



RESEARCH PAPER

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Documentation of floristic inventory along the national highway: a case study of Dhanbad district, Jharkhand, India

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Abstract

Dhanbad city is the coal capital of India. The Dhanbad town is spread over an area of 23.39 sq. kms. Dhanbad is the only district in the Jharkhand state where participation in the non-agricultural sector is more than that in the agricultural sector. It is obviously due to availability of the coal resources has prompted extensive mining activity. The studies concern along the national highway vegetation lying in the Dhanbad district, Jharkhand state, India. Which possess highly valuable vegetation; these areas are covered with different habits types of vegetation like Tree, Small tree, Cactus tree, Fern, Shrub, Small shrub, Cactus shrub, Climber, Herb, Bulb, Grass, and Stem parasite. The study area is also rich in medicinal plants and economic importance. The assessment has resulted in the recording of 138 plant species belonging to Angiosperms, 2 plants to Pteridophytes and 2 plants to Gymnosperms. Among under 53 families and 121 genera during 21 May, 2013 to 30 June, 2014. For each species scientific name, family name and habit are provided. Out of 142 plants identified along the NH-2, Dhanbad district.

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Introduction

Dhanbad district lies in the mid eastern part of Jharkhand state. Giridih bound it in the north, Bokaro in the west, Purulia district in the south and Jamtara district in the east. It is connected through NH-2 and NH-32 from state capital and different district headquarters of the state. The district has total area of 2089 sq. km. and is located between 23° 26' - 24° 01' North latitude to 86° 10' - 86° 48' East longitude. Area is included in toposheet no 73I/1, 73I/2, 73I/5, 73I/6, 73I/7, 73I/9, 73I/10, 73I/13 and 73I/14 of survey of India (1:50000 scale) (Rahul and Jain, 2014). Forest cover is spread over 189 sq. km. Area in the district. Land put to non-agricultural use covers 431 sq. km., Barren and uncultivable waste covers 325 sq. km., cultivable wasteland covers 113 sq. km. and current fallow is 392 sq. km. Net area sown is 346 sq. km. Man has surveyed remote galaxies and has stood on the surface of moon but has not so far come anywhere near to completing a taxonomic catalogue of the fewer than half a million species of higher plants that grow on our planet (Burmmitt *et al.*, 2001). The first and foremost process in ascertaining the biodiversity is the taxonomic treatment of living organisms. This can be achieved only through the process involving extensive exploration, identification and documentation. Earlier works in this branch of science in the Indian subcontinent resulted in the preparation of national and provincial floras.

Flora of British India was published by J.D Hooker during 1872-1897. This seven volume publication dealt with the phanerogams of the erstwhile British India with phytogeographical information. Subsequently regional floras like Flora of the Presidency of Bombay (Cooke, 1901-1908) and Flora of the Presidency of Madras (Gamble, 1915-1936) were published and the latter work is adjudged as the best among the regional floras. Major contributions to the floristic studies in India were made by the Britishers.

In IPNI, the number of new descriptions/revisions of vascular plants per continent (period 2004-2008,

below), for Africa is surprisingly low, considering the estimated biodiversity for that continent (Kier *et al.*, 2005). The study of floristic composition of the vegetation is crucial for conservation management and the ecologically sustainable management of natural resources that provides the starting point for more detailed study (Ejtehadi *et al.*, 2005; Tastad *et al.*, 2010). Vegetation documentation and classification efforts also required for biological conservation, from planning and inventory to direct resource management (Jennings *et al.*, 2009).

Materials and methods

The whole study area was thoroughly visited through walking method and mapped the whole study area also scored the important point of vegetation by GPS. Plant specimen was collected weekly from April to march in 2013-2014. Plant specimens were identified with the help of (Duthie, J.F. 1905; Hooker, J.D. 1872; Roxburgh, W. 1832). The specimens were checked and kept at the department of environmental science and engineering, center of mining environment, Indian school of mines, Dhanbad, Jharkhand, India.

- The list of plants (Texas) was ordered according to the vegetation of British India (Hooker, J.D., 1872), after the species name (scientific name), family name, habitat properties, altitude, collection date, plant code names were identified and registered.

