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

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Abstract. Present endeavor was aimed at recording the flora of Murree-Kotli Sattian-Kahuta National Park (MKSVPN), 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
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 km² (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.,
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 (Nakaïke 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](image)

**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:
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         | Lehrtr   | 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         | Lehrtr   | 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        | Lehrtr   | 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        | Lehrtr Uper | 33°41'37.00"N | 73°26'24.08"E | 1060     |
| Sample No. | Locality                              | Latitude       | Longitude       | Altitude |
|------------|---------------------------------------|----------------|-----------------|----------|
| S26        | Lehrtrar Upper                        | 33°41'56.00"N  | 73°26'21.12"E   | 1189     |
| S27        | Lehrtrar Upper                        | 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        | Danki                                 | 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     |
| 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 Muree                        | 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"E  | 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     |
| 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      | Ghor Gali                                 | 33°52'48.05"N | 73°20'59.09"E | 1647     |
| S131      | Lehrar                                    | 33°43'00.04"N | 73°29'55.01"E | 1420     |
| S132      | Lehrar                                    | 33°43'31.09"N | 73°30'23.03"E | 1511     |
| S133      | Lehrar                                    | 33°43'30.05"N | 73°30'16.01"E | 1518     |
| S134      | Lehrar                                    | 33°43'46.05"N | 73°30'20.06"E | 1592     |
| S135      | Lehrar                                    | 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      | Patriota 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     |
| 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      | Lehrtr                       | 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      |
### Table 2. Comparison of the flora of the project area with the flora of Pakistan

| Plant group      | National Park (area: 934 km²) | Pakistan (area: 796095 km²) (Stewart, 1967) | Percentage |
|------------------|-------------------------------|---------------------------------------------|------------|
|                  | Number of species             |                                             |            |
| 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*).
The genera importance index (GII) as calculated through Equation 2 indicated that the largest genus was \textit{Euphorbia} that contributed 10 species (2.67%), followed by \textit{Carex} (9 spp., 2.4%), \textit{Cyperus} (8 spp., 2.13%), \textit{Eragrostis}, \textit{Poa}, \textit{Ficus}, \textit{Medicago}, \textit{Rubus} and \textit{Sweria} (6 spp., 1.6% each), while rest of genera shared less than five plant species (Fig. 3).

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{family_importance_index.png}
\caption{Family importance index (FII) of the flora of Murree-Kotli Sattian-Kahuta National Park, Pakistan}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{genera_importance_index.png}
\caption{Genera importance index (GII) of the flora of Murree-Kotli Sattian-Kahuta National Park, Pakistan}
\end{figure}

\textbf{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
(21 spp., 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...
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 schlagintweitian, Carpesium abrotanoides, Cedrus deodara, Cephalanthera longifolia, Cornus macrophulla, C. oblonga, Corydalis murreana, 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. candidans, Hypericum dyeri, Ilex dipyrena, Impatiens bicolor, I. brachycentra, I. edgeworthii, Kyllinga squamulata, Lepidium didymium, Leucanthemum vulgare, Machilus duthiei, Malaxis muscifera, Mimosa hitalayana, Myrtrine semiserrata, Neolithsea pallens, Oxytropis mollis, Polystichum aculeatum, Primula denticulata, Prunella vulgaris, Quercus dilatata, Reinwardtia indica, Rhododendron arboreum, Sarcococca saligna, Solena amplexicaulis, Spiraea
