



**FLOWERING PLANT DIVERSITY AND ETHNOBOTANY OF MORNI HILLS,
SIWALIK RANGE, HARYANA, INDIA**

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ABSTRACT

The present work, an attempt to prepare an inventory of floristically richest part of Haryana, was chiefly carried out from November 2000 till March 2005 and the area under study has been studied extensively to find out the diversity of flowering plants in the area, local utilizations of the plants, their ecological status and associations, if any. Attempt has also been made to correlate the findings with the earlier works carried out in the state or adjoining regions.

KEYWORDS: Flowering Plants, Morni hills Siwalik, Ethnobotany



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INTRODUCTION

Floristic studies of a given area offer an insight into natural wealth of that particular area. In comparison to large geographical area, studying relatively smaller areas intensively is always a better way to assess the biodiversity thoroughly. These kinds of studies have attained more significance these days because our resources are fast depleting, forests receding at alarming rates, ecosystems being disturbed, all primarily due to human interventions. Many taxa are on verge of extinction, many already extinct and the trend will continue unless very serious planning and policy decisions are made. As the encroachment of habitats of native flora by fast spreading invasive alien species is also leading to changes in vegetation patterns, it has now become a task of topmost priority to document biodiversity in every area, before we further loose many of important taxa. Therefore, in the present study, an attempt has been made to document biodiversity of Morni Hills of Siwalik range in Haryana, India.

Study Area

The Morni hills are an off-shoot of the Siwaliks, a Himalayan range situated about 45 km from Chandigarh, the Union Territory and capital of two states, Haryana and Punjab. These hills form two parallel ranges from south-east to north-west located in North-eastern region of Haryana ($30^{\circ}55'$ to $34^{\circ}45'$ N latitude and $70^{\circ}00'$ to $75^{\circ}15'$ E longitude). The altitude at the highest points is 1100-1500 meters above sea level. These hills represent tertiary formations of Siwalik range which is the outermost range of the Himalaya. The soil in the area is chiefly sodic. The rainfall is monsoonal and chief portion of this is received from July to September. Anthropogenic factors are leading to ecological unbalance, destroying the habitats. Besides, forest fire and landslides result in denudation of many sites resulting in lot of damage to the vegetation. Still the area is very rich in its floristic diversity and one of the richest in Haryana state.



Figure 1
Map Showing Study Area

Methodology

To analyse the floral diversity of angiosperms of the area, extensive surveys of the area in different seasons were carried out for about five years. The documentation of the floristic diversity was done by way of collecting, preserving and drying the plant specimens and finally herbarium preparation. This was supplemented by recording photographs, wherever possible and collecting available

information from the local people about uses of plants in the area. Standard methodology for herbarium preparation was used. These specimens were then studied in detail for their identification with the help of available literature and the field notes. The identity of the specimens was further confirmed by comparing these with those available in the herbarium of Botanical Survey of India, Dehradun. Finally, the collected and processed

plants were mounted on standard sized herbarium sheets (11.5" x 16.5") and deposited in Herbarium of Botany Department, Kurukshetra University, Kurukshetra, Haryana (India).

RESULTS

The area of Morni Hills chiefly represents a dry deciduous forest type. The foothills remain dry almost throughout the year and have only scarce vegetation, that too constituted by xerophytic species. With increase in altitude, the dominant vegetation slightly changes with inclusion of large shrubs and climbers. Near highest points, the forests are evergreen conifer forest type, almost entirely made up of a single species of chir pine, *Pinus roxburghii*. Seasonal instances of forest fires and landslides also do occur in the area due to the nature of forest type. The present work conducted in the area revealed the presence of 553 species belonging to 369 genera and 95 families of angiosperms. As the state of Haryana shares its borders with Punjab,

Rajasthan, Uttar Pradesh, Delhi and Himachal Pradesh, it is presumed that flora of this state will show some affinities with the flora of these regions. Flora of Morni region can be compared to some extent with that of Delhi, upper Gangetic plains, Rajasthan and Punjab, but, unlike vegetation of Himachal Pradesh, temperate and alpine elements are not common in this area. There is very fast spread of invasive elements in the area which are disturbing the native vegetation. The most troublesome plants being *Lantana camara*, *Eupatorium adenophorum* and *Parthenium hysterophorus* which have occupied every possible habitat. *Lantana camara* and *Parthenium hysterophorus* are present in all kinds of habitats whereas *Eupatorium adenophorum* is still restricted to shady areas in a few localities, all of them being recently introduced in the area. A brief outline of the composition of vegetation of the area giving an analysis of families, genera and species of monocots and dicots is presented as follows (Table 1):

Table 1
Analysis of the Flowering Plant Diversity of Morni Hills.

