



AQUATIC PLANTS OF DELHI, GAUTAM BUDDH NAGAR, GHAZIABAD, HAPUR AND ADJACENT AREAS

Rashtra Vardhana

Department of Botany, Govt. P. G. College, Sambhal (Uttar Pradesh), India.

Abstract

In the present study, this paper enumerates 319 Aquatic angiospermic plants those are growing in Delhi, Ghaziabad, Gautam Buddh Nagar, Hapur and adjacent areas. Delhi is the metropolitan city of India. It stretches along the bank of the Yamuna River. Delhi state comprises of a long narrow strip of territory along the Yamuna River. Which has formed from a part of the Old Delhi district and 65 Trans Yamuna villages (formerly in the Ghaziabad and Meerut districts of Uttar Pradesh). On the south west of Delhi lies the Thar Desert, to the north lies the lofty Himalaya. In the north east lies the plain area on the Indo-Gangetic divide west of which are the plains of the Indus to the south and in N.E.-S.W. direction is the Aravalli range, the last tail extension of which enters Delhi from Gurgaon. While to the east lies fertile Gangetic plain. Delhi is bounded on the north by Karnal on the east by the river Yamuna that separates it from the district of Ghaziabad, Gautam Buddh Nagar and Bulandshahr in the Uttar Pradesh, on the south by Gurgaon and on the west by Rohtak. Thus Delhi occupies a unique position in the form of a gateway between the Thar Desert, Aravalli range and the Himalayas. The Ghaziabad district falls in the Indo-Gangetic plain of north west India, being a heavily industrialized district in Uttar Pradesh, near National Capital Delhi. There are four rivers in the district viz. Ganga River, Yamuna River, Black River, Hindon River and level plain with gradual slope from North to South. An extensive survey has been conducted for 4 years (2011-2015) and during the period of study it has been kept in mind that no place should be missed because every place is very useful to collect and record the new plant species. In this survey total given area was studied and collected the information of the aquatic angiospermic plants that are grown, planted, cultivated and naturalized in the area. The plants were identified with the help of different published flora and herbarium lodged in different places of India.

Key words : Aquatic angiospermic plants, Delhi, Gautam Buddh Nagar, Ghaziabad, Hapur, adjacent area, herbarium.

Introduction

The state of Delhi lies between Latitude $76^{\circ} 50' E$ to $77^{\circ} 23' E$ and longitude $28^{\circ} 12' N$ to $28^{\circ} 53' N$ with an elevation of 213-219 m above the sea level. Ghaziabad District has four rivers viz. Ganga River, Yamuna River, Black River, Hindon River and level plain with gradual slope from North to South. There are also some hillocks near Garmukteshwar, Abdullapur, Poonth and Loni, attaining an elevation of 679.156 feet above sea level and the approximate bearings are $77^{\circ} 7' E$ To $78^{\circ} 14' E$. Latitude and $28^{\circ} 27' N$ to $28^{\circ} 55' N$. Longitude. It is bounded by district Moradabad in the East, district Meerut in the North, district Bulandshahr and Gautam Buddh Nagar in the south and by National Capital and Union territory Delhi in the west. Gautam Buddh Nagar and

Hapur are newly formed districts.

The progressive and repeated Botanical survey in understanding of the flora of a region gives an up to date information about plants growing in that area. The critical review of a literature reveals that the work on an Angiospermic flora covering district Moradabad was undertaken by various workers in the past viz. Hooker (1872-1879), Duthei (1903-1929), Babu (1977), Raizada (1979) and Vardhana (1998-2007). But the survey was on all type of Angiospermic plants. Now, it has been taken in mind that how many aquatic plants are growing in Moradabad district and adjacent areas.

Materials and Methods

In the present study, the total aquatic plants of different places e.g. River banks, Canals, Ponds, Pools,

Puddles, Ditches, Lakes, water Reservoirs and Water channels have been studied and 319. species of aquatic plants has been surveyed.

All the collected plants species were identified with the help of different published floras and Herbarium e.g. IARI Delhi, BSI Dehradun, FRI Dehradun, BSI Allahabad, CNH Calcutta (Hawrah) etc.

