	0	0	0	0	0	0	0.09467	0.433817	
<i>Hypericum perforatum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0.893	0	0	0	2.965	0	0.18371	0.66633	
<i>Illium griffithianum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.968	0	0	0	0	0.42705	1.956978	
<i>Impatiens glandulifera</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.629	0	0.12519	0.573695	
<i>Impatiens parviflora</i>	0	0	0	0	0	0	0	0	0	0	0	0	3.862	0	0	0	0	0	0	0.1839	0.842757	
<i>Impatiens thomsoni</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.535	0	0	0.21595	0.989618	
<i>Incarvillea emodi</i>	4.323	0	6.423	0	0	0	0	12.55	0	0	0.961	0	2.087	0	0	0	0	0	0	1.25467	3.080319	
<i>Indigofera heterantha</i>	0	0	0	0	0	2.214	13.2	0	0	0	0	3.3	8.445	0	17.54	16.21	10.79	21.01	17.59	13.33	5.88395	7.575618
<i>Iris aitchisonii</i>	0	0	0	0	0	10.76	0	0	0	0	0	0	0	0	0	0	0	0	0	0.51238	2.348024	
<i>Iris germanica</i>	0	0	0	0	6.876	0	0	0	0	9.037	4.974	0	0	0	0	0	0	0	0	0.99462	2.577914	
<i>Iris sisyrinchium</i>	0	0	0	5.559	5.56	9.127	0	0	0	0	0	7.583	4.354	0	0	0	0	0	0	1.53252	2.934759	
<i>Juglans regia</i>	0	0	0	0	0	0	0	0	0	0	0	0	17.34	2.46	0	0	0	0	0	0.94295	3.795551	
<i>Juncus muricatus</i>	0	0	0	0	0	0	0	0	0	0	0	1.078	0	0	0	0	0	0	0	0.05135	0.235239	
<i>Justicia adhatoda</i>	12.042	9.258	0	8.693	11.69	11.97	2.236	0	0	54.95	6.553	0	0	0	0	0	0	0	0	5.5901	12.24292	
<i>Kickxia ramosissima</i>	0	2.079	0	0	0	0	0	0	0	4.164	1.396	0	0	0	0	0	0	0	0	0.36376	1.020568	
<i>Lamium amplexicaule</i>	0	3.262	0	0	0	0	2.832	0	0	4.719	1.351	0	5.784	0	0	0	0	0	0	0.85467	1.744565	
<i>Lathyrus aphaca</i>	0	0	0	0	0	0	0	0	7.627	0	0	0	0	0	0	0	0	0	0	0.36319	1.664348	
<i>Launaea procumbens</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.359	0	0	18.58	1.14005	4.163627
<i>Launaea secunda</i>	0	0	0	0	0	0	0	9.23	5.024	0	0	0	0	0	0	0	0	0	0	0.67857	2.243769	
<i>Lespedeza juncea</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.632	0	0	0.12533	0.574349	
<i>Linum corymbulosum</i>	0	4.715	9.356	0	0	0	21	0	0	0	0	0	0	0	0	0	0	0	0	1.67005	4.960825	
<i>Mallotus philippensis</i>	0	0	55.33	0	0	0	0	0	35.29	0	0	0	0	0	0	0	0	0	0	4.31519	13.99243	

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(Table 1 cont'd)