Description of study area

The Present study was primarily focused on vegetation along the NH-2 highway in Dhanbad, (Fig. 1) which enters from Barakar River in Dhanbad district and moves towards Gaya via Barwaadda, Raj Nagar and Isri. Numbers of activities are failing on both sides of NH-2 but my investigation area is the start of Kisaan check to Major, distance between Xian check to 12.3 kilometer. Actions are small townships, commercial activities, agriculture and manufactures such as coke oven plant and brick making units.

Depending on the nature of the surrounding environment, the type of input into the flora on the

national highway differed from the site-A and site-B. The vegetation was very rich in both sides, but site-B (Gobinpur to Kisaan Chowk) was very rich Comair to Site- A (Kisaan Chowk to Gobindpur).



Fig.1. Study area map of dhanbad district, NH-2 highway (Kisaan chowk to Gobindpur).

Results and discussion

Floristic inventory of floral diversity along the national highway (NH-2), Dhanbad, Jharkhand state, India has revealed a total of 138 angiosperm taxa under 120 genera and 50 families, 2 gymnosperm taxa under 2 genera and 2 families, 2 pteridophyte taxa under 2 genera and 2 families respectively (Table. 1). The dominant family was fabaceae recorded in investigation area and other sub-dominant families were Malvaceae, Asteraceae, Amaranthaceae, Apocynaceae, Euphorbiaceae, Solanacea, and verbenaceae.

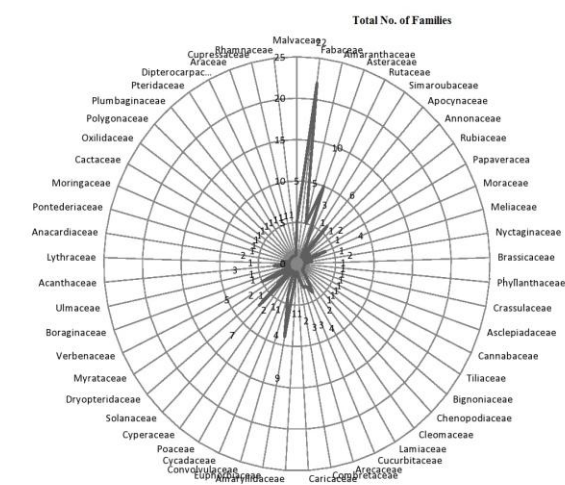


Fig.2. Radar diagram showing the contribution of families in investigation area (NH-2 Highway).

The families which receive the highest number of genera were as follows; Fabaceae (22), Asteraceae (10), Euphorbiaceae (9), Solanaceae (7), Apocynaceae (6), Malvaceae (5), Amaranthaceae (5) and Verbenaceae (5) (Fig. 2).

Among the total flora (T) tree was reported by 44 (31%), (S) Shrub 16 (11%), (H) Herb 51 (36%), (ST) Small tree 8 (5%), (F) Fern 3 (1%), (CT) Cactus tree 1 (1%), (SS) Small shrub 7 (5%), (CS) Cactus shrub 1 (1%), (C) Climber 8 (6%), (B) Bulb 1 (1%), (SP) Stem Parasite 1 (1%) and (G) Grass 2 (1%) (Fig.3). the dominant species were reported (PSP-4) *Achyranthes aspera*, (PSP-41) *Clerodendrum infortunatum*, (PSP-54) *Cynodon dactylon*, (PSP76) *Hyptis suaveolens*, (PSP-84) *Lantana camara*, (PSP-105) *Peristrophe bicalyculata*, and (PSP-121) *Sida cordifolia*.

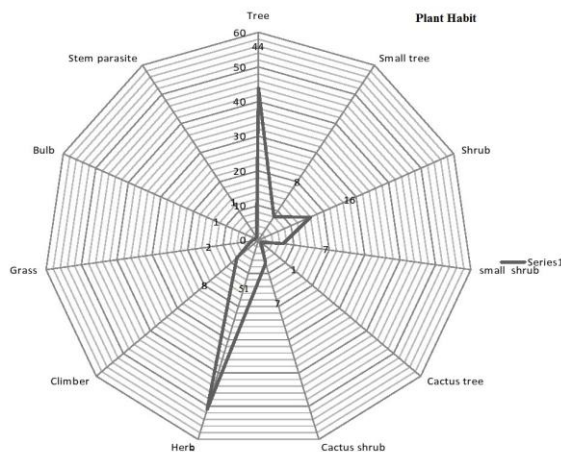


Fig. 3. Radar diagram showing the contribution of different types of plant habit in investigation area (NH-2, Highway).

