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Floristic studies of Angiosperms in Bilaspur block of District Yamuna Nagar (Haryana)

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Abstract

Science of field studies has formed a crucial link between various other branches of biology. Without the listing of species diversity, detailed and meaningful studies on conservation cannot be fruitful. One of the main time barriers to ecological& biodiversity research is the identification of organisms within communities down to the species level. Biodiversity especially species richness influences the ecosystem and hence the whole environment. A fundamental comprehension of the species richness of an area to be conserved is crucial, and a thorough survey that provides the taxonomic lists is required. Haryana though known for its agricultural output has significant patches of green cover. The district Yamuna Nagar is one of the most biodiverse regions of the state. The present paper enumerates the species diversity of Bilaspur block of district Yamunanagar. Extensive field studies were carried out during every season for a period of four years to collect the species specimens, not only that, the GPS coordinates, habit, phenology were also studied. A total of 282 angiospermic species were collected during the current study.

Introduction

Although the study of biodiversity may be traced back to Aristotle, the understanding that it is vanishing in recent years has elevated its significance and garnered public attention. Numerous studies conducted in the late 1970s and 1980s documented the rapid loss of tropical forests and ecosystems where the vast majority of biological variety is concentrated. As in-depth investigations can be carried out in small regions, the importance of regional flora is significantly greater than that of a flora representing a state or a country. A number of taxonomists (Rao & Sreeramulu, 1986) have stressed upon the need for intensive floristic exploration of local areas in order to understand the available plant wealth. Preparation of local herbaria will serve as an important resource of taxonomic information for regional research institutions. And in the near future this will help in the floristic revision of state and national flora.

The scientific study of flora and the accurate documentation of it can be used as the fundamental data needed in many disciplines of the life sciences. As a result, research on the angiosperm flora of a particular area can provide a wealth of biological data that can be used as a starting point for numerous advanced studies in the life sciences. The inventory and monitoring of biodiversity is a requirement for its preservation and sustainable usage. The different ever-changing ecosystems that exist on planet Earth, where organisms exhibit remarkable adaptability and flexibility, are better understood and maintained through taxonomy. Studying species helps us comprehend their history and variation.

YamunaNagar is one of the Twenty-two districts of the Haryana state. On November 1st, 1989, this district was established. The district is situated 274 metres above sea level. The district is bordered by the states of Himachal Pradesh in the north, Uttar Pradesh in the east, district Karnal in the south, and district Ambala in the west. Shiwalik Hills, also known as Churia Hills and Manak Parbat in the past, are a mountain range of the outer Himalayas that runs across the northern regions of the Indian subcontinent from the Indus River eastward towards the Brahmaputra River. Shivalik is a Hindi word that means "tresses of Shiva." It covers the lower hills in the districts of Himachal Pradesh, Punjab, Haryana, and Uttarakhand in the Indus River basin. Since the formation of district YamunaNagar, its flora has not been studied till date. Certain studies in the region have been restricted to the Kalesar National Park situated in block Chhachrauli. Hence this study was carried out to understand not only the species diversity but also the phytosociology of Bilaspur’s rich biodiverse region.