<i>Malva parviflora</i>	0	0	0	0	0	0	0	0	0	7.185	0	0	0	0	0	5.359	0	0	10.2	1.08319	2.826703	
<i>Maytenus royleanus</i>	7.97	14.071	0	5.437	6.001	0	7.2	0	5.024	8.805	0	11.39	9.42	0	0	0	0	0	0	3.58676	4.637311	
<i>Medicago polymorpha</i>	0	25.423	7.703	12.6	0	0	0	0	0	9.859	0	11	0	0	0	0	0	0	0	3.17071	6.601148	
<i>Melilotus indica</i>	2.209	2.059	5.332	0	0	10.32	36.3	0	35.29	0	0	7.1	0	0	0	0	7.018	0	0	5.02976	10.66609	
<i>Micromeria biflora</i>	0	0	4.591	0	4.506	0	11.1	8.55	3.778	2.252	8.181	0	0	0	0	0	0	0	0	2.04543	3.435253	
<i>Mimosa himalayana</i>	0	0	0	0	0	0	0	0	0	3.842	0	0	0	0	0	0	0	0	0	0.18295	0.838393	
<i>Morina coulteriana</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1.74	0	0	0	0	0	0.08286	0.379699	
<i>Morus alba</i>	0	0	0	0	0	0	0	0	0	0	0	4.443	0	0	0	0	0	0	0	0.21157	0.969542	
<i>Myrsine africa</i>	0	0	0	0	0	0	0	0	0	0	0	0	3.238	0	0	0	0	0	0	0.15419	0.70659	
<i>Nepeta elliptica</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.359	0	0	0.25519	1.16943	
<i>Nepeta raphanorhiza</i>	0	0	0	0	0	18.25	3.786	0	0	0	0	0	0	0	0	0	0	0	0	1.04933	4.026619	
<i>Nerium oleander</i>	0	0	0	0	0	0	4.35	0	0	0	0	0	0	0	0	0	0	0	0	0.29	1.123165	
<i>Notholirion thomsonianum</i>	0	0	0	0	0	18.28	0	0	0	0	0	0	0	0	0	0	0	0	0	0.87048	3.989023	
<i>Ocimum basilicum</i>	0	0	0	0	0	0	0	0	12.55	0	0	0	0	0	0	0	0	0	0	0.59781	2.739507	
<i>Oenothera rosea</i>	5.218	0	0	0	0	0	0	0	0	17.57	2.59	0	0	10.5	0	5.725	0	0	5.725	0.225376	4.53759	
<i>Olea ferruginea</i>	0	18.772	3.369	90.04	116.6	11.79	78.31	0	0	25.9	0	116.7	15.63	0	0	4.31	0	0	0	22.9281	39.91709	
<i>Otostegia limbata</i>	3.269	4.895	1.449	0	0	0	0	0	0	12.68	0	0	0	0	0	0	0	0	0	1.06171	2.949012	
<i>Oxalis corniculata</i>	9.65	3.247	1.717	5.559	0	18.13	3.074	0	11.31	0	0	6.471	0	3.537	5.392	8.976	0	0	1.776	3.75443	4.872573	
<i>Oxyria dyginima</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	6.06	0	0	0	2.66	0	0.41524	1.417362	
<i>Paeonia emodi</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	2.226	0	0	0	0	0	0.106	0.485753	
<i>Parnassia nubicola</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.398	0	0	0.16181	0.741504	
<i>Parrotiopsis jacquemontiana</i>	0	0	0	0	0	0	0	0	0	0	0	13.7	0	0	0	2.631	0	5.354	0	1.03252	3.168868	
<i>Peganum harmala</i>	2.559	0	0	0	0	0	0	0	0	1.368	0	0	0	0	0	0	0	0	0	0.187	0.619901	
<i>Phoenix dactylifera</i>	0	0	0	25.02	25.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.40562	7.598103	
<i>Phyla nodiflora</i>	0	0	0	0	0	0	0	0	0	19.3	0	0	0	0	0	0	0	0	0	0.91905	4.211605	
<i>Picea smithiana</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	37.36	10.6	0	72.97	0	10.6	6.26381	17.49514	
