

## Floristic Diversity and Conservation Assessment of Important Species in Baramati – A Rain-shadow Area



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**Abstract :** The paper presents the Diversity, Taxonomic Status & Distribution of different taxa found in Baramati tehsil of Pune district in Maharashtra. In addition, it also provides information on conservation requirement of rare species occurring in area under study. The flora is analyzed statistically to compare the previous floristic studies. The consistent extensive and intensive survey for more than six years enlists total of 938 species, 14 subspecies and 42 varieties of angiosperms (including cultivated species) belonging to 577 genera and 136 families. Out of 108 families are of dicotyledons and 28 families are of monocotyledons are present in the region. Despite being arid vegetation, five members of pteridophytes were found to be growing in the region. Flora includes 6 Low Risk (LR) and 11 endemic species of angiosperms. During this investigation one genera and one species is added to the flora of Maharashtra State, while one new species is also described from the region which are under serious threat and requires future conservation measures.

**Key words:** Floristic, distinctiveness, conservation, Baramati.

### Introduction

Baramati is constituent part of Pune District of Maharashtra State with 117 villages. It has total geographical area of 1382 sq. km. located in Pune district of Maharashtra State. It lies between 18°3' -18° 12' N latitude and 74° 13'-74° 40' E longitude. The average altitude in the area is about 538 m above mean sea level. River Nira flows West-East as a southern boundary and Karha towards North West-South East.

Climate of Baramati is designated as the 'extremely hot' and the vegetation is semiarid type' and is well reflected in vegetation (Champion and Seth, 1968). The soil is mainly of basaltic origin. It has a distinct climate characterized by hot & dry summer (April-June), moist & hot monsoon (July-mid September) and almost dry winter (November-mid February). The maximum temperature may reach up to 40°C, while minimum goes down to 5°C. The mean daily temperature is above 22°C throughout year. The annual rainfall is as low as 37-95 mm and is confined to Southwest monsoon. The area has got one Wildlife Sanctuary known as Mayureshwar Wild life Sanctuary has area of about 574.5 hectares. The sanctuary is protected for animal Chikara, *Gazella bennettii*.

The detail floristic inventory of district was not available except for some earlier works (Murumkar and Magdum, 1991; Deokule, 1997; Asad *et al.*, 2002) and specimens deposited in herbaria of different government and non-governmental offices. To prepare detailed inventory on the floristic vegetation in the region the present work was undertaken. All the collected species were identified with the help of regional floras, Cooke, (1958); Lakshminarasimhan *et al.*, (1996); Naik, (1996); Singh *et al.*, (2000, 2001); Almeida & Almeida, (2003). The

identified specimens were confirmed after comparing them with authentic sheets deposited at Botanical Survey of India (BSI), Blatter herbarium, Xt. Xavier's college, Mumbai, (BLAT), and Agharkar Herbarium of Maharashtra Association (AHMA), Pune.

Dryland species and ecosystems have developed unique strategies to cope up with distinct climatic conditions which are well represented in Baramati region with exclusive wild flora mainly due to rainshadow effect of monsoon. Due to low rainfall the plants mostly belongs to xerophytes. Important species reported in study area includes- *Corbichonia decumbens*, *Sporobolus spicatus*-new records for state ( Bhagat *et al.*, 2007), *Thalspi arvense*, *Pavonia zeylanica*, *Monsonia senegalensis*, *Cleome chelidonii*, *C. feline*, *C. simplicifolia*, *C. viscosa*, *Capparis decidua*, *C. divaricata*, *C. zeylanica*, *Cadaba indica*, *Crateva adansonii ssp. odora*, *Polygala arvensis*, *P.erioptera*, *Polycarpea corymbosa*, *Alangium salvifolium*, *Prosopis julifera*, *Acacia farnesiana*, *A. torta*, *A. eburnae*, *A. latorum*, *Portulaca oleracea*, *P. quadrifida*, *Bergia ammannioides*, *Hibiscus hirtus*, *Abelmoschus ficulneus*, *Abutilon bidentatum*, *A. indicum*, *A. pannosum*, *Hibiscus mutabilis var. mutabilis*, *Malvastrum coromandelianum*, *Cardiospermum helicacabum*, *Cullen corylifolia*, *A. nilotica*, *Parkinsonia aculeate*, *Indigofera trita*, *I. glandulosa*, *I. linifolia*, *Desmodium triflorum*, *Clerodendron phlomoides*, *Solanum xanthocarpum*, *S. eleagnifolium*, *Lagasca mollis*, *Phyla nodiflora*, *Calotropis gigantea*, *C. procera*, *Rungia repens*, *Evolvulus alsinoides*, *Ipomoea eriocarpa*, *I. marginata*, *I. sinensis*, *I. pes-tigridis*, *Indonessiella echinoides*, *Ceropegia bulbosa*, *Euphorbia dracunculoides*, *Echinops echinoides*, *Ficus amplissima*, *Croton bonplandianum*, *Euphorbia tiruculli*, *Iphigenia*

*indica*, etc. Impornat grass species includes-*Coix lacryma-jobi*, *Dinebra retroflexa*, *Sporobolus indicus*, *Eragrostis ciliaris*, *Echinochloa colona*, *E. tenella*, *E. gigantea*, *Imperata cylindrica*, *Thelepogon elegans*, *Chrysopogon fulvus*, *C. polyphyllus*, *Aristida adscenoinis*, *Andropogon pumilus*, *Ischaemum pilosum*, *Rottboelia exaltata*, *Chloris barbata*, *Dichanthium annulatum*, *Brachiaria erusciformis*, *Tetrapogon tenellus* (Bhagat et al. 2008).