Group	Families	Genera	Species
Dicots	84	315	474
Monocots	11	54	79

The ratio of families of monocots and dicots in the present investigation is 1: 7.63. The ratio of monocot and dicot genera is 1: 5.583, of monocot and dicot species is 1: 6 in the flora of Morni Hills. Nair (1978) observed that in flora of Punjab plains, except for Gramineae and Cyperaceae, monocots are poorly represented. According to him, of the 177 species of monocots, 103 belong to Gramineae and 35 to Cyperaceae, while the remaining 39 species belong to 19 families, none of which has more than 5 species. Similarly, Jain *et al.* (2000) reported that in the flora of Haryana, of the 168 species of monocots, 81 and 45 species belong to

families Gramineae and Cyperaceae, respectively. In the present study on the flora of Morni Hills, of the 79 species of the monocots, 47 and 14 belong to families Gramineae and Cyperaceae, respectively. The present data supported the above observation that except Gramineae and Cyperaceae, monocots are poorly represented. Analysis of the data of total number of species represented in a family in this region clearly indicates that in nearly all the earlier works, such as Duthie (1903-1929), Maheshwari (1963) and Nair (1978), Gramineae ranks first followed by Leguminosae (Table 2).

Table 2
Ten Dominant Families of the Region and Adjacent Areas in Earlier Works

Haryana Jain et al., (2000)	Gangetic Plains Duthie (1903-29)	India Hooker (1907)	Punjab Plains Nair (1978)	Delhi Maheshwari (1963)
Gramineae	Gramineae	Orchidaceae	Gramineae	Gramineae
Leguminosae	Leguminosae	Leguminosae	Papilionaceae	Leguminosae
Compositae	Cyperaceae	Gramineae	Compositae	Compositae
Cyperaceae	Compositae	Rubiaceae	Cyperaceae	Cyperaceae
Euphorbiaceae	Scrophulariaceae	Euphorbiaceae	Malvaceae	Acanthaceae
Acanthaceae	Malvaceae	Acanthaceae	Acanthaceae	Euphorbiaceae
Labiatae	Acanthaceae	Compositae	Euphorbiaceae	Convolvulaceae
Convolvulaceae	Euphorbiaceae	Cyperaceae	Convolvulaceae	Malvaceae
Malvaceae	Convolvulaceae	Labiatae	Scrophulariaceae	Amaranthaceae
Amaranthaceae	Labiatae	Urticaceae	Amaranthaceae	Scrophulariaceae

DISCUSSION

Herbaceous vegetation of the area is very diverse and different in variety of habitats. Among most common herbs are species of *Euphorbia*, *Polygonum* and *Cassia*. Many Asteraceae members like *Acanthospermum hispidum*, *Siegesbeckia orientalis*, *Pentanema indicum*, *Tagetes minuta*, Urticaceae members like *Urtica dioica*, *Girardinia heterophylla* along with *Rumex hastatus*, etc. are among the most common herbs. Rare herbs include *Sauromatum guttatum*, *Porana racemosa*. *Bauhinia vahlii* is the most common climber of the dense patches, along with occasional presence of *Abrus precatorius*, *Celastrus paniculatus*, *Vallisneria spiralis*, *Ichnocarpus frutescens*, *Oxystelma esculentum*, *Dregea volubilis*, *Pueraria tuberosa*, *Cissampelos pareira*, *Diplocyclos palmatus*, *Stephania glabra*, *Tinospora cordifolia*, *Trichosanthes dioica*, *T. cucumerina*, *Coccinia grandis* and *Dioscorea deltoidea*. Rarely the climbers like *Porana paniculata*, *Dioscorea pentaphylla*, *Hemidesmus indicus* and *Helinus lanceolatus* are also encountered. Among the most prominent shrubs are *Colebrookea oppositifolia*, *Agave americana*, *Spermadictyon suaveolens*, *Flacourtia jangomas*, *Boehmeria platyphylla*, *Debregeasia salicifolia*, *Capparis sepiaria*, *C. zeylanica*, *C. aphylla*, *Carissa spinarum* and species of *Indigofera*. Few others shrubs including *Randia dumetorum*, *Holarrhena antidysenterica*, *Ricinus communis* and *Roylea cineraria* are occasional in the area. Rare shrubs include *Euonymus echinatus*, *Gymnosporia royleana*, *Naringi crenulata* and *Cocculus laurifolius*. Tree vegetation is