canescens, Spiranthes sinensis, Swertia ciliata, S. cordata, S. paniculata, S. tetragona, Trifolium pretense, Tulipa clusiana, Valeriana hardwickii, Viburnum cassinifolium, 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, Hypodematiun crenatum, Pupalia lappacea, Rhynchosis capitata, R. himalensis, Scandix pecten-veneris, Scurryla 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,
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 severe 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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The floristic checklist of Murree-Kotli Sattian-Kahuta National Park Pakistan

| Group/family | Sr# | Habit | Status | Murree | K. Sattian | Kahuta |
|--------------|-----|-------|--------|--------|-----------|--------|
| Pteridophytes|     |       |        |        |           |        |
| 1. Adiantaceae| 1   | PH    | Native | ✓      | ✓         | ✓      |
|               | 2   | PH    | Native | ✓      | ✓         | ✓      |
|               | 3   | PH    | Native | ✓      | ✓         | ✓      |
|               | 4   | PH    | Native | ✓      | ✓         | ✓      |
|               | 5   | PH    | Native | ✓      | ✓         | —      |
| 2. Aspleniaceae| 6   | PH    | Native | ✓      | ✓         | —      |
|               | 7   | PH    | Native | ✓      | ✓         | —      |
|               | 8   | PH    | Native | ✓      | ✓         | —      |
| 3. Dennstaedtiaceae| 9   | PH    | Native | ✓      | ✓         | ✓      |
|               | 10  | PH    | Native | ✓      | ✓         | ✓      |
|               | 11  | PH    | Native | ✓      | ✓         | ✓      |
|               | 12  | PH    | Native | ✓      | ✓         | —      |
| 4. Dryopteridaceae| 13  | PH    | Native | ✓      | ✓         | —      |
|               | 14  | PH    | Native | ✓      | ✓         | ✓      |

APPENDIX
| Group/family | Sr# | Habitable Species | Status | Murree | K. Sattian | Kahuta |
|-------------|-----|------------------|--------|--------|----------|--------|
| 6. Pteridaceae | 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 | √ | √ | √ |
| 18 | *Allantodia squamigera* (Met.) Ching (WA-586) | PH Native | √ | √ | — |
| 19 | *Cheilanthes argentea* (S.G. Gmel.) Kunze (WA-387) | PH Native | — | √ | — |
| 20 | *Cheilanthes furinosa* (Forssk.) Kauff. (WA-585) | PH Native | √ | √ | — |
| 21 | *Coniogramme rosthornii* Hieron. (WA-386) | PH Native | √ | — | — |
| 22 | *Pteris cretica* L. (WA-189) | PH Native | √ | √ | — |
| 23 | *P. vititata* L. (WA-257) | PH Native | √ | √ | √ |
| 7. Hypodematiaceae | 24 | *Hypodematum crenatum* (Forssk.) Kuhn (WA-591) | PH Native | — | — | — |
| 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 | √ | √ | — |
| 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. jaquemontii* 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 | √ | — | — |
| 43 | *Polygonatum verticillatum* (L.) All. (WA-260) | PH Native | — | — | — |
| 44 | *P. multiflorum* (L.) All. (WA-261) | PH Native | — | — | — |
| 14. Convallariaceae | 45 | *Bolboschoenus maritimus* subsp. *affinis* (Roth) T. Koyama (WA-101) | PH Native | √ | — | — |
| 46 | *Carex canescens* L. (WA-182) | PH Native | √ | √ | — |
| 47 | *C. cardo* L. (WA-262) | PH Native | √ | — | — |
| 48 | *C. cuprina* (Sándor ex Heuff.) Nendtv. ex A.Kern. (WA-609) | PH Native | √ | — | — |
| 15. Cyperaceae | 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. schlaeflagitanae* Bovec. (WA-180) | PH Native | — | — | — |
| 53 | *C. foliosa* D. Don (WA-263) | PH Native | √ | — | — |
| 54 | *C. pyrochloa* Nees (WA-264) | PH Native | √ | — | — |
| 55 | *C. alopecuroides* Rothb. (WA-391) | PH Native | √ | — | — |
| 56 | *C. comans* L. (WA-102) | AH Native | √ | — | — |
| 57 | *C. delliformis* L. (WA-376) | AH Native | — | √ | — |
| 58 | *C. iria* L. (WA-265) | AH Weed | √ | — | — |
| 59 | *C. luevigatus* L. (WA-375) | PH Native | — | — | — |
| Group/family | Sr#  | Habit  | Status | Murree | K. Sattian | Kahuta |
|-------------|------|--------|--------|--------|-----------|--------|
| 17. Hydrocharitaceae | 59 | C. niveus Retz. (WA-389) | PH     | Native | √ | √ | √ |
| 60 | C. rotundus L. (WA-431) | PH     | Weed  | √ | √ | √ |
| 61 | C. squarrosa L. (WA-390) | AH     | Native | √ | √ | |
| 62 | Eleocharis uniglumis (Link) Schult. (WA-432) | PH     | Native | √ | — | — |
| 63 | Eriophorum comosum (Wall.) Nees (WA-392) | PH     | Native | √ | — | — |
