



Floristic composition of Purandar tehsil with special reference to threatened plant species and establishing the guidelines for conservation

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Abstract

Purandar tehsil falls in Pune district of Maharashtra state and located on the eastern crest of Western Ghats. An intensive and extensive field surveys were carried for last six years (June 2014 to December 2020) for detailed documentation of floristic composition. It was supported by the literature review. The threat assessment comprises far-reaching as well as wide-ranging field work. The key assessment shows that, the forest pattern found in patches is deciduous and thorny scrub type at distant locations due to variable climatic conditions. The total number of flowering plants documented were 1350. Among these, 1091 species were dicotyledonous, 255 monocotyledonous and 4 species belongs to gymnosperms. The present study has provided the valuable information on the ecological, economical and ethno-botanical data. The threat status for these species was confirmed by consulting IUCN website and Red Data Book (BSI). In all forty four species (distributed over twenty three families) were reported to be in threatened category. Orchidaceae represented highest number (seven) of threatened species followed by family Asclepiadaceae (six species). To improve the status of vulnerable and threatened plant species various practices are advised for operative management and restoration.

Keywords: floristic composition, Purandar tehsil, threaten plant species, conservation

Introduction

Purandar is an important tehsil of Pune district and named after the historically important Purandar fort. It is located about 50 km at south-east direction of Pune city, and about 10 km from Saswad town. 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 (Figure-1). It rises suddenly from the Deccan plain. The highest peak of Purandar fort rises 1389 m ASL. Vazirghad/Vajragad (*Rudramal*) is a twin fort of Purandar (1347 m ASL). '*Indraneel Parvat*' is a mythological name of Purandar fort. It is well connected to Pune city by Katraj Ghat, Bapdeo Ghat and Dive Ghat; and is bounded by Haveli Tehsil towards west, Bhore Tehsil towards South, Khandala Tehsil (Satara district) towards South. The rainfall is maximum (above 80%) from July to August. The tehsil remains humid throughout monsoon. The vegetation represents dry-deciduous along with scrub vegetation at few places. It varies at higher peaks of the mountains illustrating the rare, endemic and threatened plant species.

▪ The floristic assessment for herbaceous and woody vegetation was performed in nine eco-sensitive zones of the tehsil. Bandalwadi, Chivhewadi, Davanewadi, Gherapurandar, Ketkawale, Kumbhoshi, Panvadi, Pingori and Satalwadi are the nine ecosensitive zones. Purandar tehsil shelters very good floristic diversity. It has been explored for floristic and vegetation studies by few taxonomist (Sharma, B. D. *et al.*, 1996; Singh, N.P. and Kartikeyan, S. 2000; Singh N.P. *et al.*, 2000; Deshpande Sandhya *et al.*, 1993) [14, 15, 16, 7]. Cooke T., (1901-1908) has made passing remarks about Purandar area. Santapau H., (1958), a Spanish Botanist has first time surveyed the detailed floristic composition of

Purandar fort, however this study was confined to fort only, and no records available for rest of the tehsil. The rare and threatened species like *Frerea indica*, *Thalictrum dalzellii* can be seen on the cliffs of Purandar fort. In the dry streams at the base of the fort a peridophyte, *Ophioglossum reticulatum* grows. A rare and threatened species *Ceropegia lawii*, a plant growing above 2000' but never below 1000' (Ingalhalikar, S., 2001 and 2007) [8, 9]. Monsoon ephemeral plants disappear by November. The flowers are well documented in a book 'Flora of Purandar' by Father Santapau who visited Purandar regularly (Mahabale, 1987) [11]. Documentation of traditional knowledge through ethno-botanical studies is important for conservation and utilization of indigenous knowledge (Tetali *et al.*, 2009) [18]. In the year 2008-09, few botanists like Bhosle *et al.* (2009) [3] Performed field surveys of Purandar tehsil for medicinally important plants. Information of 77 species belonging to 30 families and 56 genera was collected. The plants were used to treat various ailments, discomforts and diseases like whooping cough, asthma, diabetes, diphtheria, conjunctivitis, snake and scorpion bite (Bhosle, *et al.*, 2009) [3]. During another ethno-botanical survey, information of 42 traditional medicinal plants had been collected (Bhosale *et al.*, 2009). Some of the important medicinal plants were *Withania*, *Asparagus*, *Tinospora*, *Bryonia*, *Amorphophallus*, *Martynia*, *Calotropis*, *Pongamia*, *Cassia* etc. These plants are useful to cure various diseases like scabies, diarrhea, leucorrhoea, urinary troubles, kidney-stone, constipation, toothache, stomachache, cough and colds, arthritis, asthma, fever, skin diseases etc. (Desale, *et al.*, 2012) [6]. The

