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Ethnobotanical Report of Kotal Wild Life Park and Contiguous Area Pakistan

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Abstract- The present paper was designed to take out ethnobotanical data in Kotal wild life park and contiguous area Kohat. We documented the use of 211 plants belonging to 170 genera and 64 families included 144 herbs, 32 shrubs, 28 trees, 4 twiner and 3 parasites. On the basis of multiple purposes the herb are utilized 53.13% in which 2 herbs have 9 (30%) uses, 2 herbs have 6 (20%) uses, 14 herbs have 5 (16.67%) uses, 22 herbs have 4 (13.33%) uses, 43 herbs have 3 (10%) uses, 29 herbs have 2 (6.667%) uses and 32 herbs have single (3.333%) use; tree (28.85%) in which 4 trees have 10 (22.22%) uses, 11 trees have 9 (20%) uses, 4 trees have 8 (17.78%) uses, 2 trees have 7 (15.56%) uses, 1 tree have 6 (13.13) uses and 6 trees have 5 (11.11%) uses; shrub (16.06%) in which 2 shrubs have 9 (26.47%) uses, single shrubs have 8 (23.53%) uses, 4 shrubs 5 (14.71%), 3 shrubs 5 (14.71%), 12 shrubs 4 (11.76%), 6 shrubs 2 (5.882%) and 2 shrubs single (2.941%) use; twiner (1.44%) and parasite (0.52%). The area was investigated for the first time and information about the traditional uses with special reference to their medicinal were collected and documented before they are lost. From the economic and botanical point of view the study area has great potentiality.

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Musharaf Khan ^α & Shahana Musharaf ^σ

Abstract- The present paper was designed to take out ethnobotanical data in Kotal wild life park and contiguous area Kohat. We documented the use of 211 plants belonging to 170 genera and 64 families included 144 herbs, 32 shrubs, 28 trees, 4 twiner and 3 parasites. On the basis of multiple purposes the herb are utilized 53.13% in which 2 herbs have 9 (30%) uses, 2 herbs have 6 (20%) uses, 14 herbs have 5 (16.67%) uses, 22 herbs have 4 (13.33%) uses, 43 herbs have 3 (10%) uses, 29 herbs have 2 (6.667%) uses and 32 herbs have single (3.333%) use; tree (28.85%) In which 4 trees have 10 (22.22%) uses, 11 trees have 9 (20%) uses, 4 trees have 8 (17.78%) uses, 2 trees have 7 (15.56%) uses, 1 tree have 6 (13.13) uses and 6 trees have 5 (11.11%) uses; shrub (16.06%) in which 2 shrubs have 9 (26.47%) uses, single shrubs have 8 (23.53%) uses, 4 shrubs 5 (14.71%), 3 shrubs 5 (14.71%), 12 shrubs 4 (11.76%), 6 shrubs 2 (5.882%) and 2 shrubs single (2.941%) use; twiner (1.44%) and parasite (0.52%). The area was investigated for the first time and information about the traditional uses with special reference to their medicinal were collected and documented before they are lost. From the economic and botanical point of view the study area has great potentiality.

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Abbreviation: A: Habit; B: Medicinal; C: Fodder; D: Fuel; E: Timber; F: vegetable; G: Veterinary; Ho: Honey bee Plants; I: Fencing Plant; J: Agriculture Appliances; K: Fruit Yielding Plant; L: Furniture; T: Tree, S: Shrub; H: Herb; P: Parasite; Tw: Twiner.

I. INTRODUCTION

Ethnobotany deals with the study and evaluation of plant-human relations in all phases and the effect of plant environment on human society. Harshberger used the term "Ethnobotany" in 1896 to indicate plants used by the aborigines. It is considered as a branch of ethnobiology. In Khyber Pakhtunkhwa different scientists work in diverse area. Khan (2007) reported the important medicinal plant of Tehsil Karak, NWFP, Pakistan. Khan et al., (2011) reported 33 plant species belonging to 18 families of medicinal importance from Tehsil Karak. Khan et al., (2013) who recorded 16 timber species and 90 honeybee plant species from Tehsil Takht-e-Nasatti, District Karak, Pakistan. Khan et al., (2013) reported 161 multi-purpose species in Tehsil Takht-e-Nasrati, Pakistan. Khan et al.,

(2014) recorded 160 important plant species from Tehsil Karak, Pakistan. According to Khan et al., (2014) that 88 honeybee plant species were found in Tehsil Karak. Khan and Musharaf (2014) also reported 32 honeybee plant species from Sheikh Maltoon, Mardan. Outside of Pakistan different researchers works in different parts of the world i.e. Harshberger, (1896); Shenji, (1994); Toledo, (1996); Singh and Pandey, (1998); Tabuti et al., (2003); Kamatenesi-Mugisha et al., (2006); Bonet and Valles, (2007); Deka et al., (2007); Mood, (2008); Ragunathan and Abey., (2009) and Rethy et al., (2010). The present research was aimed to collect, document and compile diverse and disperse traditional local information of century's experienced therapeutic uses of medicinal plants of Kotal Wild Life Park. Such a study will provide evidence for their accuracy in a rigorous disease and consequently it will give a very interesting and rewarding prepharmacological ground for undertaking its investigation on scientific basis.

II. MATERIALS AND METHODS

a) Research area

Kotal Wild Life Park was established in 1989-1990 over an area of 150 acres. The Park was under the administrative control of divisional forest officer wild life Kohat. Kotal Wild Life Park was located in the North Western side of Kohat City, at a distance of 6 km from Kohat on Kohat - Peshawar road. The Park lies between coordinates 33-34 to 33-35 North and 71-22 to 71-75 east. The area falls in the sub tropical climatic zone. Rain fall was 200-300mm. Mean maximum and minimum temperature for winter and summer were given below as per the available record data of the park. Mean Maximum, Mean Minimum Summer 38c, 26.5c winter 22c, 9c. Kotal Wild Life Park has rich biodiversity consisting of a large number of plants, some of which are used for their medicinal value. Most of the population of the area around the Kotal wild life park still depends on the folk medicines as they live in far flung areas where the facilities of the medical treatment are scarcely available. These area has a rural culture of old traditions and the people have their own principle and choice for a village site house, family, dress and ornaments, weddings, childbirth, death ceremonies, cultural functions, festivals and socio-religious beliefs. So they get indigenous knowledge about the local plants.