| 64 | Fimbristylis dichotomu (L.) Vahl (WA-266) | PH     | Native | √ | √ | √ |
| 65 | F. rigida Nees (WA-267) | PH     | Native | √ | √ | — |
| 66 | F. schoenoides (Retz.) Vahl (WA-393) | PH     | Native | √ | √ | √ |
| 67 | F. squarrosa Vahl (WA-607) | AH     | Native | √ | √ | — |
| 68 | Kobresia laxa Nees (WA-599) | PH     | Native | √ | — | — |
| 69 | Kobresia sanguinea (Boott) Raymond (WA-370) | PH     | Native | √ | √ | √ |
| 70 | Kyllinga squamulata Wahlenb. (WA-371) | PH     | Native | √ | — | — |
| 71 | Pycreus pumilus (L.) Nees (WA-374) | AH     | Native | √ | √ | — |
| 72 | P. flavidae (Retz.) T. Koyama (WA-373) | AH     | Native | √ | √ | √ |
| 73 | Schoenoplectus litoralis (Schrad.) Palla (WA-372) | PH     | Native | √ | √ | — |
| 16. Hypoxidaceae | 74 | Curculigo orchioides Gaertn. (WA-229) | PH     | Native | — | — | √ |
| 17. Hydrocharitaceae | 75 | Hydronia verticillata (L.f.) Royle (WA-228) | PH     | Native | — | — | √ |
| 76 | Juncus articulatus L. (WA-394) | PH     | Native | √ | — | — |
| 77 | J. inflexus L. (WA-268) | PH     | Native | √ | — | — |
| 78 | J. maritimus Lam. (WA-608) | PH     | Native | √ | — | — |
| 18. Juncaceae | 79 | Kobresia carinata Lindl. (WA-604) | PH     | Native | — | — | — |
| 80 | Cephalanthera longifolia (L.) Fritsch (WA-395) | PH     | Native | √ | — | — |
| 81 | Epipactis gigantea Douglas ex Hook. | PH     | Native | √ | — | — |
| 20. Orchidaceae | 82 | E. helleborine (L.) Crantz (WA-270) | PH     | Native | — | — | — |
| 83 | E. persica (Soó) Hausskn. ex Nannf. (WA-272) | PH     | Native | √ | — | — |
| 84 | Habenaria fascicula Lindl. (WA-587) | PH     | Native | — | — | — |
| 85 | Malaxis muscicola (Lindl.) Kuntze (WA-588) | PH     | Native | — | — | — |
| 86 | Spiranthes sinensis (Pers.) Ames (WA-271) | PH     | Native | — | — | — |
| 87 | Arachnis venosa Roth (WA-396) | PH     | Native | √ | — | — |
| 88 | A. stolonifera L. (WA-398) | PH     | Native | √ | √ | √ |
| 89 | Apluda mutica L. (WA-397) | PH     | Native | √ | √ | √ |
| 90 | Aristea cyanantha Steud. (WA-231) | PH     | Native | √ | √ | √ |
| 91 | Arthraxon lacinifolius (Trin.) Hochst. (WA-369) | PH     | Native | √ | √ | √ |
| 92 | A. prionodes (Steud.) Dandy (WA-367) | PH     | Native | √ | √ | √ |
| 93 | Arundinella nepalensis Trin. (WA-368) | PH     | Native | √ | √ | √ |
| 94 | Arundo donax L. (WA-453) | PH     | Native | √ | √ | √ |
| 95 | Avena fatua L. (WA-364) | PH     | Weed  | √ | √ | √ |
| 96 | Bothriochloa bladhii (Retz.) S.T. Blake (WA-365) | PH     | Native | √ | √ | √ |
| 97 | Brachiaria eruciformis (Sm.) Griseb. (WA-366) | AH     | Native | √ | √ | √ |
| 98 | B. ramosa (L.) Stapf (WA-597) | AH     | Native | √ | √ | √ |
| 99 | B. reptans (L.) C.A. Gardner & C.E. Hubb. (WA-200) | AH     | Weed  | √ | √ | √ |
| 100 | Bromus hordeaceus L. (WA-399) | PH     | Native | √ | √ | √ |
| 101 | B. pectinatus Thunb. (WA-361) | AH     | Native | √ | √ | √ |
| 102 | B. caharticus Vahl (WA-362) | PH     | Native | √ | √ | √ |
| 103 | B. ramosus Huds. (WA-363) | PH     | Native | √ | √ | √ |
| 104 | Brachypodium sylvaticum (Huds.) P. Beauv. (WA-598) | AH     | Native | √ | √ | √ |
| 105 | Capillipedium parviflorum (R.Br.) Stapf (WA-400) | PH     | Native | √ | — | — |
| 106 | Cenchrus ciliaris L. (WA-133) | PH     | Native | √ | √ | √ |
| 21. Poaceae | 107 | C. pennisetiformis Steud. (WA-356) | PH     | Native | √ | √ | √ |
| 108 | C. setiger Vahl (WA-357) | PH     | Native | √ | √ | √ |
| Sr# | Group/family | Habit | Status | Murree | K. Sattian | Kahuta |
|-----|--------------|-------|--------|--------|------------|--------|
| 111 | Chrysopegon 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 | Dactylorhiza aegyptioides (L.) Wild. (WA-402) | PH    | Weed   | √      | √          | √      |
| 118 | Desmostachya bipinnata (L.) Stapf (WA-360) | PH    | Native | √      | √          | √      |
| 119 | Dichanthium annulatum (Forsk.) Stapf (WA-232) | PH    | Native | √      | √          | √      |
| 120 | D. loveolatum (Delile) Robert (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 | Erigeron annuus (Schrad.) Nees (WA-358) | AH    | Native | √      | √          | √      |
| 124 | E. amabilis (L.) Wight & Arn.(WA-350) | AH    | Native | √      | √          | √      |
| 125 | E. ciliatus (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 Stept (WA-610) | PH    | Native | √      | √          | √      |
| 132 | Heteropogon contortus (Linn.) P. Beauv. ex Roem. & Schult. (WA-454) | PH    | Native | √      | √          | √      |
