Plant Archives Vol. 17 No. 2, 2017 pp. 993-1003 *ISSN 0972-5210*

FLORISTIC DIVERSITY OF AMBALA DISTRICT, HARYANA, INDIA

Mandeep Kaur*, Nidhan Singh[2] and B. D. Vashistha[1]

[1]Department of Botany, Kurukshetra University, Kurukshetra - 136 119 (Haryana), India.
[2]Department of Botany, I. B. College, Panipat (Haryana), India.

Abstract

This study deals with the diversity of plant species along with their vernacular names, habit and their occurrence found in Ambala district of Haryana in India. Efforts were made to compile the current status of the plant diversity in the region. In present study, a total of 414 plant species belonging to the 294 genera and 90 families were recorded from this area. A comparison with earlier works on this region work revealed the changes in the flora of this region are rapid and significant. The study also noticed that the changing environmental conditions, human activities and introduction of invasive species are resulting in the loss of native floristic diversity of the area. The assessment of plant diversity could play important role in planning conservation strategies and sustainable use of available resources.

Key words : Ambala, species diversity, taxonomy.

Introduction

Biodiversity is the heritage of millions of years of evolution. The enormous variety of life on earth is the result of complex interactions among all living organisms including microscopic species. At present the number of species described is more than 1.7 million, including 270,000 species of plants. Although, there is no correct idea about total number of species, but scientists believe that it could be anything from 5-100 millions. There may be 10 million undescribed species in the deep sea alone (Convention on Biological Diversity).

Biodiversity is important for our survival as it provides us ecosystem services, food, medicines, natural products, economic benefits and natural beauty. Many species are involved in purifying water, fixing nitrogen, recycling nutrients and pollinating crops. Plants not only produce the oxygen we breathe but also absorb carbon dioxide, the main greenhouse gas produced by other living organisms. Just three cereals: maize, rice and wheat provide 40% of the calories we consume. The water cycle, carbon cycle and countless other processes in nature depend upon the rich diversity of vegetation. Without plants maintaining and renewing the biosphere, there would be no place in it for us.

Human activities are continuously changing the world's terrestrial, freshwater and marine ecosystems. These changes are resulting in the loss of many species. As mentioned earlier, the survival and well being of the present day human population depends on several substances obtained from plants and animals. Therefore, it was realized that we must conserve biodiversity. The first step in this direction is to measure biodiversity occurring in various regions of the earth periodically. A measure of number of species present (species richness) at a given site, in a given area or country and ultimately in the whole world is still the most straightforward and in many ways the most useful measure of biodiversity.

After its reorganization in 1954, the Botanical Survey of India laid emphasis on intensive study of local floras to gather information on various aspects such as the identity, distribution, ecology, phenology, economic uses and local names of Indian plants. It has been realized that the study of local or regional flora is of much more significance than those covering big areas because explorations can be carried out intensively in small areas. Keeping in the view the importance of studies on biodiversity, work was started to explore the species diversity of state of Haryana in phases. In the initial phase area of Ambala district was selected. Ambala has a semi-arid as well as tropical climate and is rich in biodiversity. The rich biological and geographical resources of this area are, however, under the process of severe degradation.

***Author for correspondence :** Email: mandeepkuk@gmail.com

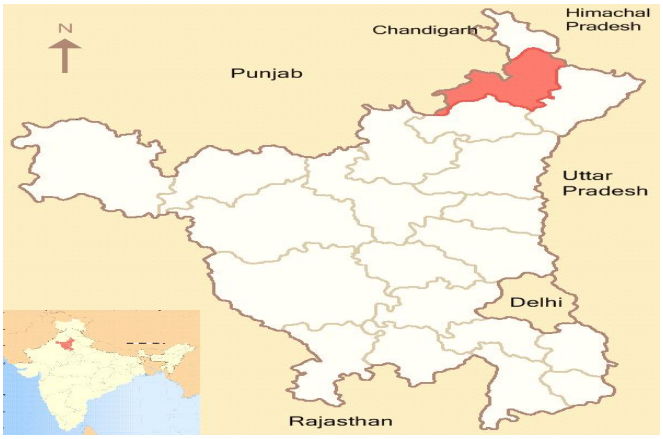

Fig. 1 : Map of Haryana showing Ambala forest district.

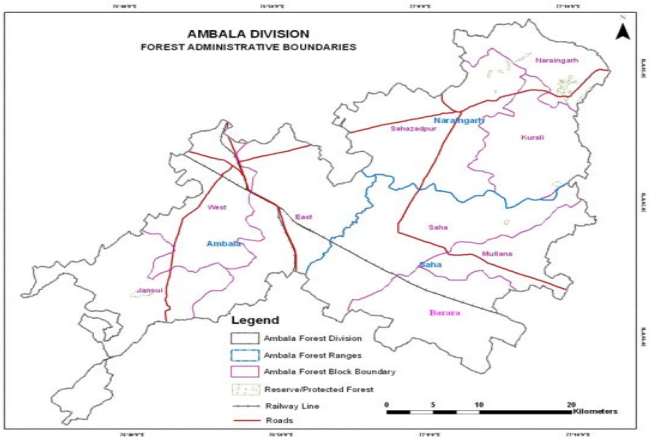

Fig. 2 : Map of Ambala district showing Division.