Observations

During the collection of plants species were collected from different places given in table 1.

Factors decreasing the number of plants

As all are aware of the fact that plants play a vital role for the existence of life on the earth but the number of natural flora is going to be decreasing continuously with unbalanced ratio due to various factors such as industrialization, urbanization, dumping garbage, uses of insecticides, pesticides and large number of crackers on Deepawali festival by Hindu's, ozone layer depletion there by global warming, less use of domestic animal dung for crops production, testing of nuclear and non-nuclear weapons, soil-erosion and various polluting, performed by men.

Table 1 : Plants species collected from different areas during study.

| Aquatic Plants : | |
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| <p>Ranunculaceae <i>Ranunculus muricatus</i> Linn. <i>R. sceleratus</i> Linn. <i>R. cantoniensis</i> D. Don. <i>R. acquatilis</i> Linn. var <i>trichophyllus</i> Hook.f & Thorns.</p> <p>Nymphaeaceae <i>Nymphaea alba</i> Linn. <i>N. nouchali</i> Burm.f. <i>N. stellata</i> Willd. <i>Nuphar luteum</i> Sibth& Smith.</p> <p>Nelumbonaceae <i>Nelumbo nucifera</i> Gaertn.</p> <p>Portulacaceae <i>Portulaca oleracea</i> Linn. <i>P.quadrifida</i> Linn</p> <p>Tamaricaceae <i>Tamarix troupii</i> Hole. <i>T. dioica</i> Roxb.</p> <p>Elatinaceae <i>Bergia ammanioides</i> Roxb.</p> <p>Malvaceae <i>Malva parviflora</i> Linn.</p> <p>Tiliaceae <i>Corchorus trilocularis</i> Linn. <i>C. aestuans</i> Linn. <i>C. tridens</i> Linn.</p> | <p>Brassicaceae <i>Iberidella andersonii</i> HK. f. & Thorns. <i>Coronopus didymus</i> (Linn.) Sm. <i>Trochilus cochlearioides</i> (Roth.) Schulz. <i>Arabidiopsis thaliana</i> (Linn.) Heynh. <i>Nastertium officinale</i> R.Br. <i>N. palustre</i> DC <i>Cardamine hirsuta</i> Linn. var. <i>Sylvatica</i> <i>Lepidium ruderale</i> Linn. <i>Arabis glabra</i> Bernh.</p> <p>Cleomaceae <i>Cleome brachycarpa</i> Vahl. ex.DC. <i>C.viscosa</i> Linn. <i>Gynandropsis gynandra</i> (Linn.) Biq.</p> <p>Caryophyllaceae <i>Holosteum umbellatum</i> Linn. <i>Stellaria media</i> (Linn.) Vill. <i>Cerastium cerastioides</i> (Linn.) Britt. <i>Arenaria serpyllifolia</i> Linn. <i>Polycarpaea corymbosa</i> (Linn.) Lamk. <i>Polycarpon prostratum</i> Aschers & Schwenf. <i>Spergula fallax</i> (Lowe) Krause. <i>Silene conoidea</i> Linn</p> <p>Mimosaceae <i>Neptunea oleracea</i> Lour.</p> <p>Rosaceae <i>Potentilla supina</i> Linn. <i>P. anseriana</i> L.</p> <p>Vahliaceae <i>Vahlia digyna</i> (Retz.) O.Ktze.</p> <p>Lythraceae <i>Rotala indica</i> (Willd) Koehne. <i>Ammannia baccifera</i> Linn. <i>A. salicifolia</i> Monti <i>A. multiflora</i> Roxb.</p> |