| 133 | Imperata cylindrica (L.) Raesuckel (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 | Ophiopogon 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 | Pipaltherum aegyptioides (Duthie ex Hook. L) Roshev. (WA-406) | PH    | Native | √      | √          | √      |
| 146 | P. hiliariae Pazi (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. polycephala Stapf (WA-533) | PH    | Native | √      | √          | √      |
| 152 | P. pratensis L. (WA-533) | PH    | Native | √      | √          | √      |
| 153 | P. infirma Kunth (WA-275) | AH    | Weed   | √      | √          | √      |
| 154 | Polygala fugax Nees ex Steud. (WA-436) | AH    | Weed   | √      | √          | √      |
| 155 | P. monspeliensis (Linn.) Desf. (WA-408) | AH    | Weed   | √      | √          | √      |
| 156 | P. viridis (Gouan) Breitr. (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.) (WA-411) | PH    | Native | √      | √          | √      |
| Group/family | Sr# | Species | Habit | Status Murree | Status K. Sattian | Status Kahuta |
|-------------|-----|---------|-------|---------------|-----------------|--------------|
| 22. Potamogetonaceae | 160 | S. spontaneum L. (WA-527) | PH | Native | ✓ | ✓ | ✓ |
| | 161 | Setaria pumila (Poir.) Roem. & Schult. (WA-276) | AH | Weed | ✓ | ✓ | ✓ |
| | 162 | S. verticalis (L.) P. Beauv. (WA-412) | AH | Invasive | ✓ | ✓ | ✓ |
| | 163 | S. viridis (L.) P. Beauv. (WA-234) | AH | Weed | ✓ | ✓ | ✓ |
| | 164 | Sorghum bicolor (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 | ✓ | ✓ | ✓ |
| 23. Smilacaceae | 168 | Zea mays L. (WA-277) | AH | Cultivated | ✓ | ✓ | ✓ |
| 24. Xanthorrhoeaceae | 169 | Potamogoton perfoliatus L. (WA-592) | PH | Native | ✓ | ✓ | ✓ |
| | 170 | Smilax aspera (L.-WA-111) | C | Native | ✓ | ✓ | ✓ |
| | 171 | S. glaucephylla Klotsch (WA-112) | C | Native | ✓ | ✓ | ✓ |
| 25. Acanthaceae | 172 | Asphodelus tenuifolius Cav. (WA-543) | AH | Native | ✓ | ✓ | ✓ |
| | 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 Thumb. (WA-349) | ES | Weed | ✓ | ✓ | ✓ |
| | 179 | J. quinqueangularis K. D. Koernig ex Roxb. (WA-346) | PH | Native | ✓ | ✓ | ✓ |
| | 180 | Strobilanthes dalhousieanus (Nees) C. B. Clarke (WA-177) | DS | Native | ✓ | ✓ | ✓ |
| | 181 | S. urticifolia Willd. ex Kuntze (WA-110) | DS | Native | ✓ | ✓ | ✓ |
| | 182 | S. glutinosa L. Graham (WA-345) | DS | Native | ✓ | ✓ | ✓ |
| 26. Adoxaceae | 183 | Viburnum roseum L. (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 | Triandria portulacastrum L. (WA-343) | AH | Native | ✓ | ✓ | ✓ |
| | 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 | Didera maricata (L.) Mart. (WA-342) | AH | Weed | ✓ | ✓ | ✓ |
| | 195 | Dysphania ambrosioides (L.) Mosyakin & Clemants (WA-546) | AH | Naturalized | ✓ | ✓ | ✓ |
| | 196 | Paspalum lappaceum (L.) Juss. (WA-542) | PH | Weed | ✓ | ✓ | ✓ |
| 28. Amaranthaceae | 197 | Cotinus coggyria Scop. (WA-279) | DS | Native | ✓ | ✓ | ✓ |
| | 198 | Lancea coronandra (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 | ✓ | ✓ | ✓ |
| 29. Anacardiaceae | 201 | Aegopodium podagraria L. (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 | Native | ✓ | ✓ | ✓ |
| | 206 | Eryngium caeruleum M. Bieb. (WA-299) | AH | Native | ✓ | ✓ | ✓ |
| Group/family | S# | Species | Habit | Status | Murree | K. Sattian | Kahuta |
|--------------|----|---------|-------|--------|--------|-----------|--------|
| 31. Apocynaceae | 213 | Dregae volubilis (L. f.) Benth. ex Hook. f. (WA-119) | C | Native | — | — | √ |
| 32. Aquifoliaceae | 216 | Ilex diphyema Wall. (WA-117) | ET | Native | — | — | — |
| 33. Araliaceae | 217 | Hedera nepullensii 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 | √ | √ | √ |
| 36. Asteraceae | 220 | Periplisaphylla Decne. (WA-534) | ES | Native | √ | √ | √ |
|  | 221 | Vincetoxicum canescens (Willd.) Decne. (WA-118) | PH | Native | — | √ | √ |
|  | 222 | V. hirundinaria Medik. (WA-565) | PH | Native | — | √ | √ |
|  | 223 | Achillea millefolium L. (WA-523) | PH | Native | — | — | — |
|  | 224 | Adenostemma laevia (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 | Anabasis adhatu 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. & Krtiam. (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. himalaiica C. B. Clarke (WA-549) | PH | Native | — | — | — |
|  | 236 | Bidens biernata (Lour.) Merr. & Sheriff (WA-298) | AH | Native | √ | √ | — |
|  | 237 | Calendula officinalis L. (WA-553) | AH | Native | √ | — | — |
|  | 238 | Carpesium abrotanoides L. (WA-530) | AH | Native | — | — | — |
|  | 239 | C. ceraunum L(WA-572) | AH | Weed | √ | — | √ |