unchecked conversion of grassland habitat to agricultural and industrial land should be disallowed (Sumant, *et.al*, 2019) ^[17].

After repeated visits during 2014 to 2019 in this tehsil, it was observed that some major concerns like anthropogenic activities, fragmentation of land should be taken into the consideration for the successful restoration and management of threatened and endangered plant species. The monotonous plantation of non-indigenous plant species disturbs the indigenous plant species and consequently the fauna. The entire tehsil suffer from fires and infestation by invasive species. The eradication of such invasive species is

not an easy task. In various ghat sections and on the slopes of few hills of Chevhwadi, Nishnaight, Askarwadi etc plantation of *Eucalyptus lanceolatus*, *Gliricidia sepium*, *Leucaena leucacephala* was observed and acclimatization of *Lantana camara* was very common.

The forest types in the tehsil are deciduous and thorny scrub type at distant locations due to variable climatic conditions. Such a Field study provides valued materials; the ecological, economical and ethno-botanical data which is beneficial and important for further studies. The study of the diversity and plant distribution patterns will further help in security, conservation and managing threatened plant species of the tehsil.

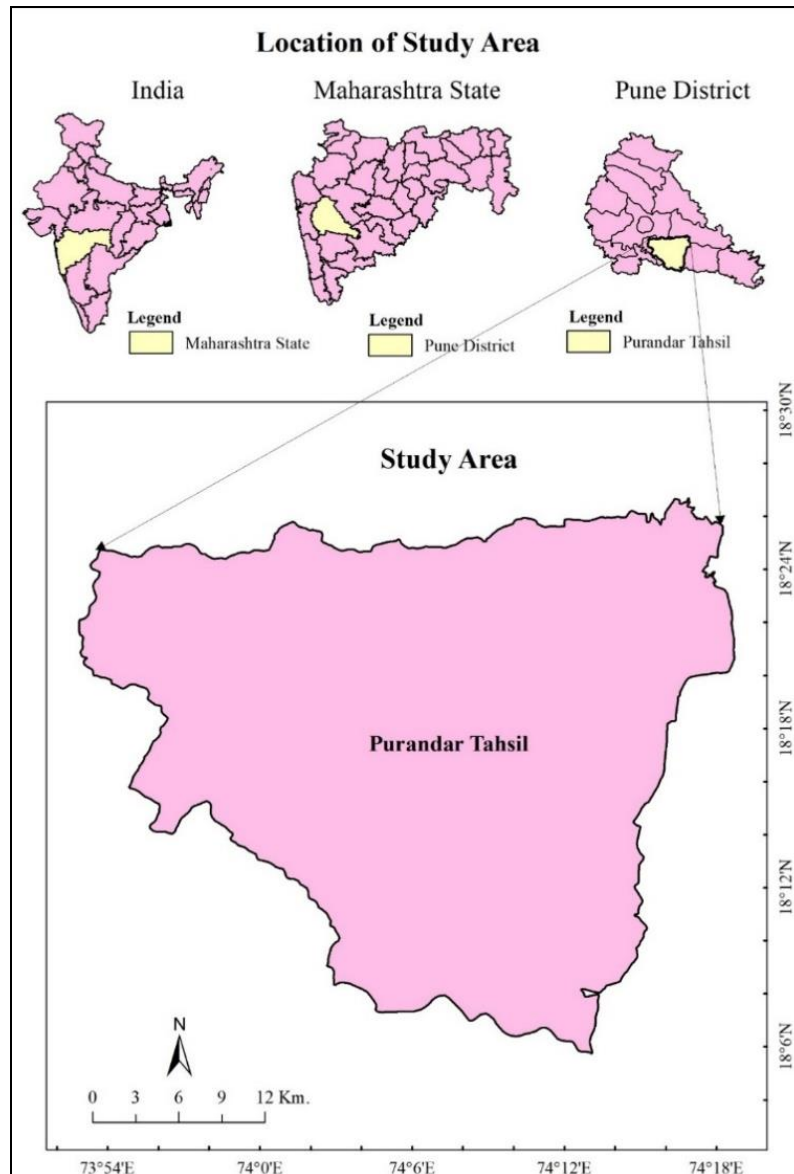


Fig 1: Location maps of Purandar tehsil.

Materials and Methods

The said work on the floristic account of Purandar tehsil involves extensive as well as comprehensive field work. The field surveys were carried out for last six years. The flora of Purandar (Santapau, 1958) ^[13] was referred along with Flora of Maharashtra State (Vol. I, II and II). During the field visits, diverse habitats were surveyed frequently throughout the years covering all seasons. It covered different areas such as the forts, hills, marshy places, ditches, agricultural