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b) Survey and Questionnaire

The study was conducted by frequently surveying in winter, spring and summer during 2011 - 2013. Ethnobotanical information was collected by using a standard semi-structured questionnaire (Khan, 2007; 2013). The information about the medicinal uses of the plants was obtained from local experienced people through personal interview. Information about the local uses of the plants as medicinal, fuel wood, timber and fodder etc were obtained through random sampling by interviewing from different walks of life because different age group and gender use these plant for different purposes. Individual questionnaire was filled from plant collectors, housewives, shopkeepers, elders, plant traders and local healers (Hakims), who are the actual users and have a lot of indigenous knowledge about the plants and their traditional uses. The data was classified, tabulated, analyzed and concluded for final report. Plants specimens were collected, dried and identified with help of local available literature, using the herbarium, Department of Biological Sciences, FGCB Mardan, Pakistan. All plant species were divided into tree, shrubs and herbs mentioning botanical name, local name, family and parts used.

III. RESULTS AND DISCUSSION

The investigated area possesses a very rich ethnobotanical heritage in the far plunge area. Even today, the inhabitants living in surrounding the research area are using various plant species for various purposes. The locals used 211 plant species belonging to 170 genera and 64 families (Figure 1). The ethnobotanical important plants included 144 herbs, 32 shrubs, 28 trees, 4 twiner and 3 parasite species. During survey it was recognized that people used plant species for simple or multiple purposes. The plant species were studied for different uses i.e. medicinal, fodder, fuel, timber, vegetable, veterinary, honey bee plants, fencing plant, agriculture appliances, fruit yielding plant and furniture making plant. On the basis of multiple uses the herb are utilized 53.13% in which 2 herbs have 9 (30%) uses, 2 herbs have 6 (20%) uses, 14 herbs have 5 (16.67%) uses, 22 herbs have 4 (13.33%) uses, 43 herbs have 3 (10%) uses, 29 herbs have 2 (6.667%) uses and 32 herbs have single (3.333%) use; tree (28.85%) in which 4 trees have 10 (22.22%) uses, 11 trees have 9 (20%) uses, 4 trees have 8 (17.78%) uses, 2 trees have 7 (15.56%) uses, 1 tree have 6 (13.13) uses and 6 trees have 5 (11.11%) uses; shrub (16.06%) in which 2 shrubs have 9 (26.47%) uses, single shrubs have 8 (23.53%) uses, 4 shrubs 5 (14.71%), 3 shrubs 5 (14.71%), 12 shrubs 4 (11.76%), 6 shrubs 2 (5.882%) and 2 shrubs single (2.941%) use; twiner (1.44%) and parasite (0.52%) (Figure 2). Each plant has some medicinal value consequently the locals used plants for different diseases. In the present study 179 (84.83 %) medicinally

important plants were reported. The result showed that there are 158 (74.9%) plant species are being used as fodder of grazing animals which includes goat, sheep and cattle. The result revealed that the locals cut and collect 64 species (30.3 %) including 28 tree, 22 shrub, 11 herb and 3 twiner species for fuel purposes. These plants are harshly used by the locals due to lack of gas facility and some other alternate resources. These plant species have high fuel value and are therefore preferred. Timber wood species is the key source of making livelihood in the investigated area. All construction assets are completed from plant resources. In the present it was seen that timber wood was obtained from 26 (13.3%) species. 32 species wild as well as cultivated used as vegetables (15.2 %) by the locals in the area. The local used 72 (34.12 %) plant species in which 32 herb, 10 shrub and 8 tree species for curing different diseases of animals. Majority of species are used for curing stomach disorders. These plants included both wild and cultivated. Honey production was widespread in investigated area. It is the source and income in the area. In the investigated area, 116 (54.98%) honeybee plant species were present. Locals of the area protect their fields and crops by fencing the borders by using 25 (11.8%) plant species. Agriculture is the back bone of the area and people used 26 (12.3%) plant species for making agricultural appliances. The people of the area get fruit from 41 (19.4 %) species including 13 trees, 8 shrubs and 12 herbs. Some of the fruits are also exported to the various parts of the country. Among them there are 18 (54.55 %) wild and 15 (45.45 %) cultivated plants. Locally furniture is made from 27 (12.8 %) plant species. Furniture made in this area is used only for local people requirements (Table 1; Figure 3).