The present paper is based on five years of extensive surveys conducted in the study area. The work was initiated with the purpose of compiling the floristic diversity of the region in order to provide a reference material for many other scientific disciplines. The work done provides detailed information regarding the floristic composition of Ambala district in Haryana, India.

Materials and Methods

Ambala district, lies on the North-Eastern edge of Haryana (27-39"-45' N to 76-36"-52' E) was the area chosen for study (figs. 1 & 2). It is bounded by the district Yamuna Nagar to the South-East. To its South lies Kurukshetra district while in its west is situated Patiala and Ropar districts of Punjab and the Union Territory of Chandigarh. The Shivalik Range of Solan and Sirmaur districts of Himachal Pradesh bound the Ambala district in the North and North-East. Ambala has a semi-arid as well as tropical climate. The rainfall is monsoonal and chief portion of this is received from July to September.

Methodology

The ultimate aim of the present study was to explore the forests of Ambala district of Haryana in order to analyze the floral diversity in angiosperms of this area. Extensive surveys of the area in different seasons were carried out during the period starting from the year 2011 till the end of 2015. Attempts were made to cover all the sites for collection of plants in flowering and/or fruiting stages. Following procedure had been followed during the surveys:

- **Collection :** The plants in flowering and/or fruiting conditions were collected so far as possible all morphological details including flower/or fruit are retained in the specimen. A field note book was prepared for labeling the plants, which comprised of the specimen number, date of collection, locality of collection, habit, habitat, flower color and any special feature of the plant, if present. Plants were photographed in natural habitat.
- **Preservation :** The specimens were sprayed with 10% solution of formaldehyde in order to protect them from infection or attack by insects and fungi. The formaldehyde solution taken in plastic bottle will be sprayed on newspaper containing specimens placed in polythene bags. After this, the specimens are sealed in air tight with cellophane in same polythene bags.
- **Pressing and drying :** The collected and preserved specimens were taken out from the polythene bags after 20-24 hours. Drying of specimens is done by placing the specimens in the folders of absorbent material such as blotting paper under some pressure in wooden plant press fitted with screws on four corners. Drying folders will be changed after suitable period depending upon moisture content of the specimens and climatic conditions.
- **Identification :** The polythene bags containing collected specimens were opened from time to time and the specimens were taken out to study their morphological details for the purpose of identification. The identification of the specimens collected was done with the help of available literature.
- **Mounting and labeling :** The collected and processed plants were mounted on standard sized herbarium sheets (28×42 cm). These sheets were properly labelled with the species names as followed in the description of work. The mounted and labeled sheets are deposited in the Herbarium of Botany Department, Kurukshetra University, Kurukshetra.

Results and Discussion

During the floristic study 414 species belonging to 294 genera and 90 families have been described from the

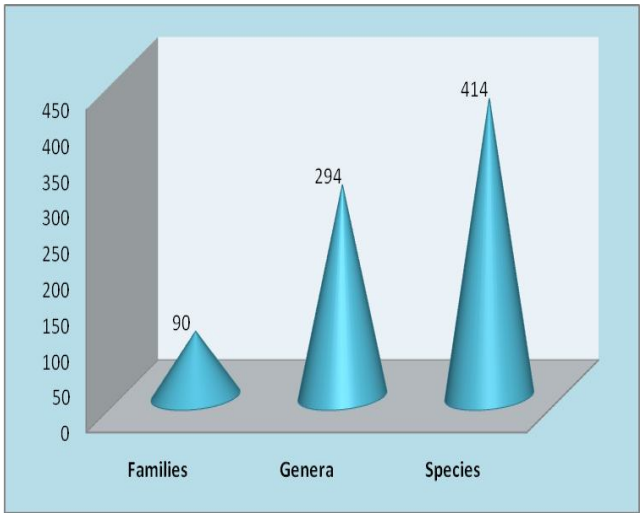

Fig. 3 : Total number of families, genera and species recorded.

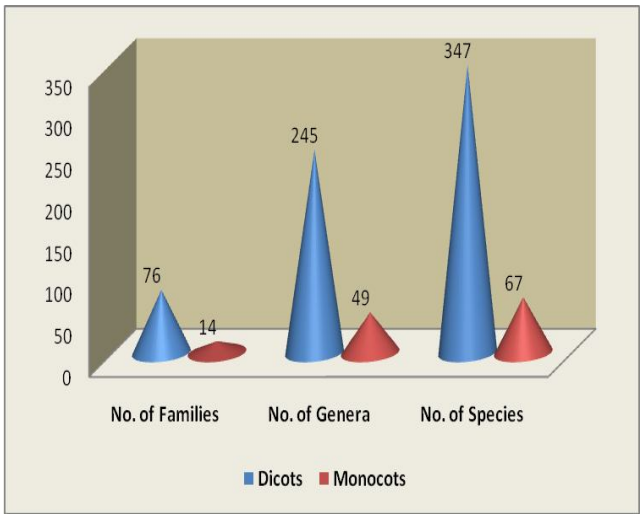

Fig. 4 : Comparison of families, genera, species of Monocots and Dicots.

various sites in Ambala district, Haryana (figs. 3 & 4). Out of total 90 families reported, 14 belong to monocots and 76 to dicots. The checklist of plant diversity of the region is given in table 2.

An analysis on the basis of habit revealed dominance of herbaceous flora (239 species) followed by shrubs (95 species) and trees (80 species), respectively (fig. 5). High percentage of herbs and shrubs may be due to existing soil quality and prevailing climatic factors like temperature and rainfall. It is particularly pertinent to mention herbs complete their life cycle in rainy season and only hardy perennials can survive in this region especially during adverse environmental conditions and growing anthropogenic activities.