lands, riversides and most of the micro habitats. The plant specimens were collected from a variety of localities and in different seasons. Two to three specimens of very common plants were collected for the preparation of herbarium. The collection of rare and threatened plant species was avoided. GPS (Geographical Position System) was practiced for the rare and endangered plants. A field diary was maintained during the collection of plants, which includes the name of a plant family, botanical name, common name, habit, habitat,

occurrence, flowering and fruiting period, etc A standard scientific procedure was followed for the preparation of herbarium. The inventory of all explored plant species within the tehsil was further processed. The accepted botanical names were checked, confirmed through valid online literature, International Union for Conservation of Nature (IUCN).

Results and Discussion

The field surveys resulted in documentation of 1350 plant species belonging to 138 families; whereas, Santapau (1958) [13] reported 683 species belonging to 101 families of flowering plants from the Purandar tehsil. The floristic data has been presented in Table-1.

Table 1: A comparative account of floristic composition of Purandar Tahsil

| Floristic Composition | Families | | Genera | | Species | |
|-----------------------|----------|---------|----------|---------|----------|---------|
| | Santapau | Authors | Santapau | Authors | Santapau | Authors |
| Dicotyledons | 85 | 106 | 343 | 593 | 548 | 1091 |
| Monocotyledons | 15 | 29 | 75 | 152 | 134 | 255 |
| Gymnosperms | 01 | 03 | 01 | 04 | 01 | 04 |
| Total | 101 | 138 | 418 | 749 | 683 | 1350 |

The plant species with its threatened status are listed in table 2. The table also shows habit, family and common name of each species. Family Orchidaceae represented highest number (seven) of threatened species followed by family Asclepiadaceae (six species).

Table 2: Enumeration of threatened plants species.