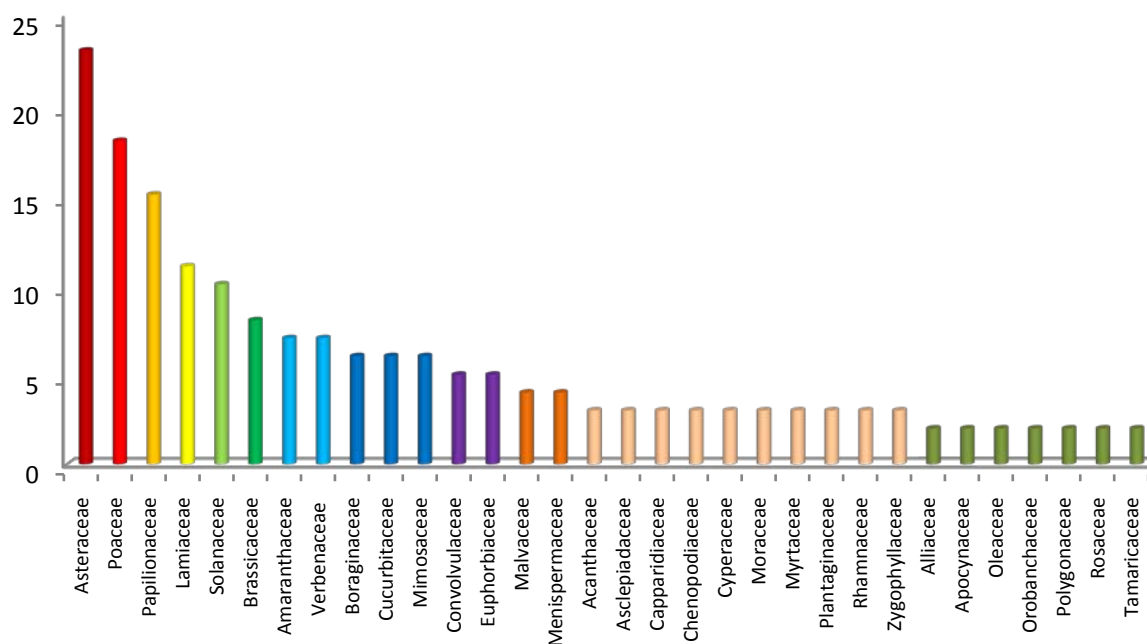


Figure 1: Number of families in research area

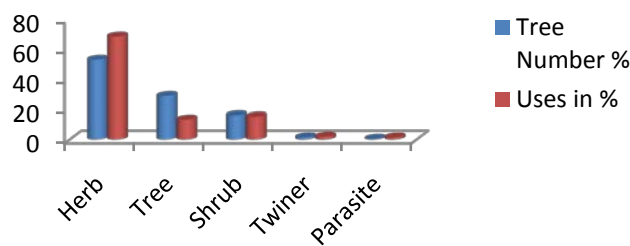


Figure 2 : Number of plant species on basis of their strata

People of the investigated areas are poor and those living in the isolated partition depend on the use of medicinal plants and prepared crude drugs in form of juice, paste, infusion, decoction, water extract and powder pills. Such type of study was also taken by Khan et al., (2013). Most of the herbal remedies were given in the form of fresh juice. In the investigated area, the people used the plants for different medicinal purposes like anthelmintic problems, digestive problems, jaundice, respiratory ailments, urinary diseases, skin diseases and diabetes. Our results agree with Khan et al., (2011a), who reported uses of *Withania* having folk therapeutic plants in southern area of Pakistan. Our finding agrees with Khan, (2013), Khan et al., (2013; 2014) who documented similar plant uses from different part of the area. Grasses and herbaceous plants are abundant in early winter. The people harvest the grasses for storing them for later use during winter. Khan and Hussain, (2012) documented the animal plant relationship in Tehsil Takht-e-Nasrati. Khan et al., (2011b) documented the ecological characteristics of

Dara Adam Khel. A number of fodder species are valued that are preferred by goat, sheep and cattle due to high nutritive values. The highly valued fodder species that used in winter season included *Acacia modesta*, *Cymbopogon jwarancusa*, *Salvadora oleoides*, *Zizyphus mauritiana* and *Zizyphus nummularia* etc. Our finding agrees with Khan et al., (2014) who stated that *Salvadora oleoides* and *Zizyphus mauritiana* is used as fodder in Karak. It is also reported in the study area and has same uses. Khan and Musharaf, (2014) mentioned 45 fodder or forage species from Sheikh Maltoon, District Mardan. All the above researchers had mentioned the same fodder species but only some of them used in the investigated area. In winter, temperature drops to low level in the area and the people preferred those species which have high heat value, burn for longer time and produce less smoke such as trees. Our result agrees with Khan et al., (2013) who reported 161 multi-purpose species in Tehsil Takht-e-Nasrati, Pakistan. Khan et al., (2014) recorded 160 important plant species from Tehsil Karak, Pakistan. Our

result is also similar with that of Khan, (2007) who reported the important medicinal plant of Tehsil Karak, NWFP, Pakistan. Our finding concerning medicinal used were similar with them. Khan et al., (2011a) also documented similar ethnobotanical work from Tehsil Karak. They reported 33 plant species belonging to 18 families of medicinal importance and some of them have been reported in the present study. Since long time wood is used for construction by human being. Although in many cases, synthetic materials and industries replacing wood, yet in the investigated area wood is easily available and economical resource of construction. The present study recorded 26 plant species on the basis of people uses. Our result is similar with Khan et al., (2013) who recorded 16 timber species from Tehsil Takht-e-Nasatti, District Karak, Pakistan.

Vegetables form an integral part of the economy and culture. The leaves especially the young shoot of wild plants are used as a vegetable included *Amaranthus viridis*, *Chenopodium album*, *Chenopodium murale* *Convolvulus arvensis* and *Spinacia oleracea*. Similar works were reported by Khan et al., (2013) and Khan, (2013) that supported the present findings. In Muslim society, honey is very consecrated and uses as a self medicine. Apiculture is a source of revenue of the inhabitants of the area. Khan, (2013) recorded 90 honeybee plant species from Takht-e-Nasrati. According to Khan et al., (2014) that 88 honeybee plant species were found in Tehsil Karak. Khan and Musharaf, (2014) also reported 32 honeybee plant species from Sheikh Maltoon, Mardan.