The ten largest families represented in this area are Leguminosae, Poaceae, Asteraceae, Euphorbiaceae, Convolvulaceae, Solanaceae, Amranthaceae,

Table 1 : Number and percentage of species and genera of the ten dominant families.

S. no.	Name of family	No. of species	% of species	No. of genera	% of genera
1.	Leguminosae	61	14.73	38	12.75
2.	Poaceae	39	9.44	31	10.40
3.	Asteraceae	28	6.77	26	8.84
4.	Euphorbiaceae	17	4.11	7	2.35
5.	Convolvulaceae	14	3.33	5	1.68
6.	Solanaceae	13	3.14	7	2.35
7.	Malvaceae	12	2.90	6	2.01
8.	Amranthaceae	11	2.66	7	2.35
9.	Cyperaceae	10	2.42	3	1.01
10.	Acanthaceae	9	2.18	8	2.68

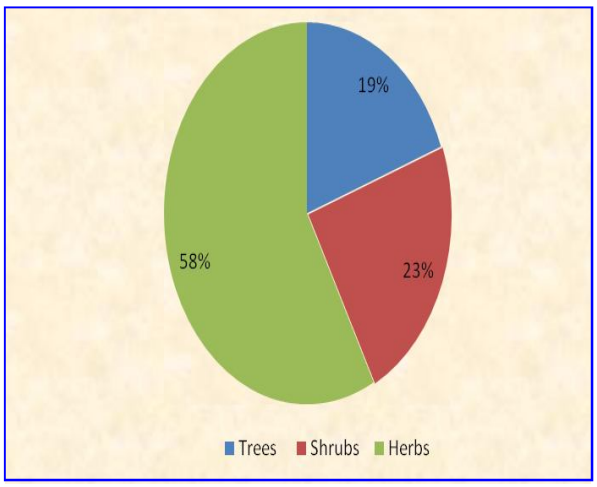

Fig. 5 : Habit of plant species.

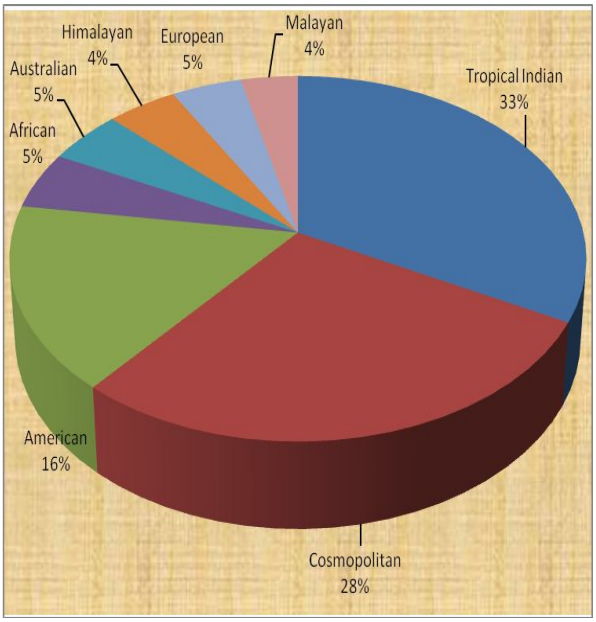

Fig. 6 : Comparison of % of various phytogeographical elements in the flora of Ambala district.

Table 2 : Checklists of the floristic diversity of Angiospermic species of Ambala district.

Family	Genus	Species
Ranunculaceae	*Ranunculus*	*Ranunculus sceleratus* L.
Annonaceae	*Annona*	*Annona squamosa* L.
	Polyalthia	*Polyalthia longifolia* (Sonn.) Thwaites
Menispermaceae	*Cissampelos*	*Cissampelos pareira* L.
	Cocculus	*Cocculus hirsutus* (L.) W.Theob.
		Cocculus laurifolius DC.
	Tinospora	*Tinospora cordifolia* (Willd.) Miers
Berberidaceae	*Berberis*	*Berberis lycium* Royle
		Berberis asiatica Roxb. *ex* DC.
Nelumbonaceae	*Nelumbo*	*Nelumbo nucifera* Gaertn.
Fumariaceae	*Fumaria*	*Fumaria indica* (Hausskn.) Pugsley
Papaveraceae	*Argemone*	*Argemone mexicana* L.
		Argemone ochroleuca Sweet
Brassicaceae	*Coronopus*	*Coronopus didymus* (L.) Sm.
	Lepidium	*Lepidium sativum* L.
	Sisymbrium	*Sisymbrium irio* L.
	Rorippa	*Rorippa indica* (L.) Hiern
	Eruca	*Eruca vesicaria* (L.) Cav.
Capparidaceae	*Cleome*	*Cleome gynandra* L.
		Cleome viscosa L.
	Capparis	*Capparis sepiaria* L.
	Crateva	*Crateva nurvala* Buch.-Ham.
Violaceae	*Viola*	*Viola pilosa* Blume
Flacourtiaceae	*Flacourtia*	*Flacourtia indica* (Burm. f) Merr.
Polygalaceae	*Polygala*	*Polygala arvensis* Willd.
Caryophyllaceae	*Stellaria*	*Stellaria media* (L.) Vill.
	Spergula	*Spergula arvensis* L.
	Silene	*Silene conoidea* L.
Portulacaceae	*Portulaca*	*Portulaca oleracea* L.
		Portulaca grandiflora Hook.
Dipterocarpaceae	*Shorea*	*Shorea robusta* Gaertn.

