

### Full Length Article

## Vascular plant diversity of Udayagiri fort, Kanyakumari district, Tamilnadu, India

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#### ABSTRACT

In this study, a systematic investigation on the plants of Udayagiri Fort was made, that the species composing of plants in the fort are analyzed and discussed, intending to provide scientific gist for the ecorestoration of the fort. The results showed that there were 346 plants species, which belonged to 265 genera and 90 families. Taxonomically dicotyledons plants were the most species rich and contribute 292 taxa belonging to 218 genera and 75 families, whereas monocotyledonous plants contribute 54 taxa belonging to 47 genera and 15 families. Fabaceae and Acanthaceae was the most speciose family with 21 species each. Most plant species of the study area are of considerable ecological and economic importance, useful as bioresources to wild fauna and human beings. Of the total 346 wild/naturalized plant species, most are useful as medicinal plants, and others are valuable as edible fruits, timbers, fuelwood, etc. Most of the plants recorded from the fort are economically important. The medicinal plant ranked first with 191 species, 50 species having ornamental value, 13 species had timber value, edible 11 species and 58 species were regarded for green manure. Many multipurpose species were also reported from fort.

**Key words:** Archaeological sites, Biodiversity, Kanyakumari district, Udayagiri fort.

#### INTRODUCTION

Biodiversity reflects variety and variability within and among living organisms, their associations and habitat-oriented ecological complexes. Natural and cultural heritage sites frequently have nonoverlapping or even conflicting conservation priorities, because human impacts have often resulted in local extirpations and reduced levels of native biodiversity (Ben *et al.*, 2013). Conservation of biodiversity is essential for the proper functioning of ecosystems and for the maintenance of the environmental services they provide (Lopez-del-Toro *et al.*, 2009; Lal and Singh, 2012; Sainkhediya and Ray, 2012; Soromessa and Kelbessa, 2013; Suba *et al.*, 2014). The preservation of archeological sites does not always overlap with the conservation of biodiversity.

Udayagiri fort, a biodiversity park in the southernmost district of peninsular India, still harbours some patches of tropical dry evergreen forests. It is necessary to document the floristic wealth and also to identify those plant species that are in urgent need of conservation, as the Biodiversity Park is highly disturbed by habitat alteration. Moreover, before implementing any conservation strategy it is of utmost necessity to understand the existing vegetation profile and to select the appropriate species for ecorestoration program. In the past, workers such as Raj and Sukumaran (1997), Swamy *et al.* (1998), Jeeva *et al.* (2005a,b, 2006), Kingston *et al.* (2006) and Prakash *et al.* (2006) have studied the phytodiversity of the region. Nayar (1959), Lawrence (1960), Henry and Swaminathan (1981), Sundarapandian and Swamy

(1997), Swamy *et al.* (2000) and Mahesh *et al.* (2010) have explored the vegetation of Kanyakumari district. Plant diversity and conservation status of some sacred groves of Kanyakumari district were studied by Raj and Sukumaran (1997), Sukumaran (1997), Sukumaran and Jeeva (2008) and Sukumaran *et al.* (2008, 2009). Plant diversity in the traditional homestead agroforestry system was explored by Paul (2009), Anami and Kingston (2009) and Geetha (2011). Recently, Sukumaran and his coworkers (2011a, b) studied the wetland plants of the district with limited objectives. The previous plant explorers have paid much attention to forests, sacred groves and wetlands and not protected areas and archaeological sites. Hence, there is an urgent need for the exploration of the plant wealth in the Udayagiri Fort, Kanyakumari district, Tamilnadu, India. With this background, the present study was intended to assess the untapped floral resources and prepare a floral inventory of Udayagirir Fort at Puliyoorkurichi of Kanyakumair district, Tamilnadu, India.

## MATERIALS AND METHODS

### Study Area

The fort in Tamil Nadu is located at a distance of 14 km from Nagercoil town in Kanyakumari District. The fort is situated on the Thiruvananthapuram-Nagercoil National highway at Puliyoorkurichi (8°14'38.4"N 77°19'55.2"E). This was the most important military barracks of the Travancore rulers, when Padmanabhapuram was their capital. The port had been originally built in the 17th century, and then rebuilt later by Maharaja Marthanda Varma of Travancore in the 18th century. Enclosing an area of about 90 acres (36 ha), with an isolated hill 260 feet (79 m) high, the fort contains an old foundry which was used for casting guns.

The fort was rebuilt during the reign of Marthanda Varma, Venad King, during 1741-44 under the supervision of Eustachius De Lannoy, a Flemish naval commander of the Dutch East India Company, who later served as the Chief of the Travancore Army. In the early days, the fort was of strategic importance. Prisoners captured in the campaign against Tippu Sultan were confined in the fort for some time. In 1810, the East India Company's Army under Colonel Leger marched into the Travancore State through the Aramboly Pass to quell a rebellion under the leadership of Velu

Thambi Dalava. In the later years, the English East India Company's troops were stationed there till the middle of the 19th century. Foundry for the manufacture of guns, mortars and cannonballs were also established within the fort under the supervision of the General.

The fort is built of massive granite blocks around an isolated hillock. The tombs of the Dutch Admiral Eustachius De Lannoy, (in whose honour the fort was once called Dillanai Kottai— De Lannoy's Fort), and of his wife and son can still be found inside a partly ruined chapel in the fort. De Lannoy's body was buried within the fort and a chapel was built at his burial site. De Lannoy's tombstone lies within the walls of the ruined chapel. The inscriptions on his stone are both in Tamil and in Latin. His wife and son were buried by his side.

Recently, officials of the Department of Archaeology found an underground tunnel within the fort. Presently, the fort has been turned into a bio-diversity park by the Tamil Nadu forest department, with sites of historical importance, such as De Lannoy's tomb, remaining as protected archaeological sites under the Archaeological Department of India.

