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Floral Diversity and Ethnobotanical Study at Jind (Haryana) of Northern India

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ABSTRACT

Haryana is a landlocked state in north-west India that contributes 1.3% of the total land area of the country. A total of 73 plant species belonging to 51 genera and 34 groups of angiosperms were discovered during the survey. Among the total, 28 species were found of highly economically importance. The study also concluded that the local people and traditional practitioners of the study site applied medicinal plants and traditional remedies to treat a variety of ailments. Ethnobotanical research could serve to renew this knowledge bridge between old and future generations and lay a firm foundation for its maintenance.

Key words: Ethnobotany, Jind district, medicinal plants, plant diversity

INTRODUCTION

Biodiversity is defined as the variability among living organisms from all sources, including inter alia (among others) terrestrial, aquatic ecosystems and the ecological complexes of which they are part, encompassing diversity within and among species and ecosystems. It is a complete measure of variety. Biodiversity has been divided into three categories: genetic, species and environmental diversity (McCauley *et al.,* 2020). Genetic diversity refers to variations in living organisms at the gene level, whereas species diversity refers to variations in living organisms at the species level. Differences in living organisms' ecosystems cause diverse types of organisms to emerge, and this level of biodiversity is referred to as ecosystem diversity.

Plants have been used in medicinal systems, either directly or indirectly, since antiquity. There are around 70,000 plant species with therapeutic characteristics that have been recorded (Ahmed, 2016). Ayurveda, Yoga, Umami, Sidha, Allopathy and Homoeopathy, for example, are predominantly based on plant resources. Medicinal plants offer a viable alternative to the primary healthcare system in underdeveloped countries (Marselle *et al.*, 2021). Terrestrial biodiversity appears to be higher around the equator, owing to the warm environment and high primary productivity. Biodiversity is not uniformly spread over the globe, with the tropics being the richest.

Ethnobotany represents the historical and contemporary use of plants to satisfy good relationships with humankind. Therefore, ethnobotany documents are important for species, conservation and sustainable use of resources. In most cases, such studies are locally important in large plant species and sometimes result in crude medicine (Singh, 2016). Compared to synthetic drugs, plant derivatives have safer and more effective drugs. Ethnobotany data and traditional knowledge play an important role in research, especially in the literature and disciplines, and need to be accurately evaluated (Kumar *et al.*, 2018).

Haryana state of India is one the crucial state with such rich plant diversity. The district Jind of Haryana has an area of 2,702 sq km. located at the south-western edge of Haryana and bordered by semi-arid districts of Rajasthan. Due to its geographical and topological conditions, the site is rich in xerophytes diversity. However, the plant diversity and ethnobotanical aspects of plants in Jind district of Haryana are not yet explored. Jind has not yet been studied from a taxonomic point of view, taking into account the changes that have occurred in recent decades due to factors such as large-scale agriculture, urbanization and industrialization.

Given the importance of biodiversity and the urgent necessity to study a regional area for floristic diversity recording, it was proposed that Haryana's species diversity be explored

in stages. Given the above, this is an attempt to address the biodiversity of plants from this perspective and provide current information about plants, their diversity and their medicinal values and their traditional uses.

MATERIALS AND METHODS

The overall goal of this study was to investigate the rural and urban areas of district Jind to assess the floral variety of angiosperms and their ethnobotanical relevance in this region. From the beginning of 2022 until the end of June 2022, the site was intensively surveyed. Jind's coordinates are 29.32°N 76.32°E. It has a 227 meter average elevation (744 feet). Sandy loam to textured loam is a soil type in different parts of the district. The average rainfall for the entire district is 55 cm. The main climatic characteristics of the region are very dry, hot in the summer and cold in the winter.

All parts of the district were visited to collect plants in flowering and/or fruiting stages within this period, and every effort was made to collect ethnobotanical data on as many plant species as possible. With the use of a scissor, knife and a hooked long stick, the plants were picked in their flowering and/or fruiting stages. The specimens were collected in such a way that all morphological characteristics, including flower/fruit, were preserved as much as possible. Plant material was collected from various regions of the study site and placed in newspaper folds. In a field notebook, a record of collected specimens was kept, including specimen number, date of collection, collection location, habit, habitat, flower colour, other floral details, and any particular feature of the plant (if available), and ethnobotanical importance of the plant. To observe variance, the greatest efforts were undertaken to gather specimens from diverse plant populations of the same species.

To protect the specimens against infection or attack by insects and fungi, they were treated with formalin. The formalin solution was sprayed on newspapers carrying specimens in polythene bags using a plastic bottle. The spraying was done such that each specimen was saturated. After that, the specimens were sealed airtight in the same polythene bags with cellophane. Any bugs or fungus present in the plant material are instantly killed by formaldehyde fumes. Because deciduous plants die practically immediately, the production of an abscission layer is not possible. This procedure minimized the possibility of plant pieces dropping down while drying.

The specimens were gathered, stored and maintained in polythene bags for 20-24 h, after which the bags were opened and the specimens were removed and placed in new, fresh blotting papers or sheets for the next 24-36 h. After replacing the old newspaper with new blotting sheets, the specimens were stacked one on top of the other in a wooden plant press with four corners secured with screws. To apply uniform pressure to the material, all the screws were tightened once the blotting sheets were placed. The process of replacing specimen blotting sheets was repeated every 36-48, 72 h, and one week to ensure that the maximum moisture of the collected plant specimens was absorbed. The majority of the specimens dry in one week; however, succulents and fleshy plants required a significantly longer drying time. When the drying procedure was finished, the dried plant specimens were preserved in fresh dry blotting sheets and packed in polythene bags.