Table 2 continued...

Table 2 continued...

Bombacaceae	*Bombax*	*Bombax ceiba* L.
Malvaceae	*Sida*	*Sida cordata* (Burm. *f.*) Borss. Walk.
		Sida cordifolia L.
		Sida acuta Burm.*f.*
		Sida rhombifolia L.
		Sida ovata Forssk.
	Abutilon	*Abutilon indicum* (L.) Sweet
		Abutilon hirtum (Lam.) Sweet
	Hibiscus	*Hibiscus lobatus* (Murray) Kuntze
		Hibiscus micranthus L. *f.*
	Malvastrum	*Malvastrum coromandelianum* (L.) Garcke
	Urena	*Urena lobata* L.
	Malva	*Malva parviflora* L.
Sterculiacaeae	*Firmiana*	*Firmiana simplex* (L.) W. Wight
	Pterosper-mum	*Pterospermum acerifolium* (L.) Willd.
	Melochia	*Melochia corchorifolia* L.
Tiliaceae	*Triumfetta*	*Triumfetta rhomboidea* Jacq.
		Triumfetta pentandra
	Corchorus	*Corchorus olitorius* L.
		Corchorus aestuans L.
		Corchorus capsularis
Zygophyllaceae	*Tribulus*	*Tribulus terrestris* L.
Oxalidaceae	*Oxalis*	*Oxalis debilis* var. *corymbosa* (DC.) Lourteig
		Oxalis corniculata L.
Rutaceae	*Citrus*	*Citrus medica* L.
	Aegle	*Aegle marmelos* (L.) Corrêa
	Murraya	*Murraya koenigii* (L.) Spreng.
		Murraya paniculata (L.) Jack
Meliaceae	*Azadirachta*	*Azadirachta indica* A. Juss.
	Melia	*Melia azedarach* L.
	Toona	*Toona ciliata* M. Roem.

Table 2 continued...

Rhamnaceae	*Zizyphus*	*Ziziphus mauritiana* Lam.
		Ziziphus oenoplia (L) Mill.
		Ziziphus nummularia (Burm. *f.*) Wight & Arn.
Vitaceae	*Cayratia*	*Cayratia trifolia* (L.) Domin
	Vitis	*Vitis vinifera* L.
Sapindaceae	*Cardiosper-mum*	*Cardiospermum halicacabum* L.
	Sapindus	*Sapindus mukorossi* Gaertn.
Anacardiaceae	*Mangifera*	*Mangifera indica* L.
Moringaceae	*Moringa*	*Moringa oleifera* Lam.
Papilionaceae	*Vicia*	*Vicia sativa* L.
	Melilotus	*Melilotus alba*
		Melilotus indicus (L.) All.
	Tephrosia	*Tephrosia purpurea* (L.) Pers.
		Tephrosia candida (Roxb.) DC.
	Dolichos	*Dolichos uniflorus*
	Clitoria	*Clitoria ternatea* L.
	Lathyrus	*Lathyrus aphaca* L.
	Rhynchosia	*Rhynchosia minima* (L.) DC.
	Dalbergia	*Dalbergia paniculata* subsp. *paniculata* (Roxb.) Thoth
		Dalbergia sissoo DC.
	Crotalaria	*Crotalaria medicaginea* Lam.
	Medicago	*Medicago polymorpha* L. *Medicago sativa* L.
	Trigonella	*Trigonella corniculata* Sibth. & Sm.
	Phaseolus	*Vigna aconitifolia* (Jacq.) Marechal
	Aeschynomene	*Aeschynomene indica* L.
	Alghai	*Alhagi camelorum* DC.
	Indigofera	*Indigofera linifolia* (L. *f.*) Retz.
		Indigofera trifoliata L.
		Indigofera linnaei Ali
	Alysicarpus	*Alysicarpus monilifer* (L.) DC.

Table 2 continued...

Table 2 continued...

		Alysicarpus vaginalis (L.) DC.
		Alysicarpus bupleuri-folius (L.) DC.
		Alysicarpus longifolius (Spreng.) Wight & Arn.
	Desmodium	*Desmodium triflorum* (L.) DC.
		Desmodium gangeticum (L.) DC.
	Teramnus	*Teramnus labialis* (L.) Spreng.
	Abrus	*Abrus precatorius* L.
	Erythrina	*Erythrina suberosa* Roxb.
	Butea	*Butea monosperma* (Lam.) Taub.
	Sesbania	*Sesbania bispinosa* (Jacq.) W.Wight
	Pongamia	*Pongamia pinnata* (L.) Pierre
	Lens	*Lens culinaris* Medik.
	Bauhinia	*Bauhinia racemosa* Lam.
		Bauhinia purpurea L.
		Bauhinia tomentosa L.
	Delonix	*Delonix regia* (Hook.) Raf.
Caesalpinieae	*Caesalpinia*	*Caesalpinia bonduc* (L.) Roxb.
	Cassia	*Cassia javanica* L.
		Cassia fistula L.
		Cassia floribunda Collad.
	Senna	*Senna siamea* (Lam.) H.S.Irwin & Barneby
		Senna occidentalis (L.) Link
		Senna sulfurea (Collad.) H.S.Irwin & Barneby
		Senna tora (L.) Roxb.
		Senna obtusifolia (L.) H.S.Irwin & Barneby
		Senna alata (L.) Roxb.
	Tamarindus	*Tamarindus indica* L.
	Parkinsonia	*Parkinsonia aculeata* L.
	Saraca	*Saraca indica* L.
Mimoseae	*Leucaena*	*Lysiloma latisiliquum* (L.) Benth.

