

Analysis of Digital Database of Dicot Flora of Wardha district

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Abstract: Biodiversity is an essential component of nature and it ensures the survival of human species by providing food, fuel, shelter, medicines and other resources to mankind (http://kerenvis.nic.in/Database/BIODIVERSITY_824.asp). Globally, biodiversity is increasingly under threat due to changes in land use, climate and socio-economic factors. Through public awareness programme or education we can make local people understand, support and implement sustainable resource conservation and environmental protection activities. For this Taxonomy is an important tool in which the components of biological diversity are identified and enumerated, and therefore provides basic knowledge underpinning management of biodiversity (UNEP/CBD/SBSTTA/2/5, 1996). The present study was conducted to explore the floristic biodiversity of Wardha district in Maharashtra. Digital database preparation technique has not been applied for dicot biodiversity of this region till today, so it was thought worthwhile to undertake current study and to prepare digital database of dicot biodiversity of Wardha district by using DELTA (Descriptive Language for Taxonomy) package. It is a flexible method for encoding taxonomic descriptions in natural language for computer processing. In this study, total 760 dicot species were identified which belonging to the 445 genera and 106 families collected from different places of the district. Some of these plants are medicinally as well as economically important. All these species are systematically arranged in alphabetic order which includes botanical names, family names, vernacular names and their (medicinally and economically) uses in the database. This digital documentation is useful for local identification of plant species. There is an urgent need to conserve, protect and utilise our forest plant resources and to uplift the tribal and rural areas people income for which this digital documentation at district level is very useful. This floristic database was analyzed into taxonomic groups, life forms and different categories of plants based on their uses, which is helpful to different walks of people.

Key Words - Analysis, Dicot, Flora, Wardha, DELTA.

I. INTRODUCTION

Wardha district lies between the 20°18' and 21°21' North latitudes and longitudes 78°4' East to 79°15' East longitudes. This district is one of the Nagpur revenue divisions along with Bhandara, Gadchiroli, Chandrapur and Nagpur districts. The district covers an area of 6309 sq km, which is 2% area of the Maharashtra state (Ramteke and Srinivasu, 2016). Construction activities in agricultural land and conversion of forest borders to cultivation land diminishing the size of forests. Grazing, indiscriminate logging, extraction of timber and fuel wood, spread of invasive alien weeds, forest fires have all resulted in severe destruction of the forest area of Wardha district. With the help of digital database we can get information about rare and socio-economic plants which in turn help us to conserve these species. In the current work, the identification and digital documentation dicot flora of Wardha district was done. This digitalization is done with the help of DELTA. It is very quick, accurate and easy method of plant identification. This digital database of plants includes indigenously developed set of more than two hundred morphological characters with a number of variable states were incorporated in the software DELTA package (Dallwitz *et al*, 2006) for feeding plant information.

This database includes virtual images of plant specimens in high resolution digital format; also provide information about individual species description, species differences for accurate identification, much more information about flowering, fruiting duration, distribution, economical importance, common names, and floristic descriptions in detail. Any specific information of plant can be retrieved from the package with the help of interactive key facility. The digital database reduces the time and efforts required for identification and study of plants. This technique was used first time in India by Srinivasu and developed 'Electronic Herbarium and Digital Flora of Mumbai' in 2005 with the help of software package DELTA (Srinivasu, 2005).

II. MATERIAL AND METHODS

The digital database of dicot plant species of Wardha district was explored in all seasons for four years from 2013-2017. During the study period several short and long field trips were undertaken including visits to water bodies, lakes, tanks, dam and rivers for aquatic and marshy area vegetation, cultivated lands, landscaped areas, gardens, degraded lands, road sides and near railway track for terrestrial vegetation. The data was prepared and analyzed in the laboratory. The digital photos of dicot species in their natural habitat and plant specimens were attached to database as mentioned by Ramteke and Srinivasu (2017) for the current study.

III. RESULTS AND DISCUSSION

The analysis of digital database shows about 760 dicot species belongs to 445 genera of 106 families includes 3 subspecies and 35 varieties. Out of these, 309 species are polypetalae (55 families), 349 species are gamopetalae (34 families) and 102 species are monochlamydeae (17 families).

Taxonomic groups	Families	Genus	Species	Subspecies	Varieties
Polypetalae	55	175	309	1	19
Gamopetalae	34	220	349	2	12
Monochlamydae	17	50	102	-	4
Total	106	445	760	3	35

Table 1: Various taxonomic groups with their Families, Genus, Species, Subspecies and Varieties.

In this dicot plant database, various types of life forms such as herbs (347), shrubs and under shrubs (161), trees (147) climbers, twinnings and lianas (105) species were recorded.

Life forms	Species	Percentage (%)
Herbs	347	45.65
Shrubs and Under-shrubs	161	21.18
Trees	147	19.34
Twinnings, Climbers and Lianas	105	13.81

