DIVERSITY AND DISTRIBUTION OF FLORA IN MURREE-KOTLI SATTIAN-KAHUTA NATIONAL PARK, PAKISTAN

AHMED, W.[1] – QURESHI, R.[1*] – MUNAZIR, M.[2] – RAHIM, B. Z.[3] – MUNIR, M.[4] – KOUSAR, R.[1] – MAQSOOD, M.[1] – ABBAS, Q.[5] – QASEEM, M. F.[1] – KHAN, A. M[1] – IQBAL, M.[6] – BHATTI, M. I.[7]

[1]Department of Botany, Pir Mehr Ali Shah Arid Agriculture University, Murree Road, Shamsabad, 46300 Rawalpindi, Punjab, Pakistan

[2]Department of Botany, Government College, Women University, 51040 Sialkot, Punjab, Pakistan

[3]Department of Botany, Baluchistan University, 87500 Quetta, Baluchistan, Pakistan

[4]Department of Botany, University of Animal & Plant Sciences, Ravi Campus, Pattoki, Punjab, Pakistan

[5]Department of Biological Sciences, Karakorum International University, Gilgit-Baltistan, Gilgit, Pakistan

[6]Department of Entomology, Pir Mehr Ali Shah Arid Agriculture University, Murree Road, Shamsabad, 46300 Rawalpindi, Punjab, Pakistan

[7]Department of Plant Pathology, Sindh Agriculture University, Sub-Campus Umarkot, Sindh, Pakistan

**Corresponding author*
e-mail: rahmatullahq@yahoo.com

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Abstract. Present endeavor was aimed at recording the flora of Murree-Kotli Sattian-Kahuta National Park (MKSKNP), Pakistan. The whole project area was surveyed thoroughly from March, 2013 till October, 2015 and 624 plant species belonging to 361 genera and 106 families were recorded. Of them, 24 ferns, four gymnosperms and 596, angiosperms (144 monocots and 452 dicots) were recorded from the park area. Poaceae was the largest family (80 spp., 12.82%), followed by Fabaceae (60 spp., 9.62%) and Asteraceae (55 spp., 8.81%). Most of the studied area was inhabited by native species (528 spp., 84.62%), followed by weeds (48 spp., 7.69%), cultivated species (21 spp., 3.37%) and naturalized (18 spp., 2.88%). Two species viz., *Aristolochia punjabensis* and *Buxus papillosa* were found endemic to Pakistan. This national park is composed of three localities (viz., Murree Kotli Sattian and Kahuta) and the pair-wise comparison revealed maximum similarity between Murree and Kotli Sattian pair due to their adjacency and similar climatic conditions. Similarly, the other pair (i.e. Kotli Sattian and Kahuta) was also closely located towards southern part and had similar floristic elements. This study serves as a platform for the detailed floristic and ecological studies to be carried out by the researchers.
Keywords: *ecological studies, endemic, floristic elements, maximum similarity, sustainable utilization*

Introduction

The flora is the compilation of all plants confined to the particular territory or region (Hooker, 1897). The correctly identified plants are very important since they are the key to the literature. Various types of flora exist like native flora, agricultural flora/garden flora, weed flora, etc. Since plants of the world are extremely variable, therefore a wide

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range of Floras are available ranging from concise or field Flora to research Flora normally, the flora is assisted with the keys and description (Ali, 2008).

The floristic checklists may serve as a platform for more detailed study from the particular area and in many cases; this may be the only source of botanical information (Kent, 2011). Because of their conciseness, the listing of species is easy approach in vegetation study because it can be done in a relatively small timeframe, easy to handle and provide fundamental information for understanding the biodiversity issues (Ilyas et al., 2012). The floristic study provide baseline for further future taxonomic, ecological, ethnobotanical, conservation and forest management projects (Khan et al., 2015).

Pakistan has moderate diversity in terms of the flora and approximately 5,700 species of vascular plants have been reported (Stewart, 1972). Many floristic studies have been conducted from various parts of Pakistan and reported checklists (Chaudhri and Chuttar, 1966; Bhatti et al., 1999, 2001; Qureshi and Bhatti, 2005; Parveen and Hussain, 2007; Hussain et al., 2008; Qureshi, 2008a, 2012; Qureshi et al., 2011a, b, 2014; Shaheen et al., 2014a; Wariss et al., 2014; Ilyas et al., 2018; Khan et al., 2018). From Rawalpindi and adjoining area, an outdated account has been previously reported (Ahmad, 1964; Stewart, 1967; Shaheen et al., 2014b). Some of other studies include Sher and Khan (2007), Djaha et al. (2008), Saima et al. (2009), Qureshi and Bhatti (2010), Haq et al. (2010), Nazir et al. (2014), Khan et al. (2015) and Badshah et al. (2016). Because of diverse topographic and microhabitat variation along with very high elevational differences, the study area harbors rich plant biodiversity, which needs to be protected and conserved as soon as possible. The present study was aimed to enlist existing floristic diversity as an effort to highlight the rich phytodiversity of the area which will provide a baseline for planning conservation effort and further ecological investigation.

Materials and methods

Study area

Murree-Kotli Sattian-Kahuta National Park (MKSKNP) is composed of three distinct localities (i.e. Murree, Kotli Sattian, Kahuta) of district Rawalpindi, Pakistan. It lies at 33° 21’ to 34° 01’ N latitudes and 73° 11’ to 73° 38’ E longitude in the district Rawalpindi, Pakistan with an area of 934 km^2 (*Fig. 1*). Climatically, the study area is subtropical to temperate owing to elevational changes varying from 500 to 2270 m. The study area is located on the lateral spur of the Sub-Himalayan Mountains bounded by river Jhelum in the east, Islamabad in west, Khyber Pakhtunkhwa in the north and Gujar Khan in the south. The topography of the study area at higher altitude is mainly composed of rugged terrain with narrow valleys and relatively flat at the lower elevations. The hilly area contains valleys created by fast flowing running water of streams and rivers. The water courses are gradually made deeper by the fast flow of water which erodes the soil and carries valuable mineral to low lying downstream areas, resulting in alluvial deposits making these areas more fertile then hilly areas for cultivation (Khan et al., 2011).

Floristic enumeration

Plant specimens were collected from 246 sampling sites in the study area from August, 2013 to September, 2016. For this purpose, the whole study area was thoroughly visited covering all seasonal variations by walking method (Nazar et al.,

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2008). Plant specimens were collected in triplicate, pressed, dried and mounted on standard herbarium sheets. Gymnosperm and Angiosperm were identified with the help of *Flora of Pakistan* (Stewart, 1972; Nasir and Ali, 1970-1989; Ali and Nasir, 1989-1991; Ali and Qaiser, 1993-2009); while, the Cryptogamic Flora of Pakistan (Nakaike and Malik, 1992) was used to identify the Pteridophytes. Nomenclature of the taxa was validated from The Plant List (TPL, 2013). Voucher specimens were deposited in the herbarium of Pir Mehr Ali Shah (PMAS), Arid Agriculture University Rawalpindi, Pakistan.

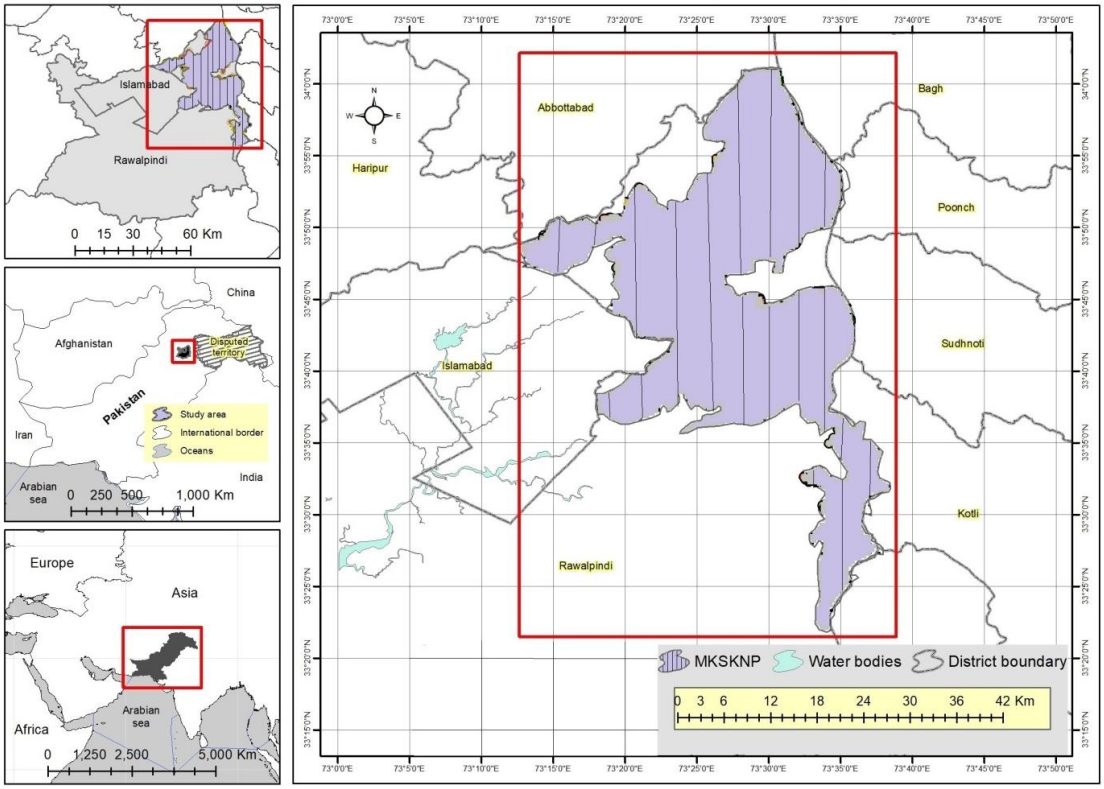

Figure 1. *Location map of the study area*

Family importance index (FII) and genera importance index (GII)

In order to calculate sharing of each family and genus, family importance index (FII) and genera importance index (GII) were calculated by using following formulae:

$$FII = \frac{\text{No. of species of a family}}{\text{Total No. of species recorded}} \times 100 \quad \text{(Eq.1)}$$

$$GII = \frac{\text{No. of species of a genus}}{\text{Total No. of species recorded}} \times 100 \quad \text{(Eq.2)}$$

Diversity index (SI)

The similarity index (SI) between localities was calculated after Kent (2011) by using following formula:

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$$Ss = \frac{2a}{2a+b+c} \quad \text{(Eq.3)}$$

where “a” is the number of species common to both habitats, while “b” is the number of species in habitat 1 and “c” is the number of species in habitat 2.

Results

Floristic diversity

The vascular flora of Murree-Kotli Sattian-Kahuta National Park (MKSNP) is comprised of 624 plant species belonging to 361 genera and 106 families (*Appendix*). Two species such as *Aristolochia punjabensis* and *Buxus papillosa* were found endemic to Pakistan. There was diversity of elevational ranges recorded from sampling sites right from Beor (500 m) to Patriata (2155 m). The detail of sampling sites along with coordinates and altitude is provided in *Table 1*. The census of the flora indicates that it includes 24 ferns, 4 gymnosperms and 596 angiosperms (i.e. 144 monocotyledon and 452 dicotyledons). Geographically, the park area shared 0.12% of the whole area of country but contains significantly higher flora diversity (10.79%) than the flora of Pakistan (*Table 2*). Compared to the vascular plants of the country, the project area was found rich in pteridophytes (18.75%) and gymnosperms (17.39%), followed by monocotyledons (12.63%) and dicotyledons (10.06%) as indicated in *Table 2*.

Table 1. *Location of sampling sites of Murree-Kotli Sattian-Kahuta National Park*

Sample No.	Locality	Latitude	Longitude	Altitude
S1	Lehtrar	33°45'03.09"N	73°29'23.01"E	1098
S2	Baroa	33°49'35.02"N	73°14'05.00"E	1181
S3	Baroa	33°49'25.01"N	73°14'04.00"E	1128
S4	Baroa	33°49'32.01"N	73°14'17.09"E	1098
S5	Baroa	33°49'20.07"N	73°14'17.01"E	1051
S6	Lehtrar	33°44'22.07"N	73°28'44.02"E	1028
S7	Kror	33°43'08.49"N	73°25'41.03"E	1006
S8	Danoi	33°44'59.00"N	73°29'25.02"E	1125
S9	Bagga Reserve Forest	33°44'07.44"N	73°25'44.01"E	1049
S10	Angori	33°48'04.03"N	73°20'22.03"E	1088
S11	Deral Reserve Forest	33°59'37.15"N	73°29'48.45"E	1017
S12	Lehtrar	33°42'03.01"N	73°26'08.40"E	1049
S13	Kohati Reserve Forest	33°56'17.03"N	73°31'33.08"E	1064
S14	Kohati Reserve Forest	33°55'49.06"N	73°31'15.01"E	1088
S15	Kohati Reserve Forest	33°55'37.00"N	73°31'05.09"E	1107
S16	Kohati Reserve Forest	33°55'22.24"N	73°31'07.48"E	1127
S17	Agori	33°48'07.08"N	73°20'43.49"E	1130
S18	Sain	33°48'38.06"N	73°22'54.02"E	1075
S19	Agori	33°48'06.04"N	73°20'29.06"E	1077
S20	Agori	33°48'05.08"N	73°20'33.05"E	1081
S21	Pastal	33°50'37.05"N	73°20'06.07"E	1168
S22	Pastal	33°50'37.07"N	73°20'06.03"E	1168
S23	Pastal	33°50'36.04"N	73°20'18.07"E	1150
S24	Pastal	33°50'18.05"N	73°20'09.03"E	1020
S25	Lehtrar Uper	33°41'37.00"N	73°26'24.08"E	1060