dominated by *Lannea coromandelica*, *Rhus parviflora*, *Kydia calycina*, *Mallotus philippensis*, *Acacia catechu*, *Acacia farnesiana*, *Prosopis chilensis*, *Wendlandia heynei*, *Holoptelea integrifolia*, *Cedrella toona*, *Sapium insigne* and *Salmalia malabarica* besides planted trees like *Haplophragma adenophyllum*, *Ailanthus excelsa*, *Grevillea robusta*, *Emblica officinalis*, *Terminalia bellerica*, *T. arjuna*, *T. chebula*. Among other trees occasionally found in the area are :*Madhuca longifolia*, *Terminalia tomentosa*, *Helicteres isora*, *Pistacia khinjuk*, *Eucalyptus citriodora*, *Butea monosperma*, *Erythrina indica*, *Diospyros melanoxylon*, *Boehmeria rugulosa*, *Rhamnus triquetrus*, *Casearia tomentosa*, *Kydia calycina* and *Adina cordifolia*. Tree species which are rare in the area include *Crataeva nurvala*, *Oroxylum indicum*, *Ougenia oojenensis*, *Anogiessus latifolia*, *A. pendula* and *Engelhardtia spicata*.

In the present study, among dominant families, the first position is occupied by Asteraceae, followed by Leguminosae and Gramineae (Poaceae). Mani (1974) made somewhat similar observations. According to him, dominant families in Indian flora are: Leguminosae, Gramineae and Euphorbiaceae followed by Acanthaceae, Compositae, Cyperaceae and Labiatae. The ratio of genera to species in Morni Hill region according to the present study is 1:1.49. This shows the small proportion of species to the number of genera and families. In the adjoining Delhi state, (Maheshwari, 1963); upper Gangetic plain (Hooker, 1907), Duthie (1903-1929); Punjab plains and Rajasthan (Nair, 1978), the ratio of

genera to species is 1:1.63, 1: 1.22, 1:1.75 and 1:1.99, respectively. In contrast, a ratio as high as 1:7 is reported for rest of India (Mani, 1974). It has been suggested that this low proportion of genera to species is due to prevailing arid and semi-arid conditions. Jain *et al.* (2000) observed that in flora of Haryana, *Cyperus* is the dominant genus represented

by 24 species followed by *Ipomoea* (15), *Euphorbia* (13), *Eragrostis* (12), *Acacia* (10) and *Crotalaria* (10). However, present study revealed that genus *Cassia* is dominant which is represented by 10 species followed by *Cyperus*, *Euphorbia* and *Indigofera* and *Ipomoea* (Table 3).

Table 3
Dominant Genera in the Study Area

Genus	Family	Species	Genus	Family	Species
<i>Cassia</i>	Leguminosae	10	<i>Ficus</i>	Moraceae	6
<i>Cyperus</i>	Cyperaceae	9	<i>Acacia</i>	Leguminosae	6
<i>Euphorbia</i>	Euphorbiaceae	9	<i>Solanum</i>	Solanaceae	5
<i>Indigofera</i>	Leguminosae	9	<i>Sida</i>	Malvaceae	5
<i>Ipomoea</i>	Convolvulaceae	7			

The phytogeographical analysis of data of Morni Hills reveals that tropical Indian element forms the major part (ca 40%) of the flora of Morni Hills, this is followed by Himalayan and temperate element, whereas African, European and Indo-Malayan elements are poorly represented (Table 4). Similar observations were made by Nair (1978) on flora of Punjab plains. However, Jain *et al.* (2000) reported predominance of Afro-Asian element in the flora of North-east Haryana, closely followed by Indian element.

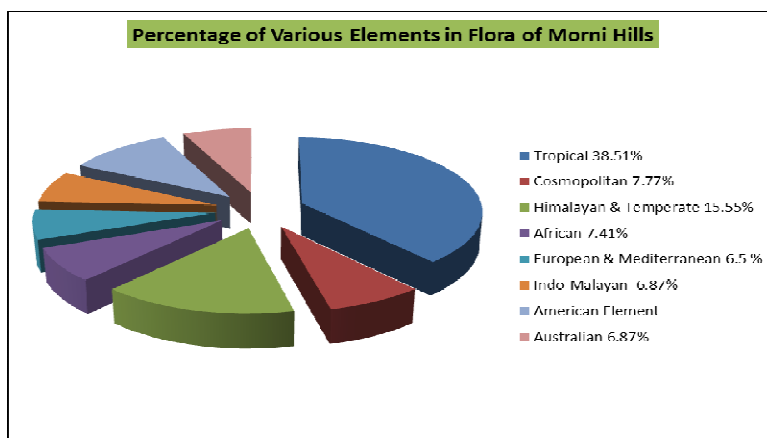


Figure 2
Floral Elements of Morni Hills

The detailed analysis of various elements as reported during the study of the vegetation of the area is given in the following pages (Table 4). For every element, the families which they represent, along with genera are listed. Names of some important species have been listed in each category.

