

FERN DIVERSITY IN THE SACRED FORESTS OF YANA, UTTARA KANNADA, CENTRAL WESTERN GHATS

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ABSTRACT

Uttara Kannada district in Central Western Ghats has the unique distinction of having the highest forest cover in the country. Ecological research spanning over three decades reveal the presence of about 67 species of ferns and fern-allies. The highest number of pteridophytes species is found in Joida taluk (41 species) followed by Siddapur (30 species), Karwar (25 species) and Kumta (15 species). The semi-evergreen to evergreen forests of Castle rock, Kaiga and Yana and the primeval evergreen forests of Gerusoppa Ghats are the rich pteridophytes diversity locations in the district. Yana located in the foothills of central Western Ghats known for unusual cathedral like towering rock formations is a place of pilgrimage. Forest ecosystems are humid and evergreen and rich in endemic species of flora, especially pteridophytes, which were hitherto unexplored. Field investigations during October-November 2012 in the region led to the documentation of 21 species of ferns. This emphasizes the need for detailed pteridological investigations in the valleys and gorges of central Western Ghats. Fern species of Yana region belong to 17 genera and 15 families and the noteworthy species are – *Cyathea gigantea*, very rare to be found in Uttara Kannada and are indicators of undisturbed forests. *Bolbitis subcrenatooides* and *B. semicordata* (endemic to south India) and others like *Blechnum orientale*, *Adiantum philippense*, *Stenochlaena palustris*, *Pteris pellucida* and *Dicranopteris linearis* were notable in the fern community. The ever increasing anthropogenic pressure in the district, particularly targeting wet and shaded valleys for cultivation, is a big threat to the fragile ecosystems with the sensitive pteridophytes.

Key Words : Yana, Uttara Kannada, Western Ghats, Fern diversity

INTRODUCTION

Nature worship was an integral part of most human societies since pre-historic era. Communities inhabiting in hilly and mountainous terrain have conserved a variety of ecosystems such as towering peaks, origins of rivers, rocky pinnacles, caves, patches of forests, etc. Arrival of organized religions led to faded away the nature worship in most parts of the world. The Indian highlands like the Himalayas, Western Ghats, Eastern Ghats, Central Indian hills, North-Eastern States etc. are major exceptions where natural sacred sites, though in diminished form persist to this day. These sacred areas known by various names like *kans*, *devarabanas*, *devarakadus* etc., associated with rich biodiversity, ecology and water resources, are local hotspots of biodiversity today.

Central Western Ghats known for its numerous sacred forests and these forest patches are with climax evergreen forest relics. However, anthropogenic activities through centuries,

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sacred forests have often given away to secondary forests, savannas and other land uses. The *kan* forests, main sacred sites of pre-colonial village communities in the Uttara Kannada district of Karnataka State, part of the State reserve forests, continue to shelter rare elements of biodiversity. The *Myristica* swamps, confined to merely few remnant patches in the southern hills of the district, interestingly, have several threatened flowering trees like *Syzygium travancoricum* (Critically Endangered), *Myristica magnifica* and *Dipterocarpus indicus* (both Endangered), *Gymnacranthera canarica* (Vulnerable) and *Semecarpus kathalekanensis* (newly discovered). These swamps have the rare presence of the tree ferns *Cyathea nilgirensis* and *C. gigantea*. Elsewhere in the district too several pteridophytes congregate in the humid and shaded environments of sacred forests. This paper focuses on the rich pteridophytes flora in the forest habitats surrounding sacred rocks of Yana village in Kumta taluk.

The pteridophytes, which include, ferns and fern-allies, form a major part of the flora only next to the angiosperms in the biodiversity rich Indian subcontinent. They grow luxuriantly in the moist tropical and temperate forests and their occurrence in different eco-geographically threatened regions from sea level to the highest mountains are of much interest (Dixit, 2000). The Western Ghats is one of the major centers of pteridophytic diversity in India. Approximately 320 species of ferns and fern-allies have found their abode in the varied habitats of Western Ghats with their diversity increasing in the north-south direction, obviously due to the more number of rainy months and higher altitudes with cooler climate that the south has. The central Western Ghats encompassing Karnataka state harbors about 174 species of ferns and fern allies distributed in various habitats (Dudani *et al.* 2011).