### Climate and Soil

The climate of Kanyakumari district is warm and humid. Summer starts from March to May followed by southwest monsoon from June to September. October and November constitute the post-monsoon or retreating monsoon season with frequent thunderstorms. From December to February, northeast monsoon season (is confined with rains) and the remaining months generally have bright weather. Rainfall varies from 103 cm to 310 cm, and elevation from sea level to 1829 m above sea level (Figure 1). Gneissic rocks are predominant in this region. The soil is red, varying in the quantity of ferruginous element.

### Biodiversity of Udayagiri Fort

The picturesque Udayagiri Fort harbours native tropical vegetation, and plantations; there are still portions of the fort with native vegetation of tropical dry evergreen forest, tropical dry evergreen scrub, savannah and thorn forests. The plant wealth and biodiversity of the fort is augmented by the plant wealth in the plantation inside the fort. The plantation is endowed with some of the rare, endemic and endangered plants of the Western Ghats.

The medicinal garden inside the fort has a large number of medicinal plants, used in the traditional medicinal system of Kanyakumari district. The medicinal plants of the fort are the control of Tamilnadu Forest Department by Kanyakumari Forest Division.

#### Floristic Survey

The task of inventorying the plant diversity of Udayagiri fort was undertaken systematically and intensively from November 2013 to April 2014, to cover most species in flowering and fruiting stages and also to cover various seasons. Plant species were identified using regional floras (Gamble, 1921-1935; Mathew, 1991; Nair *et al.*, 1983; Henry *et al.*, 1987, 1989). Angiosperm phylogeny group II was followed to classify the species. For all documented species, the binomial and author citation were checked thoroughly with International Plant Name Index (IPNI). Well-preserved specimens with voucher numbers were deposited in the Herbarium of the Department of Botany and Research Centre, Nesamony Memorial Christian College, Marthandam, Tamilnadu, India.

## RESULTS AND DISCUSSION

### Plant Diversity

A total of 346 plant species were enumerated from the Udayagiri Fort (Table 1). The 346 plant species (including a gymnosperm) belonged to 265 genera and 90 families. For all the enumerated wild and naturalized plant species, information such as botanical name, family and habit are provided. Contribution of herbaceous plants to total diversity is the maximum, i.e. 133 species (38%) belonging to 108 genera and 42 families, followed by trees – 93 species (27%) belonging to 77 genera and 38 families, shrubby plants – 84 species (24%) belonging to 70 genera and 38 families, climbers including creeping plants – 23 species (7%) and the remaining species were lianas (12) and epiphytes (1 species) (Figure 2 and 3).

Taxonomically dicotyledons plants were the most species rich and contribute 292 taxa belonging to 218 genera and 75 families, whereas monocotyledonous plants contribute 54 taxa belonging to 47 genera and 15 families (Figure 4). Among the monocotyledonous plants *Aristida setacea*, *Apluda mutica*, *Heteropogon contortus* and *Perotis indica* were collected from scrub savannas. Many species of plants enumerated in the Biodiversity Park are medicinally valuable resources, which include *Aloe vera*, *Abrus*

*precatorius*, *Achyranthes aspera*, *Cissus vitiginea*, *C. quadrangularis*, *Carissa spinarum*, *Sansevieria roxburghiana*, *Trichosanthes tricuspidata*, etc. Two species of parasitic angiosperms were reported, which include *Dendrophthoe falcata* and *Cuscuta reflexa*. The shrub *D. falcata*, a partial stem parasite, can be seen frequently parasitizing the trees *Mangifera indica* and *Anacardium occidentale*. *Cuscuta reflexa* is a commonly occurring total stem parasite, parasitizing shrubs and trees of the biodiversity park.

A large number of exotic flora were reported from the Udayagiri Fort which include *Acacia nilotica*, *Ageratum conyzoides*, *Annona squamosa*, *Asparagus racemosus*, *Bauhinia purpurea*, *Cassia occidentalis*, *Chenopodium album*, *Clitoria ternatea*, *Crotolaria medicaginea*, *Croton sparsiflorus*, *Cynodon dactylon*, *Cyperus rotundus*, *Datura metel*, *Gomphrena globosa*, *Heliotropium indicum*, *Lantana camara*, *Melia azedarach*, *Melilotus alba*, *Mimosa pudica*, *Oxalis corniculata*, *Parthenium hysterophorus*, *Physalis minima*, *Pithecolobium dulce*, *Portulaca oleracea*, *Psidium guajava*, *Punica granatum*, *Sphaeranthus indicus*, *Tridax procumbens*, *Urena lobata* and *Ziziphus mauritiana*.

**Figure 3.** Life-form classification of plant species collected from the park.

Shrubs like *Ziziphus nummularia*, *Z. oenoplia* and *Z. xylopyrus* often appear as stray plants in the grasslands of the fort. Herbaceous species like *Boerhaavia diffusa*, *Lippia nodiflora*, *T. procumbens* and *Euphorbia thymifolia* are more frequent along the hedgerows of the fort.

The plant species in the checklist and their photographs are arranged in alphabetical order to facilitate their use not only by botanists, but also by all interested in plants.