|  | 240 | Carthamus oxyanthus M. Bieb (WA-554) | AH | Weed | √ | √ | √ |
|  | 241 | Cichorium intybus L. (WA-614) | PH | Weed | √ | √ | √ |
|  | 242 | Cirsium arvense (L.) Scop. (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. multiflora (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. triloba (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 | √ | — | — |
| Group/family | Sr# | Habit | Status | Murree | K. Sattian | Kahuta |
|--------------|-----|-------|--------|--------|-----------|--------|
| 37. Balsaminaceae | 256 | AH | Native | √ | √ | √ |
| | 257 | PH | Native | √ | √ | √ |
| | 258 | PH | Native | √ | √ | — |
| | 259 | PH | Native | √ | √ | √ |
| | 260 | PH | Native | √ | — | — |
| | 261 | PH | Native | √ | √ | √ |
| | 262 | AH | Native | √ | √ | √ |
| | 263 | AH | Invasive | √ | √ | √ |
| | 264 | AH | Invasive | √ | √ | √ |
| | 265 | AH | Native | √ | √ | √ |
| | 266 | AH | Native | √ | √ | — |
| | 267 | AH | Native | √ | √ | — |
| | 268 | PH | Native | √ | √ | — |
| | 269 | AH | Native | √ | √ | — |
| | 270 | AH | Native | √ | √ | — |
| | 271 | AH | Native | √ | √ | — |
| | 272 | AH | Invasive | √ | √ | √ |
| | 273 | PH | Native | √ | √ | — |
| | 274 | PH | Native | √ | √ | — |
| | 275 | PH | Native | √ | √ | — |
| | 276 | AH | Native | √ | √ | — |
| | 277 | AH | Native | √ | √ | — |
| | 278 | AH | Native | √ | — | — |
| | 279 | AH | Native | √ | — | — |
| | 280 | AH | Native | √ | — | — |
| | 281 | PH | Native | √ | √ | — |
| | 282 | DS | Native | √ | √ | — |
| | 283 | DS | Native | √ | √ | — |
| 38. Berberidaceae | 284 | AH | Native | √ | √ | √ |
| | 285 | AH | Native | √ | √ | √ |
| | 286 | AH | Native | √ | √ | √ |
| | 287 | DT | Native | √ | √ | √ |
| | 288 | DS | Native | √ | √ | √ |
| | 289 | AH | Native | √ | √ | — |
| | 290 | AH | Native | √ | √ | — |
| | 291 | AH | Native | √ | √ | — |
| | 292 | PH | Native | √ | √ | √ |
| 39. Boraginaceae | 293 | AH | Native | √ | √ | √ |
| | 294 | PH | Native | √ | √ | √ |
| | 295 | AH | Native | √ | √ | √ |
| | 296 | AH | Cultivated | √ | √ | — |
| | 297 | AH | Weed | √ | √ | — |
| | 298 | AH | Weed | √ | √ | — |
| | 299 | AH | Native | √ | √ | √ |
| | 300 | AH | Cultivated | √ | √ | — |
| | 301 | AH | Native | √ | — | — |
| Group/family       | Sr#   | Habit | Status     | Murree  | K. Sattian | Kahuta |
|-------------------|-------|-------|------------|---------|-----------|--------|
| 41. Buxaceae      | 302   | PH    | Native     | √       | √         | √      |
|                   | 303   | AH    | Cultivated | √       | √         | √      |
|                   | 304   | AH    | Native     | √       | √         | √      |
|                   | 305   | ES    | Endemic to Pakistan | √ | — | — |
|                   | 306   | ES    | Native     | √       | —         | —      |
| 42. Cactaceae     | 307   | ES    | Native     | √       | √         | √      |
| 43. Campanulaceae | 308   | AH    | Native     | √       | √         | √      |
| 44. Cannabaceae   | 309   | AH    | Native     | √       | √         | √      |
| 45. Caprifoliaceae| 310   | ES    | Native     | √       | √         | —      |
|                   | 311   | ES    | Native     | √       | —         | —      |
|                   | 312   | DS    | Native     | √       | —         | —      |
|                   | 313   | DS    | Native     | √       | —         | —      |
| 46. Caryophyllaceae| 314  | AH    | Native     | √       | √         | √      |
|                   | 315   | AH    | Weed       | √       | √         | —      |
|                   | 316   | PH    | Weed       | √       | √         | —      |
|                   | 317   | AH    | Native     | √       | √         | —      |
| 47. Celastraceae  | 318   | DT    | Native     | √       | —         | —      |
|                   | 319   | DT    | Native     | √       | —         | —      |
|                   | 320   | DS    | Native     | √       | √         | √      |
|                   | 321   | ES    | Native     | √       | √         | √      |
| 48. Convolvulaceae| 322   | C     | Native     | √       | √         | √      |
|                   | 323   | C     | Native     | √       | —         | —      |
|                   | 324   | P     | Native     | √       | —         | —      |
|                   | 325   | P     | Native     | √       | —         | —      |
|                   | 326   | AH    | Native     | √       | —         | —      |
|                   | 327   | C     | Native     | √       | —         | —      |
|                   | 328   | C     | Native     | √       | —         | —      |