Table 2 continued...

Table 2 continued...

Table 2 continued...

	Albizzia	*Albizzia lebbek* Benth.
		Albizzia procera
	Prosopis	*Prosopis chilensis* (Molina) Stuntz
		Prosopis cineraria
	Pithecello-bium	*Pithecellobium dulce* (Roxb.) Benth.
	Mimosa	*Mimosa pudica* L.
	Acacia	*Acacia nilotica* (L.) Delile
		Acacia leucophloea (Roxb.) Willd.
		Acacia catechu (L.) Willd.
		Acacia auriculiformis Benth.
Crassulaceae	*Kalanchoe*	*Kalanchoe integra* (Medik.) Kuntze
		Bryophyllum pinnatum (Lam.) Oken
Combretaceae	*Terminalia*	*Terminalia belerica* (Gaertn.) Roxb.
		Terminalia chebula Retz.
		Terminalia arjuna (Roxb. ex DC.) Wight & Arn.
		Terminalia tomentosa Wight & Arn.
Myrtaceae	*Callistemon*	*Callistemon lanceolatus* (Sm.) Sweet
	Eucalyptus	*Eucalyptus crebra* F.Muell.
		Eucalyptus tereticornis Sm.
		Eucalyptus camaldulensis Dehnh.
	Psidium	*Psidium guajava* L.
	Syzygium	*Syzygium cumini* (L.) Skeels
Lythraceae	*Ammania*	*Ammannia baccifera* L.
	Lawsonia	*Lawsonia inermis* L.
	Lagerstro-emia	*Lagerstroemia speciosa* (L.) Pers.
Cucurbitaceae	*Coccinia*	*Coccinia grandis* (L.) Voigt
	Trichosan-thes	*Trichosanthes cucumerina* L.
	Luffa	*Luffa acutangula* (L.) Roxb.
	Mukia	*Mukia maderaspatana* (L.) M. Roem.

Table 2 continued...

Table 2 continued...

	Ctenolepis	*Ctenolepis garcini* (L.) C. B. Clarke
	Citrullus	*Citrullus colocynthis* (L.) Schrad.
Caricaceae	*Carica*	*Carica papaya* L.
Punicaceae	*Punica*	*Punica granatum* L.
Onagraceae	*Ludwigia*	*Ludwigia octoavalis* (Jacq.) P. H. Raven
		Ludwigia perennis L.
Cactaceae	*Cereus*	*Cereus pterogonus*
	Opuntia	*Opuntia elatior* Mill.
Aizoaceae	*Trianthema*	*Trianthema portulacas-trum* L.
		Trianthema triquetra Rottler & Willd.
Molluginaceae	*Glinus*	*Glinus lotoides* L.
	Mollugo	*Mollugo cerviana* (L.) Ser.
Apiaceae	*Centella*	*Centella asiatica* (L.) Urb.
	Daucus	*Daucus carota* L.
	Apium	*Apium graveolens* L.
	Trachysper-mum	*Trachyspermum ammi* (L.) Sprague
Rubiaceae	*Breonia*	*Breonia chinensis* (Lam.) Capuron
	Mitragyna	*Mitragyna parvifolia* (Roxb.) Korth.
	Gardenia	*Gardenia jasminoides* J. Ellis
	Oldenlandia	*Oldenlandia corymbosa* L.
	Wendlandia	*Wendlandia heynei* Schult.) Santapau & Merchant
	Galium	*Galium aparine* L.
Asteraceae	*Cichorium*	*Cichorium intybus* L.
	Youngia	*Youngia japonica* (L.) DC.
	Launaea	*Launaea procumbens* (Roxb.) Ramayya & Rajagopal
	Sonchus	*Sonchus asper* (L.) Hill
		Sonchus brachyotus DC.
	Cyanthillium	*Cyanthillium cinereum* (L.) H. Rob.
	Ageratum	*Ageratum conyzoides* (L.) L.

Table 2 continued...

Table 2 continued...