Table 4
Various Elements in Flora of Morni Hills

S. No.	Element	Families	Genera	Species
1.	Tropical	44	138	213
<p>Important Component Species: <i>Miliusa velutina</i>, <i>Stephania glabra</i>, <i>Crataeva nurvala</i>, <i>Capparis sepiaria</i>, <i>Shorea robusta</i>, <i>Hibiscus micrantha</i>, <i>Kydia calycina</i>, <i>Grewia tenax</i>, <i>G. elastica</i>, <i>Reinwardtia indica</i>, <i>Aegle marmelos</i>, <i>Murraya koengii</i>, <i>Naringi crenulata</i>, <i>Boswellia serrata</i>, <i>Garuga pinnata</i>, <i>Cissus repanda</i>, <i>Leea aspera</i>, <i>Vitis latifolia</i>, <i>V. parvifolia</i>, <i>Abrus precatorius</i>, <i>Acacia catechu</i>, <i>A. modesta</i>, <i>A. farnesiana</i>, <i>Aeschynomene indica</i>, <i>Alysicarpus bupleurifolius</i>, <i>A. monilifer</i>, <i>Cassia fistula</i>, <i>Crotalaria albida</i>, <i>Dalbergia paniculata</i>, <i>Desmodium gangeticum</i>, <i>D. polycarpum</i>, <i>D. laxiflorum</i>, <i>Dolichos biflorus</i>, <i>Erythrina suberosa</i>, <i>Flemingia bracteata</i>, <i>Indigofera angulosa</i>, <i>I. cordifolia</i>, <i>I. linifolia</i>, <i>Mimosa rubicaulis</i>, <i>Ougeinia oojeinensis</i>, <i>Phanera vahlii</i>, <i>Phaseolus aconitifolius</i>, <i>Prosopis cineraria</i>, <i>Shuteria vestita</i>, <i>Tephrosia purpurea</i>, <i>T. strigosa</i>, <i>Duchesnea indica</i>, <i>Rubus ellipticus</i>, <i>Anogeissus latifolia</i>, <i>Anogeissus pendula</i>, <i>Terminalia arjuna</i>, <i>T. bellerica</i>, <i>T. chebula</i>, <i>T. tomentosa</i>, <i>Diplocyclos palmatus</i>, <i>Mollugo cerviana</i>, <i>Borreria articularis</i>, <i>Oldenlandia aspera</i>, <i>Randia dumetorum</i>, <i>Hamiltonia suaveolens</i>, <i>Wendlandia exserta</i>, <i>Adenostemma lavenia</i>, <i>Blumea laciniata</i>, <i>Blumea mollis</i>, <i>Laggera aurita</i>, <i>L. flava</i>, <i>Launaea nudicaulis</i>, <i>Spheranthus indicus</i>, <i>Spilanthes acmella</i>, <i>Vicoa indica</i>, <i>V. vestita</i>, <i>Campanula canescens</i>, <i>Holarrhena pubescens</i>, <i>Vallisneria spiralis</i>, <i>Wrightia tinctoria</i>, <i>Cryptolepis buchananii</i>, <i>Trichodesma indicum</i>, <i>Convolvulus arvensis</i>, <i>Cuscuta reflexa</i>, <i>Ipomoea carica</i>, <i>I. pes-tigridis</i>, <i>Merremia hederacea</i>, <i>Porana paniculata</i>, <i>P. racemosa</i>, <i>Solanum erianthum</i>, <i>Bacopa monnieri</i>, <i>Kickxia ramosissima</i>, <i>Lindenbergia indica</i>, <i>Verbascum chinense</i>, <i>Oroxylum indicum</i>, <i>Andrographis echinoides</i>, <i>A. paniculata</i>, <i>Blepharis maderaspatensis</i>, <i>Dicliptera roxburghiana</i>, <i>Eranthemum nervosum</i>, <i>Hemigraphis rupestris</i>, <i>Hygrophila auriculata</i>, <i>Justicia quinqueangularis</i>, <i>Lepidagathis cuspidata</i>, <i>Callicarpa macrophylla</i>, <i>Clerodendrum phlomoides</i>, <i>Anisomeles indica</i>, <i>Colebrookea oppositifolia</i>, <i>Leucas cephalotes</i>, <i>Ocimum canum</i>, <i>Plectranthes mollis</i>, <i>Pogostemon benghalense</i>, <i>Rumex dentatus</i>, <i>Scurrula cordifolia</i>, <i>Baliospermum montanum</i>, <i>Bridela crenulata</i>, <i>Euphorbia clarkeana</i>, <i>Glochidion velutinum</i>, <i>Phyllanthus emblica</i>, <i>P. fraternus</i>, <i>Sapium insigne</i>, <i>Securingia virosa</i>, <i>Holoptelea integrifolia</i></p>				
2.	Cosmopolitan	10	26	43
<p>Important Component Species: <i>Coronopus didyma</i>, <i>Malvastrum coromandelianum</i>, <i>Urena lobata</i>, <i>Dodonea viscosa</i>, <i>Cassia absus</i>, <i>Caesalpinia bonduc</i>, <i>Desmodium triflorum</i>, <i>Zornia gibbosa</i>, <i>Blainvillea rhomboidea</i>, <i>Eclipta alba</i>, <i>Gnaphalium luteo-album</i>, <i>Siegesbeckia orientalis</i>, <i>Sonchus asper</i>, <i>Xanthium strumarium</i>, <i>Spilanthes acmella</i>, <i>Solanum nigrum</i>, <i>Lindernia ciliata</i>, <i>Boerhaavia diffusa</i>, <i>Cyperus cuspidatus</i>, <i>C. laevigatus</i>, <i>Scirpus maritimus</i>, <i>Cynodon dactylon</i>, <i>Dactyloctenium aegyptium</i>, <i>Digitaria apludens</i>, <i>Oplismenus compositus</i>, <i>Poa annua</i>, <i>Setaria intermedia</i>.</p>				
3.	Himalayan and Temperate	32	63	86
<p>Important Component Species: <i>Clematis buchaniana</i>, <i>Thalictrum foliosum</i>, <i>Berberis aristata</i>, <i>Capsella bursa-pastoris</i>, <i>Hypericum cernuum</i>, <i>Aspidopterys wallichii</i>, <i>Geranium ocellatum</i>, <i>Impatiens scarbida</i>, <i>Gymnospora royleana</i>, <i>Helinus lanceolatus</i>, <i>Rhamnus triquetra</i>, <i>Pistacia khinjuk</i>, <i>Rhus parviflora</i>, <i>Indigofera hamiltonii</i>, <i>Lespedeza juncea</i>, <i>Pueraria tuberosa</i>, <i>Pyrus pashia</i>, <i>Bupleurum hamiltonii</i>, <i>Adina cordifolia</i>, <i>Anaphalis contorta</i>, <i>Cirsium wallichii</i>, <i>Inula cappa</i>, <i>Inula cuspidata</i>, <i>Leucomeris spectabilis</i>, <i>Saussurea candicans</i>, <i>Senecio nudicaulis</i>, <i>Serratula pallida</i>, <i>Myrsine africana</i>, <i>Tylophora indica</i>, <i>Ipomoea muricata</i>, <i>Verbascum thapsus</i>, <i>Justicia thyrsoiflora</i>, <i>Caryopteris wallichiana</i>, <i>Ajuga parviflora</i>, <i>Plectranthes coesta</i>, <i>Scutellaria repens</i>, <i>Teucrium quadrifarium</i>, <i>Andrachne cordifolia</i>, <i>Euphorbia royleana</i>, <i>Ficus auriculata</i>, <i>Boehmeria rugulosa</i>, <i>Maoutia puya</i>, <i>Urtica dioica</i>, <i>Engelhardtia spicata</i>, <i>Acorus calamus</i></p>				
4.	Mediterranean-European	13	21	36
<p>Important Component Species: <i>Apium graveolens</i>, <i>Arenaria serpyllifolia</i>, <i>Centaurium pulchellum</i>, <i>Galium aparine</i>, <i>Geranium lucidum</i>, <i>Lathyrus sphaericus</i>, <i>Lolium tomentum</i>, <i>Malva parviflora</i>, <i>Portulaca oleracea</i>, <i>Punica granatum</i>, <i>Ranunculus arvensis</i>, <i>Silene conoidea</i>, <i>Sonchus brachyotus</i>, <i>Spergula arvensis</i>, <i>Trigonella corniculata</i>, <i>Vicia hirsuta</i>, <i>V. sativa</i></p>				
5.	Malayan	21	24	38