MATERIALS AND METHODS

Yana (14.58372°N and 74. 56476°E) is located in the Kumta taluk of Uttara Kannada district in Karnataka state (Figure 1). It is a part of the hill range of central Western Ghats and is known for the unusual rock formations in its vicinity. The diversity of the habitat is evident from the beginning of a narrow valley; with almost uninterrupted evergreen forest majestic, cathedral like rocks (Figure 2). The largest formation is known as Bhairaveshwara Shikhara and another one in close proximity designated as Mohini Shikhara. The rocks are composed of solid black, crystalline limestone. Yana is well known place of pilgrimage, considered the abode of Lord Shiva, in a cave towards the base of the rock. The forests that surround these rocks are rich in perennial water courses like streams and springs. The deep shade and higher humidity are, understandably, major reasons for rich diversity of pteridophytes. An account of these pteridophytes, encountered during our ongoing ecological surveys in the district, is presented here.

Inventory of the ferns of Yana were done during the period of October – November, 2012. The taxa were identified using appropriate floras, journals, monographs and revisions (Manickam & Irudayaraj, 1992; Fraser-Jenkins, 2008a; Rajagopal & Gopalkrishna Bhat

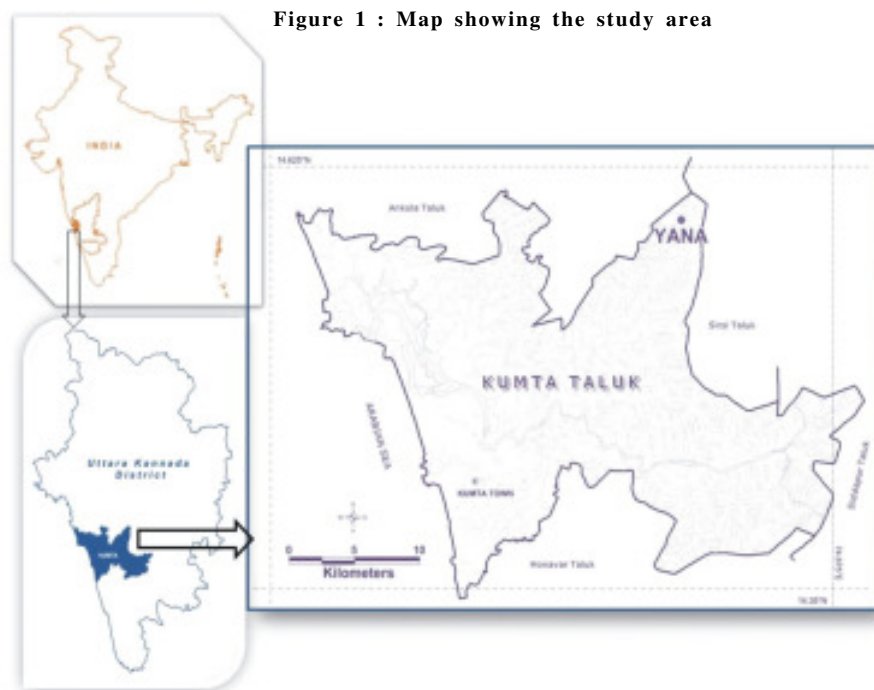


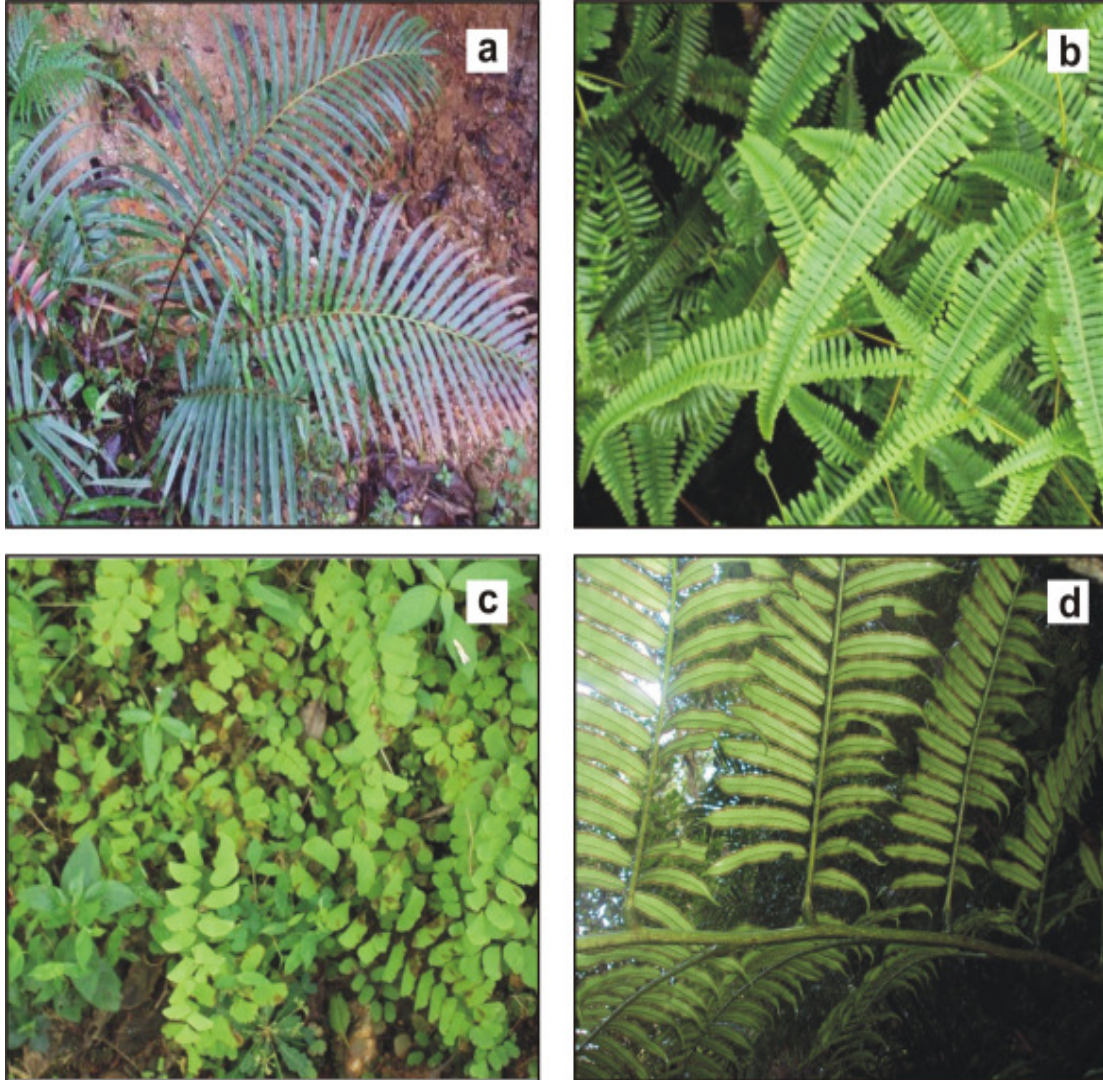
Figure 2 : Rock outcrops in Yana surrounded by thick evergreen forests



TABLE 1 : Ferns recorded from Yana sacred forests

Sr. No.	Botanical Name	Family	Remarks
1.	<i>Adiantum philippense</i> L. subsp. <i>philippense</i>	Adiantaceae	Along partially or fully exposed roadsides
2.	<i>Angiopteris helferiana</i> C. Presl	Marattiaceae	Along the shaded stream banks.
3.	<i>Athyrium hohenackerianum</i> (Kuntze) T. Moore	Woodsiaceae	Terrestrials or lithophytes along roadsides
