

## Assessment and Comparative Account of Past and Present Floristic Studies of Purandar Tehsil Dist. Pune, M.S. (India)

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### ABSTRACT

*The area under investigation for the present floristic studies was the entire Purandar tehsil. The present floristic studies for the Purandar tehsil were done by the present author in the year 2014 to 2020. The present extension work was done after more than sixty years as Father Santapau published the 'Flora of Purandar' (fort and adjoining area) in 1958. Among the 1352 species reported by present author during the year 2014 to 2020, 482 species (35%) were documented by F. Santapau (1958) in Flora of Purandar. As per F. Santapau and the present author, the trend of highest number of flowering plant species belongs to family Fabaceae (Papilionaceae), Asteraceae (Compositae) and Poaceae (Graminae), except the members of few families like Orchidaceae and Scrophulariaceae among the top ten families.*

**Keywords:** floristic, comparative account, Santapau, Purandar tehsil, extension work.

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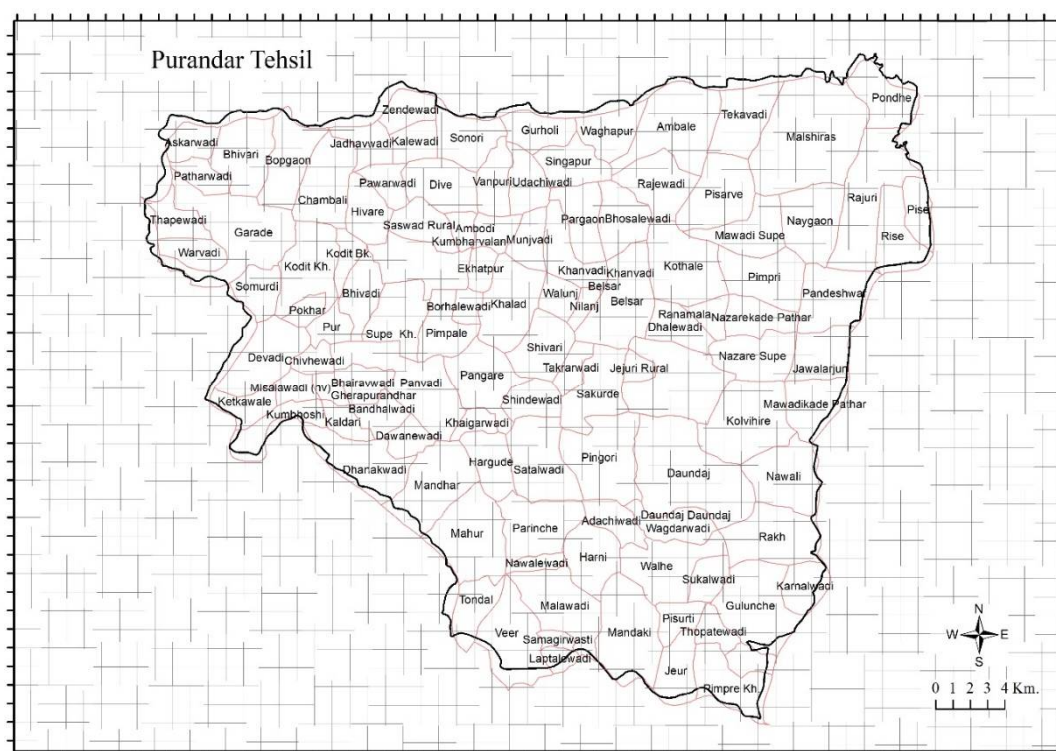
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### INTRODUCTION