(T) Tree, (S) Shrub, (H) Herb, (ST) Small tree, (F) Fern, (CT) Cactus tree, (SS) Small shrub, (CS) Cactus shrub, (C) Climber, (B) Bulb, (SP) Stem Parasite, (G)Grass

In the present study the floral diversity of roadside (NH-2, Highway) showed highest diversity and species richness especially in trees, shrubs and herbaceous plants. The pattern of plant diversity is likely the result of complex in investigations at

multiple scales among physical and biological factors within an historical context of stochastic disturbance

events (Brockway, 1998). The results of spatial pattern analysis of shrubs and the perennial herb

Table. 1. List of species recorded along the highway (NH-2).

S. No.	Code	Botanical name	Authority	English Name	Family	Habit
1.	PSP1	<i>Abutilon indicum</i>	(L.) sweet	Indian mallow	Malvaceae	S
2.	PSP2	<i>Acacia Arabica</i>	(L.)	Babula tree	Fabaceae	T
3.	PSP3	<i>Acacia auriculiformis</i>	A.cunn. ex Benth.	Earleaf acacia	Fabaceae	T
4.	PSP4	<i>Achyranthes aspera</i>	L.	Prickly chaff flower	Amaranthaceae	H
5.	PSP5	<i>Acmella uliginosa</i>	(Sw.) Cass.	Marsh para cress	Asteraceae	H
6.	PSP6	<i>Aegle marmelos</i>	(L.) Correa	Stone apple	Rutaceae	T
7.	PSP7	<i>Aerva lanata</i>	(L.) Juss.	Knot grass	Amaranthaceae	H
8.	PSP8	<i>Ageratum conyzoides</i>	L.	Chick weed	Asteraceae	H
9.	PSP9	<i>Ailanthus excels</i>	Roxb.	Heaven tree	Simaroubaceae	T
10.	PSP10	<i>Albizia lebbek</i>	(L.) Benth.	Siris tree	Fabaceae	T
11.	PSP11	<i>Alstonia scholaris</i>	(L.) R.Br.	Devil tree	Apocynaceae	T
12.	PSP12	<i>Alternanthera sessilis</i>	(L.) R.Br.	Joyweed	Amaranthaceae	H
13.	PSP13	<i>Amaranthus spinosus</i>	L.	Spiny amaranth	Amaranthaceae	H
14.	PSP14	<i>Annona squamosa</i>	L.	Sugar apple	Annonaceae	ST
15.	PSP15	<i>Anthocephalus indicus</i>	(Roxb.)	Kadam tree	Rubiaceae	T
16.	PSP16	<i>Argemone maxicana</i>	L.	Maxican poppy	Papaveracea	H
17.	PSP17	<i>Artocarpus heterophyus</i>	Lam.	Jackfruit	Moraceae	T
18.	PSP18	<i>Azadirachta indica</i>	A.Juss.	Neem	Meliaceae	T
19.	PSP19	<i>Bauhinia verigata</i>	(L.) Benth.	Orchid tree	Fabaceae	T
20.	PSP20	<i>Blumea lacera</i>	DC.	Blumea	Asteraceae	H
21.	PSP21	<i>Boerhavia diffusa</i>	L.	Pig weed	Nyctaginaceae	H
22.	PSP22	<i>Bombax malabaricum</i>	L.	Cotton tree	Malvaceae	T
23.	PSP23	<i>Bougainvillea glabra</i>	Choisy	Paper flower	Nyctaginaceae	C
24.	PSP24	<i>Brassica compestris</i>	L.	Mustard	Brassicaceae	H
25.	PSP25	<i>Breynia retusa</i>	(Dennst.)	Cup saucer plant	Phyllanthaceae	S
26.	PSP26	<i>Bryophyllum pinnatum</i>	(Lam.) oken	Life plant	Crassulaceae	H
27.	PSP27	<i>Butea monosperma</i>	(Lam.)	Flame of the forest	Fabaceae	T
28.	PSP28	<i>Calotropis gigantean</i>	(Alt.) R.Br.	Milkweed	Asclepiadaceae	S
29.	PSP29	<i>Calotropis procera</i>	(Aiton) W.T. Aiton	Sodom apple	Asclepiadaceae	S
30.	PSP30	<i>Canabis sativa</i>	L.	Hemp	Cannabaceae	H
31.	PSP31	<i>Cassia alata</i>	(L.) Roxb.	Candlebush	Fabaceae	T
32.	PSP32	<i>Cassia fistula</i>	L.	Golden shower tree	Fabaceae	T
33.	PSP33	<i>Cassia siamea</i>	(Lam.)	Siamese cassia	Fabaceae	H
34.	PSP34	<i>Cassia tora</i>	L.	Wild senna	Fabaceae	H
35.	PSP35	<i>Catharanthus roseus</i>	(L.) G.Don	Periwinkles	Apocynaceae	SS
36.	PSP36	<i>Corchorus capsularis</i>	Linn.	Jute	Tiliaceae	H
37.	PSP37	<i>Ceiba pentandra</i>	(L.) Gaertn.	Silk-cotton tree	Bignoniaceae	T
38.	PSP38	<i>Chenopodium album</i>	L.	Lamb's quarters	Chenopodiaceae	H
39.	PSP39	<i>Cleome rutidosperma</i>	DC.	Fringed spider flower	Cleomaceae	H
40.	PSP40	<i>Cleome viscosa</i>	L.	Sticky spider-flower	Cleomaceae	H
41.	PSP41	<i>Clerodendrum infortunatum</i>	L.	Glory tree	Lamiaceae	S
42.	PSP42	<i>Clitoria ternatea</i>	L.	Butterfly-pea	Fabaceae	H
43.	PSP43	<i>Coccoloba nucifera</i>	L.	Coconut	Cucurbitaceae	T
44.	PSP44	<i>Coccinia indica</i>	L.	Little gourd	Cucurbitaceae	C
45.	PSP45	<i>Corypha lecomtei</i>	L.	Palm tree	Arecaceae	T
46.	PSP46	<i>Colocasia esculenta</i>	(L.) Schott	Elephant-ear	Arecaceae	H
47.	PSP47	<i>Combretum indicum</i>	(L.) DeFilippis	Rangoon creeper	Combretaceae	C
48.	PSP48	<i>Carica papaya</i>	L.	Papaya	Caricaceae	ST
49.	PSP49	<i>Crinum bulbispermum</i>	(Burm.f.) Milne-Redh & Schweick	Orange river lily	Amarylidaceae	B
50.	PSP50	<i>Crotalaria retusa</i>	L.	Rattleweed	Fabaceae	S
51.	PSP51	<i>Croton bonplandianus</i>	Baillon	Bantulsi	Euphorbiaceae	H
52.	PSP52	<i>Cuscuta reflexa</i>	L.	Giant dodder	Convolvulaceae	SP
53.	PSP53	<i>Cycas revoluta</i>	Thunb.	Cycas	Cycadaceae	T
54.	PSP54	<i>Cynodon dactylon</i>	(L.) Pers.	Cynodon	Poaceae	G