		Important Component Species: <i>Clematis gouriana</i> , <i>Tinospora cordifolia</i> , <i>Cardamine scutata</i> , <i>Viola sepens</i> , <i>Flacourtia jangomas</i> , <i>Abutilon graveolens</i> , <i>Celastrus paniculatus</i> , <i>Lannea coromandelica</i> , <i>Butea monosperma</i> , <i>Cassia siamea</i> , <i>Solena heterophylla</i> , <i>Conyza japonica</i> , <i>Gentiana pedicellata</i> , <i>Lycium europaeum</i> , <i>Aerva sanguinolenta</i> , <i>Pachystoma senile</i> , <i>Zeuxine strateumatica</i> , <i>Arisaema decipiens</i> , <i>Saccharum benghalense</i>		
6.	American	18	32	58
		Important Component Species: <i>Argemone mexicana</i> , <i>Sida acuta</i> , <i>Corchorus aestuans</i> , <i>Mimosa pudica</i> , <i>Prosopis chilensis</i> , <i>Acanthospermum hispidum</i> , <i>Galinsoga parviflora</i> , <i>Parthenium hysterophorus</i> , <i>Tagetes minuta</i> , <i>Tridax procumbens</i> , <i>Erigeron canadensis</i> , <i>Evolvulus nummularius</i> , <i>Ipomoea angulata</i> , <i>I. fistulosa</i> , <i>Cestrum nocturnum</i> , <i>Nicotiana plumbaginifolia</i> , <i>N. rustica</i> , <i>Physalis minima</i> , <i>Solanum violaceum</i> , <i>Matynia annua</i> , <i>Lantana camara</i> , <i>Hyptis suaveolens</i> , <i>Mirabilis jalapa</i> , <i>Alternanthera paronychoides</i> , <i>Croton bonplandianum</i> , <i>Euphorbia geniculata</i> , <i>Agave americana</i> , <i>Cyperus compressus</i> , <i>C. triceps</i> , <i>Scirpus erectus</i>		
7.	Australian	09	19	38
		Important Component Species: <i>Helicteres isora</i> , <i>Zizyphus oenoplia</i> , <i>Albizia procera</i> , <i>Atylosia scarabaeoides</i> , <i>Desmodium gangeticum</i> , <i>Indigofera linnae</i> , <i>Eucalyptus camaldulensis</i> , <i>E. crebra</i> , <i>E. tereticornis</i> , <i>Trichosanthes cucumerina</i> , <i>Boerhaavia chinensis</i> , <i>Chenopodium murale</i> , <i>Brachiaria distachya</i> , <i>Dichanthium annulatum</i> , <i>Phalaris minor</i> , <i>Sporobolus diander</i> , <i>Apluda mutica</i>		
8.	African	16	24	41
		Important Component Species: <i>Sisymbrium irio</i> , <i>Capparis aphylla</i> , <i>Polygala erioptera</i> , <i>Acacia nilotica</i> , <i>Indigofera astragalina</i> , <i>Tamarindus indica</i> , <i>Woodfordia fruticosa</i> , <i>Heliotropium strigosum</i> , <i>Solanum incanum</i> , <i>Sesamum indicum</i> , <i>Justicia simplex</i> , <i>Peristrophe bicalyculata</i> , <i>Ajuga bracteosa</i> , <i>Eragrostis atrovirens</i> , <i>Pennisetum typhoides</i>		
	Total			553