### Family Richness

The most diverse families in the Udayagiri Fort includes Fabaceae and Acanthaceae (21 species each with 17 and 12 genera respectively), Poaceae (19 species and 16 genera), Euphorbiaceae (18 species and 9 genera), Rubiaceae (16 species and 11 genera), Lamiaceae (13 species and 9 genera), Malvaceae (13 species and 8 genera), Apocynaceae and Verbenaceae with 11 species each with 10 and 7 genera respectively, Caesalpiniaceae, Asteraceae and Moraceae (9 species each), Mimosaceae (8 species), Rutaceae and Asparagaceae (7 species each), Amaranthaceae, Arecaceae, Convolvulaceae and

Solanaceae (6 species each), Asclepiadaceae, Bignoniaceae, Cyperaceae, Myrtaceae and Lauraceae (5 species each), Menispermaceae, Aeraceae and Combretaceae (4 species each) and Anacardiaceae, Clusiaceae, Nyctaginaceae, Sterculiaceae, Commelinaceae, Vitaceae and Cleomaceae (3 species each). Thirteen families (Amaryllidaceae, Boraginaceae, Loranthaceae, Melastomaceae, Moringaceae, Oleaceae, Rhamnaceae, Salvadoraceae, Sapotaceae, Celastraceae, Cucurbitaceae, Piperaceae and Talinaceae) were represented by two species each, whereas 42 families were monospecific (Table 2; Figure 5 and 6).

**Table 1. List of plant species recorded from Udayagiri Fort**

Botanical Name	Family	Habit	Armature	Uses	VN
<i>Abutilon indicum</i> (L.) Sweet.	Malvaceae	S	UA	M	1339
<i>Abrus precatorius</i> L.	Fabaceae	L	UA	M	#
<i>Acacia auriculiformis</i> Benth	Mimosaceae	T	A	Ti	1356
<i>Acacia caesia</i> (L.) Will	Mimosaceae	C	A	Ot	1377
<i>Acacia mangium</i> Willd.	Mimosaceae	T	A	Ti	1419
<i>Acalypha amentacea</i> Roxb.	Euphorbiaceae	H	UA	We	1423
<i>Acalypha lanceolata</i> Willd.	Euphorbiaceae	S	UA	Or	1475
<i>Acalypha indica</i> L.	Euphorbiaceae	H	UA	M	1487
<i>Achyranthes aspera</i> L.	Amaranthaceae	H	A	M	1460
<i>Acorus calamus</i> L.	Araceae	H	A	M	#
<i>Adenantha pavonina</i> L.	Mimosaceae	T	UA	M	1436
<i>Aerva lanata</i> (L.) Juss.	Amaranthaceae	H	UA	M	1433
<i>Aegle marmelos</i> (L.) Correa	Rutaceae	T	A	M	#
<i>Ageratum conyzoides</i> (L.) L.	Asteraceae	H	UA	M	1366
<i>Aglaonema commutatum</i> Schott.	Araceae	H	UA	Or	1465
<i>Alangium salvifolium</i> (L.f) Wang	Alangiaceae	T	A	Ti	1389
<i>Albizia lebeck</i> (L.) Benth.	Mimosaceae	T	UA	Ti	1392
<i>Allamanda cathartica</i> L.	Apocynaceae	S	UA	Or	1498
<i>Alloteropsis cimicina</i> (L.) Stapf.	Poaceae	H	UA	M	1453
<i>Alocasia hypnosa</i> J.T.Yin, Y.H. Wang & Z. F.xu	Araceae	H	UA	Or	1360
<i>Alocasia macrorrhizos</i> (L.) G.Don	Araceae	H	UA	M	1408
<i>Aloe vera</i> (L.) Burm.f	Asparagaceae	H	A	M	1476
<i>Alpinia galanga</i> (L.) Willd.	Zingiberaceae	S	UA	M	#
<i>Alstonia scholaris</i> (L.) R.Br.	Apocynaceae	T	UA	Or	1343
<i>Alstonia venenata</i> R.Br.	Apocynaceae	S	UA	Or	1445
<i>Alysicarpus vaginalis</i> (L.) DC.	Apocynaceae	H	UA	F	#
<i>Amaranthus viridis</i> L.	Amaranthaceae	H	UA	Ed	1397
<i>Anacardium occidentale</i> L.	Anacardiaceae	T	A	M	#
<i>Ananas comosus</i> (L.) Merr.	Bromeliaceae	H	A	M	1376
<i>Andrographis echinoides</i> (L.) Nees	Acanthaceae	H	UA	M	#
<i>Andrographis paniculata</i> (Burm.f.) Nees	Acanthaceae	H	A	M	1402
<i>Anisomeles indica</i> (L.) Kuntze	Lamiaceae	H	UA	M	#
<i>Anisochilus scaber</i> Benth.	Lamiaceae	H	UA	M	1478
<i>Annona muricata</i> L.	Annonaceae	T	A	Ed	1431
<i>Annona reticulata</i> L.	Annonaceae	S	UA	M	1321
<i>Annona squamosa</i> L.	Annonaceae	T	UA	M	1421
<i>Apluda mutica</i> L.	Poaceae	H	UA	We	1486
<i>Arenga wightii</i> Griff.	Arecaceae	T	A	M	#
<i>Argemone mexicana</i> L.	Papaveraceae	H	A	We	1507
<i>Aristida hystrix</i> L.f	Poaceae	H	UA	Ot	1386
<i>Aristida setacea</i> Retz.	Poaceae	H	UA	We	1506
<i>Aristolochia indica</i> L.	Aristolochiaceae	C	UA	M	#
<i>Artocarpus communis</i> G.Forst	Moraceae	T	UA	M	#
<i>Artocarpus hirsutus</i> Lam.	Moraceae	T	UA	Ti	#
<i>Artocarpus heterophyllus</i> Lam.	Moraceae	T	UA	M	1488
<i>Asystasia gangetica</i> (L.) T.Anderson	Acanthaceae	H	UA	We	1393
<i>Asparagus racemosus</i> Willd.	Asparagaceae	C	A	M	#
<i>Atalantia missonoids</i> D.S	Rutaceae	T	A	M	#
<i>Atylosia scarabaeoides</i> L.	Fabaceae	S	UA	M	1375
<i>Azadirachta indica</i> A.Juss.	Meliaceae	T	UA	M	1485
<i>Azima tetracantha</i> Lam.	Salvadoraceae	C	A	M	#
<i>Bambusa bambos</i> (L.) Voss	Poaceae	S	A	Ti	#