S. No.	Code	Botanical name	Authority	English Name	Family	Habit
55.	PSP55	<i>Cyperus rotundus</i>	L.	Nut grass	Cyperaceae	G
56.	PSP56	<i>Dalbergia sissoo</i>	Roxb.	Indian redwood	Fabaceae	T
57.	PSP57	<i>Datura stramonium</i>	L.	Datura	Solanaceae	SS
58.	PSP58	<i>Delonix regia</i>	(Hook.) Raf.	Gold mohar	Fabaceae	T
59.	PSP59	<i>Dryopteris marginalis</i>	(L.) Gray	Marginal woodfern	Dryopteridaceae	F
60.	PSP60	<i>Eclipta alba</i>	L.	False Daisy	Asteraceae	H
61.	PSP61	<i>Emblica officinalis</i>	(L.)	Indian gooseberry	Euphorbiaceae	T
62.	PSP62	<i>Eucalyptus citriodora</i>	(Hook.) F.M.Bailey	Spotted gum	Myrataceae	T
63.	PSP63	<i>Euphorbia abyssinica</i>	J.F.Gmel.	Desert Candle	Euphorbiaceae	CT
64.	PSP64	<i>Euphorbia hirta</i>	L.	Asthma weed	Euphorbiaceae	H
65.	PSP65	<i>Euphorbia nerifolia</i>	L.	Common milk hedge	Euphorbiaceae	S
66.	PSP66	<i>Ficus bengalensis</i>	L.	Banyan tree	Moraceae	T
67.	PSP67	<i>Ficus religiosa</i>	L.	Bodhi tree	Moraceae	T
68.	PSP68	<i>Ficus racemosa</i>	Linn.	Cluster fig	Moraceae	T
69.	PSP69	<i>Gamelina arborea</i>	Roxb.	Beechwood	Verbenaceae	T
70.	PSP70	<i>Gomphrena celosioides</i>	Mart.	Gomphrena weed	Amaranthaceae	H
71.	PSP71	<i>Heliotropium indicum</i>	L.	Indian heliotrope	Boraginaceae	H
72.	PSP72	<i>Hibiscus rosa sinensis</i>	L.	Rose mallow	Malvaceae	ST
73.	PSP73	<i>Hemidesmus indicus</i>	R. Br.	Indian sarsaparilla	Apocynaceae	H
74.	PSP74	<i>Holoptelea integrifolia</i>	Roxb.	Indian elm	Ulmaceae	T
75.	PSP75	<i>Hygrophila auriculata</i>	(Schum.) Heyne.	Starthorn	Acanthaceae	H
76.	PSP76	<i>Hyptis suaveolens</i>	(L.) Poit	Pignut	Lamiaceae	H
77.	PSP77	<i>Ipomoea aquatica</i>	Forssk.	Water spinach	Convolvulaceae	C
78.	PSP78	<i>Ipomoea obscura</i>	(L.) Ker Gawl.	Obscure morning glory	Convolvulaceae	C
79.	PSP79	<i>Ipomoea turpethum</i>	R. Br.	Turpeth root	Convolvulaceae	C
80.	PSP80	<i>Ixora chinensis</i>	Lam.	Ixora	Rubiaceae	S
81.	PSP81	<i>Jatropha gossypifolia</i>	L.	Cotton-leaf physic nut	Euphorbiaceae	S
82.	PSP82	<i>Kyllinga nemoralis</i>	J.R.Forst. & G.Forst.	White Kyllinga	Cyperaceae	H
83.	PSP83	<i>Lagrestroemea speciosa</i>	(L.) Pers.	Pride of India	Lythraceae	T
84.	PSP84	<i>Lantana camara</i>	L.	Lantana	Verbenaceae	S