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Sample No.	Locality	Latitude	Longitude	Altitude
S26	Lehtrar Uper	33°41'56.00"N	73°26'21.12"E	1189
S27	Lehtrar Uper	33°41'39.01"N	73°26'41.07"E	1130
S28	Bhangal Reserve Forest	33°44'05.00"N	73°26'56.04"E	1026
S29	Danoi	33°44'50.09"N	73°29'24.06"E	1196
S30	Parinola Reserve Forest	33°44'33.01"N	73°30'59.09"E	1069
S31	Kamra Reserve Forest	33°45'47.02"N	73°33'30.04"E	1095
S32	Paija Kamra	33°44'52.03"N	73°32'16.01"E	1024
S33	Paija Kamra	33°45'08.54"N	73°32'32.23"E	1100
S34	Gehl	33°48'39.33"N	73°23'01.58"E	1024
S35	Sain	33°48'48.44"N	73°23'30.26"E	1119
S36	Gehl	33°48'58.54"N	73°23'27.21"E	1144
S37	Salgran	33°48'04.23"N	73°20'02.30"E	1011
S38	Salgran	33°48'11.05"N	73°20'25.01"E	1081
S39	Angori	33°48'28.03"N	73°21'58.08"E	1081
S40	Angori	33°48'27.03"N	73°22'09.05"E	1055
S41	Angori	33°48'21.07"N	73°22'22.02"E	1029
S42	Angori	33°48'21.08"N	73°22'21.01"E	1027
S43	Sain	33°48'33.04"N	73°22'55.04"E	1059
S44	Trait	33°49'58.38"N	73°18'04.26"E	1145
S45	Sain	33°48'45.03"N	73°23'09.02"E	1121
S46	Angori	33°48'43.01"N	73°23'22.04"E	1142
S47	Phaphreel	33°49'53.01"N	73°23'08.09"E	1115
S48	Angori Villge	33°48'12.07"N	73°20'17.04"E	1045
S49	Angori Villge	33°48'32.01"N	73°22'08.09"E	1099
S50	Patriata	33°51'32.03"N	73°28'54.01"E	2020
S51	Patriata	33°50'50.03"N	73°28'57.01"E	2143
S52	Patriata	33°50'47.07"N	73°29'06.01"E	2108
S53	Patriata	33°50'37.08"N	73°29'09.09"E	2026
S54	Patriata	33°51'09.03"N	73°28'42.05"E	2068
S55	Loer Topa	33°53'06.00"N	73°26'06.03"E	2102
S56	Loer Topa	33°53'06.08"N	73°26'10.07"E	2101
S57	Patriata	33°51'03.03"N	73°28'57.07"E	2155
S58	Patriata	33°51'15.03"N	73°28'51.04"E	2153
S59	Patriata	33°51'07.45"N	73°28'48.44"E	2010
S60	Bhurban	33°56'22.09"N	73°26'47.07"E	2091
S61	Bhurban	33°56'26.03"N	73°26'48.06"E	2030
S62	Bhurban	33°56'28.08"N	73°26'53.01"E	2029
S63	Loer Topa	33°53'06.08"N	73°26'02.08"E	2027
S64	Deerkot Reserve Forest	33°50'41.08"N	73°29'34.05"E	1829
S65	New Murree	33°52'29.09"N	73°27'46.00"E	1830
S66	Deerkot Reserve Forest	33°50'28.01"N	73°29'22.07"E	1955
S67	Deerkot Reserve Forest	33°51'40.04"N	73°29'38.07"E	1845
S68	Deerkot Reserve Forest	33°50'00.06"N	73°29'05.02"E	1829
S69	Kasairi Reserve Forest	33°54'19.07"N	73°26'38.01"E	1827
S70	Kasairi Reserve Forest	33°54'18.07"N	73°26'40.01"E	1855
S71	Kasairi Reserve Forest	33°50'40.06"N	73°29'23.04"E	1944
S72	Patriata	33°49'53.01"N	73°28'56.02"E	1853
S73	Patriata	33°51'56.44"N	73°28'59.41"E	1830
S74	Patriata	33°51'51.26"N	73°28'53.43"E	1820

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Sample No.	Locality	Latitude	Longitude	Altitude
S75	Patriata	33°51'57.13"N	73°29'15.42"E	1913
S76	Patriata	33°52'18.02"N	73°29'34.06"E	1826
S77	Loer Topa	33°53'19.03"N	73°25'57.02"E	1925
S78	New Muree	33°52'33.08"N	73°26'08.09"E	1819
S79	New Muree	33°52'46.08"N	73°26'11.06"E	1859
S80	Bhurban Reserve Forest	33°56'34.05"N	73°26'52.00"E	1951
S81	Bhurban Reserve Forest	33°56'35.04"N	73°26'50.03"E	1969
S82	Bhurban Reserve Forest	33°57'06.00"N	73°27'13.02"E	1916
S83	Kasairi Forest	33°55'24.3"N	73°27'20.3"E	1811
S84	Kasairi Forest	33°55'13.08"N	73°27'00.03"E	1812
S85	Kasairi Forest	33°54'37.02"N	73°26'21.02"E	1945
S86	Kasairi Forest	33°54'25.05"N	73°26'24.01"E	1944
S87	Bhurban Reserve Forest	33°56'48.09"N	73°26'27.04"E	1864
S88	Bhurban Reserve Forest	33°56'39.07"N	73°26'36.08"E	1909
S89	Bhurban Reserve Forest	33°56'38.10"N	73°26'45.54"E	1927
S90	Bhurban Reserve Forest	33°56'38.52"N	73°26'38.59"E	1917
S91	Bhurban Reserve Forest	33°56'34.12"N	73°26'43.06"E	1933
S92	Bhurban Reserve Forest	33°56'45.07"N	73°26'54.24"E	1851
S93	Bhurban Reserve Forest	33°56'49.13"N	73°26'27.67"E	1852
S94	Kasairi Forest	33°54'47.07"N	73°26'18.01"E	1920
S95	Bhurban Reserve Forest	33°56'46.07"N	73°26'48.05"E	1802
S96	Deerkot Reserve Forest	33°50'34.39"N	73°29'19.09"E	1976
S97	New Murree	33°52'29.09"N	73°27'46.00"E	1830
S98	Patriata	33°52'26.28"N	73°29'42.53"E	1798
S99	Patriata	33°52'43.08"N	73°29'49.06"E	1825
S100	Deerkot	33°52'49.00"N	73°29'58.02"E	1798
S101	Deerkot	33°52'27.00"N	73°30'18.09"E	1810
S102	Deerkot	33°52'36.02"N	73°30'7.08"E	1791
S103	Deerkot	33°52'09.02"N	73°29'25.06"E	1802
S104	Patriata	33°52'48.09"N	73°26'28.07"E	1794
S105	Patriata	33°50'23.09"N	73°28'06.01"E	1777
S106	Patriata	33°49'48.02"N	73°28'01.04"E	1761
S107	Balawra	33°48'51.06"N	73°30'07.04"E	1628
S108	New Muree	33°52'44.07"N	73°26'49.43"E	1748
S109	New Muree	33°52'15.07"N	73°27'47.43"E	1707
S110	Gora Gali	33°52'40.03"N	73°20'56.01"E	1673
S111	Mohra Shareef	33°56'55.06"N	73°26'05.06"E	1759
S112	Mohra Shareef	33°56'56.07"N	73°26'10.06"E	1617
S113	Chajana	33°53'26.58"N	73°30'01.63"E	1620
S114	Kohati	33°53'29.05"N	73°30'06.01"N	1632
S115	Chajana	33°53'41.13"N	73°30'45.86"E	1700
S116	Chajana	33°53'31.04"N	73°31'04.55"E	1691
S117	Bhurban Reserve Forest	33°56'51.07"N	73°26'27.03"E	1791
S118	Bhurban Reserve Forest	33°56'55.06"N	73°26'25.01"E	1774
S119	Bhurban Reserve Forest	33°56'55.00"N	73°26'30.08"E	1738
S120	Bun Karor	33°49'01.06"N	73°27'29.05"E	1724
S121	Bun Karor	33°48'54.05"N	73°27'12.08"E	1718
S122	Bun Karor	33°48'51.07"N	73°27'09.06"E	1737
S123	Lehtrar	33°43'01.07"N	73°26'52.01"E	1658

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Sample No.	Locality	Latitude	Longitude	Altitude
S124	Aliot	33°56'57.59"N	73°28'20.42"E	1604
S125	Aliot	33°56'47.08"N	73°27'53.03"E	1734
S126	Bara Hoter Reserve Forest	33°52'52.07"N	73°25'18.09"E	1668
S127	Bhurban Reserve Forest	33°56'49.00"N	73°26'46.09"E	1742
S128	Trait	33°51'36.06"N	73°20'05.08"E	1611
S129	Trait	33°51'36.01"N	73°20'14.08"E	1646
S130	Ghora Gali	33°52'48.05"N	73°20'59.09"E	1647
S131	Lehtrar	33°43'00.04"N	73°29'55.01"E	1420
S132	Lehtrar	33°43'31.09"N	73°30'23.03"E	1511
S133	Lehtrar	33°43'30.05"N	73°30'16.01"E	1518
S134	Lehtrar	33°43'46.05"N	73°30'20.06"E	1592
S135	Lehtrar	33°43'46.05"N	73°30'11.09"E	1512
S136	Danoi	33°44'03.03"N	73°29'32.08"E	1456
S137	Parinola Reserve Forest	33°43'52.05"N	73°29'52.04"E	1487
S138	Nar	33°43'06.03"N	73°30'01.06"E	1486
S139	Balawra	33°48'59.03"N	73°30'59.09"E	1459
S140	Balawra	33°49'00.09"N	73°31'18.05"E	1480
S141	Balawra	33°48'57.06"N	73°31'01.05"E	1460
S142	Balawra	33°48'47.08"N	73°31'08.03"E	1444
S143	Kotli Sattian	33°48'49.01"N	73°31'34.05"E	1457
S144	Kotli Sattian	33°48'50.06"N	73°31'51.09"E	1520
S145	Chajana	33°53'41.23"N	73°30'58.22"E	1577
S146	Chajana	33°53'40.08"N	73°31'17.56"E	1519
S147	Garian Reserve Forest	33°51'00.59"N	73°25'25.54"E	1402
S148	Garian Reserve Forest	33°51'28.48"N	73°25'54.40"E	1408
S149	Kala Basand Reserve Forest	33°45'36.09"N	73°25'03.05"E	1426
S150	Ban Karoor	33°47'21.47"N	73°25'47.08"E	1481
S151	Aliot	33°56'59.44"N	73°28'13.47"E	1594
S152	Ocha	33°58'00.00"N	73°26'42.06"E	1409
S153	Ocha	33°57'55.03"N	73°26'38.06"E	1443
S154	Ocha	33°57'54.02"N	73°26'32.01"E	1442
S155	Gora Gali	33°51'47.05"N	73°20'01.05"E	1517
S156	Gora Gali	33°51'39.08"N	73°20'03.08"E	1524
S157	Gora Gali	33°51'47.02"N	73°19'56.02"E	1465
S158	Samli	33°50'41.07"N	73°18'55.09"E	1210
S159	Parinola	33°44'11.02"N	73°29'35.08"E	1357
S160	Kotli Sattian	33°46'42.03"N	73°30'28.09"E	1295
S161	Danoi	33°44'29.07"N	73°29'02.08"E	1305
S162	Patriata Reserve Forest	33°52'33.80"N	73°31'05.50"E	1341
S163	Dewal Reserve Forest	33°59'25.04"N	73°29'03.05"E	1230
S164	Dewal Reserve Forest	33°59'12.05"N	73°29'15.09"E	1341
S165	Gehl Tanda	33°52'30.31"N	73°31'14.05"E	1320
S166	Gehl Tanda	33°52'23.42"N	73°31'22.11"E	1350
S167	Nankot Reserve Forest	33°50'37.06"N	73°19'29.02"E	1257
S168	Sang Reserve Forest	33°41'20.06"N	73°26'45.00"E	1258
S169	Parinola Reserve Forest	33°44'07.03"N	73°29'43.04"E	1286
S170	Parinola Reserve Forest	33°44'22.05"N	73°29'50.08"E	1217
S171	Lower Danoi	33°44'43.07"N	73°29'27.08"E	1290
S172	Glehragali	33°49'59.15"N	73°24'16.36"E	1331

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Sample No.	Locality	Latitude	Longitude	Altitude
S173	Parinola Reserve Forest	33°44'15.01"N	73°30'03.01"E	1188
S174	Parinola Reserve Forest	33°05'33.03"N	73°18'56.06"E	1221
S175	Nankot Reserve Forest	33°50'30.05"N	73°19'04.03"E	1306
S176	Phaphreel	33°49'03.07"N	73°23'36.05"E	1208
S177	Phaphreel	33°49'51.01"N	73°24'27.02"E	1332
S178	Kohati	33°53'51.49"N	73°29'35.14"E	1336
S179	Kohati	33°53'54.09"N	73°29'42.09"E	1341
S180	Kohati Rod	33°54'36.00"N	73°30'24.17"E	1330
S181	Ambani	33°42'36.02"N	73°21'08.53"E	898
S182	Ambani	33°42'39.04"N	73°21'08.11"E	939
S183	Kalla Basand Reserve Forest	33°44'03.02"N	73°22'17.07"E	856
S184	Simli Dam	33°43'09.34"N	73°22'39.01"E	832
S185	Lehtrar	33°43'02.07"N	73°26'53.03"E	922
S186	Bagga Reserve Forest	33°44'01.01"N	73°25'34.04"E	949
S187	Bagga Reserve Forest	33°43'06.36"N	73°25'44.06"E	983
S188	Bagga Reserve Forest	33°43'15.05"N	73°25'38.07"E	960
S189	Kror	33°42'27.06"N	73°25'16.09"E	957
S190	Kror	33°42'26.06"N	73°25'03.09"E	925
S191	Dewal Reserve Forest	33°59'57.22"N	73°30'26.31"E	812
S192	Kohati Reserve Forest	33°56'43.05"N	73°31'57.09"E	920
S193	Kohati Reserve Forest	33°57'37.19"N	73°31'45.42"E	843
S194	Kohati Reserve Forest	33°56'07.56"N	73°32'20.20"E	851
S195	Kohati Reserve Forest	33°56'19.03"N	73°31'33.44"E	1034
S196	Kohati Reserve Forest	33°56'46.04"N	73°31'43.02"E	976
S197	Phangal Reserve Forest	33°43'12.02"N	73°26'29.07"E	961
S198	Angori Reserve Forest	33°48'58.59"N	73°22'36.17"E	935
S199	Angori Reserve Forest	33°43'26.01"N	73°26'27.08"E	939
S200	Mangal Forest	33°47'05.01"N	73°19'41.09"E	950
S201	Mangal Forest	33°47'07.01"N	73°20'18.05"E	891
S202	Mangal Forest	33°46'49.03"N	73°20'37.02"E	903
S203	Mangal Forest	33°45'50.02"N	73°20'58.08"E	878
S204	Mangal Forest	33°46'30.56"N	73°20'36.53"E	882
S205	Mangal Forest	33°46'37.25"N	73°19'32.13"E	905
S206	Angori	33°47'11.07"N	73°19'22.06"E	952
S207	Nakka	33°48'34.03"N	73°22'06.06"E	951
S208	Nakka	33°49'24.08"N	73°16'52.01"E	839
S209	Salgaran	33°49'25.01"N	73°16'55.01"E	854
S210	Pail	33°49'47.08"N	73°17'01.01"E	826
S211	Trail	33°49'47.21"N	73°17'28.08"E	834
S212	Nandkot Reserve Forest	33°49'47.07"N	73°19'49.09"E	924
S213	Nandkot Reserve Forest	33°49'47.02"N	73°19'36.04"E	971
S214	Nandkot Reserve Forest	33°49'49.03"N	73°19'57.01"E	972
S215	Lehtrar	33°41'05.32"N	73°24'57.59"E	854
S216	Ambani Reserve Forest	33°42'47.07"N	73°21'12.04"E	788
S217	Ambani Reserve Forest	33°43'11.04"N	73°21'05.57"E	788
S218	Simli	33°43'37.03"N	73°21'19.03"E	770
S219	Gianthal	34°00'36.07"N	73°30'43.42"E	665
S220	Gianthal	34°00'11.29"N	73°30'40.32"E	757
S221	Nara	33°30'32.56"N	73°33'45.44"E	640