Botanical Name	Family	Habit	Armature	Uses	VN
<i>Bambusa vulgaris</i> Schrad.	Poaceae	H	A	Or	1385
<i>Banfderia</i> (Whitetl)	Acanthaceae	H	A	We	#
<i>Barleria cuspidata</i> F.Heyne ex Nees	Acanthaceae	S	A	Or	#
<i>Barleria mysorensis</i> B.Heyne ex Roth	Acanthaceae	S	A	Or	1316
<i>Basella alba</i> L.	Basellaceae	H	A	M	1430
<i>Basilicum polystachyon</i> (L.)Moench	Lamiaceae	S	UA	M	#
<i>Begonia malabarica</i> Lam.	Begoniaceae	H	UA	M	#
<i>Blepharis maderaspatensis</i> (L.) B. Heyne ex Roth	Acanthaceae	H	UA	M	1359
<i>Boerhavia diffusa</i> L.	Nyctaginaceae	H	UA	We	1384
<i>Bombax ceiba</i> L.	Malvaceae	T	A	Ti	#
<i>Bombax malabaricum</i> DC.	Bombacaceae	T	A	M	#
<i>Borassus flabelifer</i> L.	Areaceae	T	A	M	#
<i>Bougainvillea spectabilis</i> Willd.	Nyctaginaceae	S	A	Or	1347
<i>Brachiaria semiverticillata</i> (Rottler)Alston.	Poaceae	H	UA	F	1473
<i>Bryophyllum pinnatum</i> (Lam.) Oken	Crassulaceae	H	UA	M	1309
<i>Butea monosperma</i> Lam.	Fabaceae	T	UA	Or	#
<i>Callistemon lanceolatus</i> (Sm.) Sweet	Myrtaceae	S	UA	Or	#
<i>Calophyllum inophyllum</i> L.	Clusiaceae	T	UA	M	#
<i>Calotropis procera</i> (Aiton) Dryand.	Asclepidaceae	S	UA	M	#
<i>Canthium diccocum</i> (Gaertn.) Tegsm &Binn.	Rubiaceae	T	UA	Ti	1505
<i>Canna indica</i> L.	Cannaceae	H	UA	Or	1355
<i>Canthium coromandelicum</i> (Burm.f.) Alston	Rubiaceae	S	UA	M	1374
<i>Capparis zeylanica</i> L.	Capparaceae	S	A	M	#
<i>Capsicum annum</i> L.	Solanaceae	H	UA	M	1472
<i>Carcia papaya</i> L.	Caricaceae	T	UA	Ed	#
<i>Cardiospermum halicacabum</i> L.	Sapindaceae	C	UA	M	#
<i>Carissa spinarum</i> L.	Apocynaceae	S	A	We	#
<i>Caryota urens</i> L.	Areaceae	T	UA	Or	1365
<i>Cascabela thevetia</i> (L.)Lippold	Menispermaceae	L	UA	M	#
<i>Cassia fistula</i> L.	Caesalpiniaceae	T	UA	Or	1513
<i>Casuarina equisetifolia</i> L.	Casurinales	T	UA	Ot	1334
<i>Cassytha filiformis</i> L.	Lauraceae	L	UA	M	#
<i>Catharanthus roseus</i> (L.) G.Don.	Apocynaceae	H	UA	M	1429
<i>Cayratia pedata</i> (Lam.) Gagnep.	Vitaceae	L	UA	M	#
<i>Celosia argentea</i> L.	Amaranthaceae	H	UA	We	1404
<i>Centella asiatica</i> (L.) Urb.	Apiaceae	H	UA	M	#
<i>Centrosema pubescens</i> Benth.	Fabaceae	C	UA	We	1461
<i>Chloris barbata</i> Sw.	Poaceae	H	UA	We	1398
<i>Chromolaena odorata</i> (L.)R.M.King &H. Rob.	Asteraceae	S	UA	We	1484
<i>Cinnamomum camphora</i> (L.) J.Presl	Lauraceae	T	UA	M	#
<i>Cinnamomum malabatum</i> (Burm.f.)J.Presl	Lauraceae	T	UA	M	#
<i>Cinnamomum verum</i> J.Presl	Lauraceae	T	UA	M	#
<i>Cissampelospareira</i> L.	Menispermaceae	C	UA	M	#
<i>Cissus quadrangularis</i> L.	Vitaceae	S	UA	M	#
<i>Cissus vitiginea</i> L.	Vitaceae	L	UA	M	#
<i>Citrus aurantifolia</i> (Chri)Swi	Rutaceae	T	A	M	#
<i>Cleome viscosa</i> L.	Cleomaceae	H	UA	M	1344
<i>Cleome rutidosperma</i> DC	Cleomaceae	H	UA	M	1504
<i>Cleome gynandra</i> L.	Cleomaceae	H	UA	M	#
<i>Clerodendrum inerme</i> (L.) Gaertn	Verbenaceae	S	UA	M	1354
<i>Clerodendrum villosum</i> Blume	Verbenaceae	S	UA	M	1446
<i>Clitoria ternatea</i> L.	Fabaceae	C	UA	M	1493
<i>Centrosema virginianum</i> (L.) Benth	Fabaceae	H	UA	M	1512
<i>Coccinia grandis</i> (L.) J.Voygt.	Cucurbitaceae	C	UA	We	1378
<i>Coccinia indica</i> W&A	Cucurbitaceae	C	UA	M	#
<i>Cocos nucifera</i> L.	Areaceae	T	UA	M	1467
<i>Commelina benghalensis</i> L.	Commelinaceae	H	UA	We	1324
<i>Cordia peruviana</i> Roem. & Schult.	Boraginaceae	T	UA	Or	1499
<i>Cordyline terminalis</i> (L.) A.Chev	Asparagaceae	S	UA	Or	#
<i>Cosmos bipinnatus</i> Cav.	Asteraceae	H	UA	Or	#
<i>Costus speciosus</i> (J.Konig) C.Specht	Costaceae	H	UA	M	#
<i>Couroupita guianensis</i> Aubl.	Leythidaceae	T	UA	Or	#
<i>Crinum asiaticum</i> L.	Amaryllidaceae	H	UA	Or	1471
<i>Crossandra infundibuliformis</i> (L.) Nees	Acanthaceae	H	UA	Or	#