<i>Pimpinella Stewartii</i>	0	0	0	0	0	5.667	4.39	0	0	0	0	0	0	0	0	0	12.167	0	0	1.05838	2.965779	
<i>Pinus gerardiana</i>	0	0	55.77	0	0	0	0	0	0	0	0	0	0	0	0	0	2.305	0	0	0.10976	0.502992	
<i>Pinus roxburghii</i>	0	0	55.77	0	0	85.58	20.2	110.7	0	0	0	0	0	0	0	0	0	0	0	12.9654	31.2803	
<i>Pinus wallichiana</i>	0	0	0	0	0	0	0	0	0	0	0	0	1.937	58.72	64.07	0	14.679	48.09	64.07	11.9792	23.63917	
<i>Pistacia integrima</i>	0	0	0	0	0	0	0	4.83	0	0	0	3.403	0	0	0	0	0	0	0	0.39186	1.257897	
<i>Plantago lanceolata</i>	9.65	4.698	2.261	8.683	0	0	0	0	0	0	0	0	1.109	3.003	0	0	0	0	7.711	1.76738	3.160786	
<i>Plantago major</i>	0	0	0	0	0	0	0	7.65	0	0	0	0	2.53	1.789	0	0	1.149	2.123	4.01	0.91886	1.902946	
<i>Platanus orientalis</i>	0	0	0	0	0	5.409	0	0	0	0	0	0	3.386	1.28	0	0	0	0	0	0.47976	1.369801	
<i>Pleurospermum stylosum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.888	0	0	0	0	0.28038	1.284867	
<i>Poa annua</i>	0	6.022	2.301	14.9	0	0	0	0	0	0	0	0	2.389	0	0	0	0	0	0	1.21943	3.449131	
<i>Poa nemoralis</i>	0	0	0	0	0	0	0	0	0	0	0	0	24.04	0	0	0	0	0	0	1.14471	5.24574	
<i>Podophyllum emodi</i>	0	0	0	0	0	0	0	0	0	0	0	0	3.843	0	6.102	0	0	0	6.102	0.76414	1.961826	
<i>Polygala arvensis</i>	0	0	0	0	0	8.423	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4011	1.838049	
<i>Polygonum affine</i>	0	0	0	0	0	0	0	0	0	2.332	0	0	0	0	0	4.227	0	0	0	6.559	0.32795	1.055181
<i>Polygonum amphibium</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.209	0	0	0	0	0.3909	1.791351	
<i>Polygonum amplexicaule</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.474	0	8.209	10.65	1.3969	3.532558
<i>Polygonum aviculare</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.099	0	0	0.19519	0.894475	
<i>Polygonum nepalense</i>	0	0	0	0	0	0	0	0	0	0	0	0	5.116	7.962	0	0	0	0	0	18.4	1.49871	4.363335
<i>Polygonum plebejum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	4.548	0	0	0	0	0	0.21657	0.992455	
<i>Potentilla ambigua</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.187	0	24.37	0	1.21714	5.311977	
<i>Potentilla gerardiana</i>	0	0	0	0	0	0	0	0	0	0	0	0	2.089	0	24.37	0	0	2.629	0	8	1.75752	5.484179
<i>Potentilla indica</i>	0	0	0	0	0	0	0	0	6.858	0	0	0	8.558	0	0	12.48	0	0	0	1.32843	3.456788	
<i>Primula hazarica</i>	0	0	8.893	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.42348	1.940612	
<i>Primula rosea</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	2.224	0	0	0	0	0	0.1059	0.485317	
<i>Prunus armeniaca</i>	0	0	0	0	0	0	0	0	0	0	0	3.515	0	0	0	0	0	0	0	0.16738	0.767036	