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Sample No.	Locality	Latitude	Longitude	Altitude
S222	Nara	33°30'25.44"N	73°33'50.10"E	622
S223	Nara	33°30'38.49"N	73°33'43.24"E	649
S224	Nara	33°32'22.44"N	73°33'15.01"E	653
S225	Nara	33°32'22.08"N	73°32'58.09"E	634
S226	Nara	33°32'14.50"N	73°33'17.55"E	684
S227	Nara	33°32'21.34"N	73°32'51.56"E	608
S228	Nara	33°32'27.54"N	73°32'32.44"E	640
S229	Gura Reserve Forest	33°35'35.09"N	73°34'53.08"E	650
S230	Gura Reserve Forest	33°35'57.58"N	73°34'47.13"E	701
S231	Karoot	33°35'20.44"N	73°34'28.44"E	635
S232	Nara	33°32'37.42"N	73°32'25.59"E	641
S233	Karot	33°35'41.01"N	73°35'04.01"E	599
S234	Karot	33°35'43.01"N	73°36'22.08"E	514
S235	Karot	33°35'57.09"N	73°35'03.06"E	591
S236	Karot	33°35'43.01"N	73°34'56.04"E	585
S237	Karot	33°30'17.44"N	73°34'14.14"E	573
S238	Karot	33°35'33.03"N	73°35'03.01"E	525
S239	Karot	33°35'36.02"N	73°35'39.01"E	512
S240	Azad Pattan	33°43'46.44"N	73°36'12.32"E	501
S241	Azad Pattan	33°43'41.07"N	73°36'15.08"E	503
S242	Azad Pattan	33°40'21.05"N	73°33'21.05"E	510
S243	Nara	33°32'17.44"N	73°32'46.48"E	582
S244	Karot	33°35'44.48"N	73°35'52.24"E	551
S245	Beor	33°34'57.59"N	73°34'09.27"E	576
S246	Beor	33°29'35.44"N	73°36'07.19"E	500

Table 2. *Comparison of the flora of the project area with the flora of Pakistan*

Plant group	Number of species		Percentage
	National Park (area: 934 km^2)	Pakistan (area: 796095 km^2) (Stewart, 1967)	
Ferns	24	128	18.75
Gymnosperms	4	23	17.39
Monocotyledons	144	1140	12.63
Dicotyledons	452	4492	10.06
Total	624	5783	10.79

Family importance index (FII) and genera importance index (GII)

By using *Equation 1*, the contribution of each family was calculated and according to it, Poaceae was the largest family that shared 80 species (12.82%), followed by Fabaceae (60 spp., 9.62%), Asteraceae (55 spp., 8.81%), Cyperaceae (30 spp., 4.81%) and Lamiaceae (27 spp., 4.33%). Other dominant families with 10 or more species were Rosaceae (19 spp., 3.04%), Apiaceae, Brassicaceae and Euphorbiaceae (12 spp., 1.92% each), Convolvulaceae and Ranunculaceae (11 spp., 1.76% each), Acanthaceae, Amaranthaceae and Polygonaceae (10 spp., 1.60% each); whereas, the remaining families were represented by less than 10 species (*Fig. 2*).

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The genera importance index (GII) as calculated through *Equation 2* indicated that the largest genus was *Euphorbia* that contributed 10 species (2.67%), followed by *Carex* (9 spp., 2.4%), *Cyperus* (8 spp., 2.13%), *Eragrostis*, *Poa*, *Ficus*, *Medicago*, *Rubus* and *Swertia* (6 spp., 1.6% each), while rest of genera shared less than five plant species (*Fig.* 3).

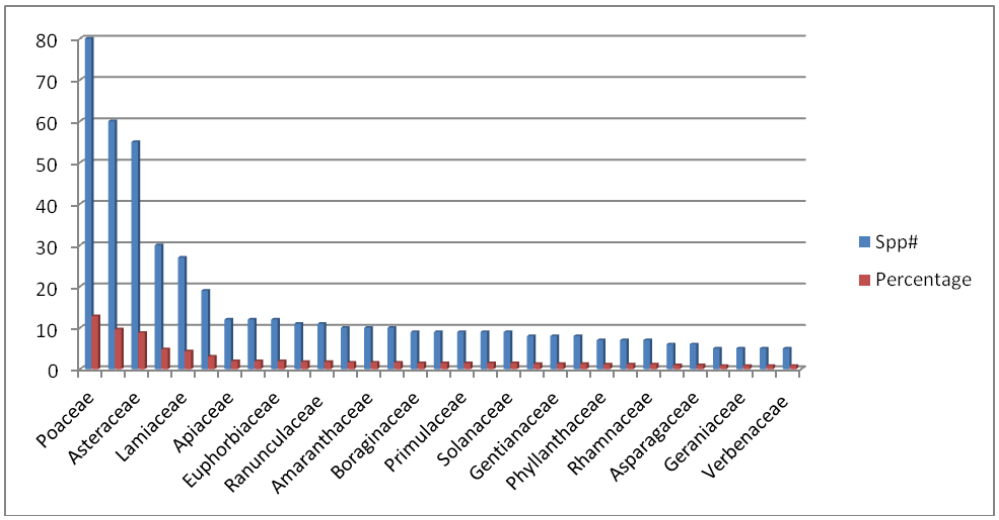

Figure 2. *Family importance index (FII) of the flora of Murree-Kotli Sattian-Kahuta National Park, Pakistan*

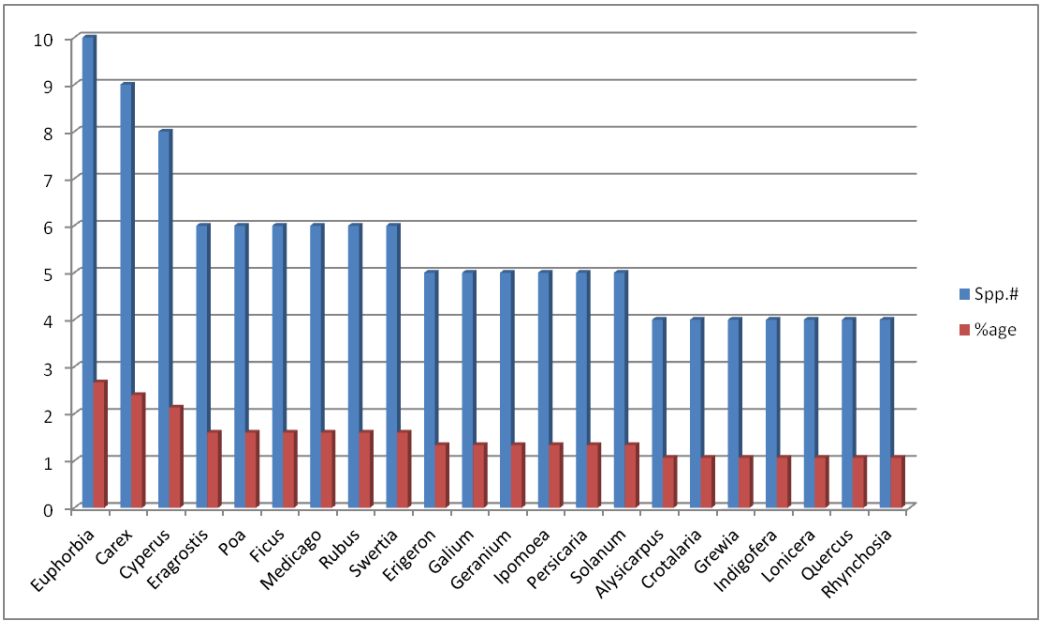

Figure 3. *Genera importance index (GII) of the flora of Murree-Kotli Sattian-Kahuta National Park, Pakistan*

Taxonomic status and diversity

Comparing with related floras, most of the project area was inhabited by native species (528 spp., 84.62%), followed weeds (48 spp., 7.69%), cultivated species

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(21spp., 3.37%), naturalized (18 spp., 2.88%), invasive (4 spp., 0.64%), introduced (3 spp., 0.48%), while two species such as *Aristolochia punjabensis* and *Buxus papillosa* were found endemic to Pakistan as shown in *Figure 4*.

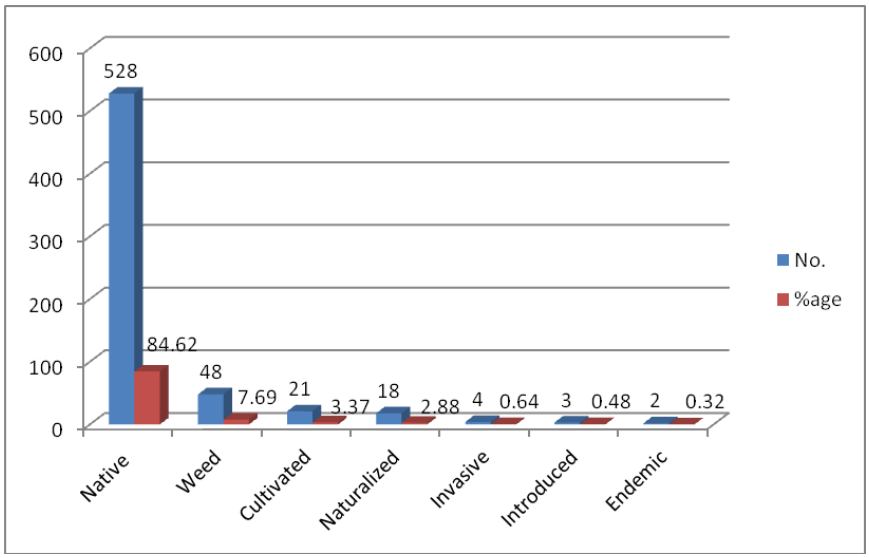

Figure 4. *Status of the flora of Murree-Kotli Sattian-Kahuta National Park*

Diversity index (DI)

The park area is composed of three localities viz., Murree Kotli Sattian and Kahuta. By using *Equation 3*, the pair-wise comparison revealed maximum similarity between Murree and Kotli Sattian sharing maximum species (518) with 89 distinct taxa and 47.94% similarity (*Table 3*). This similarity may be attributed due to their adjacency and similar climatic conditions. Likewise, the other pair viz., Kotli Sattian and Kahuta was also closely situated at the foothills towards southern part and ranked 2nd in terms of sharing species (416 spp.) with 131 distinct species and 46.27%. On the contrary, the 3rd pair comprising Murree and Kahuta was farther from each other and had least similarity in terms of species composition (i.e. 405 spp.). Since, Murree and Kotli Sattian regions are located in northeastern part of park where Himalayan floristic elements are dominant characteristically. On the other hand, The Kahuta is located at low elevation and towards southwest, therefore represented mostly by scrub forest.

Table 3. *Similarity index between pairs of localities from Murree-Kotli Sattian-Kahuta National Park*

Attribute	Murree vs. Kotli Sattian	Murree vs. Kahuta	Kotli Sattian vs. Kahuta
Shared species	518	405	416
Distinct species	89	215	131
Similarity %	47.94	44.14	46.27

Life forms

Eight life forms of the flora were determined from the Murree-Kotli Sattian-Kahuta National Park in which perennial herbs were dominating the area with 241 species

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having proportion of 38.62% of the total flora. It was followed by annual herbs (199 species, 31.89%), deciduous shrubs (62 spp., 9.94%), deciduous trees (46 spp., 7.37%), climbers (26 spp., 4.17%), evergreen shrubs and evergreen trees (23 spp., 3.69% each), while parasites were only 4 (*Fig. 5*).