A comparison of the species described by Jain *et al.* (2000) from Morni with the species collected during the present work revealed that of the 556 species, 138 species are common in both of these works, whereas, 61 species described by Jain *et al.* (2000) were not found during the present investigation. Similarly, comparison of the present data with that of Duthie (1903-1929) showed that 82 species reported from Siwaliks by Duthie (1903-1929) are also recorded in this work. However, 123 species described by Duthie (1903-1929) cannot be recollected during the tenure of this work, implying thereby that these have disappeared from the area. Important species which were reported by Duthie (1903-1929) from the area and could not be collected during the present work include *Grewia vestita*, *G. laevigata*, *G. polygama*, *Murraya exotica*, *Olax nana*, *Ilex doniana*, *Celastrus senegalensis*, *Berchemia floribunda*, *Sageretia oppositifolia*, *Schleichera trijuga*, *Saccopetalum tomentosum*, *Xylosma longifolium*, *Pittosporum eriocarpum*, *Semicarpus anacardium*, *Crotalaria tetragona*, *Atylosia mollis*, *Dumasia villosa*, *Mucuna capitata*, *Mucuna imbricata*, *Dalbergia*

lanceolaria, *Urania neglecta*, *Desmodium cephalotes*, *Acacia eburnea*, *Acacia intsia*, *Combretum nanum*, *Randia uliginosa*, *Gardenia turgida*, *Pavetta indica*, *Conyza viscidula*, *Blumea membranacea*, *Tricholepis strictophyllum*, *Catamixis baccharioides*, *Crepis acaulis*, *Androsace saxifragaefolia*, *Embelia robusta*, *Ardisia solanacea*, *Holostemma rheedianum*, *Gymnema tingens*, *Marsdenia roylei*, *Cordia vestita*, *Limnophila gratiolooides*, *Aechmanthera tomentosa*, *Eremostachys superba*, *Euphorbia acaulis*, *Trema politoria*, *Ficus scandens*, *Eulophia herbacea*, *Eulophia mackinnoni*, *Aerides multiflorum*, *Rhynchostylis retusa*, *Globba orixensis*, *Dioscorea triphylla*, *Smilax prolifera*, *Iphigenia indica*, *Commelina salicifolia*, *Aneilema scapiflorum*, *Phoenix humilis* and *Plesmonium margeritifera*.