85.	PSP85	<i>Lathyrus aphaca</i>	L.	Sweet peas	Fabaceae	H
86.	PSP86	<i>Lennea coromandelica</i>	(Houtt.) Merr.	Indian ash tree	Anacardiaceae	T
87.	PSP87	<i>Leonotis nepetiifolia</i>	(L.) R. Br.	Lion's Ear	Lamiaceae	H
88.	PSP88	<i>Lippia alba</i>	(Mill.) N.E. Brown	Wild sage	Verbenaceae	S
89.	PSP89	<i>Luffa cylindrica</i>	(L.) Roem.	Sponge gourds	Cucurbitaceae	C
90.	PSP90	<i>Mangifera indica</i>	L.	Mango	Anacardiaceae	T
91.	PSP91	<i>Melia azedarachta</i>	L.	Indian lilac	Meliaceae	T
92.	PSP92	<i>Mimosa pudica</i>	L.	Touch-me-not	Fabaceae	SS
93.	PSP93	<i>Monochoria vaginalis</i>	(Burm.f) C.Presl.	Pickereel weed	Pontederiaceae	H
94.	PSP94	<i>Moringa oleifera</i>	Lam.	Moringa	Moringaceae	T
95.	PSP95	<i>Murraya paniculata</i>	(L.) Jack	Orange jasmine	Rutaceae	S
96.	PSP96	<i>Murraya koenigii</i>	(L.) Spreng.	Curry leaves	Rutaceae	ST
97.	PSP97	<i>Nerium oleander</i>	L.	Oleander	Apocynaceae	S
98.	PSP98	<i>Ocimum canum</i>	Sim.	Basil	Lamiaceae	H
99.	PSP99	<i>Ocimum tenuiflorum</i>	L.	Holy basil	Lamiaceae	H
100.	PSP100	<i>Opuntia stricta</i>	(Haw.) Haw.	Erect prickly pear	Cactaceae	CS
101.	PSP101	<i>Oxalis corniculata</i>	L.	Creeping wood sorrel	Oxilidaceae	H
102.	PSP102	<i>Parthenium hysterophorus</i>	L.	Carrot weed	Asteraceae	H
103.	PSP103	<i>Pedilanthus tithymaloides</i>	L.	Slipper plant	Euphorbiaceae	SS
104.	PSP104	<i>Peltrophorum pterocarpum</i>	(DC.) Hayne	Copperpod	Fabaceae	T
105.	PSP105	<i>Peristrophe bicalyculata</i>	(Retz.) Nees.	Panicled peristrophe	Acanthaceae	H
106.	PSP106	<i>Persicaria hydropiper</i>	(L.) Opiz	Water-pepper	Polygonaceae	H
107.	PSP107	<i>Phoenix sylvestris</i>	(L.) Roxb.	Sugar date palm	Areaceae	T
108.	PSP108	<i>Phyllanthus niruri</i>	L.	Stonebreaker	Euphorbiaceae	H
109.	PSP109	<i>Physalis angulata</i>	L.	Angular winter cherry	Solanaceae	H
110.	PSP110	<i>Pithecolobium dulce</i>	(Roxb.) Benth.	Blackbead tree	Fabaceae	T
111.	PSP111	<i>Plumbago zeylancia</i>	L.	White leadwort	Plumbaginaceae	H
112.	PSP112	<i>Plumeria alba</i>	L.	White frangipani	Apocynaceae	T
113.	PSP113	<i>Pongamia pinnata</i>	(L.) Pierre	Indian Beech	Fabaceae	T
114.	PSP114	<i>Prosopis juliflora</i>	(Sw.) DC.	Mesquite tree	Fabaceae	T