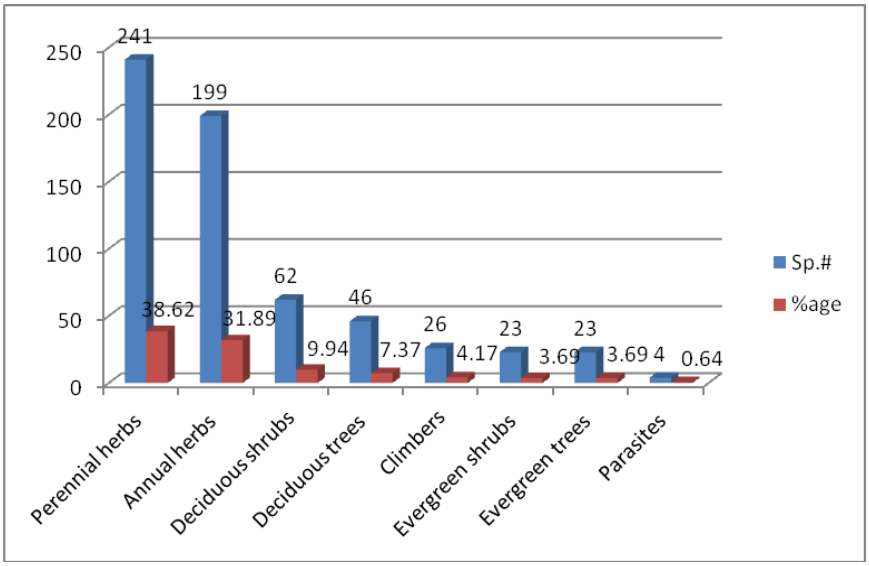

Figure 5. *Life form of the flora of Murree-Kotli Sattian-Kahuta National Park*

Locality-wise diversity

Murree-Kotli Sattian-Kahuta National Park (MKSNP) is located in the lateral spur of Himalayan Mountain in district Rawalpindi and contributed by three Tehsils such as Murree, Kotli Sattian and Kahuta. The detailed inventory is compiled and provided in *Appendix*. Localities-wise species diversity recorded as follows:

1. Murree hills

From the Murree hills, in all 592 vascular plants are documented (*Appendix*). This zone had the highest plant diversity compared to the rest of the localities. Besides, 74 species such as *Abies pindrow, Achillea millefolium, Aconitum laeve, Aegopodium burttii, Agrostis gigantea, Alisma plantago-aquatica, Anaphalis adnata, A. busua, A. margaritacea, Andrachne cordifolia, Anemone tetrasepala, A. vitifolia, Aquilegia pubiflora, Aralia cachemirica, Aristolochia punjabensis, Aster flaccidus, A. himalaicus, Buxus papillosa, Calanthe tricarinata, Carex schlagintweitiana, Carpesium abrotanoides, Cedrus deodara, Cephalanthera longifolia, Cornus macrophulla, C. oblonga, Corydalis murreeana, Daphne papyracea, Dryopteris stewartii, Elaeagnus angustifolia, Eleocharis uniglumis, Epipactis gigantea, E. helleborine, E. persica, Equisetum hyemale, Eryngium caeruleum, Gentiana argentea, G. olivieri, Habenaria furcifera, Heracleum cachemiricum, H. candicans, Hypericum dyeri, Ilex dipyrena, Impatiens bicolor, I. brachycentra, I. edgeworthii, Kyllinga squamulata, Lepidium didymium, Leucanthemum vulgare, Machilus duthiei, Malaxis muscifera, Mimosa himalayana, Myrsine semiserrata, Neolitsea pallens, Oxytropis mollis, Polystichum aculeatum, Primula denticulata, Prunella vulgaris, Quercus dilatata, Reinwardtia indica, Rhododendron arboretum, Sarcococca saligna, Solena amplexicaulis, Spiraea*

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canescens, Spiranthes sinensis, Swertia ciliata, S. cordata, S. paniculata, S. tetragona, Trifolium pretense, Tulipa clusiana, Valeriana hardwickii, Viburnum cotinifolium, V. grandiflorum and *V. mullaha* reported as distinct and unique species only recorded from this locality.

2. Kotli Sattian

This is the second most diverse locality containing 533 vascular plants (*Appendix*). Fifteen plant species were found unique to this locality which include *Cheilanthes argentea, Crotalaria prostrata, C. retusa, Eranthemum pulchellum, Hylodesmum podocarpum, Hypodematium crenatum, Pupalia lappacea, Rhynchosia capitata, R. himalensis, Scandix pecten-veneris, Scurrula pulverulenta, Trianthema portulacastrum, Uraria picta, Vincetoxicum canescens* and *V. hirundinaria*.

3. Kahuta

This locality is found mostly in low to medium elevation and found least diverse in terms of the flora. There are only 433 plant species documented from this area (*Appendix*). With reference to unique flora, 17 species are recorded as an indicator species such as *Alysicarpus bupleurifolius, A. monilifer, A. ovalifolius, A. rugosus, Atylosia mollis, A. platycarpa, A. scarabaeoides, Crotalaria calycina, Curculigo orchioides, Dregea volubilis, Hydrilla verticillata, Kydia calycina, Potamogeton perfoliatus, Pueraria tuberosa, Tephrosia strigosa, Veronica anagallis-aquatica* and *Viola pilosa*.

Discussion

The present study investigated the flora of Murree-Kotli Sattian-Kahuta National Park (MKSNP) and documented 624 vascular plants distributed across 361 genera and 106 families (*Appendix*). This work serves as checklist of the species and such kind of research is the main source for the botanical information which may serve as a benchmark for more detailed study (Kent, 2011; Reddy et al., 2011). Besides, it provides baseline for further taxonomic, ecological, ethnobotanical, conservation and forest management projects (Khan et al., 2015). The park area geographically represents only 0.12% of the land area of the country but harbors rich floristic diversity (10.79%) (*Table 3*) which can be attributed to diverse microhabitat variations because of considerable variation in elevation, topographic, edaphic factors and indeed anthropogenic effect had a major influence in controlling the vegetation (Gunatilleke and Gunatilleke, 1985). With reference to the families contribution, Poaceae was recorded as the largest family by contributing 80 species, followed by Fabaceae (60 spp.), Asteraceae (55 spp.), Cyperaceae (30 spp.) and Lamiaceae (27 spp.) as shown in *Figure 3*. Some of the studies such as Qureshi (2008a,b), Qureshi et al. (2011a, b, 2014), Shaheen et al. (2014a), Wariss et al. (2014), Ilyas et al. (2018) and Khan et al. (2018) had reported domination of Poaceae that may be indicator of subtropical forest vegetation and degradation of forest habitats.

Amongst the life forms, the flora was dominated by perennial to annual herbs in the whole project area (*Fig. 4*). This kind of assemblage of herbs is indicating a typical tropical to subtropical plant life in the park area revealing a response to the climate coupled with availability of plentiful moisture in the form of rainfall (Qureshi, 2008b,

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2009; Qureshi et al., 2014; Wasim et al., 2019). The inhabitation of herbal coverage from lower to upper elevation has been reported from other temperate regions of Himalaya (Ren et al., 2006; Zhang et al., 2009; Khan, 2012; Ilyas, 2015; Ilyas et al., 2015). With respect to woody vegetation, shrubs were more dominated in the area that is in agreement of other studies from Himalaya regions (Gairola et al., 2010; Qureshi et al., 2011a b, 2014; Chawla et al., 2012).

The flora of this park area is very rapidly deteriorating due to manmade activity. The people of the area are intentionally removing shrubs and providing opportunity for grasses and other herbs to flourish which they collect as winter fodder. Similar trend has been observed from other regions of Himalaya (Consiglio et al., 2006; Irwin and Narasimhan, 2011; Ilyas et al., 2012, 2013, 2015).

The floristic list of the study area might provide a little insight in understanding the ecosystem dynamics, along with physiological and reproductive aspect of vegetation. The floristic list of the study area could be the potential source for ethno-pharmacological studies, because many of the plant species reported in this study are medicinal one (Saqib et al., 2014). The floristic list of the study area could be the potential source for ethno-pharmacological studies (Ilys et al., 2013; Saqib et al., 2014). The park area is comprised on three localities (viz., Murree Kotli Sattian and Kahuta) and their comparison revealed that maximum similarity between Murree and Kotli Sattian is because adjacency and similar climatic condition (*Table 3*). Similarly, the other pair viz., Kotli Sattian and Kahuta was also closely located towards southwest and had similar floristic elements. Contrary, Murree and Kahuta were farther from one another and had variation in climatic conditions that resulted in least similarity in vegetation composition.

Conclusion

This is a comprehensive study not previously reported on the flora of Murree-Kotli Sattian-Kahuta National Park. It reflected the detail of their biology and plant life of the area. The detail of richness, diversity and similarity between various habitat types/localities are also discussed and highlighted. Locality-wise unique, rare and endemic species are highlighted in order to give insight for the rehabilitation and conservation efforts by the park manager for their sustainable use and availability for future generation. Therefore, this study serves as a platform for the detailed floristic and ecological studies to be carried out by the researchers. This study will be helpful for foresters/managers, plant biologist and ecologist for further detailed work. On the other hand, this ecosystem is under continuous and ever increasing human pressure in the form of deforestation, overgrazing and human settlement construction, which resulted in sever degradation the natural vegetation of the study area. Efforts are required to rehabilitate of certain eroded area and protection of key habitat indicator species.

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APPENDIX

The floristic checklist of Murree-Kotli Sattian-Kahuta National Park Pakistan

Group/family	Sr#		Habit	Status	Murree	K. Sattian	Kahuta
Pteridophytes							
1. Adiantaceae	1	*Adiantum capillus-veneris* L. (WA-251)	PH	Native	√	√	√
	2	*A. caudatum* L. (WA-95)	PH	Native	√	√	√
	3	*A. incisum* Forssk. (WA-252)	PH	Native	√	√	√
	4	*A. venustum* D. Don. (WA-253)	PH	Native	√	√	√
	5	*Onychium contiguum* Wall. ex C. Hope (WA-96)	PH	Native	√	√	—
2. Aspleniaceae	6	*Asplenium adiantum-nigrum* L. (WA-254)	PH	Native	√	√	—
	7	*A. trichomanes* L. (WA-256)	PH	Native	√	√	√
	8	*A. dalhousiae* Hook. (WA-255)	PH	Native	√	√	—
3. Dennstaedtiaceae	9	*Pteridium aquilinum* (L.) Kuhn (WA-381)	PH	Native	√	√	√
4. Dryopteridaceae	10	*Dryopteris filix-mas* (L.) Schott (WA-382)	PH	Native	√	√	—
	11	*D. ramosa* (C. Hope) C. Chr. (WA-241)	PH	Native	√	√	—
	12	*D. stewartii* Fraser-Jenk. (WA-190)	PH	Native	√	—	—
	13	*Polystichum aculeatum* (L.) Roth ex Mert. (WA-383)	PH	Native	√	—	—
5. Equisetaceae	14	*Equisetum arvense* L. (WA-615)	PH	Native	√	√	√

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Group/family	Sr#		Habit	Status	Murree	K. Sattian	Kahuta
	15	*E. hyemale* L. (WA-224)	PH	Native	√	—	—
	16	*E. ramosissimum* (Desf.) (WA-384)	PH	Native	√	√	√
	17	*Hippochaete debilis* (Roxb. ex Vaucher) Ching (WA-385)	PH	Native	√	√	√
6. Pteridaceae	18	*Allantodia squamigera* (Mett.) Ching (WA-586)	PH	Native	√	√	√
	19	*Cheilanthes argentea* (S.G. Gmel.) Kunze (WA-387)	PH	Native	—	√	√
	20	*Cheilanthes farinosa* (Forssk.) Kaulf. (WA-585)	PH	Native	√	√	√
	21	*Coniogramme rosthornii* Hieron. (WA-386)	PH	Native	√	√	—
	22	*Pteris cretica* L. (WA-189)	PH	Native	√	√	√
	23	*P. vittata* L. (WA-257)	PH	Native	√	√	√
7. Hypodematiaceae	24	*Hypodematium crenatum* (Forssk.) Kuhn (WA-591)	PH	Native	—	√	—
Gymnosperms							
8. Pinaceae	25	*Abies pindrow* (Royle ex D.Don) Royle (WA-258)	ET	Native	√	—	—
	26	*Cedrus deodara* (Roxb. ex D. Don) G. Don (WA-172)	ET	Native	√	—	—
	27	*Pinus roxburghii* Sarg. (WA-203)	ET	Native	√	√	√
	28	*P. wallichiana* A.B. Jacks. (WA-99)	ET	Native	√	√	√
Monocotyledons							
9. Alismataceae	29	*Alisma plantago-aquatica* L. (WA-617)	PH	Native	√	—	—
10. Amaryllidaceae	30	*Allium cepa* L. (WA-225)	PH	Cultivated	√	√	√
	31	*A. sativum* L. (WA-100)	AH	Cultivated	√	√	√
11. Araceae	32	*Aralia cachemirica* Decne. (WA-388)	PH	Native	√	—	—
	33	*Arisaema flavum* (Forssk.) Schott (WA-259)	PH	Native	√	√	—
	34	*A. jacquemontii* Blume (WA-97)	PH	Native	√	√	—
	35	*Sauromatum venosum* (Dryand. ex Aiton) Kunth (WA-226)	PH	Native	√	√	√
12. Asparagaceae	36	*Agave americana* L. (WA-227)	PH	Cultivated	√	√	√
	37	*Asparagus adscenden* Roxb. (WA-378)	PH	Native	√	√	—
	38	*A. capitatus* Baker (WA-379)	PH	Native	√	√	√
	39	*A. filicinus* Buch.-Ham. ex D.Don (WA-380)	PH	Native	√	√	√
	40	*A. racemosus* Willd. (WA-98)	PH	Native	√	√	—
	41	*Ophiopogon intermedius* D. Don (WA-377)	PH	Native	√	√	—
13. Commelinaceae	42	*Commelina paludosa* Blume (WA-103)	PH	Native	√	√	√
14. Convallariaceae	43	*Polygonatum verticillatum* (L.) All. (WA-260)	PH	Native	√	√	—
	44	*P. multiflorum* (L.) All. (WA-261)	PH	Native	√	√	—
15. Cyperaceae	45	*Bolboschoenus maritimus* subsp. affinis (Roth) T. Koyama (WA-101)	PH	Native	√	√	√
	46	*Carex canescens* L. (WA-182)	PH	Native	√	√	√
	47	*C. cardiolepis* Nees (WA-262)	PH	Native	√	√	√
	48	*C. cuprina* (Sándor ex Heuff.) Nendtv. ex A.Kern. (WA-609)	PH	Native	√	√	√
	49	*C. fedia* Nees (WA-183)	PH	Native	√	√	—
	50	*C. filicina* Nees (WA-104)	PH	Native	√	√	—
	51	*C. hebecarpa* C.A. Mey. (WA-181)	PH	Native	√	√	—
	52	*C. schlagintweitiana* Boeck. (WA-180)	PH	Native	√	—	—
	53	*C. foliosa* D. Don (WA-263)	PH	Native	√	√	√
	54	*C. psychrophila* Nees (WA-264)	PH	Native	√	√	√
	62	*C. alopecuroides* Rottb. (WA-391)	PH	Native	√	√	√
	55	*Cyperus compressus* L. (WA-102)	AH	Native	√	√	√
	56	*C. difformis* L. (WA-376)	AH	Native	√	√	√
	57	*C. iria* L. (WA-265)	AH	Weed	√	√	—
	58	*C. laevigatus* L. (WA-375)	PH	Native	√	√	—