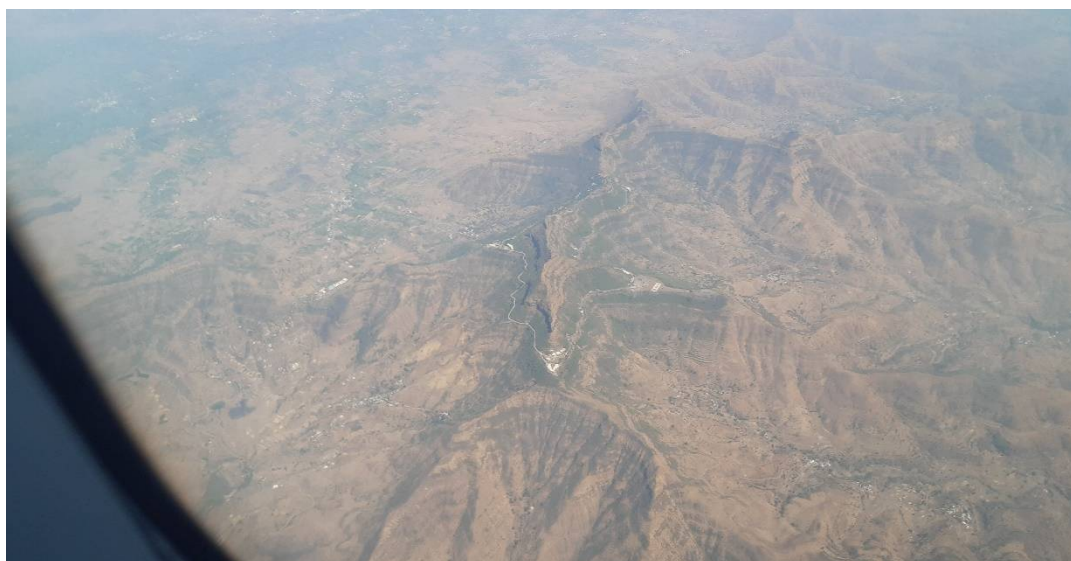
The Purandar tehsil occupies the geographical coordinates between 73° 57' 17" E to 74° 00' 18" E longitude and 18° 16' 12" N to 18° 17' 55" N latitude while the approximate bearing of Purandar fort is 74° 2' E. and 18° 17' 30" N. The highest point of Purandar fort according to the survey of India data rises to 1,387 m. (4564 ft.) above sea level, and about 760 m. (2500 ft.) above the surrounding plains. Vazirgad / Indraneel fort top is little lower than Purandar fort, 1347 m. (4,420ft.) above sea level. Purandar tehsil is categorized as Semi-critical as per the Ground Water Resources Estimation carried out by CGWB and GSDA as in March 2013 [1]. It is designated as semi-arid zone. Purandar tehsil receives average annual rainfall of 556.4 mm. Soils are of three types on the basis of color, i.e. black, red and brown. It has been observed that the major parts of the region are enclosed by agricultural land. Purandar tehsil represents dry-deciduous types of vegetation along with scrub vegetation at few places. The parts of the tehsil consisting mountains are richer in floristic diversity. Floristic assessment is required to fulfil the needs of developing and under developing countries to assess their plant wealth [2].

The inherent variation within communities and ecosystems must be documented and used as base-line data to effectively predict the outcome of disturbances, such as regeneration and harvest methods on floristic diversity and richness [3].

The prominent villages in the tehsil are 108. The proposed eco-sensitive villages in the tehsil are seven. For the proposed Airport in the tehsil, the state Government of Maharashtra has started the process of acquisition of the land of nine villages. The detailed maps of the area showing contour, vegetation margins, nesting sites, evidences of human and animal activities are very much essential not only for comparative purposes but also to follow changes in the future [4].



**Fig. 1: Location Map of Purandar tehsil**



**Fig. 2: Aerial view of Purandar Fort and surrounding area:**

## **MATERIAL AND METHODS**

The qualitative structure and composition of plant community has been termed on the basis of photographic observations and quantitative composition sampling and measurements. The devices used for the floristic work were as follows.

GPS Model GARMIN 72H (Geographical Position System) along with cells, Camera (SONY 20.4 Megapixels, 50X digital zoom, CORP DSC –HX300, 3.6 V, 4517842), Eco-friendly bags, Floras, Field guide book, Herbarium sheets, Compiled photographs of plant specimens, Maps etc.