| Sr. No. | Botanical name | Common Name | Habit | Family | Status as per IUCN |
|---------|--|--------------------------------|---------|------------------|--------------------|
| 1 | <i>Aerides maculosum</i> Lindl. | Amari / Orchid | Herb | Orchidaceae | VU. |
| 2 | <i>Alysicarpus belgaumensis</i> var. <i>racemosus</i> Baker. | Gulabi -shevra | Herb | Fabaceae | VU. |
| 3 | <i>Argyrea cuneata</i> Ker-Gawl. | Mahalungi | Climber | Convolvulaceae | LR |
| 4 | <i>Arisaema murrayi</i> (Grah.) Hook. | Pandhra-sap-kanda/ Badhada | Herb | Araceae | VU. |
| 5 | <i>Barleria gibbsini</i> Dalz. | Gura | Herb | Acanthaceae | VU. |
| 6 | <i>Caralluma frerei</i> (Rowley) Bruyns | Shindal-makudi | Herb | Asclepiadaceae | CR. |
| 7 | <i>Ceropegia bulbosa</i> Roxb. | Khapparkadu/ Kanvel | Climber | Asclepiadaceae | LR. |
| 8 | <i>Ceropegia evansii</i> McCann. | Kandilpushp | Climber | Asclepiadaceae | CR. |
| 9 | <i>Ceropegia lawii</i> Hook. f. | Lawikharpudi/ Tilori | Climber | Asclepiadaceae | CR. |
| 10 | <i>Ceropegia macenii</i> Ansari. | Kharpudi | Climber | Asclepiadaceae | EN. |
| 11 | <i>Ceropegia oculata</i> Hook. | Kharchudi | Climber | Asclepiadaceae | CR. |
| 12 | <i>Cleome simplicifolia</i> (Cambess.) Hook. fil. &Thoms. | Gawti-tilwan | Herb | Capparidaceae | LR. |
| 13 | <i>Crotalaria filipes</i> Benth. | Phatpati | Herb | Fabaceae | EN. |
| 14 | <i>Crotalaria filipes</i> Var. <i>trichophora</i> Cooke. | Phatphati | Herb | Fabaceae | EN. |
| 15 | <i>Curcuma pseudomontana</i> Graham. | Ranhalad/ Sindarbar/ Sindalvan | Herb | Zingiberaceae | VU. |
| 16 | <i>Cynotis fasciculata</i> Schult. | Nilwanti | Herb | Commelinaceae | LR. |
| 17 | <i>Cynotis tuberosa</i> (Roxb.) Schult. | Abhali | Herb | Commelinaceae | LR. |
| 18 | <i>Delphinium malabaricum</i> (Huth) Munz. | Nilambari | Herb | Ranunculaceae | EN. |
| 19 | <i>Dendrobium barbatulum</i> Lindl. | Gulabi-dande-amri | Herb | Orchidaceae | VU. |
| 20 | <i>Dendrobium microbulbon</i> Rich. | Jambhli-dande-amri | Herb | Orchidaceae | LR. |
| 21 | <i>Ensete superbum</i> (Roxb.) Cheesm. | Ran-kel/Chavin | Herb | Musaceae | LR. |
| 22 | <i>Eulophia ochreatea</i> Lindl. | Orchid | Herb | Orchidaceae | EN. |
| 23 | <i>Exacum lawii</i> Clarke. | Lahan-chirayat | Herb | Gentianaceae | LR. |
| 24 | <i>Habenaria grandifloriformis</i> Blat.et McCann. | Akash-habe-amri | Herb | Orchidaceae | LR. |
| 25 | <i>Habenaria longicorniculata</i> Grah. Cat. | Habe-amari | Herb | Orchidaceae | VU |
| 26 | <i>Habenaria rariflora</i> Rich. | Chire-habe-amri | Herb | Orchidaceae | VU. |
| 27 | <i>Haplantodes verticillatus</i> (Roxb.) R.B.M. | Kateri/Jakara | Herb | Acanthaceae | LR. |
| 28 | <i>Heterostemma deccanense</i> (Tal.) S. & Manglay. | | Shrub | Asclepiadaceae | EN. |
| 29 | <i>Impatiens dalzellii</i> Hook. fil. &Thoms. | Piwla-terda | Herb | Balsaminaceae | VU. |
| 30 | <i>Iphigenia indica</i> (L.) A. Gray. | Bhuichakra/ Markalai | Herb | Liliaceae | LR. |
| 31 | <i>Iphigenia pallida</i> Baker. | Bhui-chakra | Herb | Liliaceae | VU. |
| 32 | <i>Lamprachenium mircocephalum</i> (Dalz.) Benth. | Brahmadandi | Herb | Asteraceae | VU. |
| 33 | <i>Lobelia nicotianaefolia</i> Heyne ex Roth. | Ran-tambakhu | Herb | Lobeliaceae | VU. |
| 34 | <i>Murdannia dimorpha</i> (Daltz.) Brueck. | | Herb | Commelinaceae | LR. |
| 35 | <i>Nothapodytes nimmoniana</i> (J.Grah.) Mabberley. | Amrut/Ghanera | Tree | Icacinaceae | EN. |
| 36 | <i>Pseudodichanthium serrafalcoides</i> Bor. | | Herb | Poaceae | LR. |
| 37 | <i>Rhamphicarpa elongata</i> (Hochst.) O.J. Hansen. | Tutari | Herb | Scrophulariaceae | LR. |
| 38 | <i>Smithia purpurea</i> Hook. | Burkar | Herb | Fabaceae | VU. |
| 39 | <i>Strobilanthes callosa</i> Wall. ex Nees. | Karvi | Shrub | Acanthaceae | LR. |
| 40 | <i>Lomatogonium minus</i> (Griseb.) Fern. | Lahan-chirayat | Herb | Gentianaceae | LR. |
| 41 | <i>Thalictrum dalzellii</i> Hook. | Shwetambar | Herb | Ranunculaceae | EN. |
| 42 | <i>Tripogon jacquemontii</i> Stapf. | | Herb | Poaceae | LR. |
| 43 | <i>Vigna khandalensis</i> (Sant.) R.& W. | Badmung | Herb | Fabaceae | LR. |
| 44 | <i>Zingiber neesatum</i> (Garh.) Ramam. | Nisam | Herb | Zingiberaceae | UV. |