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| <p><i>C. capsularis</i> Linn. Oxalidaceae <i>Oxalis corniculata</i> Linn. <i>O. corymbosa</i> DC. <i>O. europaea</i> Jordan. <i>O. latifolia</i> Auct. Pl. (non-H.B.&K) Papilionaceae <i>Psoralea corylifolia</i> Linn. <i>Aeschynomene indica</i> Linn. <i>Trifolium alexandrinum</i> Linn. <i>T. resupinatum</i> Linn. <i>T. tomentosum</i> Linn. <i>Medicago lupulina</i> Linn. <i>M. polymorpha</i> Linn. var. <i>polymorpha</i> <i>Atylosia scarabaeoides</i> (Linn.) Benin. <i>Vicia hirsuta</i> (Linn.) S.F. Gray. <i>V. sativa</i> Linn. var. <i>angustifolia</i> Linn. <i>Lathyrus aphaca</i> Linn. Haloragaceae <i>Myriophyllum intermedium</i> DC. (Vell.) Verdc.</p> <p>Molluginaceae <i>Glinus lotoides</i> Linn. <i>G. oppositifolius</i> (Linn.) DC. Apiaceae <i>Centella asiatica</i> (Linn.) Urban. <i>Coriandrum sativum</i> Linn <i>Hydrocotyle sibthorbioides</i> Lamk. <i>H. peltata</i> Salisb. <i>Oenanthe javanica</i> (Bl.) DC. <i>Psammogeton biternatum</i> Edgew.</p> <p>Rubiaceae <i>Dentalla repens</i> (Linn.) J.R. & G. Forst. <i>Oldenlandia brachiata</i> Hook.f.</p> <p>Asteraceae <i>Myriactis walichii</i> Less. <i>Eupatorium adenophorum</i> Spreng. <i>Ethulia megacephala</i> Sch.-Bip. <i>Ageratum conyzoides</i> Linn. <i>A. houstonianun</i> Mill. <i>Sonchus brachyotus</i> DC. <i>S. oleraceus</i> Linn. <i>S. asper</i> (Linn.) Hill. <i>Artemisia nilagirica</i> (Clarke) Pomp. <i>Soliva anthemifolia</i> (Juss.) R. Br. Ex. Less. <i>Centipeda minima</i> (Linn.) A. Br. & Aschers</p> <p><i>Cichorium intybus</i> Linn. <i>Cotula hemispherica</i> Wall. <i>C. anthemoides</i> Linn <i>Verbesena encelioides</i> (Cav.) Benth & Hook f.</p> <p><i>Bidens biternata</i> (Lour.) Merr. & Sherff. <i>Conyza japonica</i> (Thunb) Less. <i>C. aegyptiaca</i> Dryand.</p> | <p><i>A. senegalensis</i> Lamk. Onagraceae <i>Jussiaea repens</i> Linn. <i>J. suffruticosa</i> Linn. <i>Ludwigia perennis</i> Linn. <i>Oenothera drummondii</i> Hock <i>O. rosea</i> Soland. <i>O. laciniata</i> Hill. Trapaceae <i>T. natans</i> Linn. var. <i>bispinosa</i> (Roxb.) Makino.</p> <p>Campanulaceae <i>Campanula benthamii</i> Wall. <i>Wahlenbergia marginata</i> (Thunb.) DC. Sphinoceleaceae <i>Sphinocelea zeylanica</i> Gaertn. Primulaceae <i>Primula umbellata</i> (Lour.) Bentvelzen. Gentianaceae <i>Centaurium centaurioides</i> (Roxb.) Comb. <i>M. aquaticum</i> <i>C. pullchellum</i> (SW.) Druce. <i>Hoppea dichotoma</i> Hayne ex Willd. Menyanthaceae <i>Nymphoides cristatum</i> (Roxb.) Kuntze. <i>N. indicum</i> (Linn.) Kuntze. Verbenaceae <i>Phyla nodiflora</i> (Linn.) Greene. <i>Bouchea marrubifolia</i> Schau. Lamiaceae <i>Teucrium quadrifarium</i> Buch-Ham. <i>Leonurus cardiaca</i> Linn. <i>Mentha aquatica</i> Linn. <i>M. arvensis</i> Linn. <i>M. cardiaca</i> J. Girard