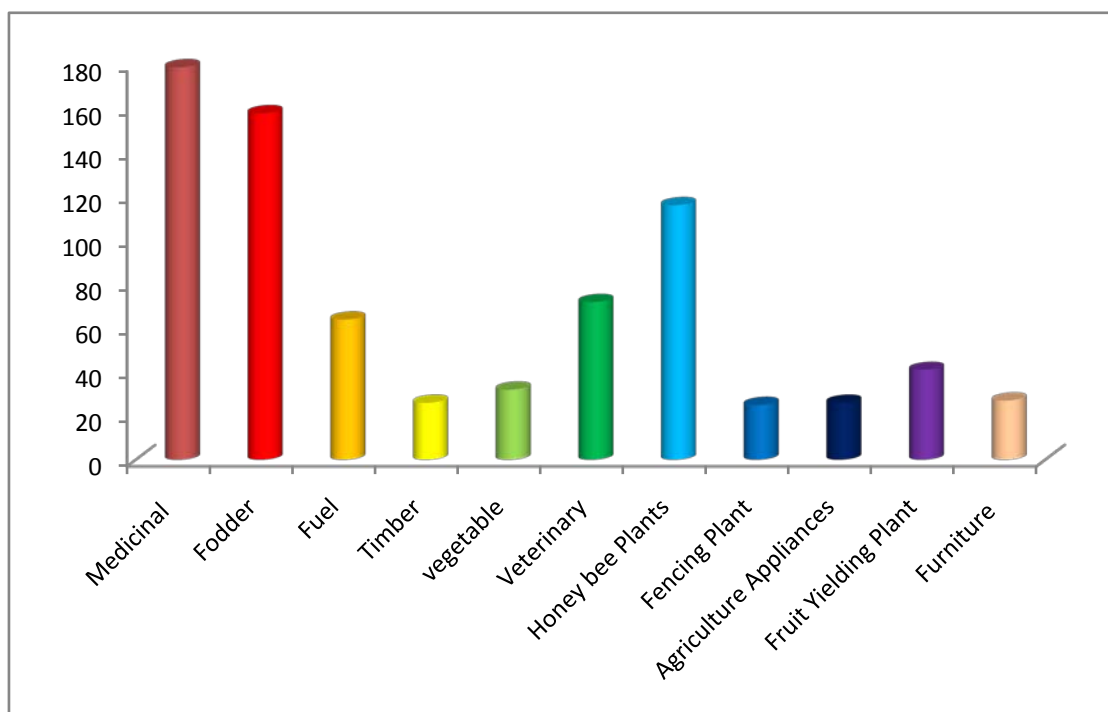


Figure 3 : Number of plant species on the basis of their uses

IV. CONCLUSION

The present study showed that the people of area has possessed good knowledge of herbal drugs but as people were going to modernization, their knowledge of traditional uses of plants might be lost in due course. Many of the important medicinal plants were sold at higher prices in the market. Most of the plants used by the local people were not conserved but were over exploited. The investigated area has a rich diversity of medicinal plants and provides a conducive habitat and ideal conditions for their growth. Native healers should be encouraged to accurately share their knowledge to others. Such studies might also provide some information to biochemist and pharmacologist in screening of individual species and in rapid assessing

of phyto-chemical constituent and bioanalysis for authentic treatment of various diseases.

V. ACKNOWLEDGEMENTS

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Table 2 : Ethnobotanical profile of plant species of Kotal Wild Life Park and contiguous area Kohat

Species	Family	A	B	C	D	E	F	G	Ho	I	J	K	L
<i>Abelmoschus esculentus</i> (L.) Moench.	Malvaceae	H	+	-	-	-	+	-	+	-	-	-	-
<i>Acacia farnesiana</i> (L.) Willd.	Mimosaceae	T	+	+	+	+	-	+	+	+	+	+	+
<i>Acacia modesta</i> Wall.	Mimosaceae	T	+	+	+	+	-	+	+	+	+	+	+
<i>Acacia nilotica</i> (L) Delice.	Mimosaceae	T	+	+	+	+	-	-	+	+	+	+	+
<i>Achyranthus aspera</i> L.	Amaranthaceae	H	-	+	-	-	-	+	+	-	-	-	-
<i>Aerua persica</i> (Burm.f.) Merrill.	Amaranthaceae	H	+	+	+	-	-	-	-	-	-	-	-
<i>Ageratum houstonianum</i> Mill	Asteraceae	H	+	-	-	-	-	-	-	-	-	-	-
<i>Ajuga bracteosa</i> Wall.ex Benth.	Lamiaceae	H	+	-	-	-	-	-	-	-	-	-	-
<i>Albizia lebbeck</i> (L.) Benth.	Mimosaceae	T	+	+	+	+	-	+	+	-	+	+	+
<i>Alhagi maurorum</i> Medic.	Papilionaceae	S	-	+	+	-	-	-	-	-	-	-	-
<i>Allium cepa</i> L.	Alliaceae	H	+	+	-	-	+	-	-	-	-	-	-
<i>Allium sativum</i> L.	Alliaceae	H	+	+	-	-	+	-	-	-	-	-	-