S. No.	Code	Botanical name	Authority	English Name	Family	Habit
115.	PSP115	<i>Psidium guajava</i>	L.	Guava	Myrtaceae	T
116.	PSP116	<i>Pteris vittata</i>	L.	Ladder brake	Pteridaceae	F
117.	PSP117	<i>Ricinus communis</i>	L.	Castor bean	Euphorbiaceae	ST
118.	PSP118	<i>Rungia pectinata</i>	(L.) Nees.	Comb rungia	Acanthaceae	H
119.	PSP119	<i>Senna occidentalis</i>	(L.) Link	Coffee senna	Fabaceae	S
120.	PSP120	<i>Shorea robusta</i>	Gaertner f.	Sal tree	Dipterocarpaceae	T
121.	PSP121	<i>Sida cordifolia</i>	Linn.	Flannel weed	Malvaceae	S
122.	PSP122	<i>Solanum lycopersicum</i>	L.	Tomato	Solanaceae	H
123.	PSP123	<i>Solanum nigrum</i>	L.	Black Night Shade	Solanaceae	H
124.	PSP124	<i>Solanum sisymbriifolium</i>	Lam.	Sticky nightshade	Solanaceae	SS
125.	PSP125	<i>Solanum viarum</i>	Dunal	Tropical soda apple	Solanaceae	SS
126.	PSP126	<i>Solanum xanthocarpum</i>	Schrad. & J.C.Wendl.	Yellow-berried Nightshade	Solanaceae	H
127.	PSP127	<i>Sonachus asper</i>	(L.) Hill	Spiny sowthistle	Asteraceae	H
128.	PSP128	<i>Syngonium podophyllum</i>	Schott	Arrowhead plant	Araceae	C
129.	PSP129	<i>Syzygium cumini</i>	(L.) Skeels	Jambul	Myrtaceae	T
130.	PSP130	<i>Tagetes patula</i>	L.	Marigold	Asteraceae	H
131.	PSP131	<i>Tamarindus indica</i>	L.	Tamarind	Fabaceae	T
132.	PSP132	<i>Tectona grandis</i>	L. f.	Teak	Verbenaceae	T
133.	PSP133	<i>Tephrosia purpurea</i>	(Linn.) Pers.	Wild Indigo	Fabaceae	H
134.	PSP134	<i>Terminalia arjuna</i>	(Roxb.) Wight & Arn.	Arjuna	Combretaceae	T
135.	PSP135	<i>Thevetia peruviana</i>	(L.) Lippold	Yellow oleander	Apocynaceae	ST
136.	PSP136	<i>Thuja occidentalis</i>	L.	White cedar	Cupressaceae	T
137.	PSP137	<i>Tridax procumbens</i>	L.	Coat-button	Asteraceae	H
138.	PSP138	<i>Urena lobata</i>	L.	Caesarweed	Malvaceae	SS
139.	PSP139	<i>Vernonia cinerea</i>	Less.	Purple fleabane	Asteraceae	H
140.	PSP140	<i>Vitex negundo</i>	L.	Five-leaved chastetree	Verbenaceae	S
141.	PSP141	<i>Xanthium strumarium</i>	L.	Rough cocklebur	Asteraceae	H
142.	PSP142	<i>Ziziphus mauritiana</i>	Lam.	Indian jujube	Rhamnaceae	ST