Botanical Name	Family	Habit	Armature	Uses	VN
<i>Crotalaria laburnifolia</i> L.	Fabaceae	S	UA	Or	#
<i>Crotalaria pallida</i> Ait	Fabaceae	H	UA	Ot	#
<i>Croton bonplandianum</i> Baill.	Euphorbiaceae	H	UA	M	#
<i>Cyanotis axillaris</i> (L.) Don ex Sweet	Commelinaceae	H	UA	We	1383
<i>Cyanotis tuberosa</i> (Roxb.) Schult. & Schultes.f.	Commelinaceae	H	UA	We	#
<i>Cycas circinalis</i> L.	Cycadaceae	T	UA	M	#
<i>Cynodon dactylon</i> (L.) Pers	Poaceae	H	UA	M	1495
<i>Cymbopogon citratus</i> (DC.) Stapf.	Poaceae	H	UA	M	#
<i>Cyperus rotundus</i> L.	Cyperaceae	H	UA	M	1492
<i>Dactyloctenium aegyptium</i> (L.) Willd.	Poaceae	H	UA	We	1331
<i>Dalbergia latifolia</i> Roxb.	Fabaceae	T	UA	Ti	#
<i>Delonix regia</i> (Boj) Rafin	Caesalpiniaceae	T	UA	Or	1437
<i>Dendrocalamus strictus</i> (Roxb.) Ness	Poaceae	S	UA	Ot	#
<i>Dendrophthoe falcata</i> (L.f) Ettingsh.	Loranthaceae	S	UA	We	1391
<i>Datura metel</i> L.	Solanaceae	S	UA	M	#
<i>Derris scandens</i> (Roxb.) Benth.	Fabaceae	L	UA	M	1503
<i>Desmodium triflorum</i> (L.) DC	Fabaceae	S	UA	We	1353
<i>Digera muricata</i> (L.) Mart.	Amaranthaceae	H	UA	We	#
<i>Dracaena reflexa</i> Lam.	Asparagaceae	S	UA	Or	1454
<i>Dregea volubilis</i> (L.f) Stapf.	Apocynaceae	L	UA	M	#
<i>Drimys indica</i> (Roxb.) Jessop.	Asparagaceae	H	UA	M	1319
<i>Duranta repens</i> L.	Verbenaceae	S	UA	Or	1466
<i>Dyopsis lutescens</i> (H. Wendl.) Beentje & J. Dransf.	Arecaceae	T	UA	Or	1358
<i>Ecbolium ligustrinum</i> (Vahl) Vollesen	Acanthaceae	H	UA	Or	#
<i>Ehretia microphylla</i> Lam.	Boraginaceae	S	UA	M	1438
<i>Eleusine indica</i> (L.) Gaertn	Poaceae	H	UA	We	1364
<i>Emilia sonchifolia</i> (L.) DC. ex DC	Asteraceae	H	UA	We	#
<i>Eriochloa procerata</i> (Retz.) C.E Hubb	Poaceae	H	UA	F	1470
<i>Erythrina variegata</i> L.	Fabaceae	T	A	M	#
<i>Eucalyptus globulus</i> Laill.	Myrtaceae	T	UA	M	#
<i>Eucalyptus tereticornis</i> Sm.	Myrtaceae	T	UA	M	#
<i>Euphorbia antiquorum</i> L.	Euphorbiaceae	S	A	We	1511
<i>Euphorbia cyathophora</i> Murr.	Euphorbiaceae	S	UA	Or	1340
<i>Eunulus alsinoides</i> L.	Euphorbiaceae	H	UA	M	1449
<i>Evolvulus alsinoides</i> (L.) L.	Convolvulaceae	H	UA	M	#
<i>Evolvulus nummularis</i> (L.) L.	Convolvulaceae	H	UA	M	#
<i>Feronia limonia</i> W. Rrea.	Rutaceae	T	A	M	#
<i>Ficus benghalensis</i> L.	Moraceae	T	UA	M	1462
<i>Ficus hispida</i> L.f	Moraceae	T	UA	M	#
<i>Ficus microcarpa</i> L.f	Moraceae	T	UA	M	1332
<i>Ficus racemosa</i> L.	Moraceae	T	UA	M	1448
<i>Ficus religiosa</i> L.	Moraceae	T	UA	M	#
<i>Flueggea leucopyrus</i> Willd.	Euphorbiaceae	S	UA	We	1362
<i>Garcinia gummi-gutta</i> L. (Roxb)	Clusiaceae	T	UA	M	#
<i>Gardenia gummifera</i> L.f	Rubiaceae	T	UA	M	#
<i>Gloriosa superba</i> L.	Cloicaceae	C	UA	M	1401
<i>Glycosmis pentaphylla</i> (Retz.) DC.	Rutaceae	T	UA	M	#
<i>Gmelina arborea</i> Roxb.	Verbenaceae	T	UA	Ot	#
<i>Gmelina asiatica</i> L.	Verbenaceae	C	UA	M	#
<i>Gomphrena celosioides</i> Mart.	Amaranthaceae	H	UA	We	1413
<i>Gymnema sylvestre</i> (Retz.) R.Br. ex Sm	Asclepidaceae	C	UA	M	#
<i>Hamelia patens</i> Jacq.	Rubiaceae	S	UA	Or	1480
<i>Helicteres isora</i> L.	Sterculiaceae	S	UA	M	#
<i>Hemidesmus indicus</i> (L.) R.Br.	Periplocaceae	C	UA	M	#
<i>Hibiscus micranthus</i> L.f	Malvaceae	H	UA	We	1439
<i>Hibiscus rosa-sinensis</i> L.	Malvaceae	S	UA	M	#
<i>Hibiscus vitifolius</i> L.	Malvaceae	S	UA	We	1373
<i>Hugonia mystax</i> L.	Linaceae	L	UA	M	#
<i>Hydnocarpus laurifolia</i> (Denn.) Sle.	Flacourtiaceae	T	UA	M	#
<i>Hybanthus enneaspermus</i> (L.) F. Muell.	Violaceae	H	UA	We	1483
<i>Hyptis suaveolens</i> (L.) Poit.	Lamiaceae	S	UA	M	1382
<i>Ichnocarpus frutescens</i> (L.) W.T. Aiton	Apocynaceae	L	UA	M	1432
<i>Ilysanthes veronicaefolia</i> Urban.	Scrophulariaceae	H	UA	Ot	1497
<i>Indigofera linnaei</i> Ali.	Fabaceae	H	UA	We	1326