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	59	*C. niveus* Retz. (WA-389)	PH	Native	√	√	√
	60	*C. rotundus* L. (WA-431)	PH	Weed	√	√	√
	61	*C. squarrosus* L. (WA-390)	AH	Native	√	√	√
	63	*Eleocharis uniglumis* (Link) Schult. (WA-432)	PH	Native	√	—	—
	64	*Eriophorum comosum* (Wall.) Nees (WA-392)	PH	Native	√	√	—
	65	*Fimbristylis dichotoma* (L.) Vahl (WA-266)	PH	Native	√	√	√
	66	*F. rigidula* Nees (WA-267)	PH	Native	√	√	√
	67	*F. schoenoides* (Retz.) Vahl (WA-393)	PH	Native	√	√	√
	68	*F. squarrosa* Vahl (WA-607)	AH	Native	√	√	√
	69	*Kobresia laxa* Nees (WA-599)	PH	Native	√	√	—
	70	*Kobresia sanguinea* (Boott) Raymond (WA-370)	PH	Native	√	√	√
	71	*Kyllinga squamulata* Vahl (WA-371)	PH	Native	√	—	—
	72	*Pycreus pumilus* (L.) Nees (WA-374)	AH	Native	√	√	—
	73	*P. flavidus* (Retz.) T. Koyama (WA-373)	AH	Native	√	√	√
	74	*Schoenoplectus litoralis* (Schrad.) Palla (WA-372)	PH	Native	√	√	—
16. Hypoxidaceae	75	*Curculigo orchioides* Gaertn. (WA-229)	PH	Native	—	—	√
17. Hydrocharitaceae	76	*Hydrilla verticillata* (L.f.) Royle (WA-228)	PH	Native	—	—	√
18. Juncaceae	77	*Juncus articulatus* L. (WA-394)	PH	Native	√	√	—
	78	*J. inflexus* L. (WA-268)	PH	Native	√	√	—
	79	*J. maritimus* Lam. (WA-608)	PH	Native	√	√	—
19. Liliaceae	80	*Tulipa clusiana* DC. (WA-230)	PH	Native	√	—	—
20. Orchidaceae	81	*Calanthe tricarinata* Lindl. (WA-604)	PH	Native	√	—	—
	82	*Cephalanthera longifolia* (L.) Fritsch (WA-395)	PH	Native	√	—	—
	83	*Epipactis gigantea* Douglas ex Hook.	PH	Native	√	—	—
	84	*E. helleborine* (L.) Crantz (WA-270)	PH	Native	√	—	—
	85	*E. persica* (Soó) Hausskn. ex Nannf. (WA-272)	PH	Native	√	—	—
	86	*Habenaria furcifera* Lindl. (WA-587)	PH	Native	√	—	—
	87	*Malaxis muscifera* (Lindl.) Kuntze (WA-588)	PH	Native	√	—	—
	88	*Spiranthes sinensis* (Pers.) Ames (WA-271)	PH	Native	√	—	—
21. Poaceae	89	*Agrostis gigantea* Roth (WA-396)	PH	Native	√	—	—
	90	*A. stolonifera* L. (WA-398)	PH	Native	√	√	√
	91	*Apluda mutica* L. (WA-397)	PH	Native	√	√	√
	92	*Aristida cyanantha* Steud. (WA-231)	PH	Native	√	√	√
	93	*Arthraxon lancifolius* (Trin.) Hochst. (WA-369)	PH	Native	√	√	√
	94	*A. prionodes* (Steud.) Dandy (WA-367)	PH	Native	√	√	√
	95	*Arundinella nepalensis* Trin. (WA-368)	PH	Native	√	√	√
	96	*Arundo donax* L. (WA-453)	PH	Naturalized	√	√	√
	97	*Avena fatua* L. (WA-364)	PH	Weed	√	√	√
	98	*Bothriochloa bladhii* (Retz.) S.T. Blake (WA-365)	PH	Native	√	√	√
	99	*Brachiaria eruciformis* (Sm.) Griseb. (WA-366)	AH	Native	√	√	√
	100	*B. ramosa* (L.) Stapf (WA-597)	AH	Native	√	√	√
	101	*B. reptans* (L.) C.A. Gardner & C.E. Hubb. (WA-200)	AH	Weed	√	√	√
	102	*Bromus hordeaceus* L. (WA-399)	PH	Native	√	√	√
	103	*B. pectinatus* Thunb. (WA-361)	AH	Native	√	√	√
	104	*B. catharticus* Vahl (WA-362)	PH	Naturalized	√	√	√
	105	*B. ramosus* Huds. (WA-363)	PH	Native	√	√	√
	106	*Brachypodium sylvaticum* (Huds.) P. Beauv. (WA-598)	AH	Native	√	√	—
	107	*Capillipedium parviflorum* (R.Br.) Stapf (WA-400)	PH	Native	√	√	—
	108	*Cenchrus ciliaris* L. (WA-133)	PH	Native	√	√	√
	109	*C. pennisetiformis* Steud. (WA-356)	PH	Native	√	√	√
	110	*C. setiger* Vahl (WA-357)	PH	Native	√	√	√

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Group/family	Sr#		Habit	Status	Murree	K. Sattian	Kahuta
	111	*Chrysopogon aucheri* (Boiss.) Stapf. (WA-354)	PH	Native	√	√	√
	112	*C. serrulatus* Trin. (WA-355)	PH	Native	√	√	√
	113	*C. gryllus* (L.) Trin. (WA-401)	PH	Native	√	√	√
	114	*Cymbopogon martini* (Roxb.) Will. Watson (WA-433)	PH	Native	√	√	√
	115	*Cynodon dactylon* (Linn.) Pers. (WA-353)	PH	Native	√	√	√
	116	*Dactylis glomerata* L. (WA-434)	PH	Native	√	√	√
	117	*Dactyloctenium aegyptium* (L.) Willd. (WA-402)	PH	Weed	√	√	√
	118	*Desmostachya bipinnata* (L.) Stapf (WA-360)	PH	Native	√	√	√
	119	*Dichanthium annulatum* (Forssk.) Stapf (WA-232)	PH	Native	√	√	√
	120	*D. foveolatum* (Delile) Roberty (WA-107)	PH	Native	√	√	√
	121	*Digitaria sanguinalis* (L.) Scop. (WA-352)	AH	Native	√	√	√
	122	*Echinochloa crus-galli* (L.) P. Beauv.(WA-403)	AH	Weed	√	√	√
	123	*Eragrostis curvula* (Schrad.) Nees (WA-358)	AH	Native	√	√	√
	124	*E. amabilis* (L.) Wight & Arn.(WA-350)	AH	Native	√	√	√
	125	*E. cilianensis* (All.) Janch. (WA-596)	AH	Native	√	√	√
	126	*E. minor* Host. (WA-359)	AH	Native	√	√	√
	127	*E. papposa* (Desf. ex Roem. & Schult.) Steud. (WA-351)	PH	Native	√	√	√
	128	*E. pilosa* (L.) P. Beauv. (WA-105)	AH	Native	√	√	√
	129	*Eulaliopsis binata* (Retz.) C. E. Hubb. (WA-404)	PH	Native	√	√	√
	130	*Festuca gigantea* (L.) Vill. (WA-600)	PH	Native	√	√	√
	131	*Festuca kashmiriana* Stapf (WA-610)	PH	Native	√	√	√
	132	*Heteropogon contortus* (Linn.) P. Beauv. ex Roem. & Schult. (WA-454)	PH	Native	√	√	√
	133	*Imperata cylindrica* (L.) Raeuschel (WA-405)	PH	Native	√	√	√
	134	*Lolium perenne* L. (WA-187)	PH	Native	√	√	√
	135	*L. persicum* Boiss. & Hohen. (WA-108)	AH	Native	√	√	√
	136	*L. temulentum* L. (WA-188)	AH	Weed	√	√	√
	137	*Oplismenus compositus* (L.) P. Beauv. (WA-191)	PH	Native	√	√	√
	138	*Panicum antidotale* Retz (WA-595)	PH	Naturalized	√	√	√
	139	*Paspalidium flavidum* (Retz.) A. Camus (WA-427)	PH	Naturalized	√	√	√
	140	*Paspalum dilatatum* Poir. (WA-457)	PH	Naturalized	√	√	√
	141	*P. distichum* L. (WA-544)	PH	Native	√	√	√
	142	*Pennisetum glaucum* (L.) R. Br. (WA-455)	AH	Cultivated	√	√	√
	143	*P. orientale* Rich. (WA-503)	PH	Native	√	√	√
	144	*Phalaris minor* Retz. (WA-106)	AH	Native	√	√	√
	145	*Piptatherum aequiglume* (Duthie ex Hook. f.) Roshev. (WA-406)	PH	Native	√	√	√
	146	*P. hilariae* Pazij (WA-435)	PH	Native	√	√	√
	147	*P. gracile* Mez (WA-602)	PH	Native	√	√	√
	148	*Poa alpina* L. (WA-273)	PH	Native	√	√	√
	149	*P. annua* L. (WA-274)	AH	Weed	√	√	√
	150	*P. nemoralis* L. (WA-603)	PH	Native	√	√	√
	151	*P. polycolea* Stapf (WA-533)	PH	Native	√	√	√
	152	*P. pratensis* L. (WA-533)	PH	Native	√	√	√
	153	*P. infirma* Kunth (WA-275)	AH	Weed	√	√	√
	154	*Polypogon fugax* Nees ex Steud. (WA-436)	AH	Weed	√	√	√
	155	*P. monspeliensis* (Linn.) Desf. (WA-408)	AH	Weed	√	√	√
	156	*P. viridis* (Gouan) Breistr. (WA-601)	PH	Native	√	√	√
	157	*Rostraria cristata* (L.) Tzvelev (WA-545)	AH	Weed	√	√	√
	158	*Saccharum bengalense* Retz. (WA-409)	PH	Native	√	√	√
	159	*S. ravennae* (L.) L. (WA-411)	PH	Native	√	√	√

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	160	*S. spontaneum* L. (WA-527)	PH	Native	√	√	√
	161	*Setaria pumila* (Poir.) Roem. & Schult. (WA-276)	AH	Weed	√	√	√
	162	*S. verticillata* (L.) P. Beauv. (WA-412)	AH	Invasive	√	√	√
	163	*S. viridis* (L.) P. Beauv. (WA-234)	AH	Weed	√	√	√
	164	*Sorghum bicolo*r (Linn.) Moench. (WA-413)	AH	Cultivated	√	√	√
	165	*S. halepense* (L.) Pers.(WA-235)	PH	Native	√	√	√
	166	*Tetrapogon villosus* Desf. (WA-414)	PH	Native	√	√	√
	167	*Themeda anathera* (Nees ex Steud.) Hack. (WA-201)	PH	Native	√	√	√
	168	Zea mays L. (WA-277)	AH	Cultivated	√	√	√
22. Potamogetonaceae	169	*Potamogeton perfoliatus* L. (WA-592)	PH	Native	—	—	√
23. Smilacaceae	170	*Smilax aspera* L. (WA-111)	C	Native	√	√	—
	171	*S. glaucophylla* Klotzsch (WA-112)	C	Native	√	√	—
24. Xanthorrhoeaceae	172	*Asphodelus tenuifolius* Cav. (WA-543)	AH	Native	√	√	√
Dicotyledons							
25. Acanthaceae	173	*Barleria cristata* L. (WA-236)	DS	Native	√	√	√
	174	*B. acanthoides* Vahl. (WA-109)	DS	Native	√	√	√
	175	*Dicliptera bupleuroides* Nees (WA-415)	PH	Native	√	√	√
	176	*Eranthemum pulchellum* Andrews (WA-605)	ES	Native	—	√	—
	177	*Justicia adhatoda* L. (WA-237)	ES	Native	√	√	√
	178	*J. japonica* Thunb. (WA-349)	ES	Weed	√	√	√
	179	*J. quinqueangularis* K. D. Koenig ex Roxb. (WA-346)	PH	Native	√	√	√
	180	*Strobilanthes dalhousieanus* (Nees) C. B. Clarke (WA-177)	DS	Native	√	√	—
	181	*S. urticifolia* Wall. ex Kuntze (WA-110)	DS	Native	√	√	—
	182	*S. glutinosa* J. Graham (WA-345)	DS	Native	√	√	—
26. Adoxaceae	183	*Viburnum cotinifolium* D. Don (WA-205)	ES	Native	√	—	—
	184	*V. grandiflorum* Wall. ex DC. (WA-278)	ES	Native	√	—	—
	185	*V. mullaha* Buch.-Ham. ex D. Don (WA-344)	ES	Native	√	—	—
27. Aizoaceae	186	*Trianthema portulacastrum* L. (WA-343)	AH	Weed	—	√	√
28. Amaranthaceae	187	*Achyranthes aspera* L. (WA-114)	PH	Weed	√	√	√
	188	*A. bidentata* Blume (WA-238)	PH	Weed	√	√	√
	189	*Aerva javanica* (Burm. f.) Juss. ex Schult. (WA-115)	PH	Native	√	√	√
	190	*Alternanthera pungens* Kunth (WA-341)	PH	Naturalized	√	√	√
	191	*Amaranthus spinosus* L. (WA-340)	AH	Native	√	√	√
	192	*A. viridis* L. (WA-437)	AH	Native	√	√	√
	193	*Chenopodium album* L. (WA-314)	AH	Native	√	√	√
	194	*Digera muricata* (L.) Mart. (WA-342)	AH	Weed	√	√	√
	195	*Dysphania ambrosioides* (L.) Mosyakin & Clemants (WA-546)	AH	Naturalized	√	√	—
	196	*Pupalia lappacea* (L.) Juss. (WA-542)	PH	Weed	—	√	√
29. Anacardiaceae	197	*Cotinus coggygria* Scop. (WA-279)	DS	Native	√	√	—
	198	*Lannea coromandelica* (Houtt.) Merr. (WA-339)	DS	Native	√	√	√
	199	*Pistacia chinensis* Bunge (WA-239)	DT	Native	√	√	√
	200	*Pistacia integerrima* J. L. Stewart ex Brandis (WA-240)	DT	Native	√	√	√
30. Apiaceae	201	*Aegopodium burttii* Nasir (WA-416)	PH	Native	√	—	—
	202	*Bupleurum marginatum* Wall. ex DC. (WA-418)	PH	Native	√	√	√
	203	*Carissa opaca* Stapf ex. Haines (WA-199)	ES	Native	√	√	√
	204	*Centella asiatica* (L.) Urb. (WA-336)	PH	Native	√	√	—
	205	*Coriandrum sativum* L. (WA-505)	AH	Cultivated	√	√	√
	206	*Eryngium caeruleum* M. Bieb. (WA-299)	AH	Native	√	—	—