The polythene bags containing the gathered specimens were periodically opened, and the specimens were removed to examine their physical traits for identification purposes. The acquired specimens were identified using the available literature. For this aim, the field notes for the specific specimens were also consulted. The specimens' authenticity was further confirmed by matching them to herbarium specimens available at the Botany Laboratory of Chandigarh University as well as with the help of experts of Chandigarh University.

After mounting the specimens, herbarium sheets were given a final touch by labelling. The size of the label was 11 × 7 cm which was printed in the lower right-hand corner of the herbarium sheet. These sheets were properly labelled with the species names, scientific as well as local, family, name of the collector, locality, and date of collection, habit 24 and habitat of the specimen. The mounted and labelled sheets were deposited in the Department of Botany, Biosciences, Chandigarh University (Punjab).

The ethnobotanical data on the selected plants

were gained through interviews and questionnaires with Hakims, Vaids, medical practitioners and elderly rural residents. The information gathered was documented, and the questionnaire record was put in the Department of Botany, Biosciences, Chandigarh University.

RESULTS AND DISCUSSION

In this research study, 73 plant species belonging to 51 genera and 34 groups of angiosperms were discovered during the survey of district Jind. Bentham and Hook's classification scheme was mostly followed, with significant variations. In a floristic survey of Jind district, the number of tree species observed was lower than expected as compared to herbs. Dicotyledons were represented by 62 species belonging to 44 genera and 30 families, while the remaining 11 plant species were represented by monocotyledons belonging to 7 genera and 4 families. The ratio of families of monocots and dicots was 1 : 5.63. The ratio of monocot and dicot genera found was 1 : 6.28, while concerning species the ratio observed was 1:7.5 in the present study. The dicotyledons were dominant forms over the monocots in the study area (Figs. 1 and 2).

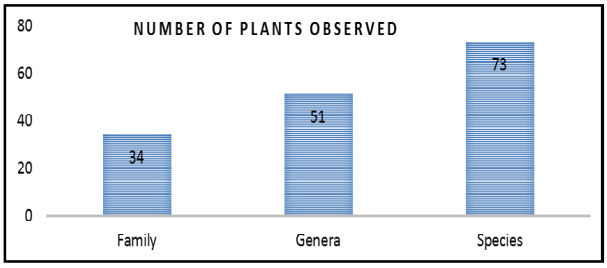

Fig. 1. Graphical representation of total number of studied families, genera and species.

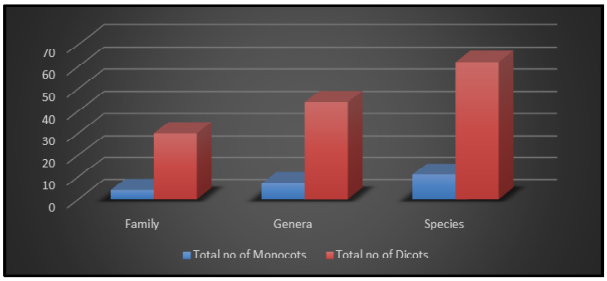

Fig. 2. Comparative analysis of family, genera and species among monocots and dicots families.

During the survey, the presence of some crucial plant species was observed which were frequently used by local people and vaidya to treat/cure various diseases. India had extremely rich and diversified flora and fauna due to its different topography and climatic conditions. The most valuable resource on earth was biodiversity, which also served as the cornerstone of human civilization. All of humanity's sociocultural, economic and other endeavours were either directly or indirectly related to a variety of environmental resources. Numerous regions in the world, including Africa, Canada, Malaysia, Nepal, Pakistan and Malaysia had conducted ethnobotanical studies (Idrees *et al.*, 2016; Aziz *et al.*, 2017; Marselle *et al.*, 2021). Even though there was a lot of research being done in India (Mwamahonje and Maseta, 2018; Kumar *et al.*, 2021; Marrelli, 2021), a lot of crucial data and indigenous knowledge had already been lost because older generations' expertise could not be passed on to new generations and was still unrecorded. Although there were numerous generic references to ethnobotany for the entire nation in the literature, nothing has been done to record the specifics of this knowledge, although various workers made attempts in this regard.

In the study, it was observed that the majority of the plant species present in the area had great economic value. Local people and mainly those who were associated with the treatment of various diseases had great information about the plants and their medicinal uses. However, it was also observed that the majority of the plants were in danger as there was no information about their medicinal values and an immediate effort to protect those plants was required. It was also observed that the total number of species declined rapidly in this part of Haryana as the total number of plant species found was lesser than the number of species observed in the past (Sharma *et al.,* 2016; Savina and Kumar, 2018; Rani, 2019). A similar study was carried out by Savina and Kumar (2018), but the number of species and genera were found less in our study. This may happen because pollution and other anthropogenic activities led to a decline in the number of florae.

CONCLUSION

In this study, all the floral species are organized with their botanical name, family,

local name, parts used and many usages of disorder and diseases to gain a better grasp of an area's plant variety, graphical representation of data and a detailed comprehension of vegetation dynamics required. Although some floristic research has been done in Haryana's northern regions, there is no specific reference to the floristic makeup of district Jind. As a result, the current study was conducted to document the area's floristic richness and ethnobotany.

According to the findings, local people in the research area used medicinal plants and traditional medicines to treat a variety of diseases. If studies on the biochemical potential of these indigenous medicines were conducted, the human health care system would undoubtedly take on new directions. The purpose of this research was to emphasize the significance of medicinal trees on the site and would raise awareness among residents about the importance of preserving and conserving medicinal plants. Plants of the site were needed because local people must be involved in resource sustainability.

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