Review of Literature

Jain *et al.* (1981, 1982), Jain & Singh (1984) and Jain (1985) published papers on various aspects of vegetation of **North-Eastern Haryana**. Sharma and Khosla (1989) described Grasses of **Punjab and Chandigarh**. Rout & Gupta (1989) carried out vegetation analysis of Siwalik forests in **Morni Hills**, North-East Haryana. Jain *et al.* (2000) published Flora of Haryana which included more than 1000 species of plants. An extensive work on the vegetation of **Haryana** was published entitled Flora of Haryana by Kumar (2001). In his work the author described plants belonging to 583 genera and 138 families. Yadav *et al.* (2010,2012) carried out field work in sacred groves of **Mahendragarh** district, **Haryana** and elaborated on the traditional medicinal knowledge of plants. Kumar *et al.* (2013) studied the medicinal flora of Aravalli Hill in **Khanak, Haryana**. Vashishtha & Kaur (2013) carried out the floristic and ethnobotanical survey of **Ambala District**, Haryana and found 70 species to be of ethnomedicinal significance. Gupta & Ravi (2014) studied the vegetation composition and patterns of plant diversity in Kalesar reserve Forest, **Yamuna Nagar**, Haryana. Kaur and Vashishtha (2014) studied the flora of **Karnal district**, Haryana from ethnomedicinal importance and published a total of 71 plant species. Nidhan & Vashistha (2014) carried out intensive field studies in **Morni Hills**, Haryana and presented detailed account of vegetation as well as ethnobotanical significance of the vegetation. Gulia *et al.* (2017) carried out plant collection from village ponds of **Haryana** and identified 181 plant species belonging to 52 families. Kaur *et al.* (2017) studied the diversity of plant species along with their vernacular names, habit and their occurrence found in **Ambala district of Haryana** in India. In this study, a total of 414 plant species belonging to the 294 genera and 90 families were recorded from this area. Singh *et al.* (2018) reported a plant species-_*Basilicum polystachyon (L.) Moench* as addition to the flora of Haryana and Uttarakhand.Acharya *et al.* (2018) carried out extensive field surveys in **Morni Hills, Haryana** . Harikesh & Jakhar (2020) studied the floristic diversity and vegetation structure in tropical dry deciduous forests of **South-West Haryana**. Palria *et al.* (2020) reported a new record *Hypecoum pendulum* L. from **Hisar District, Haryana State**. Shukla & Srivastava (2021) carried out floristic studies of **Kalesar National Park, Yamuna Nagar, Haryana** and collected 317 species belonging to 80 families. Sukhorukov *et al.* (2023) carried out field studies in Haryana, India and found and named a new species of Atriplex- *Atriplex pseudotatarica* **Sukhor. & Nidhan Singh.**

Materials and Methods

1. The forest areas in the study region were thoroughly explored in order to study the angiosperm diversity of the region. Periodic surveys were conducted from July, 2019 to June, 2024. Efforts were made to survey all the sites for collection of angiosperm species in different phenological states. Standard procedures of Herbarium preparation including collection, preservation, drying, mounting, etc. were followed based on Jain and Rao (1977). The poisoned and well dried specimens were mounted using Fevicol on standard sized Herbarium sheets. Standard labelling with complete details including GPS location was carried out. The labelled sheets were deposited in the Herbarium of Department of Botany, JV College, Baraut, Baghpat (UP).
2. The digital herbarium of the specimens was also prepared. The APG IV (2016) classification has been followed in the arrangement of families as given by Chase *et al.* (2016). Latest Scientific names of plant taxa have been used throughout the work as obtained and verified from POWO (2024) and IPNI (2019) resources. Similarly, Synonyms have been provided for all taxa. Identification was done with the help of relevant literature and local experts. The identification of certain specimens was made by comparison with identified specimens in the Herbarium of Forest Research Institute, Dehradun.

Results and Discussion

During the current floristic study of angiosperms, a total of 280 plant species belonging to 113 genera and 75 families were collected and described. Out of the 75 families, 10 belonged to monocots while 65 belonged to the dicotyledons. The ratio of monocot to dicot family is 1:6.5 . The total number of genera studied were 113, of whom 25 genera were monocots while 88 belonged to the dicots. The ratio of monocot to dicot genera is 1:3.52. Similarly, the total number of species observed were 280, of whom 28 were monocots while 252 belonged to the dicots. The ratio of monocots to dicots species is 1:8.92.