(Cont'd)

(Table 1 cont'd)

<i>Psammogeton biternatum</i>	0	0	3.231	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.15386	0.7050762		
<i>Pteris aspericaulis</i>	0	0	0	0	0	0	0	0	5.024	0	0	0	0	0.379	0	0	0	0	0	0.25729	1.095311		
<i>Pyrus communis</i>	0	0	0	0	0	0	0	0	0	0	0	6.655	0	0	0	0	0	0	0	0.3169	1.45224		
<i>Pyrus pistacia</i>	0	0	0	0	0	0	0	0	5.097	0	0	0	0	0	0	0	0	0	0	0.24271	1.112257		
<i>Quercus dilatata</i>	0	0	0	0	0	0	0	0	0	0	2.788	0	0	0	0	96.49	0	11.2	0	14.82	5.96652	2111343	
<i>Quercus incana</i>	0	0	0	0	0	0	0	19	0	0	0	0	0	17.32	0	0	0	0	0	0	1.73148	5.475248	
<i>Quercus semicarpifolia</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14.193	0	0	0	0.67586	3.097167	
<i>Ranunculus laetus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	3.376	0	0	0	0	0	0	0.16076	0.736704	
<i>Ranunculus muricatus</i>	0	0	0	8.672	0	0	0	0	0	0	0	0	0	0	2.089	0	0	0	0	0	0.51243	1.924231	
<i>Rhabdosia rugosa</i>	0	0	0	0	0	0	0	4.82	0	0	0	0	0	0	2.583	0	0	0	0	0	0.35243	1.167833	
<i>Ribes emodence</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.909	0	0	0.04329	0.19836	
<i>Riccia poly morpha</i>	0	0	0	0	0	0	0	0	0	0	0	0	1.147	0	0	0	0	0	0	0	0.05462	0.250296	
<i>Rosa brunonii</i>	0	0	0	0	0	0	0	0	0	0	0	0	13.23	0.901	0	0	0	0	0	0	0.67314	2.884974	
<i>Rosa webbiana</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10.35	0	0	0	0	0	0.49286	2.258555	
<i>Rubus fruticosus</i>	0	0	0	0	0	23.9	0	9.776	0	0	0	0	0	0.902	0	0	0	0	0	0	1.64657	5.525661	
<i>Rubus macilanthus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	0	0	0	0	0	0	0.04286	0.196396	
<i>Rumex dentatus</i>	0	0	0	0	0	0	2.207	0	0	0	0	0	12.17	0	0	0	0	9.107	0	0	1.11814	3.237198	
<i>Rumex hastatus</i>	0	0	0	5.564	0	18.17	18.2	0	0	0	0	0	0	2.203	0	0	0	0	0	0	2.10181	5.497576	
<i>Rumex nepalensis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11.043	0	0	5.167	0.7719	2.608957	
<i>Saccharum spontaneum</i>	0	8.572	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.40819	1.8170564	
<i>Salix flabillarlis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.796	0	0	0	0.60933	2.792316	
<i>Salix karelinii</i>	0	0	0	0	0	0	0	0	0	0	0	0	1.286	0	0	0	0	0	0	0	0.06124	0.280628	
<i>Sambucus wightiana</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.894	8.843	3.415	0	0.874	8.843	0	1.23186	2.757895
<i>Saussurea candolleana</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8.628	0	0	0	0.41086	1.882784	
<i>Scabiosa speciosa</i>	0	0	0	9.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.44524	2.040337	
<i>Scandix pectin-veneris</i>	4.323	2.079	4.99	9.35	6.88	0	0	0	0	0	0	0	3.58	0	0	0	0	0	0	0	1.48581	2.730602	
<i>Scrophularia calycina</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11.17	0	0	0	0.532	2.43793	
<i>Sedum adenotrichum</i>	0	0	0	0	0	0	0	5.074	0	0	6.998	0	0	0	0	0	0	0	0	0	0.57486	1.840894	
<i>Sedum crassipes</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.428	0	0	0	0.16324	0.748051	
<i>Sedum roseum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12.87	0	0	9.446	12.97	0	1.68048	4.265466
<i>Senecio chrysanthemoides</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	4.778	5.256	0	0	10.418	0	0	0.9739	2.636961	
<i>Setaria glauca</i>	0	0	0	0	0	0	0	0	0	0	0	0	3.545	0	0	11.65	0	0	0	0	0.72376	2.6209	
<i>Setaria palmiflora</i>	0	0	0	0	0	0	0	0	0	0	0	0	1.089	0	0	0	0	0	0	0	0.05186	0.237639	
<i>Setaria viridis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	3.6	0	0	0	0	0	0	0.17143	0.785584	
<i>Sida cordifolia</i>	5.335	0	0	7.315	0	8.423	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.00348	2.566828	
<i>Silene conoidea</i>	0	5.068	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.24133	1.105928	
<i>Silene dubium</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.701	0	0	0	0	0	0.22386	1.025842	
<i>Silene vulgaris</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1.29	0	0	11.84	10.42	0	4.602	1.34033	3.418874	
<i>Sisymbrium irio</i>	0	0	0	0	12.57	0	0	0	0	0	0	0	0	0	0	6.177	0	0	0	6.177	0	1.187	3.2021
<i>Solanum nigrum</i>	0	6.03	1.449	2.541	0	10.66	7.599	0	0	9.135	0	0	0	4.778	0	7.855	0	0	0	7.855	0	2.75724	3.783699
<i>Sonchus oleraceus</i>	2.512	0	0	5.045	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.35986	1.205046	
<i>Sorbaria tomentosa</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.633	40.79	0	0	2.02033	8.891289
<i>Sorghum halepense</i>	0	3.854	0	0	0	0	0	0	8.106	0	0	0	0	0	0	0	0	0	0	0	0.56952	1.920274	
<i>Spiraea vacciniifolia</i>	0	0	0	0	0	0	4.412	0	0	0	0	0	0	0	0	1.3	0	0	0	1.37	2.188	0.44143	1.089219
<i>Swertia paniculata</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0.892	0	0	0	0	0	0	0.04248	0.19465	
<i>Tamarix aphylla</i>	0	0	0	0	0	0	0	0	0	0	0	0	3.388	0	0	0	0	0	0	0	0.16133	0.739322	
<i>Taraxacum officinale</i>	3.604	3.254	2.893	2.466	6.876	10.51	0	0	0	0	0	0	0	0	0	0	6.39	0	0	0	1.71405	2.95757	
<i>Tetrapogon villosus</i>	0	0	0	0	0	0	4.37	0	0	0	0	0	0	0	0	0	0	0	0	0	0.20824	0.954267	
<i>Themeda anathera</i>	0	0	5.098	0	0	0	0	5.1	6.562	7.672	0	0	1.17	10.06	0	0	0	0	0	0	1.6981	3.129674	
<i>Tribulus terrestris</i>	0	0	0	0	0	0	0	0	5.497	5.581	5.581	0	0	0	0	0	0	0	0	0	0.79329	1.99119	
<i>Trichodesma indica</i>	0	0	0	5.584	0	0	0	0	5.497	0	0	0	0	0	0	0	0	0	0	0	0.52767	1.666598	