The work on the floristic account of Purandar tehsil comprises far-reaching as well as wide-ranging field work. Floristic and ecological assessments, investigations were done in all seasons by arranging consistent visits to the Purandar fort and tehsil during the years 2014 to 2020. The flora of Purandar by F. Santapau, [16] was the only basis of orientation for floristic studies of Purandar fort and adjoining area.

The sampling of vegetation was practiced by the random walk method and simultaneous listing of plants. During the field visits, field data was noted in the field diary which includes the name of a plant family, botanical name, common name, habit, habitat, occurrence, flowering and fruiting period etc. The prominence was given to the economical, ecological, ethno-botanical uses of the plants. Accomplishment of keen observations was a result of these visits. The references have been searched from various botanical institutes like Agharkar Research Institute Pune, Botanical Survey of India, Jaykar Library SPPU, British Library etc.

The very common plants were collected to process them in conventional herbaria preparation. A prior permission was taken from Maharashtra Biodiversity Board, Nagpur Office. (Permission letter is preserved). The rare, endangered, threatened plants were not collected. The coordinates for rare, endangered and threatened plants was noted by using GPS Instrument. Such plant species were observed at frequent intervals and photographed for e herbaria.

The recognition, identification of flowering plant species (Angiosperms) was done with the help of taxonomic literature such as field guide, floras etc. The specimens were identified with the help of the published taxonomic literature such as The Flora of Maharashtra State – Singh, Kartikeyan, (Ed.) [17] Dicotyledons. Vol -I, Flora of Maharashtra State, Singh, Kartikeyan, Lakshminarasimhan, and Prasanna, Dicotyledons Vol II, (Ed.) (Sharma, Flora of Maharashtra State – Monocotyledons [18], Kartikeyan and Singh (Ed.) [19], Flora of Purandar: Santapau, [15], Botany and Flora of Maharashtra: Mahabale, [1]. Gazetteers Department, Government of Maharashtra, Flora of Baramati: Bhagat and Shimple *et.al.* [2], The Flora of the Presidency of Bombay. Cooke (1908, 1958–Revised) Vol. I, II and III.

Flora of Kolhapur district: Yadav and Sardesai, Shivaji University (2002), Flowers of Sahyadri: Field Guide to 500 Flowers of North Western-Ghats of India: Ingahalikar S., [6], Further Flowers of Sahyadri: Field Guide to Additional 1200 Flowers of North Western Ghats of India: Ingahalikar [7], Flowers of Sahyadri: Field Guide to Additional 600 Flowers of North Western Ghats of India: Ingahalikar [8], Additions to Flowers of Sahyadri: Field Guide to Additional 800 Flowers of North Western Ghats of India: Ingahalikar, [9], Floristic Diversity of Mulshi: Bhagat, [2]. Few genuine specimens were identified and confirmed by comparing them with trustworthy specimens at Botanical Survey of India, BSI, Western Circle, Koregaon Park, Pune. For the authentic identification of some of the flowering plant specimens, help of the expert taxonomist was taken.

The online databases like International Plant Name Index, Red Data Book was referred for the initial determination of taxa. Google images, Flowers of India etc were also referred. 'Flora of Purandar' by Santapau consists 683 plant species which were thoroughly studied with respect to their Habit, Family, Local name, Origin, Flowering and Fruiting period, present status / availability. By using the assessment criteria, additional plants which were found in the entire tehsil were also studied. The flora and vegetation of the entire Purandar tehsil has been studied on the basis of the guiding principles mentioned below:

1. Phenology
2. Plant list has been scrutinised for the availability status, Santapau [15]
3. Comparison of the past and present inventories.
4. Herbarium specimens are well maintained for future studies.

The field studies involve the preparation of an Inventory of various species of plants in the plant community. The floristic studies include-

- Name of the Plant Species
- Plant family
- Vernacular name
- Habit of the Plant
- Origin of the Plant
- Flowering and fruiting data.

The floristic assessments were directed to list plant species to find out the ecological, economical standings. The cryptogamic plant forms which include algae, fungi, lichens, bryophytes and pteridophytes were also observed, identified, recorded and studied.