	Monocots	Dicots	Ratio
Family	**10**	**65**	**1: 6.50**
Genera	**25**	**88**	**1: 3.52**
Species	**28**	**250**	**1: 8.92**

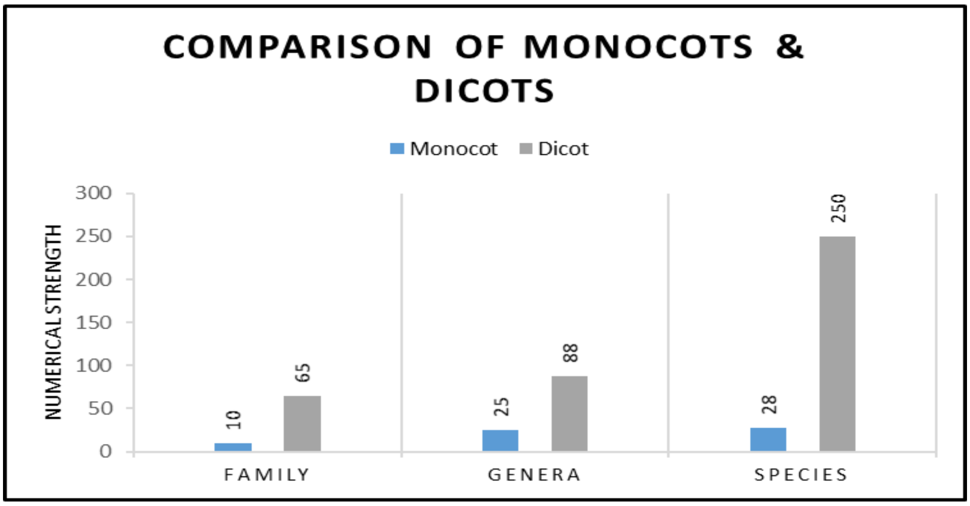

Figure 1.1: Comparison of Monocots and Dicots

A detailed analysis of the habit of flora showed the dominance of herbs (199 species, 69%) followed by trees (57 species, 20%) and Shrubs (32 species, 11%). The higher diversity of herbs points to their ephemeral nature and a short lifespan. These plants complete their life cycle under favourable conditions of rains and spring which has resulted in their high diversity as compared to the perennials, namely the shrubs and the trees.

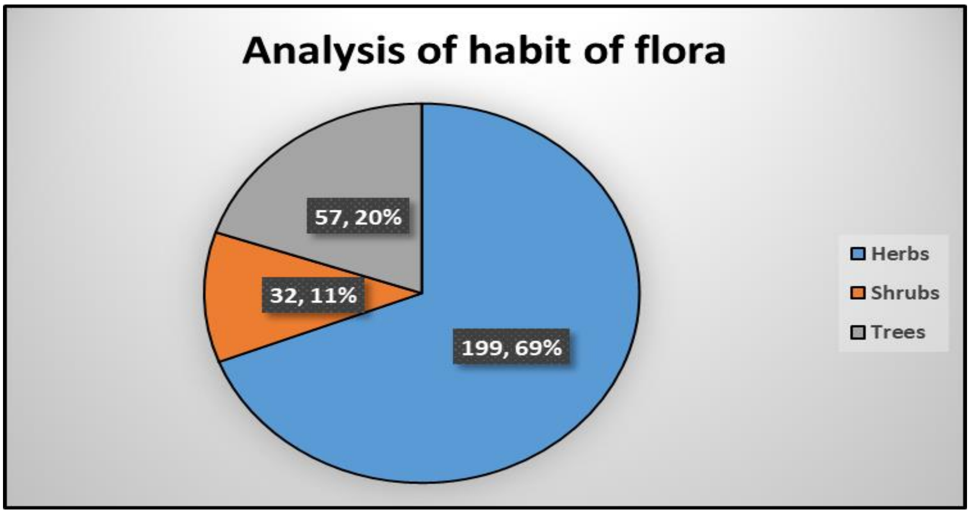

Figure 1.2: Pie Chart showing Habit analysis of Flora

The Family wise analysis of vegetation was carried and it showed that the dominant families with higher number of species in decreasing order are Fabaceae (39 species), Malvaceae (18 species), Poaceae (13 species), Convolvulaceae (13 species), Lamiaceae (12 species), Euphorbiaceae (12 species), Amaranthaceae (12 families), Asteraceae (11 species), Solanaceae (10 species) and Acanthaceae with 7 species.