|                   | 329   | C     | Native     | √       | —         | —      |
|                   | 330   | C     | Naturalized | √     | √         | —      |
|                   | 331   | C     | Native     | √       | √         | √      |
| 49. Cornaceae     | 332   | ET    | Native     | —       | —         | —      |
|                   | 333   | Native | —         | —       | —         | —      |
| 50. Cucurbitaceae | 334   | C     | Native     | √       | —         | —      |
| 51. Dioscoreaceae | 335   | C     | Native     | √       | —         | —      |
|                   | 336   | C     | Native     | √       | —         | —      |
|                   | 337   | C     | Native     | √       | —         | —      |
| 52. Ebenaceae     | 338   | ET    | Cultivated | √       | —         | —      |
| 53. Elaeagnaceae  | 339   | ET    | Native     | —       | —         | —      |
| 54. Ericaceae     | 340   | ET    | Native     | —       | —         | —      |
| 55. Euphorbiaceae | 341   | AH    | Native     | √       | √         | √      |
|                   | 342   | AH    | Weed       | √       | √         | —      |
|                   | 343   | AH    | Weed       | √       | √         | —      |
|                   | 344   | AH    | Native     | √       | —         | —      |
|                   | 345   | AH    | Native     | √       | √         | —      |
|                   | 346   | AH    | Native     | √       | —         | —      |
|                   | 347   | AH    | Native     | √       | —         | —      |
|                   | 348   | AH    | Weed       | √       | √         | —      |
|                   | 349   | AH    | Native     | √       | √         | —      |
|                   | 350   | AH    | Native     | √       | √         | √      |
| Sr# | Group/family | S|t|u|a|l|y| | Habit | Status | Murree | K. Sattian | Kahuta |
|-----|--------------|---|---|---|---|---|---|---|---|---|---|
| 351 | *Mallotus philippensis* (Lam.) Müll. Arg. (WA-210) | DS | Native | ✓ | ✓ | ✓ |
| 352 | *Ricinus communis* L. (WA-211) | ES | Native | ✓ | ✓ | ✓ |
| 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 | *Albizia lebbeck* Bentham. | DS | Native | ✓ | ✓ | ✓ |
| 357 | *Alysicarpus bupreureifolius* (L.) DC. | AH | Native | — | — | ✓ |
| 358 | *A. rugosus* (Willd.) DC. (WA-93) | AH | Native | — | — | ✓ |
| 359 | *A. montifer* (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 molla* "Benth., p.p.A" (WA-250) | AH | Native | — | — | ✓ |
| 364 | *A. platycarpus* Bentham. (WA-249) | AH | Native | — | — | ✓ |
| 365 | *A. scarabaeoides* (L.) Bentham. (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. gontericum* (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.) 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.) 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. lapulina* L. (WA-2) | AH | Native | ✓ | ✓ | ✓ |
| 389 | *M. lacinata* (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 | *Mellotus indicus* (L.) All. (WA-88) | AH | Native | ✓ | ✓ | ✓ |
| 394 | *Mimosa hirsuta* L. | DT | Native | — | — | — |
| 395 | *Oxytropis mollis* Bentham. (WA-313) | PH | Native | — | — | — |
| 396 | *Pongamia pinnata* (L.) Pierre (WA-502) | ET | Native | ✓ | ✓ | ✓ |
| 397 | *Pueraria tuberosa* (Willd.) DC. (WA-479) | C | Native | — | ✓ | ✓ |
| 398 | *Rhyynchostachys 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 | ✓ | ✓ | ✓ |
| Group/family | Sr# | Common Name | Habit | Status | Murree | K. Sattian | Kahuta |
|-------------|-----|-------------|-------|--------|--------|-----------|--------|
| 57. Fagaceae | 402 | Robinia pseudoacacia L. (WA-3) | DT | Naturalized | ✓ | ✓ | — |
|              | 403 | T. cuneiformis (Roth) Ali (WA-487) | DT | Native | ✓ | ✓ | ✓ |
|              | 404 | T. trifoliata (D. Don ex G. Don) B. L. (WA-584) | AH | Native | — | — | ✓ |
|              | 405 | T. dubium (L.) (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 | Usnea filipendula (Jacq.) DC. (WA-611) | AH | Native | — | ✓ | ✓ |
|              | 411 | Vicia sativa L. (WA-128) | AH | Weed | ✓ | ✓ | — |
|              | 412 | V. monantha Retz. (WA-129) | AH | Native | ✓ | ✓ | ✓ |
| 58. Gentianaceae | 413 | Quercus dilatata Royle (WA-126) | ET | Native | ✓ | ✓ | — |
|              | 414 | Q. glauca Thumb. (WA-173) | ET | Native | ✓ | ✓ | ✓ |
|              | 415 | Q. incana Bartram (WA-86) | ET | Native | ✓ | ✓ | — |
| 59. Geraniaceae | 416 | Gentiana argentea (Royle ex D. Don) Royle ex D. Don (WA-83) | AH | Native | ✓ | — | — |