Plants are universally recognized as a vital part of the world's biodiversity and an essential natural heritage for the planet. Thousands of wild plants have great economic and cultural significance, providing food, medicine, fuel, clothing and shelter for humans across the globe. Plants also play a key role in maintaining the Earth's environment (CBD). As per the International Union for Conservation of Nature (IUCN), many species are facing tremendous pressure and are on the verge of extinction in the whole world.

The five most important drivers of plant extinction are: (1) habitat loss and fragmentation, (2) introduction of exotic species, (3) climate change, (4) overexploitation and (5) pollution. For conservation plans to be effective, four essential steps are needed to maintain viable plant populations in the long term. These include assessment of the biological status of a species, diagnosis of the causes of decline, prescription of management strategies that will counter balance the decline, and implementation of management practices and further monitoring. (Martin Hermy et al. 2014)

Conservation efforts focus on measuring species diversity and distribution, assessing biodiversity threats, and managing habitats to maintain that diversity. (Krupnick, G.A. and Kress, J. 2003). To maintain and restore viable populations of all indigenous species across their natural range and maintain their genetic diversity is indispensable.

While going through the changed magnitude of study region, it was found that the place, from where we have reported the two important species i.e *Eriocaulon baramaticum* from family Eriocaulaceae, a new species record (Shimple et al., 2009) and a type locality of said species and *Dipcadi saxorum* (Shimplae et al., 2008) belonging to family Liliaceae, a critically endangered species which was reported for the first time after type locality i.e. canary caves, Mumbai from village Waghalwadi. The area reporting these species is now highly disturbed and species are facing a serious problem of extinction. This is due to the anthropogenic pressure as well as the area of occurrence belongs to the local field owners and they sold it to farm development projects.

There is a pressing need for developing novel techniques using ground-truthed remote sensing to quantify changes in the condition of key habitats (Thompson et al., 2005), and for extending promising meta-analytical approaches for using existing data on population and habitat trends

(Loh et al. 2005). There is a considerable need for local field studies quantifying the impacts on human wellbeing of changes in the size or composition of populations and habitats (A. Balmford and William Bond . 2005). *Ex-situ* conservation and its restoration is the urgent need of time for these two important species. Further systematic monitoring of habitats and population for these two species are necessary.

### Material and Methods

The present work on Floristic account of Baramati Tahsil involves intensive and extensive field work. The work was carried out for five years. Since the floristic inventory of district is not available, data available in the form of herbarium was searched in local & regional herbariums. The checklist of plants of the region is prepared by consulting the different herbaria viz., Botanical Survey of India Western Circle (BSI); Blatter Herbarium (BLAT), Mumbai; Agharkar Herbarium (AHMA), Pune and herbarium at Shivaji University, Kolhapur. During the field survey wide range of habitats were visited frequently in all seasons especially during monsoon. All possible localities were traced and various habitats were carefully explored. Attempts were made to even to survey microhabitats in the region such as riversides, hill ranges, marshy places, small streams, agricultural lands, ditches etc. Special attention was paid to collect plants from different areas and as far as possible; all the localities have been covered during all seasons. Three to four specimens of each species were collected. While collecting the specimens, field notes such as habit, habitat, flower colour, abundance, distribution, phenology and local names were recorded and field number was given to each specimen.

The methodology adopted for herbarium preparation is as follows:

- a) Plants were collected in plastic bags.
- b) The collected specimens were individually pressed in between blotting papers or news papers. This helps to remove the moisture content and to retain the morphological features.
- c) Small branches with flower and/or with fruits were collected in case of trees, shrubs and tall herbs.
- d) In case of small herbs and grasses, the entire plants with flowers and/or fruit including the underground portion were collected.
- e) Uniform pressure was applied through field press to develop moisture-free good specimens.
- f) The blotting papers were changed regularly once in a day to avoid fungal or insect attack. A solution of Mercuric Chloride (HgCl<sub>2</sub>; 1%) was used for poisoning of the specimens as per standard methods .
- g) The well-pressed specimens were mounted on the herbarium sheets using an adhesive (Fevicol) and stitched with thread. Botanical name, local name, morphology and

field note were entered on each herbarium sheet from field notebook with respective field number.

h) The tag with field number was pasted on herbarium sheet.