Table 2: Percentage and Species number of Life form

This database included various categories of plants species such as Medicinal, oil seeds, fruit and vegetable plants etc. which are socio-economically important. Eight species of Pulses, the members of Papilionaceae reported in Wardha district, out of which *Cicer arietinum* L. is the main pulse plant. *Citrus aurantium* L. is important fruit plant out of twenty eight species cultivated. *Spinacia oleracea* L. is the main leafy vegetable of the district among fifteen species which are grown for human nutritious purpose. *Glycine max* (L.) Merr. largely cultivated oil seed plant out of eleven species found in Wardha district. *Gossypium arboreum* L., *G. herbaceum* L., *G. hirsutum* L. are commercially grown Fiber yielding plants in large scale out of seven species which are used to make mattresses and rope (http://macp.gov.in/sites/default/files/user_doc/Wardha%20MSS.pdf). Several medicinal plants are used to cure certain health problems in rural areas where people are dependent on traditional medicines and pharmaceutical industries for manufacture of herbal medicines. Some of the important medicinal plants are *Azadirachta indica* A. Juss., *Ocimum tenuiflorum* L., *Phyllanthus emblica* L., *Withania somnifera* (L.) Dunal., *Eucalyptus citriodora* Hook., *Mentha spicata* L. etc out of 440 species. Edible dry (fruits) seeds are one of the most nutritious and delicious food in human diet like *Anacardium occidentale* L., *Buchanania cochinchinensis* (Lour.) M. R. Almeida etc. available (6 species) in the district. Nineteen species of fruit vegetable found in Wardha district and some of the important vegetables are *Solanum melongena* L., *Lycopersicon lycopersicum* (L.) Karsten., *Abelmoschus esculentus* (L.) Moench, *Coriandrum sativum* L., *Brassica juncea* (L.) Czern. are the common Spices and Condiments plants out of four species which are used as flavoring agent of food. One hundred eighty three ornamental plants are grown for decorative purpose in public and home gardens. Nineteen species are cultivated for its flower plants which are sold in pots, hanging baskets and used them as indoor and outdoor plants. Cut flowers are usually sold in bunches or as bouquets and some of them are *Solidago canadensis* L., *Chrysanthemum indicum* L., *Petunia x hybrida* E. Vilm., *Murraya paniculata* (L.) Jack etc. Avenue plants which enhances the beauty of roads, are also used as shade plants and prevent air pollution. Out of forty three species found in the district, some of them are *Azadirachta indica* A. Juss., *Melia azedarach* L. *Bauhinia purpurea* L., *B. variegata* L., *Delonix regia* (Hook.) Raf. Tannin yielding plants are an important ingredient in the process of tanning leather. *Peltophorum pterocarpum* (DC.) Baker ex Heyne, *Acacia auriculiformis* A. Cunn., *Parkia biglandulosa* Wight. & Arn., *Bridelia retusa* (L.) A. Juss are the tannin yielding plants found. Gum and resin yielding plants *Butea monosperma* (Lam.) Taub. var. *monosperma*, *Acacia campbellii* Arn., *Acacia nilotica* (L.) Delile etc. are commonly seen out of seven species. Thirty six species Timber plants recorded from the district which used to make furniture and building; some of them are *Tectona grandis* L. f., *Acacia nilotica* (L.) Delile, *Dalbergia sissoo* DC. etc. *Ocimum tenuiflorum* L., *Ficus bengalensis* L., *F. religiosa* L. etc. are main sacred plants out of nineteen plants species used for religious purpose in Wardha district. Fodder plants are animal food, some of them are *Stylosanthes fruticosa* (Retz.) Alston., *Sesbania bispinosa* (Jacq.) W. Wight., *Gliricidia sepium* (Jacq.) Walp., *Medicago polymorpha* L. etc. Weeds are unwanted plants or considered as undesirable plants which are growing in agricultural field, garden, waste land. One hundred seventy eight weed species are recorded from the district; some of them are *Cleome viscosa* L., *Senna tora* (L.) Roxb., *Oxalis corniculata* L., *Tephrosia purpurea* (L.) Pers. etc. Border and fence plants are perennial shrubs and climbers which look beautiful in the gardens. *Duranta erecta* L., *Euphorbia tithymaloides* L., *Volkameria inermis* L. are largely grown garden plants out of 21 species recorded in Wardha district. Some of the aquatic plants are *Nymphaea nouchali* var. *cyanea* (Hook. f. & Thoms.) Almeida, *Nymphaea pubescens* Willd., *Ceratophyllum demersum* L. (out of six species). Liquor yielding plants *Vitis vinifera* L., *Madhuca longifolia* var. *latifolia* (Roxb.) A. Chev. are two species found in the district. Dye yielding plants which are used in textile and cosmetic industries are *Bixa orellana* L., *Butea monosperma* (Lam.) Taub., *Indigofera tinctoria* L. among 12 species. Five species of fruit pickle plants recorded from Wardha district are *Mangifera indica* L., *Phyllanthus emblica* L. etc. These plants are reported based on their utilities.

IV. CONCLUSION

In the Wardha district, a large number of timber species, varieties of medicinal plants, large number of cultivated plants and economically important plants are found. Some dominant families (based on number of species detected) are Fabaceae, Asteraceae, Euphorbiaceae, Malvaceae, Caesalpiniaceae, Acanthaceae etc. Number of species belongs to dominant families are Fabaceae (86 species), Asteraceae (55 species), Euphorbiaceae (46 species), Malvaceae (32 species), Caesalpiniaceae (30 species), Acanthaceae (30 species), Convolvulaceae (26 species), Mimosaceae (25 species), Rubiaceae (24 species), Apocynaceae (22 species), Scrophulariaceae (20 species), Amaranthaceae (20 species).

The database provides socio-economical information about dicot species of Wardha district. Some medicinally and economically important floral species are less populated in this district, so it is urgent need to cultivate those socio-economically important plants species for bio-diversity conservation indirectly for plant wealth creation in the district. This database provides significant, socio-economic and ecological values which are of fundamental importance for improving livelihood, development, employment and resilience to environment change. It helps in maintaining traditional knowledge and digitalization of this knowledge has provided novel information for this area. It is also helps the scientific community to keep themselves updated for their research and developmental work being carried out on particular medicinal or economical plant. It also provides useful information for various walks of people such as botanists, students, teachers, foresters, researchers, pharmacists, Ayurvedic practitioners and tribal people. Some rare wild plants may be suggested as one of the alternate method to maintain the unique diversity of the species and conserve the rare and endemic plant for ornamental interest.

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