ex Baker. <i>M. citrate</i> Ehrh. <i>M. piperita</i> Linn. <i>M. spicata</i> Linn. <i>M. spicata</i> Linn. var. <i>viridis</i> Linn. <i>Lycopus europaeus</i> Linn. <i>Pogostemon benghalense</i> (Burm.f.) Kuntze. <i>Salvia plebeia</i> R.Br. <i>Anisochilus carnosus</i> Wall. Plantaginaceae <i>Plantago major</i> Linn. Amaranthaceae <i>Alternanthera philoxeroides</i> (Mart.) Griseb. <i>A. sessilis</i> (Linn.) DC. <i>A. paronychioides</i> St.Hill. Asclepiadaceae <i>Oxystelma secamone</i> (Linn.) K.Schum <i>Oxystelma bornouense</i> R.Br. Chenopodiaceae <i>Chenopodium ambrosioidis</i> Linn. <i>C. murale</i> Linn. Polygonaceae <i>Polygonum plebeium</i> R.Br. <i>P. plebeium</i> R.Br. Var. <i>micranthema</i> Bl.</p> |
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| <p><i>Gnaphalium lutoalbum</i> Linn. <i>G.lutoalbum</i> Linn subsp. <i>affine</i>.(D.Don) Koster. <i>G. pulvinatum</i> Delile. <i>Enydra fluctuans</i> Lour. <i>Eclipta prostrata</i> (Linn.) Linn. <i>Caesulia axillaris</i> Roxb. <i>Sphaeranthus indicus</i> Linn. <i>Spilanthes acmella</i> Linn. <i>S. paniculata</i> Wall. Ex DC. <i>Chrysanthellum indicum</i> DC. Hydrophyllaceae <i>Hydrolea zeylanica</i> (Linn.) Vahl. Convolvulaceae <i>Ipomoea aquatica</i> Forsk. <i>I.fistulosa</i> Mart Ex Choisy. <i>I.biloba</i> Forsk. <i>Merremia quinquefolia</i> (Linn.) Hall.f. <i>M.gangetica</i> (Linn.) Cufod. <i>Volvulopsis nummularia</i> (Linn.) Roberty. Scrophulariaceae <i>Verbascum chinense</i> (Linn.) Santapau. <i>V. thapsus</i> Linn. <i>Bacopa procumbens</i> (Mill.) Greenm. <i>B.monnieryi</i> (Linn.) Penn. <i>Limnophila indica</i> (Linn.) Druce. <i>L. rugosa</i> (Roth.) Men. <i>Veronica anagallis-aquatica</i> Linn. <i>V. agrestis</i> Linn. <i>V.didyma</i> Tenore. Lentibulariaceae <i>Utricularia inflexa</i> Forsk.var. <i>stellaris</i> (Linn.f.) P. Taylor. <i>U. gibba</i> Linn.subsp. <i>exoleta</i> (R.Br.)Taylor <i>U.aurea</i> Lour. Acanthaceae <i>Asystasia gangetica</i> (L.) T. Anderson <i>Acanthus ebracteatus</i> Vahl. <i>Asteracantha longifolia</i> (Linn.) Vahl. <i>Hygrophila polysperma</i> (Roxb.) T. Anders. <i>Rungia pectinata</i> (Linn.) Nees. <i>R. repens</i> (Linn.) Nees. <i>Ruellia brittoniana</i> Leonard <i>R. tuberosa</i> Linn. Piperaceae <i>Z. grandiflora</i> Lindl. <i>Peperomia pellucida</i> (Linn.) H. B. & K. Euphorbiaceae <i>Securinega virosa</i> (Roxb. ex. Willd.) Baillon <i>Euphorbia geniculata</i> Orteg. <i>E. helioscopia</i> Linn Urticaceae <i>Pouzolzia hirta</i> (Bl.) Hassk. <i>P. pentandra</i> (Roxb.)Benn. Ceratophyllaceae <i>Ceratophyllum demersum</i> Linn.