Botanical Name	Family	Habit	Armature	Uses	VN
<i>Indigofera enneaphylla</i> (L.)	Fabaceae	H	UA	M	1424
<i>Indigofera tinctoria</i> L.	Fabaceae	H	UA	M	#
<i>Ipomoea carnea</i> Jacq.	Convolvulaceae	S	UA	M	1412
<i>Ipomoea pes-tigridis</i> L.	Convolvulaceae	S	UA	We	1390
<i>Ipomoea teristris</i> L.	Convolvulaceae	S	UA	We	1479
<i>Ixcora coccinea</i> L.	Rubiaceae	S	UA	M	#
<i>Ixcora parviflora</i> Lam.	Rubiaceae	S	UA	Or	1455
<i>Jasminum auriculatum</i> Vahl.	Oleaceae	C	UA	Or	#
<i>Jatropha curcas</i> L.	Euphorbiaceae	S	UA	Ot	1477
<i>Jatropha glandulifera</i> Roxb.	Euphorbiaceae	S	UA	M	1428
<i>Jatropha gossypifolia</i> L.	Euphorbiaceae	S	UA	M	#
<i>Jatropha multifida</i> Jacq.	Euphorbiaceae	S	UA	Or	1447
<i>Justicia adhatoda</i> L.	Acanthaceae	S	UA	M	1400
<i>Justicia diffusa</i> Roxb.	Acanthaceae	H	A	M	1387
<i>Justicia gendarussa</i> Burm.f	Acanthaceae	H	A	Or	1363
<i>Justicia glauca</i> Rott.	Acanthaceae	H	A	M	1463
<i>Justicia simplex</i> D.Don	Acanthaceae	H	UA	M	1361
<i>Justicia tranquebariensis</i> L.f.	Acanthaceae	S	UA	We	#
<i>Kleinia grandiflora</i> (Wall.ex DC.) Rani	Asteraceae	S	UA	We	1394
<i>Kyllinga monocephala</i> Rottb.	Cyperaceae	H	UA	We	#
<i>Kyllinga triceps</i> Rottb.	Cyperaceae	H	UA	We	#
<i>Lannea coromandelica</i> (Houtt.) Merr.	Anacardiaceae	T	UA	Ti	1328
<i>Lantana camara</i> R.Fern.	Verbenaceae	S	UA	We	1336
<i>Leucacna leucocephala</i> Lam.	Fabaceae	S	UA	We	1352
<i>Leucas aspera</i> (Willd.) Link	Lamiaceae	H	UA	M	#
<i>Leucas biflora</i> (Vahl) R.Br.	Lamiaceae	H	UA	M	1415
<i>Lipocarpha sphacelata</i> Kunth.	Cyperaceae	H	UA	Ot	#
<i>Litsea glabrata</i> Hook.f.	Lauraceae	T	UA	M	#
<i>Loranthus longiflorus</i> Desr.	Loranthaceae	S	UA	M	#
<i>Malvastrum coromandelianum</i> (L.) Gracke	Malvaceae	H	UA	We	1441
<i>Mangifera indica</i> L.	Anacardiaceae	T	UA	M	#
<i>Manilkera zapota</i> (L.) P.Royen	Sapotaceae	T	UA	Ed	1327
<i>Melochia corchorifolia</i> L.	Sterculiaceae	H	UA	We	1381
<i>Memecylon umbellatum</i> Burn.f.	Melastomataceae	T	UA	Or	#
<i>Merremia tridentata</i> (L.) Hall.f.	Convolvulaceae	H	UA	M	#
<i>Mesua ferrea</i> L.	Clusiaceae	T	UA	Ot	#
<i>Michelia champaca</i> L.	Magnoliaceae	T	UA	Or	#
<i>Micrococca mercurialis</i> L. (Benth)	Euphorbiaceae	H	UA	We	1367
<i>Mimosa pudica</i> L.	Mimosaceae	H	A	M	#
<i>Mimusops elengi</i> L.	Sapotaceae	T	UA	Ed	1482
<i>Mirabilis jalapa</i> L.	Nyctoginaceae	H	UA	Ed	#
<i>Mollugo lotoides</i> O.Kuze	Molluginaceae	H	UA	We	#
<i>Moringa tinctoria</i> Roxb.	Rubiaceae	T	UA	Ed	1320
<i>Moringa umbellata</i> L.	Rubiaceae	L	UA	Ot	#
<i>Moringa oleifera</i> Lamk.	Moringaceae	T	UA	M	1440
<i>Moringa pterygosperma</i> C.FGaertn.	Moringaceae	S	UA	M	1500
<i>Muntingia calabura</i> L.	Elaeocarpaceae	T	UA	Ed	#
<i>Murraya koenigii</i> (L.) Spreng	Rutaceae	T	UA	M	#
<i>Musa paradisiaca</i> L.	Musaceae	H	UA	Ed	1416
<i>Mussaenda frondosa</i> L.	Rubiaceae	S	UA	We	#
<i>Mussaenda glabrata</i> Vahl	Rubiaceae	S	UA	Or	#
<i>Myristica fragrans</i> Houtt.	Myristicaceae	T	UA	Ot	#
<i>Myxopyrum serratum</i> A.W. Hill.	Oleaceae	C	UA	M	#
<i>Naregamia alata</i> Wight & Arn.	Menispermaceae	C	UA	M	#
<i>Neolamarckia cadamba</i> (Roxb.) Bosser	Rubiaceae	T	UA	M	1345
<i>Ocimum americanum</i> L.	Lamiaceae	H	UA	M	1502
<i>Ocimum basilicum</i> L.	Lamiaceae	H	UA	M	1388
<i>Ocimum orthocipum</i> L.	Lamiaceae	H	UA	M	#
<i>Ocimum tenuiflorum</i> L.	Lamiaceae	S	UA	M	#
<i>Oldenlandia corymbosa</i> L.	Rubiaceae	H	UA	We	1468
<i>Oldenlandia umbellata</i> L.	Rubiaceae	H	UA	We	#
<i>Opuntia dillenii</i> (Ker Gawl.) Haw	Cactaceae	H	A	We	1474
<i>Orthosiphon thymiflorus</i> (Roth.) Sleesan.	Lamiaceae	H	UA	We	1409
<i>Paspalum raginatum</i> Sw	Poaceae	H	UA	Or	#