|              | 417 | G. olivieri Griseb. (WA-302) | PH | Native | ✓ | — | — |
|              | 418 | S. alata 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 | ✓ | — | — |
| 60. Grossulariaceae | 424 | Geranium lucidum L. (WA-1) | AH | Native | ✓ | ✓ | — |
|              | 425 | G. mucronatum 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 | ✓ | ✓ | ✓ |
| 61. Hamamelidaceae | 429 | Ribes alpestre Wall. ex Decne. (WA-589) | DS | Native | ✓ | ✓ | — |
|              | 430 | Parrotipsis 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 | ✓ | ✓ | — |
|              | 435 | A. bracteosa Wall. ex Bentham. (WA-165) | PH | Native | ✓ | ✓ | ✓ |
|              | 436 | A. parviflora Bentham. (WA-166) | AH | Native | ✓ | ✓ | ✓ |
|              | 437 | Antimima indica (L.) Kuntze (WA-222) | PH | Native | ✓ | ✓ | ✓ |
|              | 438 | Calliprora macrophylla Vahl (WA-32) | DS | Native | ✓ | ✓ | — |
|              | 439 | Clinopodium ambrosia (M. Bieb.) Kuntze (WA-474) | PH | Native | ✓ | ✓ | ✓ |
|              | 440 | Colebrookea oppositifolia Sm. (WA-49) | DS | Native | ✓ | ✓ | ✓ |
|              | 441 | Symphoricarpus albus (Buch.-Ham.) Kudó (WA-473) | PH | Native | ✓ | ✓ | ✓ |
| 64. Lamiaceae | 442 | I. lophanthoides (Buch.-Ham. ex D. Don) H. Harada (WA-475) | AH | Native | ✓ | ✓ | ✓ |
|              | 443 | I. rugosus (Wall. ex Bentham.) Cord (WA-304) | DS | Native | ✓ | ✓ | ✓ |
|              | 444 | L. album L. (WA-168) | PH | Native | ✓ | ✓ | ✓ |
|              | 445 | L. cephalotes (Roth) Spreng. (WA-246) | AH | Native | ✓ | ✓ | ✓ |
|              | 446 | Lewisia lanata Baker (WA-167) | PH | Native | ✓ | ✓ | ✓ |
|              | 447 | L. decemdentata (Wild.) Sm (WA-245) | PH | Native | ✓ | ✓ | ✓ |
|              | 448 | L. nutans (Roth) Spreng. (WA-50) | PH | Native | ✓ | ✓ | ✓ |
| Group/family | Sr# | Name | Status | Murree | K. Sattian | Kahuta |
|-------------|-----|------|--------|--------|-----------|--------|
| Menispermaceae | 67. | Micromeria biflora (Buch.-Ham. ex D. Don) Benth. (WA-244) | PH | Native | √ | √ | √ |
| Nyctaginaceae | 68. | Teucrium quadrifarium (D. Don) P.D. Cantino (WA-582) | DS | Native | √ | √ | — |
| 69. Malvaceae | 69. | Malva neglecta | P | Native | — | — | — |
| 70. Mazaceae | 70. | Abutilon bidentatum Hochst. ex Rich. (WA-47) | DT | Native | √ | √ | √ |
| 71. Malvaceae | 71. | Bombax ceiba L. (WA-30) | DT | Cultivated | √ | √ | — |
| 72. Menispermaceae | 72. | Ficus carica L. (WA-8) | DT | Native | √ | √ | √ |
| 73. Molluginaceae | 73. | Mollugo nudicaulis Lam. (WA-27) | AH | Native | √ | √ | — |
| 74. Moraceae | 74. | F. palmata Forssk. (WA-306) | DT | Native | √ | √ | √ |
| 75. Myrtaceae | 75. | Olea ferruginea Royle (WA-195) | ET | Native | √ | √ | √ |
| 76. Nitrariaceae | 76. | Micromeria pulverulenta | P | Native | — | — | — |
| 77. Nyctaginaceae | 77. | Boerhaavia procumbens Banks ex Roth. (WA-9) | PH | Native | √ | √ | √ |
| 78. Oleaceae | 78. | Prunella vulgaris L. (WA-6) | PH | Native | √ | — | — |
| 79. Oleaceae | 79. | Pseudocaryopteris bicolor (Roxb. ex Hardw.) P.D. Cantino (WA-531) | DS | Native | √ | √ | — |
| 80. Oleaceae | 80. | P. spectabilis | PH | Native | √ | √ | √ |
| 81. Oleaceae | 81. | Phlomis italica | PH | Native | √ | — | — |
| 82. Oleaceae | 82. | Phlomoides spectabilis (Falc. ex Benth.) Kamelin & Makhm. (WA-624) | Native | √ | — | — |

**References:**

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| Group/family | Sr# | Scientific Name | Habit | Status | Murree | K. Sattian | Kahuta |
|-------------|-----|-----------------|-------|--------|--------|-----------|--------|
| 79. Orobanchaceae | 496 | *Oenothera rosea* L’Hér. ex Aiton (WA-34) | PH | Native | √ | √ | — |
| 80. Oxalidaceae | 497 | *Oxalis corniculata* L. (WA-192) | AH | Native | √ | √ | — |
| 81. Papaveraceae | 498 | *O. pes-caprae* L. (WA-208) | PH | Native | √ | √ | √ |
| 82. Phyllanthaceae | 499 | *Corydalis mureeana* Jafri (WA-41) | AH | Native | √ | — | — |
| 83. Plantaginaceae | 500 | *Fumaria indica* (Haukskn.) Pugsley (WA-450) | AH | Native | √ | √ | √ |
| 84. Polygalaceae | 501 | *Andrachne cordifolia* (Deene.) Müll. Arg. (WA-176) | DS | Native | √ | — | — |
| 85. Polygonaceae | 502 | *Bridelia verrucosa* Haines (WA-52) | DS | Native | √ | √ | √ |
| 86. Primulaceae | 503 | *Glochidion hueleanum* (Wight & Arn.) Wight (WA-25) | ET | Native | √ | √ | — |
| 87. Punicaceae | 504 | *Phyllanthus emblica* L. (WA-38) | DT | Native | √ | √ | — |
| 88. Ranunculaceae | 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 | √ | √ | √ |