(Cont'd)

(Table 1 cont'd)

<i>Trifolium repens</i>	0	9.65	0	0	0	0	0	0	0	0	0	0	0	4.262	0	0	0	4.463	0	0	0	0.875	2.399244
<i>Tulipa stellata</i>	0	0	5.048	5.584	6.876	0	10.3	2.68	0	35.29	0	0	3.367	0	0	0	0	0	0	0	0	3.29229	7.893291
<i>Urtica dioica</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	6.18	0	0	0	3.074	1.248	0	0	0.5001	1.482353
<i>Urtica urdens</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	2.586	0	0	0	0	0	0	0	0.12314	0.564311
<i>Valeriana clarkei</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.632	0	0	0	0.22057	1.010785
<i>Valeriana jatamonsii</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.404	4.061	0	0	0.26024	0.923058
<i>Verbascum thapsus</i>	0	2.053	0	0	0	0	8.423	0	0	0	2.698	0	3.487	2.089	0	2.857	1.404	12.119	0.881	2.857	4.602	2.07	3.131309
<i>Verbena officinalis</i>	0	0	0	0	0	0	0	0	0	10.11	0	0	0	0	0	0	0	0	0	0	0	0.48133	2.205746
<i>Viburnum cotinifolium</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.656	0	0	20.05	44.13	3.1349	10.35727
<i>Viburnum nervosum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22.79	20.05	0	0	0	0	2.03995	6.457324
<i>Vicia monantha</i>	2.512	2.053	0	8.683	6.876	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.95829	2.386569
<i>Viola canescens</i>	0	0	5.238	5.56	6.876	0	4.35	5.24	2.985	0	0	0	0	0	0	22.54	0	0	0	22.58	0	3.5891	6.739453
<i>Viola rupestris</i>	0	0	0	0	0	0	0	0	0	0	0	0	8.517	0	0	0	0	0	0	0	0	0.40557	1.858562
<i>Vitex nequundo</i>	0	0	0	0	0	0	0	0	0	14.64	29.28	0	0	0	0	0	0	0	0	0	0	2.09138	6.999378
<i>Vitis Jacquemontii</i>	0	0	0	0	0	0	8.423	0	0	0	0	0	4.01	1.093	0	0	0	0	1.224	0	7.853	1.07633	2.520527
<i>Zanthoxylum armatum</i>	0	0	2.261	0	0	0	0	2.25	0	0	0	0	0	0	0	0	0	0	0	0	2.604	0.339	0.853232
<i>Ziziphus jujuba</i>	0	0	0	0	6.876	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.32743	1.500466
<i>Ziziphus nummularia</i>	15.541	5.489	15.33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.73133	4.709838

shady slopes becoming free of snow much later. At higher altitudes vegetation is affected by climatic factors such as rainfall, humidity, ultra-violet radiation, temperature and winter precipitousness of slope.

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