**Results & Discussion**

Efforts have been made to understand the changes in floristic diversity due to various impact factors and to make a comprehensive study of the area. During the earlier works, Fabaceae was considered as the dominant family but critical studies reveals that Poaceae is the dominant family of the region with 97 species. This may be due to occurrence of grasslands and wasteland in most of the area. The flora is composed of more than 100 species of weeds, of which some are aggressive. 56 species of medicinal importance were also noted from the area. The dominant and invasive species in study area – *Aristida redacta* Stapf, *Boerhavia erecta* L., *Cassia tora* L., *Cassia uniflora* Mill., *Cynodon dactylon* (L.) Pers., *Digitaria ciliaris* (Retz.) Koel., *Heteropogon contortus* (L.) Beauv., *Leucas longifolia* Benth., *Parthenium hysterophorus* L., *Prosopis cineraria* (L.) Druce. Majority of the forest areas in the region being monocultures of *Acacia torta*, *Azadirachta indica* Juss. and *Gliricidia sepium* (Jacq.) Kunth ex Steud. species. In spite of xeric condition five Pteridophytes viz. *Actinopteris dichotoma*, *Adiantum lunulatum*, *Marsilea quadrifolia*, *Ophioglossum lucitani* and *Pteris acquilina* were found in the wild region. Absence of the epiphytic flora, except the cultivated few is distinctive feature of the region.

The floristic and ecological survey since enlisted total of 938 species 14 subspecies and 42 varieties (including cultivated) belonging to 577 genera and 136 families of flowering plants for the taluka (Graph-1) The observation on percent increase in flora with comparison to earlier work (Deokule, 1997) in given in (Graph-2). Ten dominant genera and species are mentioned in Table-1. During this work two species viz. *Corbichonia decumbens* (Forssk.) Jack ex. Excell. (Molluginaceae) and *Sporobolus spicatus* (Vahl) Kunth (Poaceae) have been recorded for the first time to the Maharashtra State (Bhagat *et al.*, 2008) and one new species of genus *Eriocaulon* (Shimpale *et al.*, 2009) has been described from the study area. Floristic Survey concludes the change in floristic composition from dry-xeric to semi-xeric condition due to more water loving plants and changed agro climatic practices like irrigation, fertigation and cultivated species.

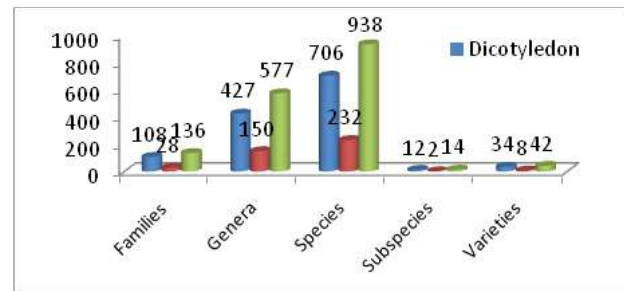
Intensive surveys have resulted in addition of 23 families, 166 genera, 414 species, 8 subspecies, 29 varieties of angiosperms and 2 pteridophytes to the earlier works. Besides 11 endemic plants, one critically endangered species, 6 Low Risk plants, two new records to Maharashtra, one new species to science and 86 species belonging to family Poaceae gives the uniqueness of flora and justifies the need of study.

Further recent study with respect to new species and

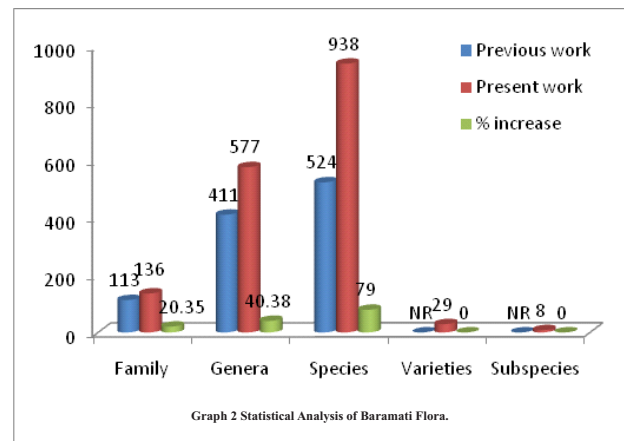
critically endangered species are found at very low distribution and with limited population. These are need to be systematically explored in other similar habitats and conservation should be done.

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Graph 1 Floristic analysis of genera and species in Baramati Taluka



Graph 2 Statistical Analysis of Baramati Flora.

**Table-1** Ten Largest Families from Baramati with Maximum Genera and Species

Family	No. of Genera	Family	No. of Species
Poaceae	67	Poaceae	97
Asteraceae	37	Fabaceae	71
Fabaceae	36	Asteraceae	48
Euphorbiaceae	17	Euphorbiaceae	37
Malvaceae	14	Caesalpiniaceae	34
Bignoniaceae	14	Cyperaceae	26
Apocynaceae	13	Malvaceae	25
Cucurbitaceae	12	Mimosaceae	24
Verbenaceae	12	Convolvulaceae	21
Araceae	12	Apocynaceae	19

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