4.	<i>Blechnum orientale</i> L.	Blechnaceae	Along exposed roadsides and road cuttings
5.	<i>Bolbitis semicordata</i> (Baker) Ching	Lomariopsidaceae	Endemic to S. India. Along stream banks in semi-evergreen and evergreen forests.
6.	<i>Bolbitis subcrenatooides</i> Fras.-Jenk.	Lomariopsidaceae	Endemic to S. India. In evergreen and semi-evergreen forests.
7.	<i>Cyathea gigantea</i> (Wall. ex Hook.) Holttum	Cyatheaceae	Terrestrials along shaded stream banks.
8.	<i>Dicranopteris linearis</i> (Burm. f.) Underwood	Gleicheniaceae	Along shaded or open road cuttings.
9.	<i>Drynaria quercifolia</i> (L.) J. Sm.	Polypodiaceae	Epiphytes in partly or fully shaded places.
10.	<i>Lindsaea heterophylla</i> Dryand.	Lindsaeaceae	Along dry slopes in evergreen forests.
11.	<i>Lygodium flexuosum</i> (Linn) Sw.	Schizaeaceae	Climbers along road sides and road cuttings.
12.	<i>Microlepia speluncae</i> (L.) T. Moore	Dennstaedtiaceae	Terrestrials on forest floor or along shaded stream banks.
13.	<i>Nephrolepis multiflora</i> (Roxb.) Jarrett ex Morton	Oleandraceae	Along fully exposed roadsides or stream banks.
14.	<i>Pityrogramma calomelanos</i> (L.) Link	Pteridaceae	Terrestrials or lithophytes along roadsides.
15.	<i>Pteris biaurita</i> L.	Pteridaceae	Along fully exposed roadsides.
16.	<i>Pteris pellucida</i> C. Presl.	Pteridaceae	Inside fully shaded forests.
17.	<i>Pteris quadriaurita</i> Retz.	Pteridaceae	Distributed in various habitats.
18.	<i>Pteris vittata</i> L.	Pteridaceae	Along fully exposed roadsides and rock crevices.
19.	<i>Stenochlaena palustris</i> (Burm.f.) Bedd.	Blechnaceae	Epiphytes inside forests or shaded roadsides.
20.	<i>Tectaria coadunata</i> (J. Sm.) C. Chr.	Dryopteridaceae	Fully or partially shaded roadsides.
21.	<i>Thelypteris (Christella) parasitica</i> (L.) Tardieu	Thelypteridaceae	Inside partially shaded evergreen forests.