S. No.	Name of Family	Number of Species	Percentage of Species	Number of Genera	Percentage of Genera
1.	Fabaceae	39	13.95%	34	30.1%
2.	Malvaceae	18	6.4%	14	12.4%
3.	Poaceae	13	4.6%	12	10.6%
4	Convolvulaceae	13	4.6%	06	5.3%
5.	Lamiaceae	12	4.3%	10	8.8%
6.	Euphorbiaceae	12	4.3%	08	7.1%
7.	Amaranthaceae	12	4.3%	07	6.2%
8.	Asteraceae	11	3.9%	11	9.7%
9.	Solanaceae	10	3.6%	04	3.5%
10.	Acanthaceae	07	2.5%	07	6.2%

Table 1.3: Analysis of dominance of families

An analysis of number of orders and families within those orders was carried out which showed that species studied belonged to 75 families and 28 orders. Lamiales and Caryophyllalles were the largest orders accounting for 10 and 7 families respectively.

S.No.	Orders	Families	Name of Families
1	**Alismatales**	**3**	Araceae, Hydrocharitaceae, Potamogetonaceae
2	**Dioscoreales**	**1**	Dioscoreaceae
3	**Liliales**	**1**	Colchicaceae
4	**Asparagales**	**3**	Hypoxidaceae, Asparagaceae
5	**Arecales**	**1**	Arecaceae
6	**Poales**	**2**	Poaceae, Cyperaceae
7	**Commelinales**	**2**	Commeminaceae, Pontederiaceae
8	**Ranunculales**	**3**	Menispermaceae, Papaveraceae, Ranunculaceae
9	**Vitales**	**1**	Vitaceae
10	**Zygophyllales**	**1**	Zygophyllaceae
11	**Oxalidales**	**1**	Oxalidaceae
12	**Malpighiales**	**4**	Euphorbiaceae, Phyllanthaceae, Salicaceae, Malpighiaceae
13	**Fabales**	**2**	Fabaceae, Polygalaceae
14	**Rosales**	**3**	Rosaceae, Cannabaceae, Moraceae, Ulmaceae
15	**Cucurbitales**	**1**	Cucurbitaceae

16	**Myrtales**	**3**	Combretaceae, Myrtaceae, Lythraceae
17	**Sapindales**	**5**	Anacardiaceae, Meliaceae, Rutaceae, Burseraceae, Sapindaceae
18	**Malvales**	**2**	Malvaceae, Dipterocarpaceae
19	**Brassicales**	**4**	Brassicaceae, Cleomaceae, Moringaceae, Capparaceae
20	**Santalales**	**2**	Loranthaceae
21	**Caryophyllales**	**7**	Aizoaceae, Caryophyllaceae, Molluginaceae, Polygonaceae, Amaranthaceae, Portulacaceae, Cactaceae
22	**Ericales**	**3**	Primulaceae, Ebenaceae, Sapotaceae
23	**Solanales**	**2**	Convolvulaceae, Solanaceae
24	**Gentianales**	**3**	Apocynaceae, Gentianaceae, Rubiaceae
25	**Lamiales**	**10**	Acanthaceae, Lamiaceae, Orobanchaceae, Plantaginaceae, Bignoniaceae, Scrophulariaceae, Martyniaceae, Pedaliaceae, Oleaceae, Verbenaceae
26	**Boraginales**	**1**	Boraginaceae
27	**Asterales**	**2**	Asteraceae, Companulaceae
28	**Apiales**	**1**	Apiaceae