| 508 | *Bacopa monnieri* (L.) Wetst. (WA-35) | AH | Native | √ | √ | — |
| 509 | *Nanorrhina ramosissima* (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 | √ | √ | — |
| 515 | *Polygonum abyssinica* R. Br. ex Fresen (WA-81) | PH | Native | √ | — | — |
| 516 | *P. arvensis* Wild. (WA-459) | PH | Native | √ | — | — |
| 517 | *P. eriopera* DC. (WA-55) | PH | Native | √ | — | — |
| 518 | *Persicaria amplexicaulis* (D. Don) Ronse Decr. (WA-80) | PH | Native | √ | √ | — |
| 519 | *P. barbata* (L.) H. Harra (WA-309) | AH | Native | √ | √ | — |
| 520 | *P. hydropiper* (L.) Delarbre (WA-79) | AH | Native | √ | — | — |
| 521 | *P. mits* (Schrank) Holub (WA-11) | AH | Native | √ | — | — |
| 522 | *P. nepalensis* (Meissn.) 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 | √ | — | — |
| 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 | *M. africanum* L. (WA-194) | ES | Native | √ | — | — |
| 535 | *M. semisserrata* Wall. (WA-12) | DS | Native | √ | — | — |
| 536 | *Primula denticulata* Sm. (WA-145) | PH | Native | — | — | — |
| 537 | *Punica granatum* L. (WA-64) | DS | Native | √ | — | — |
| 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 pabuliflora* Wall. ex Royle (WA-63) | PH | Native | √ | — | — |
| 542 | *Clematis barberrata* Edgew. (WA-311) | C | Native | √ | √ | — |
| 543 | *C. grata* Wall. (WA-147) | C | Native | √ | √ | — |
| 544 | *C. montana* Buch.-Ham. ex DC. (WA-58) | C | Native | √ | √ | √ |
| Group/family | Sr# | Common Name and Scientific Name | Habit | Status | Murree | K. Sattian | Kahuta |
|-------------|-----|----------------------------------|-------|--------|--------|-----------|--------|
| 89. Rhamnaceae | 545 | *Ranunculus arvensis* L. (WA-312) | AH | Weed | √ | √ | √ |
|  | 546 | *R. laetus* Wall. ex Hook. f. & J.W. Thomson (WA-157) | PH | Native | √ | √ | √ |
|  | 547 | *R. maricaitus* L. (WA-148) | AH | Weed | √ | √ | √ |
|  | 548 | *R. scleratus* L. (WA-149) | AH | Native | √ | √ | √ |
|  | 549 | *Rhamnus purpurea* Edgew. (WA-77) | DT | Native | √ | √ | — |
|  | 550 | *R. trigera* (Wall.) Brandis (WA-22) | DT | Native | √ | √ | — |
|  | 551 | *R. virga* 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. oxyphyla* Edgew. (WA-156) | DS | Native | √ | √ | — |
|  | 556 | *Aegrimonia epyatoria* L. (WA-463) | AH | Native | √ | √ | — |
|  | 557 | *Cotoneaster affinis* Lindl. (WA-464) | DS | Native | √ | √ | — |
|  | 558 | *Duchesnea indica* (Jack.) Focke (WA-186) | PH | Native | √ | √ | — |
|  | 559 | *Fragaria nubicola* (Hook. f.) Lindl. ex Lacaita (WA-465) | PH | Native | √ | √ | — |
| 90. Rosaceae | 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 | √ | — | — |
|  | 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 | √ | √ | — |
| 91. Rubiaceae | 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 | √ | √ | — |
| Sr# | Group/family       | Status      | Murree | K. Sattian | Kahuta |
|-----|-------------------|-------------|--------|------------|--------|
| 96  | Scrophulariaceae   | PH Native   | √      | √          | √      |
| 594 | Verbascum thapsus L. (WA-319) | PH Native   | √      | √          | √      |
| 595 | Ailanthus altissima (Mill.) Swingle (WA-16) | DT Naturalized | √    | √          | √      |
| 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 L. (WA-324) | AH Native   | √      | √          | —      |
| 601 | S. incanum L. (WA-325) | AH Native   | √      | —          | —      |
| 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   | √      | √          | √      |
| 605 | Thymelaeaceae      | ES Native   | √      | —          | —      |
| 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   | √      | √          | √      |
| 610 | Celtis australis subsp. caucasica (Wild.) C.C. Towns. (WA-154) | ET Native   | √      | √          | √      |
| 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   | √      | √          | √      |
| 614 | Valeriana hardwickii Wall. (WA-420) | PH Native   | √      | —          | —      |
| 615 | V. jatamansi Jones (WA-348) | PH Native   | √      | —          | —      |
| 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     | √    | √          | √      |
| 621 | Viola canescens Wall. (WA-467) | PH Native   | √      | √          | √      |
| 622 | V. pilosa Blume (WA-66) | PH Native   | √      | √          | —      |
| 623 | V. stocksii Boiss.(WA-212) | PH Native   | —      | —          | √      |
| 624 | Tribulus terrestris L. (WA-65) | AH Weed     | √    | √          | √      |
| Total |                        |             | 592   | 533        | 433    |