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	207	*Foeniculum vulgare* Miller. (WA-337)	PH	Cultivated	√	√	√
	208	*Heracleum. cachemiricum* C. B. Clarke (WA-338)	PH	Native	√	—	—
	209	*Heracleum candicans* Wall. ex DC. (WA-280)	PH	Native	√	—	—
	210	*Psammogeton biternatum* Edgew. (WA-547)	PH	Native	√	√	√
	211	*Scandix pecten-veneris* L. (WA-223)	AH	Weed	—	√	√
	212	*Torilis japonica* (Houtt.) DC. (WA-623)	AH	Weed	√	√	—
31. Apocynaceae	213	*Dregea volubilis* (L. f.) Benth. ex Hook. f. (WA-119)	C	Native	—	—	√
	214	*Nerium oleander* L. (WA-335)	ES	Native	√	√	√
	215	*Tylophora hirsuta* Wight (WA-594)	C	Native	√	√	√
32. Aquifoliaceae	216	*Ilex dipyrena* Wall. (WA-117)	ET	Native	√	—	—
33. Araliaceae	217	*Hedera nepallensis* K. Koch (WA-116)	C	Native	√	√	√
34. Aristolochiaceae	218	*Aristolochia punjabensis* Lace (WA-532)	C	Native	√	—	—
35. Asclepiadaceae	219	*Calotropis procera* (Aiton) Dryand. (WA-333)	ES	Native	√	√	√
	220	*Periploca aphylla* Decne. (WA-334)	ES	Native	√	√	√
	221	*Vincetoxicum canescens* (Willd.) Decne. (WA-118)	PH	Native	—	√	√
	222	*V. hirundinaria* Medik. (WA-565)	PH	Native	—	√	√
36. Asteraceae	223	*Achillea millefolium* L. (WA-523)	PH	Native	√	—	—
	224	*Adenostemma lavenia* (L.) Kuntze (WA-573)	AH	Native	√	√	√
	225	*Ageratum conyzoides* (L.) L. (WA-550)	AH	Native	√	√	√
	226	*Ainsliaea latifolia* (D. Don) Sch. Bip. (WA-548)	PH	Native	√	√	—
	227	*Anaphalis adnata* DC. (WA-120)	AH	Native	√	—	—
	228	*A. busua* (Buch.-Ham.) DC. (WA-570)	AH	Native	√	—	—
	229	*A. margaritacea* (L.) Benth. & Hook. f. (WA-281)	AH	Native	√	—	—
	230	*Artemisia dubia* Wall. ex Besser (WA-529)	AH	Native	√	√	—
	231	*A. scoparia* Waldst. & Kitam. (WA-551)	DS	Native	√	√	√
	232	*A. vulgaris* L. (WA-552)	PH	Native	√	√	√
	233	*Aster flaccidus* Bunge (WA-124)	PH	Native	√	—	—
	234	*A. aitchisonii* Boiss. (WA-282)	PH	Native	√	√	√
	235	*A. himalaicus* C. B. Clarke (WA-549)	PH	Native	√	—	—
	236	*Bidens biternata* (Lour.) Merr. & Sherff (WA-298)	AH	Native	√	√	√
	237	*Calendula officinalis* L. (WA-553)	AH	Native	√	√	—
	238	*Carpesium abrotanoides* L. (WA-530)	AH	Native	√	—	—
	239	*C. cernuum* L.(WA-572)	AH	Weed	√	√	√
	240	*Carthamus oxycantha* M. Bieb (WA-554)	AH	Weed	√	√	√
	241	*Cichorium intybus* L. (WA-614)	PH	Weed	√	√	√
	242	*Cirsium arvense* (L.) Scope. (WA-555)	PH	Native	√	√	√
	243	*Conium maculatum* L. (WA-606)	PH	Native	√	√	√
	244	*Conyza canadensis* (L.) Cronq. (WA-122)	AH	Native	√	√	√
	245	*Cousinia thomsonii* C. B. Clarke (WA-283)	PH	Native	√	√	—
	246	*Crepis multicaulis* Ledeb. (WA-534)	PH	Native	√	√	—
	247	*Eclipta prostrata* (L.) L. (WA-439)	AH	Native	√	√	√
	248	*Erigeron canadensis* L. (WA-556)	AH	Native	√	√	√
	249	*E. multiradiatus* (Lindl. ex DC.) Benth. ex C. B. Clarke (WA-536)	PH	Native	√	√	√
	250	*E. aegyptiacus* L. (WA-123)	AH	Native	√	√	√
	251	*E. bonariensis* L. (WA-440)	AH	Native	√	√	√
	252	*E. trilobus* (Decne.) Boiss. (WA-125)	AH	Native	√	√	√
	253	*Gerbera gossypina* (Royle) Beauverd (WA-284)	PH	Native	√	√	—
	254	*Inula cappa* (Buch.-Ham. ex D. Don) DC. (WA-575)	DS	Native	√	√	—
	255	*Lactuca serriola* L. (WA-577)	AH	Native	√	√	√

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	256	*L. brunoniana* (DC.) Wall. ex C.B. Clarke (WA-178)	AH	Native	√	√	√
	257	*L. dissecta* D. Don (WA-285)	PH	Native	√	√	√
	258	*L. secunda* (C. B. Clarke) Hook. f. (WA-426)	PH	Native	√	√	—
	259	*Launaea procumbens* (Roxb.) Ram. & Rajgo. (WA-574)	PH	Native	√	√	√
	260	*Leucanthemum vulgare* (Vaill.) Lam (WA-580)	PH	Native	√	—	—
	261	*Myriactis nepalensis* Less. (WA-287)	PH	Native	√	√	√
	262	*M. wightii* DC. (WA-286)	AH	Native	√	√	√
	263	*Parthenium hysterophorus* L. (WA-537)	AH	Invasive	√	√	√
	264	*Saussurea heteromalla* (D. Don) Hand.-Mazz. (WA-441)	AH	Invasive	√	√	√
	265	*S. atkinsonii* C. B. Clarke (WA-417)	AH	Native	√	√	√
	266	*Senecio nudicaulis* Buch.-Ham. ex D. Don (WA-578)	AH	Native	√	√	—
	267	*Siegesbeckia orientalis* L. (WA-442)	AH	Native	√	√	—
	268	*Silybum marianum* (L.) Gaertin (WA-443)	PH	Native	√	√	√
	269	*Sonchus arvensis* L. (WA-526)	AH	Native	√	√	√
	270	*S. asper* (L.) Hill (WA-571)	AH	Native	√	√	√
	271	*S. oleraceus* L. (WA-569)	AH	Native	√	√	√
	272	*Tagetes minuta* L. (WA-425)	AH	Invasive	√	√	√
	273	*Taraxacum campylodes* G. E. Haglund	PH	Native	√	√	√
	274	*T. wallichii* DC. (WA-70)	PH	Native	√	√	√
	275	*Tridax procumbens* (L.) L. (WA-242)	PH	Native	√	√	√
	276	*Xanthium strumarium* L. (WA-581)	AH	Native	√	√	√
	277	*Youngia japonica* (L.) DC. (WA-583)	AH	Native	√	√	√
37. Balsaminaceae	278	*Impatiens* bicolor Royle (WA-290)	AH	Native	√	—	—
	279	*I. brachycentra* Kar. & Kir (WA-288)	AH	Native	√	—	—
	280	*I. edgeworthii* Hook. f. (WA-289)	AH	Native	√	—	—
	281	*Sinopodophyllum hexandrum* (Royle) T.S. Ying (WA-144)	PH	Native	√	√	—
38. Berberidaceae	282	*Berberis lycium* Royle. (WA-174)	DS	Native	√	√	√
	283	*B. parkeriana* C. K. Schneid. (WA-291)	DS	Native	√	√	—
39. Boraginaceae	284	*Buglossoides tenuiflora* (L. f.) I. M. Johnst. (WA-291)	AH	Native	√	√	√
	285	*Cynoglossum glochidiatum* Wall. ex Benth. (WA-444)	AH	Native	√	√	√
	286	*C. lanceolatum* Forssk. (WA-445)	AH	Native	√	√	√
	287	*Ehretia acuminata* R. Br. (WA-563)	DT	Native	√	√	√
	288	*E. obtusifolia* Hochst. ex A. DC. (WA-528)	DS	Native	√	√	√
	289	*Heliotropium strigosum* Willd. (WA-566)	AH	Native	√	√	√
	290	*H. crispum* Desf. (WA-447)	AH	Native	√	√	√
	291	*H. europaeum* L. (WA-524)	AH	Native	√	√	√
	292	*Trichodesma indicum* (L.) Lehm. (WA-446)	PH	Native	√	√	√
40. Brassicaceae	293	*Alliaria petiolata* (M.Bieb.) Cavara & Grande (WA-510)	AH	Native	√	√	√
	294	*Arabis amplexicaulis* Edgew. (WA-557)	PH	Native	√	√	√
	295	*A. nova* Vill. (WA-616)	AH	Native	√	√	√
	296	*Brassica napus* L. (WA-522)	AH	Cultivated	√	√	√
	297	*Capsella bursa-pastoris* (L.) Medik (WA-576)	AH	Weed	√	√	√
	298	*Cardamine impatiens* L. (WA-562)	AH	Weed	√	√	√
	299	*Crucihimalaya himalaica* (Edgew.) Al-Shehbaz, O'Kane & R. A. Price (WA-521)	AH	Native	√	√	√
	300	*Lepidium sativum* L. (WA-448)	AH	Cultivated	√	√	√
	301	*L. didymum* L. (WA-558)	AH	Native	√	—	—

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	302	*Nasturtium officinale* R. Br. (WA-559)	PH	Native	√	√	√
	303	*Raphanus sativus* L. (WA-568)	AH	Cultivated	√	√	√
	304	*Sisymbrium irio* L. (WA-449)	AH	Native	√	√	√
41. Buxaceae	305	*Buxus papillosa* C.K. Schneid. (WA-564)	ES	Endemic to the Pakistan	√	—	—
	306	*Sarcococca saligna* (D. Don) Muell.-Arg. (WA-292)	ES	Native	√	—	—
42. Cactaceae	307	*Opuntia monacantha* (Willd.) Haw. (WA-561)	ES	Native	√	√	√
43. Campanulaceae	308	*Campanula pallida* Wall (WA-438)	AH	Native	√	√	√
44. Cannabaceae	309	*Cannabis sativa* L. (WA-331)	AH	Native	√	√	√
45. Caprifoliaceae	310	*Lonicera hispida* Pall. ex Schult. (WA-612)	ES	Native	√	√	—
	311	*L. myrtillus* Hook. f. & Thomson (WA-560)	ES	Native	√	√	—
	312	*L. quinquelocularis* Hard. (WA-206)	DS	Native	√	√	—
	313	*L. webbiana* Wall. ex DC. (WA-520)	DS	Native	√	√	—
46. Caryophyllaceae	314	*Cerastium glomeratum* Thuill. (WA-567)	AH	Native	√	√	√
	315	*Silene conoidea* L. (WA-525)	AH	Weed	√	√	√
	316	*Stellaria media* (L.) Vill. (WA-579)	PH	Weed	√	√	√
	317	*Vaccaria hispanica* (Mill.) Rauschert (WA-471)	AH	Native	√	√	√
47. Celastraceae	318	*Cassine glauca* (Rottb.) Kuntze (WA-519)	DT	Native	√	√	√
	319	*Euonymus fimbriatus* Wall. (WA-10)	DT	Native	√	√	√
	320	*E. hamiltonianus* Wall. (WA-330)	DS	Native	√	√	√
	321	*Maytenus royleanus* (Wall. ex Lawson) Cufodontis (WA-329)	ES	Native	√	√	√
48. Convolvulaceae	322	*Convolvulus arvensis* L. (WA-500)	C	Native	√	√	√
	323	*C. prostratus* Forssk. (WA-499)	C	Native	√	√	√
	324	*Cuscuta. reflexa* Roxb. (WA-94)	P	Native	√	√	√
	325	*C. gigantea* Griff. (WA-328)	P	Native	√	√	—
	326	*Evolvulus alsinoides* (L.) L. (WA-327)	AH	Native	√	√	√
	327	*Ipomoea carnea* Jacq. (WA-293)	C	Native	√	√	√
	328	*I. eriocarpa* R. Br. (WA-496)	C	Native	√	√	√
	329	*I. hederacea* (L.) Jacq. (WA-497)	C	Native	√	√	√
	330	*I. nil* (L.) Roth (WA-294)	C	Naturalized	√	√	√
	331	*I. purpurea* (L.) Roth (WA-517)	C	Native	√	√	√
49. Cornaceae	332	*Cornus macrophulla* Wall. (WA-295)	ET	Native	√	—	—
	333	*Cornus oblonga* Wall (WA-265)		Native	√	—	—
50. Cucurbitaceae	334	*Solena amplexicaulis* (Lam.) Gandhi (WA-296)	C	Native	√	—	—
51. Dioscoreaceae	335	*Dioscorea belophylla* (Prain) Voigt ex Haines (WA-494)	C	Native	√	√	—
	336	*D. bulbifera* L. (WA-518)	C	Native	√	√	—
	337	*D. deltoidea* Wall. ex Griseb. (WA-495)	C	Native	√	√	√
52. Ebenaceae	338	*Diospyros lotus* L. (WA-493)	ET	Cultivated	√	√	—
53. Elaeagnaceae	339	*Elaeagnus angustifolia* L. (WA-489)	ET	Native	√	—	—
54. Ericaceae	340	*Rhododendron arboreum* Sm. (WA-490)	ET	Native	√	—	—
55. Euphorbiaceae	341	*Euphorbia clarkeana* Hook. f. (WA-492)	AH	Native	√	√	√
	342	*E. granulata* Forssk. (WA-540)	AH	Weed	√	√	√
	343	*E. helioscopia* L. (WA-491)	AH	Weed	√	√	√
	344	*E. heterophylla* L. (WA-620)	AH	Native	√	√	—
	345	*E. hirta* L. (WA-515)	AH	Native	√	√	√
	346	*E. indica* Lam. (WA-539)	AH	Native	√	√	√
	347	*E. prolifera* Buch.-Ham. ex D. Don (WA-621)	AH	Native	√	√	√
	348	*E. prostrata* Aiton (WA-516)	AH	Weed	√	√	√
	349	*E. royleana* Boiss (WA-618)	AH	Native	√	√	√
	350	*E. wallichii* Hook. f. (WA-619)	AH	Native	√	√	√