Additional research should be conducted to evaluate the intrinsic ecological values of the local flora and to incorporate characteristics of species composition with ecological functions (Zhao *et al.*, 2010) will provide a baseline for planning and proper conservation measures to safeguard phytodiversity which is facing ever growing biotic stress.

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References

Brummit KR, Castroviejo S, Augustine C, Chikuni Anthony E, Orchard Gideon F, Smith Warren L, Wagner. 2001. The species Plantarum

Project, An International Collaborative Initiative for Higher Plant Taxonomy. Taxon **50(4)**, 1217-1230.

Brockway DG. 1998. Forest Plant Diversity at Local and Landscape Scales in the Cascade Mountains of Southwestern Washington. Forest Ecology and Management. **109**, 323-341.

Cooke T. 1901-1908. The Flora of the Presidency of Bombay, Vols. 1-3. Taylon & Francis, London.

Duthie JF. 1905. Flora of the Upper Gangetic Plain. Vols. I, II & III. Bishan Singh Mahendra Pal Singh, Dehradun.

Ejtehadi H, Amini T, Zare H. 2005. Importance of Vegetation Studies in Conservation of Wildlife: A Case Study in Miankaleh Wildlife refuge, Mazandaran Province, Iran, Archive of SID, 53-58.

Gamble JS, Fischer CEC. 1915-1936. Flora of the Presidency of Madras. 11 parts (1-7 by Gamble, 8-11 by Fischer). Adlard & Son., Ltd., London.

Hooker JD. 1872-1897. The Flora of British India, Vol. I-VII. Reeve & Co., London.

Jennings MD, Faber-Langendoen D, Loucks OL, Peet RK, Roberts D. 2009 Characterizing Associations and Alliances of the U.S. National Vegetation Classification. *Ecological Monographs* **79**, 173-199.

Kier G. 2005. *Journal of Biogeography* **32**, 1107–1116 IPNI, International Plant Names Index, <http://www.ipni.org>, data accessed in March 2009 GBIF, Global Biodiversity Information Facility, <http://www.gbif.org>, data accessed in March 2009 ISI Web of Knowledge, <http://www.isiknowledge.com>, data accessed in May 2009.

Rahul J, Jain MK. 2014. An Investigation in to the impact of particulate matter on vegetation along the national highway: A Review. *Research Journal of Environmental Science*. **8(7)**, 356-372. DOI: 10.3923/rjes.2014.356.372

Roxburgh W. 1832. *Flora Indica*. Today and Tomorrow's Publishers, New Delhi.

Tastad A, Salkin K, Battikha N, Jasra AW, Louhaichi M. 2010. Ecological dynamics of protected and unprotected rangelands in three climatic zones of Syria. *Pakistan Journal of Agriculture Science*. **47**, 89-98.

Zhao J, Ouyang Z, Zheng H, Zhou W, Wang X, Xu W, Ni Y. 2010. Plant Species Composition in Green Spaces within the Built-up Areas of Beijing, China. *Plant Ecology*. **209**, 189-204. DOI 10.1007/s11258-009-9675-3.