<i>Aloe barbadensis</i> Mill.	Aloaceae	H	+	-	-	-	-	+	-	-	-	-	-
<i>Alternanthera pungens</i> Kunth.	Amaranthaceae	H	+	-	-	-	-	+	-	-	-	-	-
<i>Amaranthus viridis</i> L.	Amaranthaceae	H	+	+	-	-	+	-	+	-	-	-	-
<i>Anagalis arvensis</i> L.	Primulaceae	H	-	+	-	-	-	-	+	-	-	-	-
<i>Anisomeles indica</i> Kuntze.	Lamiaceae	S	+	+	-	-	+	-	-	-	-	-	-
<i>Artemisia brevifolia</i> Wall	Asteraceae	H	+	-	-	-	-	-	-	-	-	-	-
<i>Asparagus gracilis</i> Royle.	Asparagaceae	H	-	+	-	-	-	-	+	-	-	-	-
<i>Asphodelous tenuifolius</i> Cavan.	Asphodelaceae	H	+	-	-	-	-	-	-	-	-	-	-
<i>Astragalus hamosus</i> L.	Papilionaceae	H	+	+	-	-	-	-	-	-	-	-	-
<i>Astragalus psilocentros</i> Fisch.	Papilionaceae	S	+	+	+	-	-	-	+	-	-	-	-
<i>Avena sativa</i> L.	Poaceae	H	+	+	-	-	-	-	+	-	-	-	-
<i>Barleria cristata</i> L.	Acanthaceae	H	+	+	-	-	-	+	-	-	-	-	-
<i>Boerhaavia diffusa</i> auct plur.	Nyctaginaceae	H	+	+	-	-	-	+	-	-	-	-	-
<i>Brassica rapa</i> L.	Brassicaceae	H	+	+	+	-	+	+	+	-	-	-	-
<i>Buxus walichiana</i> Baill	Buxaceae	H	+	+	-	-	-	-	+	-	-	-	-
<i>Calendula arvensis</i> L.	Asteraceae	H	+	+	-	-	-	-	+	-	-	-	-
<i>Callistemon citrinus</i> Stapf	Myrtaceae	T	+	+	+	+	-	+	+	-	+	+	+
<i>Calotropis procera</i> (Wild) R.Br.	Asclepiadaceae	S	+	-	+	-	-	-	-	-	-	-	-
<i>Cannabis sativa</i> L.	Cannabinaceae	H	+	+	-	-	-	+	+	-	-	-	-
<i>Capparis decidua</i> (Forssk). EdgeWorth.	Capparidaceae	T	+	+	+	-	-	+	+	+	+	+	-
<i>Capparis spinosa</i> L.	Capparidiaceae	S	+	+	+	-	-	-	+	-	-	+	-
<i>Capsicum annum</i> L.	Solanaceae	H	+	+	-	-	+	-	-	-	-	+	-
<i>Caralluma tuberculata</i> N. E. Brown	Asclepiadaceae	H	+	-	+	-	-	-	-	-	-	-	-
<i>Carthamus oxycantha</i> Bieb	Asteraceae	H	+	-	-	-	-	-	+	-	-	-	-
<i>Celosia argentea</i> L.	Amaranthaceae	H	+	-	-	-	-	+	-	-	-	-	-
<i>Cenchrus biflorus</i> Hook. f.,	Poaceae	H	-	+	-	-	-	-	-	-	-	-	-
<i>Cenchrus ciliaris</i> L.	Poaceae	H	-	+	-	-	-	-	-	-	-	-	-
<i>Centaurea iberica</i> Trev.Ex. Spreng.	Asteraceae	H	+	+	-	-	-	-	-	-	-	-	-
<i>Chenopodium album</i> L.	Chenopodiaceae	H	+	+	-	-	+	+	+	-	-	-	-
<i>Chenopodium murale</i> L.	Chenopodiaceae	H	+	+	-	-	+	+	+	-	-	-	-
<i>Chrozophora obliqua</i> (Vahl) A. Juss.	Euphorbiaceae	H	+	+	-	-	-	+	-	-	-	-	-
<i>Chrysanthemum leucanthemum</i> L.	Asteraceae	H	+	+	-	-	-	-	+	-	-	-	-
<i>Cicer arietinum</i> L.	Papilionaceae	H	+	+	-	-	+	+	+	-	-	+	-
<i>Cissampelos pareira</i> L.	Menispermaceae	Tw	+	+	-	-	-	-	-	-	-	-	-
<i>Cistanche tubulosa</i> (Schenk) Wight.	Orobanchaceae	P	+	-	-	-	-	+	-	-	-	-	-
<i>Cistrum nocturnum</i> L.	Solanaceae	S	+	-	+	-	-	-	+	-	-	-	-
<i>Citharexylum spinosum</i> L.	Verbenaceae	T	+	+	+	+	-	+	+	-	+	+	+
<i>Citrullus colocynthis</i> L. Schrad.	Cucurbitaceae	H	+	-	-	-	-	+	+	-	-	+	-
<i>Cleome viscosa</i> L.	Capparidiaceae	H	+	-	-	-	-	-	-	-	-	-	-
<i>Cocculus pendulus</i> (Forst) Diels	Menispermaceae	S	+	-	-	-	-	-	-	-	-	-	-
<i>Convolvulus arvensis</i> L.	Convolvulaceae	H	+	+	-	-	+	+	+	-	-	-	-
<i>Convolvulus pluricaulis</i> Choisy	Convolvulaceae	H	+	+	-	-	-	-	+	-	-	-	-