	Erigeron	*Erigeron canadensis* L.
		Erigeron bonariensis L.
	Conyza	*Conyza japonica* (Thunb.) Less. *ex* Less.
	Caesulia	*Caesulia axillaris* Roxb.
	Pentanema	*Pentanema indicum* (L.) Ling
	Pulicaria	*Pulicaria crispa* Sch. Bip.
	Anaphalis	*Anaphalis subdecurrens* (DC.) Gamble
	Blumea	*Blumea laciniata* (Wall. & Roxb.) DC.
	Laggera	*Laggera aurita* (DC.) Sch. Bip. *ex* Schweinf.
	Xanthium	*Xanthium strumarium* L.
	Eclipta	*Eclipta prostrata* (L.) L.
	Bidens	*Bidens biternata* (Lour.) Merr. & Sherff
	Tridax	*Tridax procumbens* (L.) L.
	Verbesina	*Verbesina encelioides* (Cav.) Benth. & Hook. f.ex. A. Gray
	Artemisia	*Artemisia scoparia* Waldst. & Kitam.
	Parthenium	*Parthenium hysterophorus* L.
	Emilia	*Emilia sonchifolia* (L.) DC.
	Echinops	*Echinops echinatus* Roxb.
	Sphageticola	*Sphagneticola calendulacea* (L.) Pruski
	Cirsium	*Cirsium arvense* (L.) Scop.
	Ixeris	*Ixeris polycephala*
Sphenocleaceae	*Sphenoclea*	*Sphenoclea zeylanica* Gaertn.
Plumbaginaceae	*Plumbago*	*Plumbago zeylanica* L.
Primulaceae	*Anagallis*	*Anagallis arvensis* L.
Sapotaceae	*Madhuca*	*Madhuca longifolia* (J. Koenig *ex* L.) J. F. Macbr.
	Mimusops	*Mimusops elengi* L.
Ebenaceae	*Diospyros*	*Diospyros montana* Roxb.
Oleaceae	*Jasminum*	*Jasminum arborescens* Roxb.

Table 2 continued...

Table 2 continued...

		Jasminum multiflorum (Burm. *f.*) Andrews
	Nyctanthes	*Nyctanthes arbor-tristis* L.
Apocyanaceae	*Catharanthus*	*Catharanthus pusillus* (Murray) G. Don
	Ichnocarpus	*Ichnocarpus frutescens* (L.) W. T. Aiton
	Carissa	*Carissa spinarum* L.
	Cascabela	*Cascabela thevetia* (L.) Lippold
	Alstonia	*Alstonia scholaris* (L.) R. Br.
	Nerium	*Nerium oleander* L.
	Tabernaemontana	*Tabernaemontana diverticata* (L.) R.Br. *ex* Roem. & Schult.
Asclepiadaceae	*Calotropis*	*Calotropis gigantea* (L.) Dryand.
		Calotropis procera (Aiton) Dryand.
	Pergularia	*Pergularia daemia* (Forssk.) Chiov.
	Oxystelma	*Oxystelma esculentum* (L. *f.*) Sm.
	Pentatropis	*Pentatropis nivalis* (J. F. Gmel.) D. V. Field & J. R. I. Wood
	Tylophora	*Tylophora indica* (Burm. *f.*) Merr.
Gentianaceae	*Centaurium*	*Centaurium pulchellum* (Sw.) Druce
Hydrophyllaceae	*Hydrolea*	*Hydrolea zeylanica* (L.) Vahl
Boraginaceae	*Cordia*	*Cordia dichotoma* G.Forst.
	Heliotropium	*Heliotropium strigosum* Willd.
	Trichodesma	*Trichodesma indicum* (L.) Lehm.
Convolvulaceae	*Cuscuta*	*Cuscuta reflexa* Roxb.
	Evolvulus	*Evolvulus alsinoides* (L.) L.
		Evolvulus nummularius (L.) L.
	Ipomoea	*Ipomoea fistulosa*
		Ipomoea nil (L.) Roth

Table 2 continued...

Table 2 continued...

Table 2 continued...

		Ipomoea pes-tigridis L.
		Ipomoea cairica (L.) Sweet
		Ipomoea quamoclit L.
		Ipomoea aquatica Forssk.
		Ipomoea muricata (L.) Jacq.
	Covolvulus	*Convolvulus arvensis* L.
		Convolvulus microphyllus
	Merremia	*Merremia hederacea* (Burm. *f.*) Hallier *f.*
		Merremia ageyptia (L.) Urb.
Solanaceae	*Physalis*	*Physalis minima* L.
		Physalis peruviana L.
	Withania	*Withania somnifera* (L.) Dunal
	Nicotiana	*Nicotiana plumbaginifolia* Viv.
	Datura	*Datura metel* L.
		Datura stramonium L.
	Solanum	*Solanum nigrum* L.
		Solanum torvum Sw.
		Solanum surattense Burm. *f.*
		Solanum violaceum Ortega
		Solanum incanum L.
	Cestrum	*Cestrum nocturnum* L.
	Lycopersicon	*Lycopersicon esculentum* Mill.
Scrophulariaceae	*Mazus*	*Mazus pumilus* (Burm. *f.*) Steenis
	Lindernia	*Lindernia ciliata* (Colsm.) Pennell
	Bacopa	*Bacopa monnieri* (L.) Wettst.
	Verbascum	*Verbascum chinense* (L.) Santapau
	Scoparia	*Scoparia dulcis* L.
	Veronica	*Veronica aquatic*
Pedaliaceae	*Sesamum*	*Sesamum indicum* L.
Martyniaceae	*Martynia*	*Martynia annua* L.
Bignoniaceae	*Tecomella*	*Tecomella undulata* (Sm.) Seem

Table 2 continued...

Table 2 continued...