## RESULTS AND DISCUSSION

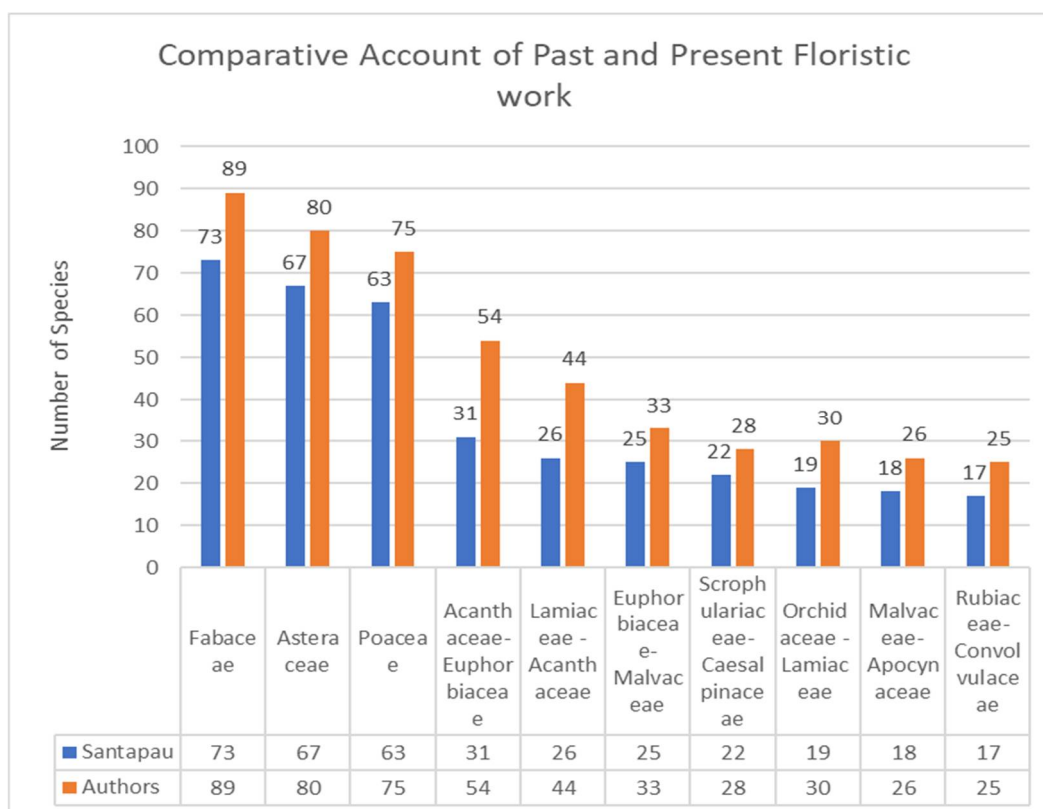
To note the field observations and other details of the Purandar tehsil the geographical parameters, historical accounts, local names of the plants, Specimen voucher number etc. were noted in a field diary.

**Table: 1. Following is the interpretation of taxa in two different floristic work.**

Flora and Authors	Families	Genera	Species
Flora of Purandar (Santapau)	101	400	683
Floristic studies of Purandar tehsil (present author)	138	749	1352

**Table: 2. Comparative Account of Plant Families and no. of Species**

Flora of Purandar Fort (1958)		Floristic studies of Purandar Tehsil (2020)	
Family	Species	Family	Species
Fabaceae	73	Fabaceae	89
Asteraceae	67	Asteraceae	80
Poaceae	63	Poaceae	75
Acanthaceae	31	Euphorbiaceae	54
Lamiaceae	26	Acanthaceae	44
Euphorbiaceae	25	Malvaceae	33
Scrophulariaceae	22	Caesalpinaceae	28
Orchidaceae	19	Lamiaceae	30
Malvaceae	18	Apocynaceae	26
Rubiaceae	17	Convolvulaceae	25



**Figure.3: Comparative account past and present status of Major Plant Families and plant species**

As per F. Santapau and the Present authors, the trend of highest number of flowering plant species found on the Purandar fort and in the tehsil respectively belongs to family 1. Papilionaceae (Fabaceae), 2. Compositae (Asteraceae) and 3. Graminae (Poaceae) is the same among ten families. The members of majority of the families (among ten) shows gain in number in after studies except the members of two families like Orchidaceae and Scrophulariaceae.