<i>Convolvulus microphyllus</i> Sieber	Convolvulaceae	S	+	-	-	-	-	+	-	-	-	-	-
<i>Conyza bonariensis</i> (L.) Cronquist	Asteraceae	H	+	+	-	-	-	-	+	-	-	-	-
<i>Conyza canadensis</i> (L.) Cronquist	Asteraceae	H	+	+	-	-	-	-	+	-	-	-	-
<i>Corchorus trilocularis</i> L.	Tiliaceae	H	+	-	-	-	-	-	-	-	-	-	-
<i>Coriandrum sativum</i> L.	Apiaceae	H	+	+	-	-	+	+	+	-	-	-	-
<i>Coronopus didymus</i> (L) Smith.	Brassicaceae	H	-	+	-	-	-	-	-	-	-	-	-
<i>Crotalaria medicaginea</i> Lam.	Papilionaceae	H	+	-	-	-	-	-	-	-	-	-	-
<i>Cucurbita maxima</i> Duchesne.	Cucurbitaceae	H	+	+	-	-	+	-	+	-	-	+	-
<i>Cucurbita pepo</i> L.	Cucurbitaceae	H	+	+	-	-	+	-	+	-	-	+	-
<i>Cuscuta reflexa</i> Roxb.	Cuscutaceae	P	+	-	-	-	-	-	-	-	-	-	-
<i>Cymbopogon jwarancusa</i> (Jones) Schult.	Poaceae	H	+	+	+	-	-	+	-	-	-	-	-
<i>Cynodon dactylon</i> (L) Pers.	Poaceae	H	+	+	-	-	-	-	-	-	-	-	-
<i>Cynoglossum lanceolatum</i> Forssk.	Boraginaceae	H	+	+	-	-	-	+	+	-	-	-	-
<i>Cyperus niveus</i> Retz.	Cyperaceae	H	+	+	-	-	-	-	+	-	-	-	-
<i>Cyperus rotundus</i> L.	Cyperaceae	H	+	+	-	-	-	-	+	-	-	-	-
<i>Cyperus scarlosus</i> R.Br.	Cyperaceae	H	+	+	-	-	-	-	+	-	-	-	-
<i>Dalbergia sissoo</i> Roxb.	Papilionaceae	T	+	+	+	+	-	+	+	-	+	+	+
<i>Datura metel</i> L.	Solanaceae	S	+	-	+	-	-	-	-	-	-	-	-
<i>Datura innoxia</i> Mill.	Solanaceae	S	+	-	+	-	-	-	-	-	-	-	-
<i>Descurainia Sophia</i> (L.) Webb.	Brassicaceae	H	-	-	-	-	-	+	-	-	-	-	-
<i>Desmostachya bipinnata</i> (L) Stapf.	Poaceae	H	+	-	-	-	-	+	-	-	-	-	-
<i>Dichanthium annulatum</i> (Forsk) Staph.	Poaceae	H	+	+	-	-	-	-	-	-	-	-	-
<i>Dicliptera roxburghiana</i> Nees	Acanthaceae	H	+	+	-	-	-	+	-	-	-	-	-
<i>Digera muricata</i> (L). Mart.	Amaranthaceae	H	+	+	-	-	-	-	-	-	-	-	-
<i>Dodonaea viscosa</i> L.	Sapindaceae	S	+	-	+	-	-	-	+	-	-	-	-
<i>Duchesnea indica</i> (Andrew) Focke	Rosaceae	H	+	-	-	-	-	-	-	-	-	-	-
<i>Echinochloa colonum</i> (L) Link.	Poaceae	H	-	+	-	-	-	-	-	-	-	-	-
<i>Echinops echinatus</i> D.C	Asteraceae	H	-	+	-	-	-	-	-	-	-	-	-
<i>Eragrostis pilosa</i> (L.) P.Beauv	Poaceae	H	+	+	+	-	-	-	-	+	-	-	-
<i>Eragrostis poaoides</i> Beauv.	Poaceae	H	+	+	-	-	-	-	-	-	-	-	-
<i>Erodium malacoides</i> Willd	Geraniaceae	H	-	+	-	-	-	-	-	-	-	-	-
<i>Eruca sativa</i> Millel.	Brassicaceae	H	+	+	-	-	+	+	+	-	-	-	-
<i>Eucalyptus globules</i> L.	Myrtaceae	T	+	+	+	+	-	-	-	+	-	-	-
<i>Eucalyptus lanceolatus</i> L	Myrtaceae	T	+	+	+	+	-	-	-	+	-	-	+
<i>Euphorbia helioscopia</i> L.	Euphorbiaceae	H	-	-	-	-	-	-	-	-	-	-	+
<i>Euphorbia hirta</i> L.	Euphorbiaceae	H	+	+	-	-	-	+	-	-	-	-	-
<i>Euphorbia prostrata</i> Ait.	Euphorbiaceae	H	+	+	-	-	-	-	+	-	-	-	-
<i>Evolvulus alsinoides</i> L.	Convolvulaceae	H	-	+	-	-	-	-	-	-	-	-	-
<i>Fagonia cretica</i> L.	Zygophyllaceae	H	+	+	-	-	-	-	+	-	-	-	-
<i>Ficus palmate</i> Forsk.	Moraceae	T	+	+	+	+	-	-	+	+	+	+	+
<i>Fumaria indica</i> (Haussk.) Pugsley.	Fumaraceae	H	-	-	-	-	-	-	+	-	-	-	-
<i>Grevillea robusta</i> A. Cunn.	Proteaceae	T	+	+	+	+	+	+	+	+	+	+	+

Gymnosporia royleana Wall.	Celastraceae	T	+	+	+	+	-	-	+	-	+	-	+
Hedera nepalensis K.Koch	Araliaceae	S	+	-	+	-	-	+	+	-	-	-	-
Helianthus annuus L.	Asteraceae	H	+	+	-	-	-	-	+	-	-	-	-
Heliotropium europaeum L.	Boraginaceae	H	+	+	-	-	-	+	+	-	-	-	-
Heliotropium strigosum Willd.	Boraginaceae	H	+	-	-	-	-	-	-	-	-	-	-
Hordeum vulgare L.	Poaceae	H	+	+	-	-	-	-	+	-	-	-	-
Hypericum pendulum L.	Hypericaceae	H	+	-	-	-	-	-	-	-	-	-	-
Ifloga fontanesii Cass.	Asteraceae	H	+	+	-	-	-	-	-	-	-	-	-
Indigofera linifolia (L.f.) Rets.	Papilionaceae	H	+	-	-	-	+	-	-	-	-	-	-
Ipomoea hederacea (L.) Jack.	Convolvulaceae	H	+	-	-	-	-	+	-	-	-	-	-
Justicia adhatoda L.	Acanthaceae	S	+	+	-	-	-	+	-	-	-	-	-
Kickxia ramosissima (Wall) Jan.	Scrophulariaceae	H	+	-	-	-	-	+	+	-	-	-	-
Lactuca sativa L.	Asteraceae	H	+	+	-	-	+	-	+	-	-	-	-
Lactuca serriola L.	Asteraceae	H	+	+	-	-	+	-	+	-	-	-	-
Lantana camara L.	Verbenaceae	S	+	+	+	+	-	+	+	-	+	+	+
Launaea nudicaulis (L.) Hook. f.	Asteraceae	H	+	+	-	-	-	+	+	-	-	-	-
Launaea procumbens (Roxb.) Ramayya & Rajgopal.	Asteraceae	H	+	+	-	-	-	+	+	-	-	-	-
Lens culinaris Medic.	Papilionaceae	H	+	+	-	-	+	-	-	-	-	-	-
Lepedeza juncea (L.f.) Pers	Papilionaceae	H	+	+	-	-	+	-	-	-	-	-	-
Lepidium sativum L.	Brassicaceae	H	-	+	-	-	-	-	-	-	-	-	-
Leucas capitata Desf.	Lamiaceae	H	+	+	-	-	+	+	+	-	-	-	-
leucas cephalotes (Roth) Spreng.	Lamiaceae	H	+	+	-	-	+	+	+	-	-	-	-
Lippia nodiflora (L.) L.C. Rich.ex Michaux.	Verbenaceae	H	+	+	-	-	+	-	-	-	-	-	-
Lithospermum arvense L.	Boraginaceae	H	+	-	-	-	-	-	-	-	-	-	-
Luffa acutangula Roxb.	Cucurbitaceae	H	+	+	-	-	+	-	+	-	-	+	-
Luffa aegyptiaca (L) M.J.Rocm.	Cucurbitaceae	H	+	+	-	-	+	-	+	-	-	+	-
Lycopersicom esculentum Mill.	Solanaceae	H	+	+	-	-	-	-	+	-	-	+	-
Malcolmia africana (L) R.Br.	Brassicaceae	H	-	+	-	-	-	-	-	-	-	-	-
Malva neglecta Wallr.	Malvaceae	H	+	+	-	-	-	-	+	-	-	-	-
Malva parviflora L.	Malvaceae	H	+	+	-	-	-	-	+	-	-	-	-
Malvastrum coromandelianum (L.) Gareke.	Malvaceae	H	-	+	-	-	-	-	-	-	-	-	-
Medicago laciniata (L.) Mill.	Papilionaceae	H	-	+	-	-	-	-	+	-	-	-	-
Melia azedarach L.	Meliaceae	T	+	+	+	-	-	-	+	-	-	-	+
Melilotus indicus (L.) All.	Papilionaceae	H	+	-	-	-	+	-	-	-	-	-	-
Mentha arvensis L.	Lamiaceae	H	+	+	-	-	+	+	+	-	-	-	-
Mentha longifolia (L.) Huds	Lamiaceae	H	+	+	-	-	+	+	+	-	-	-	-
Micromeria biflora (Buchi .Ham exD. DonBenth).	Lamiaceae	H	-	+	-	-	-	-	-	-	-	-	-
Mimosa himalayana Gamble	Mimosaceae	T	+	+	+	+	-	+	+	-	+	+	+
Momordica charantia L.	Cucurbitaceae	H	+	-	-	-	-	-	+	-	-	-	-
Monothea buxifolia (falk) A.DC.	Sapotaceae	T	+	+	+	-	-	-	+	-	+	+	+
Morus alba L.	Moraceae	T	+	+	+	+	-	-	+	+	+	+	+
Morus nigra L.	Moraceae	T	+	+	+	+	-	-	+	+	+	+	+