	Kigelia	*Kigelia africana* (Lam.) Benth.
	Tecoma	*Tecoma stans* (L.) Juss. *ex* Kunth
	Jacaranda	*Jacaranda mimosifolia* D.Don
	Oroxylum	*Oroxylum indicum* (L.) Kurz
	Fernandao	*Fernando adenophylla*
Acanthaceae	*Thunbergia*	*Thunbergia erecta* (Benth.) T. Anderson
	Andrographis	*Andrographis paniculata* (Burm. *f.*) Nees
	Hygrophila	*Hygrophila auriculata* (Schumach.) Heine
	Peristrophe	*Peristrophe bicalyculata* (Retz.) Nees
	Rungia	*Rungia pectinata* (L.) Nees
	Justicia	*Justicia adhatoda* L.
	Ruellia	*Ruellia prostrata* Poir.
	Barleria	*Barleria prionitis* L.
		Barleria cristata L.
Verbenaceae	*Phyla*	*Phyla nodiflora* (L.) Greene
	Lantana	*Lantana camara* L.
	Duranta	*Duranta erecta* L.
	Tectona	*Tectona grandis* L. *f.*
	Vitex	*Vitex negundo* L.
	Clerodendrum	*Clerodendrum indicum* (L.) Kuntze
		Clerodendrum phlomoides
	Stachytarpheta	*Stachytarpheta jamaicensis* (L.) Vahl
Lamiaceae	*Hyptis*	*Hyptis suaveolens* (L.) Poit.
	Anisomeles	*Anisomeles indica* (L.) Kuntze
	Leucas	*Leucas cephalotes* (Roth) Spreng.
		Leucas lanata Benth.
	Ocimum	*Ocimum tenuiflorum* L.
		Ocimum americanum L.
		Ocimum basilicum L.
Plantaginaceae	*Mecardonia*	*Mecardonia procumbens* (Mill.) Small
Nyctaginaceae	*Boerhavia*	*Boerhavia chinensis* (L.) Roxb.

Table 2 continued...

Table 2 continued...

		Boerhavia diffusa L.
	Mirabilis	*Mirabilis jalapa* L.
Amaranthaceae	*Alternan-thera*	*Alternanthera pungens* Kunth
		Alternanthera sessilis (L.) R. Br. *ex* DC.
		Alternanthera paronychioides A. St.-Hil.
	Gomphrena	*Gomphrena celosoides* Mart.
	Pupalia	*Pupalia lappacea* (L.) Juss.
	Digera	*Digera muricata* (L.) Mart.
	Celosia	*Celosia argentea* L.
	Achyranthes	*Achyranthes aspera* L.
	Amaranthus	*Amaranthus spinosus* L.
		Amaranthus tricolor L.
		Amaranthus viridis L.
Chenopodiaceae	*Chenopodium*	*Chenopodium ambrosioides*
		Chenopodium murale L.
		Chenopodium album L.
Basellaceae	*Basella*	*Basella alba* L.
Polygonaceae	*Polygonum*	*Polygonum plebeium* R. Br.
		Polygonum barbatum L
		Polygonum glabrum
	Rumex	*Rumex dentatus* L.
	Antigonon	*Antigonon leptopus* Hook. & Arn.
Proteaceae	*Grevillea*	*Grevillea robusta* A. Cunn. *ex* R. Br.
Euphorbiaceae	*Euphorbia*	*Euphorbia royleana* Boiss.
		Euphorbia heterophylla L.
		Euphorbia helioscopia L.
		Euphorbia hirta L.
		Euphorbia prostrata Aiton
		Euphorbia pulcherrima Willd. ex Klotzsch
		Euphorbia thymifolia L.
	Jatropha	*Jatropha curcas* L.
		Jatropha gossypifolia L.
	Croton	*Croton bonplandianus* Baill.
	Ricinus	*Ricinus communis* L.

Table 2 continued...

Table 2 continued...

	Phyllanthus	*Phyllanthus fraternus* G. L. Webster
	Kirganelia	*Kirganelia reticulata*
	Emblica	*Emblica officinalis*
	Putranjiva	*Putranjiva roxburghii* Wall.
	Securingea	*Securingea virosa*
Ulmaceae	*Holoptelea*	*Holoptelea integrifolia* Kanju
Cannabaceae	*Cannabis*	*Cannabis sativa* L.
Moracece	*Ficus*	*Ficus benghalensis* L.
		Ficus religiosa L.
		Ficus virens Aiton
		Ficus rumphii Blume
		Ficus auriculata Lour.
		Ficus racemosa L.
	Morus	*Morus alba* L.
		Morus australis Poir.
	Streblus	*Streblus asper* Lour.
Hydrocharitaceae	*Hydrilla*	*Hydrilla verticillata* (L. *f.*) Royle
Musaceae	*Musa*	*Musa aurantiaca* G. Mann *ex* Baker
Agavaceae	*Agave*	*Agave americana* L.
Dioscoreaceae	*Dioscorea*	*Dioscorea bulbifera*
Liliaceae	*Aloe*	*Aloe vera* (L.) Burm. *f.*
	Asphodelus	*Asphodelus tenuifolius* Cav.
	Gloriosa	*Gloriosa superba* L.
	Asparagus	*Asparagus adscendens* Roxb.
		Asparagus racemosus Willd.
Pontederiaceae	*Eichhornia*	*Eichhornia crassipes* (Mart.) Solms
Commelinaceae	*Commelina*	*Commelina benghalensis* L.
		Commelina forskalii Vahl
	Aneilema	*Aneilema nudiflorum*
Arecaceae	*Phoenix*	*Phoenix dactylifera* L.
		Phoenix sylvestris (L.) Roxb.
Typhaceae	*Typha*	*Typha latifolia* L.
Araceae	*Colocasia*	*Colocasia esculenta* (L.) Schott

Table 2 continued...

Table 2 continued...