The inventory of all explored plant species within the tehsil has been preserved. It was then processed statistically by using Microsoft Excel software. Plants were categorised habit wise, and applying other assessment criteria. The accepted botanical names were checked, confirmed through International Union for Conservation of Nature (IUCN) categories.

The present work will be useful for the various assignments connected with vegetation affluence of the country. It works was undertaken to discover the underexplored region with a view to bring about floristic account of vegetation. This will help in the preparation of the district flora in particular and for providing materials for the flora of a state and nation.

The data analysis resulted in floristic diversity documentation. In all, 1352 species of angiosperms belonging to 749 genera and 138 families were documented from the entire Purandar tehsil. Out of 1352 species, 1103 (82%) were dicotyledonous taxa and 249 (18%) were monocotyledonous taxa. The abundant genera were *Euphorbia*, *Ficus*, *Ipomea*, *Acacia*, *Cassia*, *Solanum*, *Hibiscus*, *Justicia*, *Cyperus*, *Indigofera* etc. The most abundant family was Fabaceae with highest number of species (89 species) showing the numerical dominance. The second largest family was Asteraceae consisting 80 species. The third largest family was Poaceae consisting 75 species. The other abundant families were Euphorbiaceae, Acanthaceae, Malvaceae, Caesalpinaceae, Lamiaceae, Apocynaceae and Convolvulaceae. The species that have been reported earlier as endemic to Indian sub-continent were *Alysicarpus monilifer*, *Aristida stocksii*, *Chlorophytum tuberosum*, *Cleome simplicifolia*, *Crotalaria fillips*, *Hardwickia binate*, *Dichrostachys cinerea* var. *indica*, *Glossocardia bosvallia*, *Iseilema antheophoroides*, *Lophopogon tridentatus*, *Oropetium roxburghianum*, *Oropetium villosulum*, *Sehima nervosum*, *Tragus roxburghii* and *Tricholepis glaberrima*. However, there was report of *Rhamnus purandharensis* as local endemic species.

The seasonal variations and phenological properties of plants belonging to Purandar tehsil was very well established. Seasonal variations influence the overall appearance and survival of various plants. The species association of herbaceous flora on the arrival of rainy season was typically short lived; and once the ephemerals flush recede, the other seasonal invades the place and continues for a complete season. The flowering- fruiting datum was documented for all the flowering species. Among 1352 species, 98 species consist flowering and fruiting for the entire year. The flower or fruit formation occur in January and lasts for few months in 58 species among the species studied.

#### **SIMILARITY MATRIX**

Among the 1352 species, 482 species (35%) were documented by F. Santapau [15] in Flora of Purandar as well as in the present Floristic work (2014-2020).

Among 1352 flowering plant species, 771 were herbs, 241 shrubs, 208 trees and 132 climbers. Among the 1352 species, 862 species were exotic while 490 were natives.

The plant species found in threatened category were 44. Among the 44 threatened flowering plant species, 14 belongs to vulnerable category, 18 species at least risk, 4 critically endangered while 8 species were in endangered category.

#### **CONCLUSION**

Over the years, the species composition of any given area may change; the area well-thought-out, Purandar tahsil was not an exception. The species configuration of the area has transformed, striking species have increased and indigenous species also has dwindled in their number. The qualitative structure and composition of plant community has been termed based on photographic observations and quantitative composition was based on sampling and measurements. It was successfully done with the authentic evidence using GPS. The present work was undertaken to discover the underexplored region with a view to bring about floristic account of vegetation. The revision or extension work is useful for the various assignments connected with vegetation affluence of the country. The present work was undertaken to discover the underexplored region with a view to bring about floristic account of vegetation. This will help in the preparation of the district flora in particular and for providing materials for the flora of a state and nation.

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