<i>Murraya paniculata</i> (L.) Jack	Rutaceae	S	+	+	+	-	-	-	-	+	-	-	-
<i>Nerium oleander</i> Mill.	Apocynaceae	S	+	-	+	-	-	+	+	-	-	-	-
<i>Nyctanthes arbor-tristis</i> L.	Oleaceae	S	+	+	+	+	-	-	+	+	+	+	+
<i>Ocimum basilicum</i> L.	Lamiaceae	S	+	+	-	-	-	+	+	-	-	-	-
<i>Olea ferrugina</i> Royle.	Oleaceae	T	+	+	+	+	-	-	+	+	+	+	+
<i>Opuntia ficus indica</i> (L.) Mill	Cactaceae	S	-	-	-	-	-	-	-	+	-	-	-
<i>Orobanche ramosa</i> L.	Orobanchaceae	P	+	-	-	-	-	-	-	-	-	-	-
<i>Otostegia limbata</i> (Benth.) Boiss.	Lamiaceae	S	+	+	+	-	-	-	+	-	-	-	-
<i>Oxalis corniculata</i> L.	Oxalidaceae	H	-	+	-	-	-	-	-	-	-	-	-
<i>Parkinsonia aculeata</i> L.	Cesalpiniaceae	T	-	+	+	+	-	-	-	+	-	-	+
<i>Parthenium hysterophorus</i> L.	Asteraceae	H	+	+	-	-	-	-	+	-	-	-	-
<i>Peganum harmala</i> L.	Zygophyllaceae	H	+	-	-	-	-	+	-	-	-	+	-
<i>Pennisetum typhoides</i> (Burm) Stapf.	Poaceae	H	-	+	+	-	-	-	+	-	-	-	-
<i>Periploca aphylla</i> Decne.	Asclepiadaceae	S	+	+	+	-	-	-	-	-	-	-	-
<i>Phoenix dactylifera</i> L.	Arecaceae	T	+	+	+	+	-	-	+	+	-	+	+
<i>Phragmites karka</i> (Retz) Trin. Ex. Steud.	Poaceae	H	-	-	+	-	-	-	-	+	-	-	-
<i>Plantago ciliata</i> Desf.	Plantaginaceae	H	+	+	-	-	-	-	+	-	-	-	-
<i>Plantago lanceolata</i> L.	Plantaginaceae	H	+	+	-	-	-	-	-	-	-	-	-
<i>Plantago ovata</i> Forsk.	Plantaginaceae	H	+	+	-	-	-	-	+	-	-	-	-
<i>Polygonum plebeium</i> R. Br.	Polygonaceae	H	+	+	+	-	-	-	-	+	-	-	-
<i>Prosopis juliflora</i> (SW.) DC.	Mimosaceae	T	-	+	+	-	-	-	+	+	+	-	-
<i>Punica granatum</i> L.	Punicaceae	T	+	+	+	-	-	-	+	-	-	+	-
<i>Pupalia lappacea</i> (L.) Juss.	Amaranthaceae	H	-	+	-	-	-	-	-	-	-	-	-
<i>Ranunculus muricatus</i> L.	Ranunculaceae	H	+	-	-	-	-	-	-	-	-	-	-
<i>Raphanus sativus</i> L.	Brassicaceae	H	+	+	-	-	+	-	+	-	-	-	-
<i>Rhazya stricta</i> Decne.	Apocynaceae	S	+	-	+	-	-	+	+	-	-	-	-
<i>Rhynchosia minima</i> (L.) DC.	Papilionaceae	Tw	+	+	-	-	-	-	-	-	-	-	-
<i>Ricinus communis</i> L.	Euphorbiaceae	S	+	-	+	-	-	-	-	-	-	-	-
<i>Rosa indica</i> L.	Rosaceae	S	+	+	-	-	-	+	+	-	-	-	-
<i>Rumex dentatus</i> L.	Polygonaceae	H	+	+	-	-	-	+	+	-	-	-	-
<i>Saccharum bengalense</i> Retz	Poaceae	S	+	+	+	-	-	+	-	+	-	-	-
<i>Saccharum spontaneum</i> L.	Poaceae	S	+	+	+	-	-	-	-	+	-	-	-
<i>Salvadora oleoides</i> Decne.	Salvadoraceae	T	+	+	+	+	-	+	+	+	+	-	+
<i>Salvia moorcroftiana</i> Wall	Lamiaceae	H	+	-	-	-	-	-	+	-	-	-	-
<i>Saussurea heteromalla</i> (D. Don) Hand.	Asteraceae	H	-	+	-	-	-	-	-	-	-	-	-
<i>Sesamum indicum</i> L.	Pedaliaceae	H	+	+	-	-	-	+	+	-	-	-	-
<i>Silene conoidea</i> L.	Caryophyllaceae	H	+	+	-	-	-	-	-	-	-	-	-
<i>Sissymbrium irio</i> L.	Brassicaceae	H	+	+	-	-	-	-	+	-	-	-	-
<i>Solanum incanum</i> L.	Solanaceae	H	+	+	-	-	-	+	-	-	-	-	-
<i>Solanum nigrum</i> L.	Solanaceae	H	+	-	-	-	+	-	-	-	-	-	-
<i>Solanum surattense</i> Burm.f	Solanaceae	H	+	-	-	-	-	-	+	-	-	-	-
<i>Sonchus asper</i> (L.) Hill.	Asteraceae	H	+	+	-	-	-	+	-	-	-	-	-