Table 1.4: Orders and their families

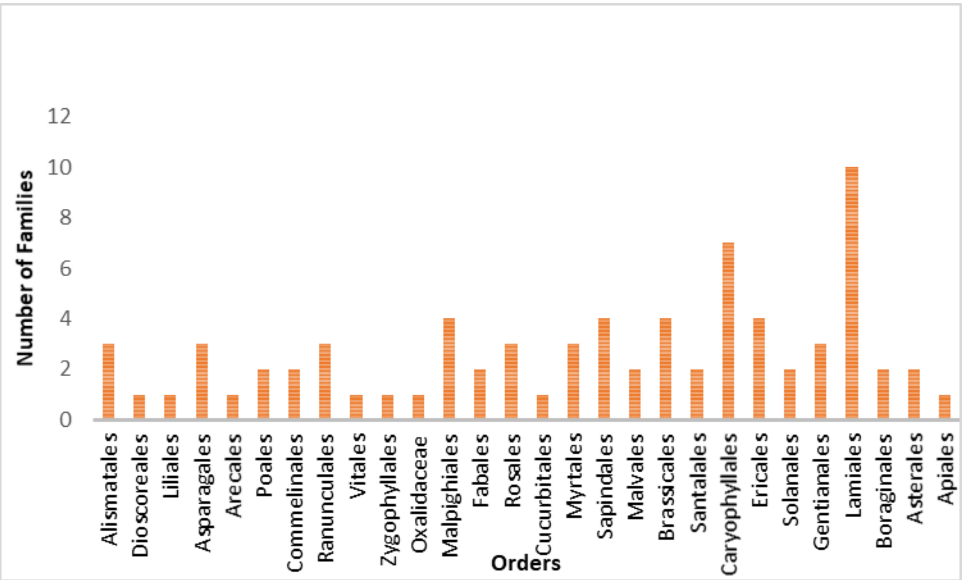

Figure 1.5: Graphical representation of Orders Vs Families

Conclusion

In the present study, a total of 280 plant species belonging to 113 genera and 75 families have been recorded. Out of the 75 families, 10 belonged to monocots while 65 belonged to the dicotyledons. The total number of genera studied were 113, out of which 25 genera were monocots while 88 belonged to the dicots. Similarly, the total number of species observed were

280, out of which 28 were monocots while 252 belonged to the dicots. The study of the habit of flora showed the dominance of herbs (199 species, 70%) followed by trees (57 species, 20%) and Shrubs (28 species, 10%). The species studied belonged to 75 families and 28 orders. Lamiales and Caryophyllalles were the largest orders accounting for 10 and 7 families respectively.

The present work carried out in Yamuna Nagar district has provided an insight into the phyto-diversity of the state of Haryana. The work highlighted the significance of regional floristic studies. The present work has added much information to the previous works on the flora of Haryana. As many as 09 species have been reported as new records to the Flora of the State. *Leea asiatica* (L.) Ridsdale (Vitaceae), *Canscora alata* (Roth) Wall. (Gentianaceae), *Gentiana decemfida* Buch. - Ham. ex D.Don (Gentianaceae), *Platostoma hispidum* (L.) A.J.Paton (Lamiaceae), *Curculigo orchioides* Gaertn. (Hypoxidaceae), *Iphigenia indica* (L.) Kunth (Colchicaceae), *Ficus semicordata* Miq. (Moraceae), *Aeginetia indica* L. (Orobanchaceae) and *Hackelochloa granularis* (L.) Kuntze (Poaceae) are the new records to the flora of state of Haryana.

References

Rao, R. S. & Sreeramulu (1986). Flora of Srikakulam district, Andhra Pradesh, India. Indian Botanical Society, Meerut.

M. W. Chase, M. J. M. Christenhusz, M. F. Fay, J. W. Byng, W. S. Judd, D. E. Soltis, D. J. Mabberley, A. N. Sennikov, P. S. Soltis, P. F. Stevens (2016). An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV, *Botanical Journal of the Linnean Society*,181(1):1–20, https://doi.org/10.1111/boj.12385

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

Jain, S.P. 1985. Addition to the Flora of North-East Haryana. *J. Econ. Tax. Bot.* 6(3): 652-654.

Jain, S.P. and Singh, J.S. 1984. Biological spectrum of the vegetation of North-East Haryana in India. *Bull. Bot. Surv. India*. 26(3-4).