Botanical Name	Family	Habit	Armature	Uses	VN
<i>Passiflora foetida</i> L.	Passifloraceae	C	UA	M	1414
<i>Parthenium hysterophorus</i> L.	Asteraceae	H	UA	We	#
<i>Pavonia zeylanica</i> (L.) Cav.	Malvaceae	H	UA	M	1379
<i>Pedaliium murex</i> L.	Pedaliaceae	H	UA	We	1315
<i>Peltophorum pterocarpum</i> (DC) K.Heyne	Caesalpinaceae	T	UA	Or	1335
<i>Pennisetum hohenackeri</i> Hochst,ex Steud.	Poaceae	H	UA	F	1351
<i>Pennisetum polystachyon</i> (L.)Schult	Poaceae	H	UA	F	#
<i>Pentas lanceolata</i> (Forssk.)Deflers.	Rubiaceae	H	UA	Or	#
<i>Pentatropis capensis</i> (L.F.)Bullock.	Asclepidaceae	C	UA	M	1442
<i>Pergularia daemia</i> (Forssk.)Chiov.	Asclepidaceae	C	UA	M	#
<i>Peristrophe bicalyculata</i> (Retz.)Nees.	Acanthaceae	H	UA	M	1395
<i>Phoenix pusilla</i> Gaertn.	Arecaceae	T	A	Or	#
<i>Phyllanthus amarus</i> Schum&Thonn.	Euphorbiaceae	H	UA	M	#
<i>Phyllanthus emblica</i> L.	Euphorbiaceae	T	UA	M	#
<i>Phyllanthus micrandrus</i> (Mull Arg.)G.L.Websler	Euphorbiaceae	H	UA	We	#
<i>Phyllanthus myrtifolius</i> (Wight) Mull. Arg.	Euphorbiaceae	S	UA	Or	#
<i>Piper barberi</i> Gamble.	Piperaceae	C	UA	M	1348
<i>Piper nigrum</i> L.	Piperaceae	S	UA	M	#
<i>Pithecellobium dulce</i> (Roxb.)Benth.	Mimosaceae	T	A	M	1456
<i>Plectranthus amboinicus</i> (Lour.) Spreng.	Lamiaceae	H	UA	M	1427
<i>Plumbago zeylanica</i> L.	Plumbaginaceae	H	UA	M	#
<i>Polyalthia longifolia</i> (Sonn.)Thwaites	Annonaceae	T	UA	Or	1509
<i>Pongamia pinnata</i> (L.) Pierre	Fabaceae	T	UA	M	1329
<i>Portulaca tuberosa</i> Roxb.	Oleraceae	H	UA	M	1501
<i>Prosopis cineraria</i> (L.) Druce	Mimosaceae	T	UA	Ot	1450
<i>Psidium guajava</i> L.	Myrtaceae	T	UA	Ed	1369
<i>Pterocarpus marsupium</i> Roxb.	Fabaceae	T	UA	M	#
<i>Pterocarpus santalinus</i> L.f.	Fabaceae	T	UA	M	#
<i>Punica granatum</i> L.	Lythraceae	S	A	M	1510
<i>Pycreus sanguinolentus</i> (Vahl) Nees.	Cyperaceae	H	UA	Ot	1380
<i>Pyrenacantha volubilis</i> Hook.	Icacinaceae	L	UA	M	1489
<i>Rauvolfia tetraphylla</i> L.	Apocynaceae	S	UA	Or	#
<i>Rhinacanthus nasutus</i> (L.) Kurz	Acanthaceae	S	UA	M	#
<i>Ricinus communis</i> L.	Euphorbiaceae	S	UA	M	1417
<i>Rosa indica</i> L.	Rosaceae	S	A	Or	1396
<i>Ruellia patula</i> Jacq.	Acanthaceae	S	UA	M	1491
<i>Ruellia prostrata</i> Poir.	Acanthaceae	H	UA	Or	1318
<i>Ruellia tuberosa</i> L.	Acanthaceae	H	UA	M	1434
<i>Salacia reticulata</i> Wt	Celastraceae	L	UA	M	#
<i>Salacia oblonga</i> L.	Celastraceae	S	UA	M	1405
<i>Salvadora persica</i> L.	Salvadaraceae	S	UA	We	1496
<i>Sansevieria trifasciata</i> Prain.	Asparagaceae	H	UA	M	1422
<i>Sansevieria roxburghiana</i> Schult.f.	Asparagaceae	H	UA	M	#
<i>Saraca asoca</i> (Roxb.) Willd.	Caesalpinaceae	T	UA	M	#
<i>Santalum album</i> L.	Santalaceae	T	UA	M	1443
<i>Scadoxus multiflorus</i> (Marty) Raf.	Amaryllidaceae	H	UA	Or	1464
<i>Scoparia dulcis</i> L.	Plantaginaceae	H	UA	We	1508
<i>Scutellaria violacea</i> B.Heyne ex Benth	Lamiaceae	H	UA	M	1368
<i>Senna didymobotrya</i> (Fresen.)H.S.Irwin & Barneby	Caesalpinaceae	T	UA	M	1370
<i>Senna occidentalis</i> (L.) Link	Caesalpinaceae	S	UA	M	1337
<i>Senna siamea</i> (Lam.)H.S.Irwin&Barneby	Caesalpinaceae	T	UA	M	#
<i>Senna tora</i> (L.) Roxb	Caesalpinaceae	S	UA	M	1451
<i>Setaria palmifolia</i> (J.Koenig) Stapf.	Poaceae	H	UA	We	1425
<i>Sida acuta</i> Burm.f.	Malvaceae	H	UA	M	#
<i>Sida cordifolia</i> L.	Malvaceae	H	UA	M	1342
<i>Sida rhombifolia</i> L.	Malvaceae	H	UA	M	#
<i>Sida spinosa</i> L.	Malvaceae	S	UA	M	1420
<i>Solanum americanum</i> Mill.	Solanaceae	S	UA	Ed	1322
<i>Solanum torvum</i> Sw.	Solanaceae	S	A	M	1469
<i>Solanum trilobatum</i> L.	Solanaceae	S	A	M	1457
<i>Solanum virginianum</i> L.	Solanaceae	H	A	M	1403
<i>Spathodea campanulata</i> P.Beauv.	Bignoniaceae	T	UA	Or	#
<i>Spermacoce hispida</i> L.	Rubiaceae	H	UA	We	1323
<i>Stachytarpheta jamaicensis</i> (L.)Vahl.	Verbenaceae	H	UA	We	1494