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	351	*Mallotus philippensis* (Lam.) Müll. Arg. (WA-210)	DS	Native	√	√	√
	352	*Ricinus communis* L. (WA-211)	ES	Native	√	√	√
56. Fabaceae	353	*Acacia catechu* (Linn. f.) Willd (WA-501)	DS	Native	√	√	√
	354	*A. modesta* Wall. (WA-197)	DS	Native	√	√	√
	355	*A. nilotica* (L.) Delile (WA-196)	DS	Native	√	√	√
	356	*Albizzia lebbeck* Benth.	DS	Native	√	√	√
	357	*Alysicarpus bupleurifolius* (L.) DC.	AH	Native	—	—	√
	358	*A. rugosus* (Willd.) DC. (WA-93)	AH	Native	—	—	√
	359	*A. monilifer* (L.) DC. (WA-218)	AH	Native	—	—	√
	360	*A. ovalifolius* (Schum.) Leonard (WA-511)	AH	Native	—	—	√
	361	*Argyrolobium roseum* (Cambess.) Jaub. & Spach (WA-512)	AH	Native	√	√	√
	362	*Astragalus leucocephalus* Bunge (WA-92)	PH	Native	√	√	—
	363	*Atylosia mollis* "Benth., p.p.A" (WA-250)	AH	Native	—	—	√
	364	*A. platycarpa* Benth. (WA-249)	AH	Native	—	—	√
	365	*A. scarabaeoides* (L.) Benth. (WA-217)	AH	Native	—	—	√
	366	*Bauhinia variegata* L. (WA-243)	DT	Native	√	√	√
	367	*Butea monosperma* (Lam.) Taub. (WA-514)	DT	Native	√	√	√
	368	*Cassia fistula* L. (WA-216)	DT	Native	√	√	√
	369	*Crotalaria prostrata* Willd. (WA-91)	PH	Native	—	√	√
	370	*C. retusa* L. (WA-213)	PH	Native	—	√	√
	371	*C. calycina* Schrank (WA-214)	PH	Native	—	—	√
	372	*C. medicaginea* Lam. (WA-215)	PH	Native	√	√	√
	373	*Dalbergia sissoo* DC. (WA-209)	DT	Cultivated	√	√	√
	374	*Desmodium elegans* DC (WA-89)	DS	Native	√	√	—
	375	*D. gangeticum* (L.) DC. (WA-297)	DS	Native	√	√	—
	376	*D. laxiflorum* DC. (WA-508)	DS	Native	√	√	—
	377	*Hylodesmum podocarpum* (DC.) H. Ohashi & R. R. Mill (WA-57)	DS	Native	—	√	—
	379	*Indegofera cordifolia* Roth (WA-219)	AH	Native	√	√	√
	380	*I. hebepetala* Baker (WA-509)	AH	Native	√	√	√
	381	*I. heterantha* Brandis (WA-506)	DS	Native	√	√	—
	378	*Indigofera linifolia* (L. f.) Retz. (WA-538)	AH	Native	√	√	√
	382	*Lathyrus aphaca* L. (WA-507)	AH	Weed	√	√	√
	383	*Lathyrus sphaericus* Retz. (WA-590)	AH	Native	√	√	√
	384	*Lespedeza juncea* (L. f.) Pers. (WA-87)	PH	Native	√	√	√
	385	*Leucaena leucocephala* (Lam.) de Wit	ET	Cultivated	√	√	√
	386	*Lotus corniculatus* L. (WA-504)	PH	Native	√	√	√
	387	*Medicago edgeworthii* Sirj. (WA-221)	AH	Native	√	√	√
	388	*M. lupulina* L. (WA-2)	AH	Native	√	√	√
	389	*M. laciniata* (L.) Mill. (WA-483)	AH	Native	√	√	√
	390	*M. orbicularis* (L.) Bartal. (WA-220)	AH	Native	√	√	√
	391	*M. polymorpha* L. (WA-481)	AH	Weed	√	√	√
	392	*M. sativa* L. (WA-482)	AH	Native	√	√	√
	393	*Melilotus indicus* (L.) All. (WA-88)	AH	Native	√	√	√
	394	*Mimosa himalayana* Gamble (WA-488)	DT	Native	√	—	—
	395	*Oxytropis mollis* Benth. (WA-313)	PH	Native	√	—	—
	396	*Pongamia pinnata* (L.) Pierre (WA-502)	ET	Native	√	√	√
	397	*Pueraria tuberosa* (Willd.) DC. (WA-479)	C	Native	—	—	√
	398	*Rhynchosia capitata* (Roth) DC. (WA-476)	C	Native	—	√	√
	399	*R. himalensis* Baker (WA-477)	C	Native	—	√	√
	400	*R. minima* (L.) DC (WA-480)	PH	Native	√	√	√
	401	*R. pseudo-cajan* Cambess (WA-486)	DS	Native	√	√	√

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	402	*Robinia pseudoacacia* L. (WA-3)	DT	Naturalized	√	√	—
	403	*Taverniera cuneifolia* (Roth) Ali (WA-487)	DT	Native	√	√	√
	404	*Tephrosia strigosa* (Dalzell) Santapau & Maheshw. (WA-584)	AH	Native	—	—	√
	405	*Trifolium dubium* Sibth. (WA-301)	PH	Introduced	√	√	—
	406	*T. repens* L. (WA-300)	PH	Native	√	√	—
	407	*T. pratense* L. (WA-478)	PH	Native	√	—	—
	408	*Trigonella emodi* Benth. (WA-171)	AH	Native	√	√	√
	409	*T. gracilis* Benth. (WA-170)	AH	Native	√	√	√
	410	*Uraria picta* (Jacq.) DC. (WA-611)	AH	Native	—	√	√
	411	*Vicia sativa* L. (WA-128)	AH	Weed	√	√	√
	412	*V. monantha* Retz. (WA-129)	AH	Native	√	√	√
57. Fagaceae	413	*Quercus dilatata* Royle (WA-126)	ET	Native	√	—	—
	414	*Q. glauca* Thunb. (WA-173)	ET	Native	√	√	—
	415	*Q. incana* Bartram (WA-86)	ET	Native	√	√	—
58. Gentianaceae	416	*Gentiana argentea* (Royle ex D. Don) Royle ex D. Don (WA-83)	AH	Native	√	—	—
	417	*G. olivieri* Griseb. (WA-302)	PH	Native	√	—	—
	418	*Swertia alata* C. B. Clarke (WA-4)	AH	Native	√	√	—
	419	*S. angustifolia* Buch.-Ham. ex D. Don (WA-131)	AH	Native	√	√	—
	420	*S. ciliata* (D. Don ex G. Don) B. L. Burtt (WA-85)	AH	Native	√	—	—
	421	*S. cordata* (Wall. ex G. Don) C. B. Clarke (WA-132)	AH	Native	√	—	—
	422	*S. paniculata* Wall. (WA-84)	AH	Native	√	—	—
	423	*S. tetragona* R.H. Miao (WA-130)	AH	Native	√	—	—
59. Geraniaceae	424	*Geranium lucidum* L. (WA-1)	AH	Native	√	√	—
	425	*G. mascatense* Boiss. (WA-138)	AH	Native	√	√	—
	426	*G. nepalense* Sweet (WA-303)	AH	Native	√	√	—
	427	*G. rotundifolium* L. (WA-137)	AH	Native	√	√	√
	428	*G. wallichianum* D. Don ex Sweet (WA-136)	AH	Native	√	√	√
60. Grossulariaceae	429	*Ribes alpestre* Wall. ex Decne. (WA-589)	DS	Native	√	√	—
61. Hamamelidaceae	430	*Parrotiopsis jacquemontiana* (Decne.) Rehder (WA-5)	DS	Native	√	√	—
62. Hypericaceae	431	*Hypericum dyeri* Rehder (WA-347)	DS	Native	√	—	—
	432	*H. oblongifolium* Choisy (WA-135)	DS	Native	√	√	—
	433	*H. perforatum* L. (WA-134)	PH	Native	√	√	—
63. Juglandaceae	434	*Juglans regia* L. (WA-169)	ET	Naturalized	√	√	—
64. Lamiaceae	435	*Ajuga bracteosa* Wall. ex Benth. (WA-165)	PH	Native	√	√	√
	436	*A. parviflora* Benth. (WA-166)	AH	Native	√	√	√
	437	*Anisomeles indica* (L.) Kuntze (WA-222)	PH	Native	√	√	√
	438	*Callicarpa macrophylla* Vahl (WA-32)	DS	Native	√	√	—
	439	*Clinopodium umbrosum* (M. Bieb.) Kuntze (WA-474)	PH	Native	√	√	√
	440	*Colebrookea oppositifolia* Sm. (WA-49)	DS	Native	√	√	√
	441	*Isodon coetsa* (Buch.-Ham. ex D. Don) Kudô (WA-473)	PH	Native	√	√	√
	442	*I. lophanthoides* (Buch.-Ham. ex D. Don) H. Hara (WA-475)	AH	Native	√	√	√
	443	*I. rugosus* (Wall. ex Benth.) Codd (WA-304)	DS	Native	√	√	√
	444	*Lamium album* L. (WA-168)	PH	Native	√	√	√
	445	*L. cephalotes* (Roth) Spreng. (WA-246)	AH	Native	√	√	√
	446	*Leucas lanata* Baker (WA-167)	PH	Native	√	√	√
	447	*L. decemdentata* (Willd.) Sm (WA-245)	PH	Native	√	√	√
	448	*L. nutans* (Roth) Spreng. (WA-50)	PH	Native	√	√	√

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	449	*Mentha longifolia* (L.) L. (WA-44)	PH	Native	√	√	√
	450	*M. royleana* Wall. ex Bth. (WA-43)	PH	Native	√	√	√
	451	*Micromeria biflora* (Buch.-Ham. ex D. Don) Benth. (WA-244)	PH	Native	√	√	√
	452	*Origanum vulgare* L. (WA-305)	PH	Native	√	√	—
	453	*Phlomoides spectabilis* (Falc. ex Benth.) Kamelin & Makhm. (WA-624)		Native	√	√	—
	454	*Prunella vulgaris* L (WA-6)	PH	Native	√	—	—
	455	*Pseudocaryopteris bicolor* (Roxb. ex Hardw.) P.D. Cantino (WA-531)	DS	Native	√	√	—
	456	*Pseudocaryopteris foetida* (D. Don) P.D. Cantino (WA-582)	DS	Native	√	√	√
	457	*Rydingia limbata* (Benth.) Scheen & V.A. Albert (WA-31)	DS	Native	√	√	√
	458	*Salvia moorcroftiana* Wall. ex Benth. (WA-26)	PH	Native	√	√	√
	459	*S. plebeia* R. Br. (WA-46)	PH	Weed	√	√	√
	460	*Teucrium quadrifarium* Buch.-Ham. (WA-622)	PH	Native	√	√	√
	461	*T. royleanum* Wall. ex Benth. (WA-40)	PH	Native	√	√	√
	462	*Vitex negundo* L. (WA-472)	DS	Native	√	√	√
65. Lauraceae	463	*Neolitsea pallens* (D. Don) Momiy. & H. Hara (WA-139)	ET	Native	√	—	—
	464	*Machilus duthiei* King (WA-140)	ET	Native	√	—	—
66. Linaceae	465	*Reinwardtia indica* Dumort. (WA-29)	DS	Native	√	—	—
67. Loranthaceae	466	*Scurrula pulverulenta* (Wall.) G. Don (WA-45)	P	Native	—	√	—
68. Lythraceae	467	*Woodfordia fruticosa* (L.) Kurz (WA-7)	DS	Native	√	√	√
69. Malvaceae	468	*Abutilon bidentatum* Hochst. ex Rich. (WA-47)	DT	Native	√	√	√
	469	*Bombax ceiba* L. (WA-30)	DT	Cultivated	√	√	√
	470	*Corchorus aestuans* L. (WA-430)	DS	Native	√	√	√
	471	*Kydia calycina* Roxb. (WA-48)	DT	Native	—	—	√
	472	*Malva neglecta* Waller. (WA-28)	AH	Weed	√	√	√
	473	*Malvastrum aboriginum* B.L. Rob. (WA-202)	AH	Native	√	√	√
	474	*Sida cordifolia* L. (WA-207)	AH	Native	√	√	√
	475	*S. cordata* (Burm. f.) Borss. Waalk. (WA-51)	AH	Native	√	√	√
70. Mazaceae	476	*Mazus alpinus* Masam. (WA-458)	AH	Native	√	√	√
71. Meliaceae	477	*Melia azedarach L.*	DT	Native	√	√	√
72. Menispermaceae	478	*Cissampelos pareira* L. (WA-247)	C	Native	√	√	√
73. Molluginaceae	479	*Mollugo nudicaulis* Lam. (WA-27)	AH	Native	√	√	√
74. Moraceae	480	*Broussonetia papyrifera* (L.) L'Hér. ex Vent. (WA-429)	DT	Naturalized	√	√	√
	481	*Ficus auriculata* Lour. (WA-428)	DT	Native	√	√	√
	482	*F. benghalensis* L. (WA-248)	ET	Native	√	√	√
	483	*F. carica* L. (WA-8)	DT	Cultivated	√	√	√
	484	*F. palmata* Forssk. (WA-306)	DT	Native	√	√	√
	485	*F. religiosa* L. (WA-141)	ET	Native	√	√	√
	486	*F. sarmentosa* Buch.-Ham. ex Sm. (WA-33)	C	Native	√	√	—
	487	*Morus alba* L. (WA-142)	DT	Native	√	√	√
	488	*M. nigra* L. (WA-143)	DT	Native	√	√	√
75. Myrtaceae	489	*Eucalyptus camaldulensis* Dehnh. (WA-456)	DT	Introduced	√	√	√
76. Nitrariaceae	490	*Peganum harmala* L. (WA-39)	AH	Native	√	√	√
77. Nyctaginaceae	491	*Boerhavia procumbens* Banks ex Roxb. (WA-9)	PH	Native	√	√	√
	492	*Mirabilis jalapa* L. (WA-233)	AH	Naturalized	√	√	√
78. Oleaceae	493	*Jasminum humile* L. (WA-307)	DS	Native	√	√	—
	494	*J. officinale* L. (WA-470)	DS	Native	√	√	—
	495	*Olea ferruginea* Royle (WA-195)	ET	Native	√	√	√