</p> | <p><i>Plapathifolium</i> Linn.var. <i>lanatum</i> (Roxb.) Steward. <i>P.glabrum</i> Willd. <i>Phydropiper</i> Linn. <i>Pbarbatum</i> Linn.. subsp. <i>gracile</i> Danser <i>Pbarbatum</i> Linn.subsp. <i>barbatum</i> Danser. <i>Rumex dentatus</i> Linn. <i>R. crispus</i> Linn. Typhaceae <i>Typha angustata</i> Bory & Chaub. <i>Telephantina</i> Roxb. Sparganiaceae <i>Sparganium ramosum</i> Huds. Araceae <i>Acorus gramineus</i> Soland. <i>Alocasia forniculata</i> (Roxb.) Schott. <i>Pistia stratiotes</i> Linn. <i>Pothos aureus</i> Hort. Liliaceae <i>Hosta fortunii</i> Baily. <i>H. plantaginea</i> (Lam.) Asch. <i>Zantedeschia aeothiopica</i> (Linn.) Spreng. Lemnaceae <i>Lemna gibba</i> Linn. <i>L.purpusilla</i> Torre. <i>L. trisulca</i> Linn. <i>Spirodela polyrrhiza</i> (Linn.) Schleid <i>Wolffia arrhiza</i> Wimm. <i>W.microscopica</i> (Griff.ex.Voigt.) Kurz. Alismataceae <i>Limnophyton obtusifolium</i> Miq. <i>Sagittaria quayanensis</i> H.B.& K. <i>S.sagittifolia</i> Linn. <i>Echinodorus cordifolius</i> Grisebach. Limnocharitaceae <i>Limnochairs flava</i> (Linn.) Buch. Aponogetonaceae <i>Aponogeton natans</i> (Linn.) Engl. & Krause. Amaryllidaceae <i>Zephyranthes candida</i> Herb. <i>Z. citrina</i> Baker <i>Z. grandiflora</i> Lindl. <i>Z. rosea</i> Lindl. Cyperaceae <i>Carex fedia</i> Nees <i>Cyperus globosus</i> All. <i>C. sanguinolentus</i> Vahl. <i>C. pumilus</i> Linn. <i>C. alopecuroides</i> Rottb. <i>C. pygmaeus</i> Rottb. <i>C. laevigatus</i> Linn. <i>C. kyllingia</i> Endl. <i>C. brevifolius</i> (Rottb.) Hassk. <i>C. compactus</i> Ritz.</p> |
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| <p>Hydrocharitaceae <i>Hydrilla verticillata</i> (Linn.f.) Royle. <i>Elodia canadensis</i> Michx. <i>E.canadensis</i> var <i>gigantea</i> Hort. <i>E.densa</i> Planch. <i>Ottelia alismoides</i> Pers. <i>Vallisneria spiralis</i> Linn.</p> <p>Musaceae <i>Musa paradisiaca</i> Linn <i>M.chinensis</i> Sweet. <i>Ensete glaucum</i> (Roxb.) Cheesman <i>E. superbum</i> Roxb.</p> <p>Cannaceae <i>Canna indica</i> Linn.</p> <p>Marantaceae <i>Thalia dealbata</i> Fraser ex Roscoe <i>T. geniculata</i> Linn.</p> <p>Iridaceae <i>Acidanthera bicolor</i> Hochst.</p> <p>Pontederiaceae <i>Eichhornia crassipes</i> (Mart.) Solms. <i>Monochoria hastata</i> (Linn.) Solms. <i>M.vaginalis</i> (Burm.f.) Presl.</p> <p>Commelinaceae <i>Commelina forskalii</i> Vahl. <i>Cyanotis vaga</i> (Lour.) Schultz. <i>C. axillaris</i> (Linn.) Schultz. <i>C. cristata</i> Schultz.</p> <p>Potamogetonaceae <i>Potamogetone crispus</i> Linn. <i>P. natans</i> Roxb. <i>P. nodosus</i> Poir. <i>P. pectinatus</i> Linn.</p> <p>Zannichelliaceae <i>Zannichellia palustris</i> Linn.</p> <p>Najadaceae <i>Najas graminea</i> Del. <i>N. major</i> Allioni <i>N. minor</i> All.</p> <p>Butomaceae <i>Butomus umbellatus</i> Linn.</p> <p>Eriocaulaceae <i>Eriocaulon cinereum</i> R. Br.</p> <p>Hypoxidaceae <i>Curculigo orchiooides</i> Gaertn. <i>Paspalum dilatatum</i> Poir.