Similarly some important species described by Jain *et al.* (2000) and were not found during the present investigation include *Delphinium denudatum*, *Desmodium velutinum*, *Opuntia vulgaris*, *Knoxia sumatrensis*, *Conyza leucantha*, *Erigeron sublyratus*, *Filago pyramidata*, *Glossogyne bidens*, *Ifloga spicata*, *Wahlenbergia*

marginata, *Hoppea dichotoma*, *Cordia vestita*, *Lindernia sessiliflora*, *L. angallis*, *Aechmanthera gossypina*, *Quercus leucotrichophora*, *Habenaria plantaginea*, *Hedychium spicatum* and *Agave cantula*. This clearly indicates the extent to which the ecosystem has been disturbed, leading to disappearance of vulnerable species from the area. Similar kinds of processes are happening in many such ecosystems. The vegetation of the area is under threat from invasive alien species, the prominent ones being *Lantana camara*, *Parthenium hysterophorous* and *Eupatorium adenophorum*. These species are fast

spreading in the area and majority of landscapes are covered by fast growth of these, especially so in exposed slopes. However, in the dense patches of forest the frequency of elements is considerably low, where the native vegetation dominates. The locals utilize the forests in various ways and many plants are a source of valuable products including medicine, as this is the readily available. In recent study of Ambala District of Haryana by Vashistha and Kaur (2013), ethnobotanical uses of 70 species have been listed. Some of the more important plants from the present work are listed below:

Table 5
Some Ethnobotanical Significant Plants from the Region

S.N.	Name of Species	Local Name	Family	Part Used	Uses
1.	<i>Abrus precatorius</i>	Ratti/ Chirmati	Fabaceae	Roots and Seeds	Root decoction cures cough and colds. Seeds applied as a paste on stiffening of shoulder joints and to cure paralysis.
2.	<i>Acacia catechu</i>	Khair	Mimosaceae	Bark and exudates	"Kaththa" is obtained from the heartwood, "kheersal" obtained from older trees relieves from sore throat and cough.
3.	<i>Achyranthes aspera</i>	Puthkanda	Amaranthaceae	Leaves, Tender stem	Decoction diuretic, used in renal dropsies, young leaves used like spinach. The potash rich ash is a manure.
4.	<i>Agave americana</i>	Kantala/Bans Keora	Agavaceae	Leaves, Peduncle	Leaves yield strong and durable fibre, also act as laxative, dried flower-stalks are used for thatching.
5.	<i>Andrographis paniculata</i>	Kalmegh, Kirayat	Acanthaceae	Foliage	A bitter tonic and febrifuge. Astringent, useful in dysentery, diabetes, itches and piles. Decoction used in jaundice.
6.	<i>Adhatoda vasica</i>	Vasaka	Acanthaceae	Leaves, Roots	Used in asthma, juice cures diarrhoea, powder heals skin affections. Very useful in curing <i>post-partum</i> bleeding.
7.	<i>Aegle marmelos</i>	Bael Pattar	Rutaceae	Fruit	Fruit digestive, cooling and a great tonic, also used for diarrhoea and dysentery. Offered to gods.
8.	<i>Artemisia scoparia</i>	Dona	Asteraceae	Leaves, Inflorescence	Decoction of leaves and inflorescence a strong laxative, flower tops burnt to repel insects of cattle sheds.
9.	<i>Asparagus racemosus</i>	Shatawari	Liliaceae	Roots	Herb tonic, root juice with honey cures dyspepsia. Root oil cures nervous and rheumatic disorders.
10.	<i>Bacopa monnieri</i>	Nir-Brahmi	Scrophulariaceae	Leaves, Stem	A popular memory booster. Also used in epilepsy, insanity and other nervous diseases.
11.	<i>Bauhinia purpurea</i>	Khairwal	Caesalpiniaceae	Roots, Bark, Flower buds, Pods	Roots carminative. Bark used in diarrhoea, fibre yielding. Flower buds laxative, anthelmintic. Wood used for agricultural implements.
12.	<i>Bauhinia vahlii</i>	Maljan	Caesalpiniaceae	Seeds, Bark, Leaves	Bark gives a cordage fibre, seeds edible. Leaves used for thatching and for making umbrellas.
13.	<i>Barleria cristata</i>	Bansla	Acanthaceae	Roots, Leaves	Leaves and roots burnt and mixed with honey prove useful in curing coughs and swellings of bronchioles.
14.	<i>Berberis aristata</i>	Kashmal	Berberidaceae	Roots, Stem, Berries	Dried stems tonic, used for intermittent fevers, berries edible. Roots and stems yield a yellow dye.
15.	<i>Boerhaavia diffusa</i>	Punarnava/Santi	Nyctaginaceae	Roots, Foliage	Roots are expectorant, diuretic and laxative, used in asthma. Decoction of entire plant is vitalizing.
16.	<i>Centella asiatica</i>	Mandukparni	Apiaceae	Leaves	Diuretic, used in leprosy. The juice of leaves is used to enhance memory and relieve the nervous tension.
17.	<i>Centratherum anthelminticum</i>	Kali Ziri	Asteraceae	Fruits	The fruits are considered very useful in killing intestinal worms, also relieve flatulence.
18.	<i>Costus speciosus</i>	Keu	Zingiberaceae	Rhizomes	Rhizomes edible, tonic, mixed with roots are anthelmintic. Boiled to bathe painful joints.
19.	<i>Crataeva nurvala</i>	Barna	Capparaceae	Bark	Sacred, bark infusion known to cure kidney stones and hepatic dysfunction.
20.	<i>Digera muricata</i>	Taandla	Amaranthaceae	Tender shoots,	Entire plant is a pot herb, improves urinary