*VU= Vulnerable, EN = Endangered, LR= Low Risk, CR= Critically Endangered

Management and Restoration

The rare and endemic plant species like *Caralluma frerii*, and *Dremia razii* were present at high altitude. To improve the status of vulnerable and threatened plant species more period is required. Some practices are advised for operative management and restoration for the semi-arid zone like Purandar tehsil. To target more objectives in single practice is to replace the exotic plants with native species e.g. the

exotic plants like *Gliricidia sepium*, *Eucalyptus lanceolatus.*, *Delonix regia*, can be replaced by native species like *Azadirchata indica*, *Tamarindus indica* etc. The selection of the native plant materials that are ecologically appropriate and genetically diverse is a vital element of any restoration project. The long distance dispersal of seeds, spores is central to species expansion following ecological disturbance (Johnson *et.al*, 2010). Ecologically adapted

native species are essential for reviving healthy and sustainable ecosystems. Eliminate some exotic tree species like *Leucaena leucacephala*, *Gliricidia sepium*, *G. maculata*, *Eucalyptus lanceolatus*. The manual root stock removal should be practiced instead of using heavy machinery. The deep contour trenches may disturb the normal water flows and hamper the movement of animals, so it must be avoided. The good grass cover will help for the soil conservation measures and will prevent the runoff. The removal of invasive species such as *Parthenium hysterophorus*, *Lantana camara*, *Alternanthera sp.*, etc should be carried out (Vanak *et.al.*, 2014) ^[19]. The state government should promote the establishment of nurseries, farm ponds by giving subsidies and land near by water canals and should introduce some schemes to maintain natural vegetation. The main fruit trees grown in the tehsil are custard apple, pomegranate, figs etc. For the packings of fruits in boxes, farmers' use the leaves and soft branches of different plants e.g. *Azadirachta indica*. So indigenous plant species should be grown on a very large scale. These measures can focus mostly on restoration and management of threatened plant species.

The better living conditions are required for the wild life. This can be achieved through habitat improvement which includes availability of food, fodder, water, space etc. The continuous contour trenching is a soil and water retaining technique that can be easily applied in semi-arid and semi critical regions to allow water, and soil conservation, and to promote the vegetation of an area.

There are forty four plants under threatened condition in Purandar tahsil, they are mostly herbs. The family Orchidaceae stands dominant with seven species, then family Asclepiadaceae with six species. After the detail study of these plants, they are categorised in to vulnerable, endangered, low risk and critically endangered categories (Bhagat, *et. al.*, 2017, 2008) ^[1, 2].

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