</p> <p>Agavaceae</p> | <p><i>C. paniceus</i> (Rottb) Boeck. <i>C. tenuispica</i> Steud. <i>C. squarrosus</i> Linn. <i>C. compressus</i> Linn. <i>C. alulatus</i> Kern. <i>C. iria</i> Linn. <i>C. corymbosus</i> Rottb. <i>C. articulatus</i> Linn. <i>C. nutans</i> Vahl. <i>C. pangorii</i> Rottb. <i>C. papyrus</i> Linn. <i>C. exaltatus</i> Ritz. <i>C. digitatus</i> Roxb. <i>C. procerus</i> Rottb. <i>C. pilosus</i> Vahl. <i>Eleocharis palustris</i> R.Br. <i>E. dulcis</i> (Burm.f.) Henschel. <i>E.atropurpurea</i> (Retz.) Kunth. <i>E.capitata</i> R.Br. <i>Fimbristylis pierotii</i> Mig. <i>F. tenera</i> Roem & Schult. <i>F.miliacea</i> (Linn.) Vahl. <i>F. complanata</i> (Retz) Link. <i>F.ferruginea</i> (Linn.) Vahl. <i>Scirpus tuberosus</i> Desf. <i>S. littoralis</i> Schrad. <i>S. affinis</i> Roth. <i>S. juncooides</i> Roth. <i>S. articulatus</i> Linn. <i>S. squarrosus</i> Linn. <i>S. supinus</i> Linn. <i>S. roylei</i> (Nees) Parker.</p> <p>Poaceae <i>Apluda mutica</i> Linn. subsp. <i>mutica</i>. <i>A. mutica</i> Linn. subsp. <i>aristata</i> (Linn.) Comb. nov. <i>Eragrostis gangetica</i> (Roxb.) Steud. <i>E. diarrhena</i> (Schult) Steud. <i>Elusine indica</i> (Linn.) Gaertn. <i>E. compressa</i> (Forsk.) Aschers & Schwfth. <i>Phragmites karka</i> (Retz.) Trin ex Steud. <i>Arundo donax</i> Linn. <i>Hygroryza aristata</i> (Retz) Nees ex Wt. & Arn. <i>Oryza sativa</i> Linn. <i>Polypogon fugax</i> Nees ex Steud. <i>Oropetium thomaeum</i> (Linn.f.) Trin. <i>Erianthus procerus</i> (Roxb.) Raizada. <i>Imperata cylindrica</i> (Linn.) Beauv. <i>Hemarthria compressa</i> (Linn.f) R.Br. <i>Vetiveria zizanioides</i> (Linn.) Nash. <i>Setaria glauca</i> (Linn.) Beauv. <i>Eriochloa procera</i> (Retz) Hubb.</p> <p><i>P. scrobiculatum</i> Linn.</p> |
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| <i>Dracaena sanderiana</i> Hort. <i>Paspalidium flavidum</i> (Retz.) A. Camus. Heliconiaceae <i>Heliconia angustifolia</i> Hk. <i>H. humilis</i> Jacq. <i>H. rostrata</i> Ruiz. & Pav. <i>P. antidotale</i> Ritz. <i>Digitaria stricta</i> Roth. ex Roem & Schult var. <i>stricta</i> <i>D. bififormis</i> Willd. | <i>P. paspalodes</i> (Michx.) Scribn. <i>P. punctatum</i> (Burm.) A. Camus. <i>Echinochloa colonum</i> (Linn.) Link. <i>E. crusgalli</i> (Linn.) Beauv. <i>Panicum palludosum</i> Roxb. |
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Inference

We are planting only useful cultivated plants ignoring other one. For the proper existence of natural flora and fauna we should spare 40% land especially for the purpose of vegetation only we should control undesirable activities which are responsible for reducing the number of flora as well as fauna globally.

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