<i>Sonchus oleraceus</i> L.	Asteraceae	H	+	+	-	-	-	-	+	-	-	-	-
<i>Sorghum vulgare</i> (L.) Pers.	Poaceae	H	-	+	-	-	-	-	-	-	-	-	-
<i>Spinacia oleraceae</i> L.	Chenopodiaceae	H	-	+	-	-	+	-	-	-	-	-	-
<i>Tagetes minuta</i> L.	Asteraceae	H	+	+	-	-	-	-	+	-	-	-	-
<i>Tagetes patula</i> L.	Asteraceae	H	+	+	-	-	-	-	+	-	-	-	-
<i>Tamarix aphylla</i> (L.) Karst.	Tamaricaceae	T	+	+	+	+	-	+	+	-	+	-	+
<i>Tamarix decidua</i> Roxb.	Tamaricaceae	T	+	+	+	+	-	+	+	-	+	-	+
<i>Taraxacum officinale</i> Weber.	Asteraceae	H	-	+	-	-	-	+	+	-	-	-	-
<i>Teucrium stocksianum</i> Boiss	Lamiaceae	H	-	+	-	-	-	-	-	-	-	-	-
<i>Tinospora cordifolia</i> Miers	Menispermaceae	Tw	+	+	+	-	-	-	-	-	-	-	-
<i>Tinospora malabarica</i> Miers	Menispermaceae	Tw	+	+	+	-	-	-	-	-	-	-	-
<i>Trianthema portulacastrum</i> L.	Aizoaceae	H	+	+	-	-	-	-	-	-	-	-	-
<i>Tribulus terrestris</i> L.	Zygophyllaceae	H	+	+	-	-	-	+	+	-	-	+	-
<i>Trichodesma incanum</i> Bunge.	Boraginaceae	H	+	+	-	-	-	+	+	-	-	-	-
<i>Trichodesma indicum</i> (L.) Sm.	Boraginaceae	H	+	+	-	-	-	+	+	-	-	-	-
<i>Trifolium alexandrianum</i> L.	Papilionaceae	H	+	+	-	-	-	+	+	-	-	-	-
<i>Trifolium repens</i> L.	Papilionaceae	H	-	+	-	-	-	-	-	-	-	-	-
<i>Triticum aestivum</i> L.	Poaceae	H	+	+	-	-	-	-	+	-	-	+	-
<i>Verbena officinalis</i> L.	Verbenaceae	H	+	+	+	+	-	+	+	-	+	+	+
<i>Verbena tenuisecta</i> Briq.	Verbenaceae	H	+	+	+	+	-	+	+	-	+	+	+
<i>Vicia sativa</i> L.	Papilionaceae	H	+	+	-	-	-	+	+	-	-	-	-
<i>Vites vinifera</i> L.	Vitaceae	S	+	+	-	-	-	-	+	-	-	+	-
<i>Vitex negundo</i> L.	Verbenaceae	S	+	-	-	-	-	+	+	-	-	+	-
<i>Vitex trifolia</i> L.	Verbenaceae	S	+	-	+	-	-	+	+	-	-	+	-
<i>Withania coagulans</i> Dunal.	Solanaceae	S	+	-	+	-	-	+	+	-	-	+	-
<i>Withania somnifera</i> (L) Dunal.	Solanaceae	S	+	-	-	-	-	+	+	-	-	+	-
<i>Xanthium strumarium</i> L.	Asteraceae	H	+	-	+	-	-	-	-	-	-	-	-
<i>Zea mays</i> L.	Poaceae	H	+	+	-	-	-	-	+	-	-	-	-
<i>Zizyphus mauritiana</i> Lam	Rhamnaceae	T	+	+	+	+	-	+	+	+	+	+	+
<i>Zizyphus nummularia</i> (Burm.f) W.&A.	Rhamnaceae	S	+	+	+	-	-	+	+	+	+	+	-
<i>Zizyphus oxyphylla</i> EdgeW	Rhamnaceae	T	+	+	+	-	-	-	+	-	-	+	-
Total			179	158	64	26	32	72	116	25	26	41	27