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79. Orobanchaceae	496	*Oenothera rosea* L'Hér. ex Aiton (WA-34)	PH	Native	√	√	—
80. Oxalidaceae	497	*Oxalis corniculata* L. (WA-192)	AH	Native	√	√	√
	498	*O. pes-caprae* L. (WA-208)	PH	Native	√	√	√
81. Papaveraceae	499	*Corydalis murreeana* Jafri (WA-41)	AH	Native	√	—	—
	500	*Fumaria indica* (Hausskn.) Pugsley (WA-450)	AH	Native	√	√	√
82. Phyllanthaceae	501	*Andrachne cordifolia* (Decne.) Müll. Arg. (WA-176)	DS	Native	√	—	—
	502	*Bridelia verrucosa* Haines (WA-52)	*DS*	Native	√	√	√
	503	*Glochidion heyneanum* (Wight & Arn.) Wight (WA-25)	*ET*	Native	√	√	—
	504	*Phyllanthus emblica* L. (WA-38)	*DT*	Native	√	√	√
	505	*P. niruri* L. (WA-451)	*AH*	Native	√	√	√
	506	*P. urinaria* L. (WA-53)	*AH*	Native	√	√	√
	507	*P. virgatus* G. Forst. (WA-24)	*AH*	Native	√	√	√
83. Plantaginaceae	508	*Bacopa monnieri* (L.) Wettst. (WA-35)	AH	Native	√	√	√
	509	*Nanorrhinum ramosissimum* (Wall.) Betsche (WA-54)	AH	Native	√	√	√
	510	*Plantago lanceolata* L. (WA-452)	PH	Weed	√	√	√
	511	*P. major* L. (WA-185)	PH	Native	√	√	—
	512	*P. ovata* Forssk. (WA-184)	PH	Native	√	√	√
	513	*Veronica anagallis-aquatica* L. (WA-460)	PH	Native	—	—	√
	514	*V. arvensis* L (WA-308)	AH	Native	√	√	√
84. Polygalaceae	515	*Polygala abyssinica* R. Br. ex Fresen (WA-81)	PH	Native	√	√	—
	516	*P. arvensis* Willd. (WA-459)	PH	Native	√	√	—
	517	*P. erioptera* DC. (WA-55)	PH	Native	√	√	—
85. Polygonaceae	518	*Persicaria amplexicaulis* (D. Don) Ronse Decr. (WA-80)	PH	Native	√	√	—
	519	*P. barbata* (L.) H. Hara (WA-309)	AH	Native	√	√	—
	520	*P. hydropiper* (L.) Delarbre (WA-79)	AH	Native	√	√	—
	521	*P. mitis* (Schrank) Holub (WA-11)	AH	Native	√	√	√
	522	*P. nepalensis* (Meisn.) Miyabe (WA-56)	AH	Native	√	√	√
	523	*Polygonum aviculare* L. (WA-310)	AH	Native	√	√	√
	524	*P. plebeium* R. Br. (WA-37)	AH	Native	√	√	√
	525	*Rumex dentatus* L. (WA-61)	AH	Weed	√	√	√
	526	*R. hastatus* D. Don (WA-82)	PH	Native	√	√	√
	527	*R. nepalensis* Spreng. (WA-36)	PH	Native	√	√	—
86. Primulaceae	528	*Anagallis arvensis* L. (WA-78)	AH	Weed	√	√	√
	529	*Androsace foliosa* Duby (WA-158)	PH	Native	√	√	√
	530	*A. rotundifolia* Hardw. (WA-75)	PH	Native	√	√	√
	531	*A. umbellata* (Lour.) Merr. (WA-60)	AH	Native	√	√	√
	532	*Embelia robusta* Roxb. (WA-23)	DS	Native	√	√	√
	533	*Lysimachia pyramidalis* Wall. (WA-62)	AH	Native	√	√	√
	534	*Myrsine africana* L (WA-194)	ES	Native	√	√	√
	535	*M. semiserrata* Wall. (WA-12)	DS	Native	√	—	—
	536	*Primula denticulata* Sm. (WA-145)	PH	Native	√	—	—
87. Punicaceae	537	*Punica granatum* L. (WA-64)	DS	Native	√	√	√
88. Ranunculaceae	538	*Aconitum laeve* Royle (WA-59)	PH	Native	√	—	—
	539	*Anemone tetrasepala* Royle (WA-146)	PH	Native	√	—	—
	540	*A. vitifolia* Buch.-Ham. ex DC. (WA-76)	PH	Native	√	—	—
	541	*Aquilegia pubiflora* Wall. ex Royle (WA-63)	PH	Native	√	—	—
	542	*Clematis barbellata* Edgew. (WA-311)	C	Native	√	√	√
	543	*C. grata* Wall. (WA-147)	C	Native	√	√	—
	544	*C. montana* Buch.-Ham. ex DC. (WA-58)	C	Native	√	√	√

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	545	*Ranunculus arvensis* L. (WA-312)	AH	Weed	√	√	√
	546	*R. laetus* Wall. ex Hook. f. & J.W. Thomson (WA-157)	PH	Native	√	√	√
	547	*R. muricatus* L. (WA-148)	AH	Weed	√	√	√
	548	*R. sceleratus* L. (WA-149)	AH	Native	√	√	√
89. Rhamnaceae	549	*Rhamnus purpurea* Edgew. (WA-77)	DT	Native	√	√	—
	550	*R. triquetra* (Wall.) Brandis (WA-22)	DT	Native	√	√	—
	551	*R. virgata* Roxb. (WA-13)	DT	Native	√	√	—
	552	*Sageretia thea* (Osbeck) M.C. Johnston (WA-461)	DS	Native	√	√	√
	553	*Ziziphus jujuba* Mill. (WA-462)	DT	Cultivated	√	√	√
	554	*Z. mauritiana* Lam. (WA-155)	DT	Native	√	√	√
	555	*Z. oxyphylla* Edgew. (WA-156)	DS	Native	√	√	√
90. Rosaceae	556	*Agrimonia eupatoria* L. (WA-463)	AH	Native	√	√	√
	557	*Cotoneaster affinis* Lindl. (WA-464)	DS	Native	√	√	√
	558	*Duchesnea indica* (Jacks.) Focke (WA-186)	PH	Native	√	√	√
	559	*Fragaria nubicola* (Hook. f.) Lindl. ex Lacaita (WA-465)	PH	Native	√	√	√
	560	*Malus domestica* Borkh. (WA-466)	DT	Cultivated	√	√	√
	561	*Potentilla reptans* L. (WA-320)	PH	Native	√	√	√
	562	*Prunus armeniaca* L. (WA-113)	DT	Cultivated	√	√	√
	563	*P. domestica* L. (WA-315)	DT	Cultivated	√	√	√
	564	*P. persica* (L.) Batsch (WA-121)	DT	Cultivated	√	√	√
	565	*Pyrus pashia* Buch.-Ham. ex D. Don (WA-204)	DT	Native	√	√	√
	566	*Rosa moschata* Herrm. (WA-316)	DS	Native	√	√	—
	567	*R. multiflora* Thunb. (WA-513)	DS	Native	√	√	—
	568	*Rubus ellipticus* Sm. (WA-469)	DS	Native	√	√	√
	569	*R. anatolicus* Focke (WA-593)	DS	Native	√	√	—
	570	*R. fruticosus* L. (WA-14)	DS	Native	√	√	—
	571	*R. niveus* Thunb. (WA-179)	DS	Native	√	√	—
	572	*R. sanctus* Schreb. (WA-317)	DS	Native	√	√	—
	573	*R. ulmifolius* Schott (WA-410)	DS	Native	√	√	—
	574	*Spiraea canescens* D. Don (WA-21)	DS	Native	√	—	—
91. Rubiaceae	575	*Galium acutum* Edgew. (WA-159)	AH	Native	√	√	√
	576	*G. aparine* L. (WA-424)	AH	Native	√	√	√
	577	*G. asperifolium* Wall. (WA-161)	AH	Native	√	√	√
	578	*G. elegans* Wall. ex Roxb. (WA-160)	PH	Native	√	√	√
	579	*G. rotundifolium* L. (WA-193)	PH	Native	√	√	√
	580	*Himalrandia tetrasperma* (Wall. ex Roxb.) T. Yamaz. (WA-423)	DS	Native	√	√	√
	581	*Pavetta tomentosa* Roxb. ex Sm. (WA-318)	DS	Native	√	√	√
	582	*Rubia cordifolia* L. (WA-162)	C	Native	√	√	√
	583	*Wendlandia heynei* (Schult.) Santapau & Merchant (WA-20)	DT	Native	√	√	√
92. Rutaceae	584	*Zanthoxylum armatum* DC. (WA-422)	DS	Native	√	√	√
93. Salicaceae	585	*Flacourtia indica* (Burm. f.) Merr. (WA-152)	DT	Native	√	√	√
	586	*Populus deltoides* Marshall (WA-421)	DT	Naturalized	√	√	√
	587	*Salix acmophylla* Boiss. (WA-15)	DT	Native	√	√	√
	588	*S. tetrasperma* Roxb. (WA-485)	DT	Naturalized	√	√	—
	589	*Xylosma longifolia* Clos (WA-150)	DT	Native	√	√	—
94. Sapindaceae	590	*Aesculus indica* (Wall. ex Cambess.) Hook. (WA-468)	DT	Native	√	√	—
	591	*Cardiospermum halicacabum* L. (WA-151)	AH	Native	√	√	√
	592	*Dodonaea viscosa* (L.) Jacq. (WA-198)	ES	Native	√	√	√
95. Saxifragaceae	593	*Bergenia ciliata* (Haw.) Sternb. (WA-19)	PH	Native	√	√	—

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Group/family	Sr#		Habit	Status	Murree	K. Sattian	Kahuta
96. Scrophulariaceae	594	*Verbascum thapsus* L. (WA-319)	PH	Native	√	√	√
97. Simaroubaceae	595	*Ailanthus altissima* (Mill.) Swingle (WA-16)	DT	Naturalized	√	√	√
98. Solanaceae	596	*Datura innoxia* Mill. (WA-17)	AH	Naturalized	√	√	√
	597	*D. stramonium* L. (WA-68)	AH	Native	√	√	√
	598	*Physalis divaricata* D. Don (WA-326)	AH	Weed	√	√	√
	599	*Solanum americanum* Mill. (WA-163)	AH	Weed	√	√	√
	600	*S. erianthum* D. Don (WA-325)	AH	Native	√	√	—
	601	*S. incanum* L. (WA-324)	AH	Weed	√	√	√
	602	*S. surattense* Burm. f (WA-67)	AH	Native	√	√	√
	603	*S. villosum* Mill. (WA-164)	AH	Weed	√	√	√
	604	*Withania somnifera* (L.) Dunal. (WA-74)	PH	Native	√	√	√
99. Thymelaeaceae	605	*Daphne pappyracea* Wall. ex G. Don. (WA-175)	ES	Native	√	—	—
100. Tiliaceae	606	*Grewia asiatica* L. (WA-69)	DT	Native	√	√	√
	607	*G. eriocarpa* Juss. (WA-613)	DT	Native	√	√	√
	608	*G. optiva* J.R. Drumm. ex Burret (WA-153)	DT	Native	√	√	√
	609	*G. tenax* (Forssk.) Fiori (WA-71)	DT	Native	√	√	√
101. Ulmaceae	610	*Celtis australis subsp. caucasica* (Willd.) C.C. Towns. (WA-154)	ET	Native	√	√	√
102. Urticaceae	611	*Debregeasia saeneb* (Forssk.) Hepper & J.R.I. Wood (WA-72)	ES	Native	√	√	√
	612	*Urtica dioica* L. (WA-18)	PH	Native	√	√	—
	613	*U. pilulifera* L. (WA-73)	PH	Native	√	√	√
103. Valerianaceae	614	*Valeriana hardwickii* Wall. (WA-420)	PH	Native	√	—	—
	615	*V. jatamansi* Jones (WA-348)	PH	Native	√	√	—
104. Verbenaceae	616	*Glandularia aristigera* (S. Moore) Tronc. (WA-332)	AH	Introduced	√	√	√
	617	*Lantana camara* L. (WA-323)	ES	Naturalized	√	√	√
	618	*L. indica* Roxb. (WA-322)	ES	Naturalized	√	√	√
	619	*Phyla nodiflora* (L.) Greene (WA-419)	AH	Native	√	√	√
	620	*Verbena officinalis* L. (WA-321)	AH	Weed	√	√	√
105. Violaceae	621	*Viola cancescens* Wall. (WA-467)	PH	Native	√	√	√
	622	*V. pilosa* Blume (WA-66)	PH	Native	√	√	—
	623	*V. stochsii Boiss.*(WA-212)	PH	Native	—	—	√
106. Zygophyllaceae	624	*Tribulus terrestris* L. (WA-65)	AH	Weed	√	√	√
				Total	**592**	**533**	**433**

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