Jain, S. P., Singh, J. S., & Verma, D. M. (1982). Flora of north-east Haryana (India). *Journal of Economic and Taxonomic Botany*, *3*, 151-176.

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

Sharma, M.L. and Khosla, P.K. 1989. Grasses of Punjab and Chandigarh. Publication Bureau, Panjab University, Chandigarh.

Rout, S.K., Gupta, S.R. (1989). Analysis of forest vegetation of Morni hills in northeast

Haryana. *Proc. Indian Acad. Sci.* 99, 117–126.

Yadav, S.; Arya, V.; Kumar, S.; Yadav, M. and Yadav, J.P. (2012). Ethnomedicinal flora of Dosi Hills of Mahendargarh district of Haryana, India. *Annals of Biology*, 28(2):213-222.

Yadav, S.; Yadav, J.P. Arya, V. and Panghal, M. (2010). Sacred groves in conservation of plant diversity in Mahendargarh district of Haryana, India. *Indian J. Traditional Knowledge*. 9(4):693-700.

Kumar, P.; Devi, R. and Singh, R. (2013). Medicinal Floristic Wealth at Aravalli Hill Range in Khanak, (Haryana), India. *International J. Ayurvedic & Herbal Medicine.* 3(6):1391-1400.

Vashishtha, B.D. and Kaur, M. (2013). Floristic and EthnoBotanical survey of Ambala District, Haryana. (2013). *Int. J. Pharm. Bio. Sci* 4(2) (P) 353-360.

Kaur, R. and Vashishtha, B.D. (2014). Ethnobotanical studies on Karnal district, Haryana, India. *International Res. J. Biol. Sci.* 3(8):46-55.

Gupta, S. R., & Ravi, K. (2014). Vegetation composition and plant biodiversity in forest ecosystems of Siwaliks in northern Haryana. *Indian Journal of Fundamental and Applied Life Sciences*, *4*(2), 76-88.

Nidhan, S., & Vashistha, B. D. (2014). Flowering plant diversity and ethnobotany of Morni hills, Siwalik range, Haryana, India. *International Journal of Pharma and Bio Sciences*, *5*(2).

Gulia, S. S., Ganie, S. A., Bhandoria, M. S., & Yadav, S. S. (2017). Floristic Inventory of Village Ponds of Southern Haryana, India. *Plant Archives*, *17*(1), 681-690.

Kaur, M. (2017). *Angiospermic Species Diversity in Ambala District Haryana*. [Ph.D. Thesis Kurukshetra University]

Kaur, M., Singh, N., & Vashistha, B. D. (2017). Floristic diversity of Ambala District, Haryana, India. *Plant Archives*, *17*(2), 993-1003.

Singh, V. K., Chaudhuri, S., Maiti, G., & Mandal, M. (2018). Basilicum polystachyon (L.) Moench (Lamiaceae)—a rare, medicinally important plant from West Bengal and its addition to the flora of Haryana and Uttarakhand. *J Econ Environ Soc*, *2*(1), 34-40.

Harikesh, H., & Jakhar, S (2020). Floristic diversity and vegetation analysis of the community forests of South-West Haryana, India. *Current Science*, 11:51-59.

Palria, N., Singh, N., & Vashistha, B. D. (2020). Hypecoum pendulum L.(Papaveraceae: Ranunculales): a new record for the flora of Haryana, India. *Journal of Threatened Taxa*, *12*(14), 17057-17059.

Shukla, A. N., & Srivastava, S. K. (2021). Enumeration of Vascular Plants of Kalesar National Park, Yamuna Nagar, Haryana. *Nelumbo*, *63*(1), 130-157.

Sukhorukov, A. P., Singh, N., Kushunina, M., Zaika, M. A., & Sennikov, A. N. (2023). A new species of *Atriplex* (Amaranthaceae) from the Indian subcontinent. *PhytoKeys*, *229*, 167–183. https://doi.org/10.3897/phytokeys.229.105162