21.	<i>Dioscorea belophylla</i>	Turar	Dioscoreaceae	Leaves Roots, Leaves	blockages due to calculi. The tubers are edible after boiling. Leaves used as vegetable. Tubers also considered abortifacient.
22.	<i>Eclipta alba</i>	Bhringraj	Asteraceae	Leaves	Tonic and antiseptic, gives a stain useful for blackening the hair. Used for washing the wounds of cattle.
23.	<i>Emblica officinalis</i>	Amla	Euphorbiaceae	Fruits	Fruit astringent, cooling, diuretic, laxative, rich in vitamin C, used in hair dyes, shampoos. Also eaten raw, pickled or in jams.
24.	<i>Euphorbia hirta</i>	Dudhi	Euphorbiaceae	Foliage	Dried foliage useful in piles and dysentery. Also considered febrifuge. Latex applied to wounds and warts.
25.	<i>Ficus glomerata</i>	Goolar	Moraceae	Fruits	Fruit edible, cooling and nutritious, wood very light but durable. Latex cures piles.
26.	<i>Helicteres isora</i>	Marodphali	Sterculiaceae	Fruits, Leaves	Fruit very effective against piles, leaves used as fodder, bark yields a tough fiber.
27.	<i>Hemidesmus indicus</i>	Anantmool	Asclepiadaceae	Roots	Roots used in Ayurveda, effective in urinary tract and skin problems.
28.	<i>Holarrhena antidysentrica</i>	Kura	Apocyanaceae	Bark	Bark anthelmintic, used against amoebiasis and many kinds of abdomen pains related with worms.
29.	<i>Mallotus philippensis</i>	Kamila	Euphorbiaceae	Bark, Fruit	Bark is used in tanning. Fruit is extensively used for dyeing fibres, like vermilion and in skin diseases.
30.	<i>Martynia annua</i>	Gokhru	Martyniaceae	Leaves, Flowers, Fruit	Leaves a vegetable, infusion of flowers and buds used for inflammations. Seeds yield oil, which can be burnt in lamps.
31.	<i>Physalis minima</i>	Rasbhari, Papotan	Solanaceae	Fruits	Fruits edible, raw or cooked, tonic and appetizer, are laxative thus given in constipation.
32.	<i>Solanum erianthum</i>	Asedu, Ban Tamakhu	Solanaceae	Roots, Leaves	Root decoction useful in joint pains. Leaves mild sedative, smoked as tobacco.
33.	<i>Solanum nigrum</i>	Makoe, Pilu	Solanaceae	Foliage, Fruits	Ripe fruits edible, appetizer, a remedy in fever, diarrhoea and eye troubles. Infusion of plant cures abdominal disorders of the infants. Leaves cooked as green vegetable.
34.	<i>Terminalia bellirica</i>	Baheda	Combretaceae	Fruits	Astringent and laxative, a constituent of "triphal". Juice of immature fruit mixed with honey clears throat and chest.
35.	<i>Terminalia chebula</i>	Harad	Combretaceae	Fruits	Very useful in problems related to digestion, flatulence. Also a constituent of "triphal".
36.	<i>Withania somnifera</i>	Asgandh	Solanaceae	Roots, Leaves, Fruits	Roots cure intermittent fevers, hiccups, cough, ulcers and scabies. Leaf decoction useful in swellings joints, fever, sore eyes, cleaning wounds. Fruits improve digestion of cattle.
37.	<i>Woodfordia fruticosa</i>	Dhau	Lythraceae	Bark, Flowers	The bark and flowers are used in dysentery. Flowers yield a red dye, used for fabric colouring.

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