Lemnaceae	*Lemna*	*Lemna minor* L.
Hydrocharitaceae	*Najas*	*Najas graminea*
Cyperaceae	*Cyperus*	*Cyperus alopecuroides* Rottb.
		Cyperus brevifolius
		Cyperus compressus L.
		Cyperus cuspidatus Kunth
		Cyperus iria L.
		Cyperus kyllingia
		Cyperus triceps
		Cyperus niveus Retz.
	Fimbristylis	*Fimbristylis complanata* (Retz.) Link
Poaceae	*Setaria*	*Setaria intermedia* Roem. & Schult.
		Setaria glauca
		Setaria verticillata (L.) P. Beauv.
	Brachiaria	*Brachiaria distachya* (L.) Stapf
	Hemarthria	*Hemarthria compressa* (L.) R. Br.
	Cymbopogon	*Cymbopogon commutatus* (Steud.) Stapf
		Cymbopogon martini (Roxb.) W. Watson
	Dendrocal-amus	*Dendrocalamus strictus* (Roxb.) Nees
	Phragmites	*Phragmites karka* (Retz.) Trin. *ex* Steud.
	Dinebra	*Dinebra retroflexa* (Vahl) Panz.
	Desmosta-chya	*Desmostachya bipinnata* (L.) Stapf
	Leptochola	*Leptochloa panicea* (Retz.) Ohwi
	Arundinella	*Arundinella nepalensis* Trin.
	Arundo	*Arundo donax* L.
	Bothriochloa	*Bothriochloa insculpta* (A. Rich.) A. Camus
		Bothriochloa pertusa (L.) A. Camus

Table 2 continued...

Table 2 continued...

	Cenchrus	*Cenchrus ciliaris* L.
		Cenchrus setigerus
	Chloris	*Chloris barbata* Sw.
	Cynodon	*Cynodon dactylon* (L.) Pers.
	Dactyloct-enium	*Dactyloctenium scindicum* Boiss.
		Dactyloctenium aegyptium (L.) Willd.
	Dichanthium	*Dichanthium annulatum*
	Digitaria	*Digitaria abludens* (Roem. & Schult.) Veldkamp
	Echinochloa	*Echinochloa colonum* (L.) Link
		Echinochloa crus-galli (L.) P. Beauv.
	Eleusine	*Eleusine indica* (L.) Gaertn.
	Eragrostis	*Eragrostis amabilis* (L.) Wight & Arn.
	Imperata	*Imperata cylindrica* (L.) Raeusch.
	Oplismenus	*Oplismenus burmanni* (Retz.) P. Beauv.
	Paspalidium	*Paspalidium flavidum* (Retz.) A. Camus
	Phalaris	*Phalaris minor* Retz.
	Poa	*Poa annua* L.
	Polypogon	*Polypogon monspeliensis* (L.) Desf.
	Saccharum	*Saccharum bengalense* Retz.
		Saccharum spontaneum L.
	Sorghum	*Sorghum halepense* (L.) Pers.
	Sporobolus	*Sporobolus* (Retz.) P. Beauv.
	Chrysopogon	*Chrysopogon zizanioides* (L.) Roberty

Acanthaceae, Cyperaceae and Verbenaceae. The number and percentage of genera and species of the dominant families have been summarized in table 1.

The phytogeographical analysis of data reveals that tropical Indian elements form the major part (*ca* 33%) of the flora of Ambala district, this is followed by Cosmopolitan, American and African. Australian and

European are equally represented followed by Himalayan temperate and Malayan elements (fig. 6). However, Jain *et al*. (2000) reported predominance of Afro-Asian element in the flora of North-East Haryana, closely followed by Indian elements.

A comparison of the species described by Jain *et al*. (2000) from Ambala with species recorded during the present work revealed that 85.74% species are those which are not described by Jain *et al*. (2000) from area. Similarly, comparison of the present data with that of Duthie (1903-1929) showed that present work also includes 28.5% species which were not described by Duthie (1903-1929) from this area. These observations suggest that the changes in the flora of this region are rapid and significant.

Conclusion

Changing environmental conditions due to global warming which results in floods and drought conditions in the area may be responsible for changes in the floristic patterns of this region. Human activities such as intensive cultivation, grazing, rapid urbanization, industrialization and construction of roads are the important factors which are affecting the vegetation. Invasive species are growing profoundly in the area resulting in the loss of native floristic diversity of the area.

Gloriosa superba, *Oroxylum indicum*, *Clitoria ternatea*, *Sphageticola calendulacea*, *Martynia annua*, *Bacopa monnieri*, *Heliotropium strigosum*, *Pentatropis nivalis* and *Plumbago zeylinca* are in queue for becoming extinct in the future from the study area as these has been reported at one or two study sites in the district. Overexploitation of these medicinally valuable plant species is resulting in decrease in their number in study area and there is an urgent need of conserving these species.

References

Duthie, J. F. (1903-1922). Flora of the Upper Gangetic Plains and of the adjacent Siwalik and Sub-Himalayan Tracts. Govt. Press, Calcutta.

Jain, S. K. and R. R. Rao (1977). *A Handbook of Field an Herbarium Methods*. Today and Tommorrow's Publishers, New Delhi.

Jain, S. P., D. M. Verma, S. C. Singh, J. S. Singh and S. Kumar (2000). *Flora of Haryana*. Central Institute of Medicinal and Aromatic Plants, Lucknow.

Maheshwari, J. K. (1963). *The Flora of Delhi*. Council of Scientific and Industrial Research, New Delhi.