PLATE I



Figs. : (a) *Blechnum orientale* (b) *Dicranopteris linearis*,
(c) *Adiantum philippense* (d) *Angiopteris helferiana*

1998). Special emphasis was given to the occurrence of endemic and threatened pteridophytes (as evaluated by Fraser-Jenkins, 2008b and Chandra *et al.* 2008). The important ferns were collected, dried and stored in the form of herbarium specimens following the standard techniques at the Kumta Field Station of Centre for Ecological Sciences, Indian Institute of Science.

PLATE II



Figs. : (e) *Microlepia speluncae* (f) *Pteris vittata*
(g) *Tectaria coadunata* (h) *Pityrogramma calomelanos*

RESULTS AND DISCUSSIONS

The sacred forests of Yana are characterized by low elevation evergreen and semi-evergreen climax and potentially related forests (Pascal et al., 1982) and harbor many endemic angiosperms such as *Diospyros candolleana*, *Knema attenuata*, *Myristica malabarica*, *Artocarpus hirsutus*, *Holigarna arnottiana*, *Actinodaphne hookerii*, *Cinnamomum*

macrocarpum, etc. The moist and humid environment coupled with the presence of many perennial streams favor a luxuriant growth of ferns and fern-allies in these forests. Altogether, 21 species of ferns, belonging to 17 genera and 15 families, were recorded from Yana (Table 1). Among the fern families, Pteridaceae was dominant with 5 species followed by Blechnaceae and Lomariopsidaceae with 2 species each, while the other families were represented by single species each. At generic level, *Pteris* was found to be dominant with 4 species followed by *Bolbitis* with 2 species while the remaining fern genera were represented by single species each. The notable fern species in Yana included tree fern *Cyathea gigantea* along with *Bolbitis semicordata* and *B. subcrenatooides* which are considered to be endemic to south India (Fraser-Jenkins 2008b). Other common and well represented ferns included *Blechnum orientale*, *Christella parasitica*, *Dicranopteris linearis*, *Pteris pellucida*, *Stenochlaena palustris* and *Tectaria coadunata*. Most of the ferns present in this region are known for ethno-medicinal uses, as dealt with in various studies conducted elsewhere in the country. Plate I & Plate II depicts the selected ferns of the region.

The occurrence of rich diversity in Yana coupled with fragile ecology due to anthropogenic stress (due to unplanned tourism), necessitate appropriate conservation measures for the protection of sacred forests. The practice of sacred forest conservation is on the wane due to cultural erosion, which is affecting the rare and high humidity loving ferns. Yana is an instance of a relatively smaller patch of nearly pristine forests functioning as a rich repository of pteridophytes like *Cyathea gigantea*, *Angiopteris helferiana*, *Stenochlena palustris*, *Bolbitis* spp. etc. This forest patch is in contrast to the bulk of secondary forests, in nearby villages, practically bereft of rare ferns. Yana forests though survived pressures of erstwhile slash and burn cultivators, betel-nut farmers and loggers, due to the sacredness attributed by local people. However, the spurt of tourism with numerous visitors, both pilgrims and picnickers in recent times, has increased and pressures on the forests evident from the construction of roads, fragmenting sensitive forest habitats. The clamor is on for other kinds of constructions as well near the rocks. In any case the rare pteridophytes cannot stand the ravages of humans for long. The locally constituted village forest committee and the forest department are striving to safeguard the ecology of the forests.

CONCLUSION

The presence of good diversity and luxuriant growth of ferns apart from the occurrence of *Cyathea gigantea* along with *Bolbitis semicordata* and *B. subcrenatooides* symbolizes the ecological importance of Yana forests. Although Uttara Kannada is well known for its vast forests places like Yana are rare. Yana would be an ideal place in central Western Ghats for raising a fernery, of natural ferns growing there and of other indigenous ferns grown using appropriate techniques. However there need to be concerted efforts from all stakeholders including local people in the protection and sustainable management of

ecosystems. Also, the awareness among visitors to Yana would enhance the environmental responsibilities which would help in the conservation of fragile habitats of ferns.

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