Botanical Name	Family	Habit	Armature	Uses	VN
<i>Stachytarpheta indica</i> (L.) Vahl.	Verbenaceae	H	UA	We	#
<i>Stereospermum tetragonum</i> DC.	Bignoniaceae	T	UA	Ti	1349
<i>Streblus asper</i> Lour.	Moraceae	T	UA	M	#
<i>Strobilanthes foliosus</i> T. And	Acanthaceae	S	UA	M	1426
<i>Strychnos nux-vomica</i> L.	Loganiaceae	T	UA	M	#
<i>Stylosanthes fruticosa</i> (Retz.) Alston	Fabaceae	H	UA	We	1444
<i>Symplocos cochinchinensis</i> (Lour.)S.Moore	Symplocaceae	T	UA	M	1407
<i>Synedrella nodiflora</i> (L.) Gaertn.	Asteraceae	H	UA	We	1452
<i>Syzygium cumini</i> (L.) Skeels.	Myrtaceae	T	UA	M	1333
<i>Tabernaemontana alternifolia</i> L.	Apocynaceae	S	UA	M	#
<i>Talinum fruticosum</i> (L.) Juss	Talinaceae	H	UA	Ed	1490
<i>Talinum paniculatum</i> L.	Talinaceae	S	UA	M	1406
<i>Tamarindus indica</i> L.	Caesalpiaceae	T	UA	M	1435
<i>Tarenna asiatica</i> (L.) Kuntze ex K.Schum.	Rubiaceae	S	UA	M	1371
<i>Tecoma stans</i> (L.) Juss. ex Kunth	Bignoniaceae	S	UA	Or	1481
<i>Tecomaria capensis</i> (Thunb.)Lindl.	Bignoniaceae	S	UA	Or	1317
<i>Tectona grandis</i> L.f.	Verbinaceae	T	UA	Ti	#
<i>Tephrosia purpurea</i> (L.) Pers.	Fabaceae	H	UA	M	1410
<i>Terminalia arjuna</i> (Roxb.ex.DC)Wight&&Arn	Combretaceae	T	UA	Ti	#
<i>Terminalia bellirica</i> (Gaertn) Roxb.	Combretaceae	T	UA	M	#
<i>Terminalia catappa</i> L.	Combretaceae	T	UA	M	1458
<i>Terminalia chebula</i> Retz.	Combretaceae	T	UA	M	#
<i>Thespesia populnea</i> (L.) Sol ex Correa.	Malvaceae	T	UA	M	1418
<i>Tibouchina longifolia</i> (Vahl) Bail	Melastomataceae	T	UA	Ot	1346
<i>Tinospora cordifolia</i> (Willd.) Miers	Menisprmeaceae	L	UA	M	1325
<i>Toddalia asiatica</i> (L.) Lam.	Rutaceae	S	A	M	#
<i>Tridax procumbens</i> (L.) L.	Asteraceae	H	UA	M	1357
<i>Triumfetta pilosa</i> Roth.	Malvaceae	H	UA	M	1459
<i>Tylophora indica</i> (Burm.f.) Merr.	Asclepidaceae	C	UA	M	1338
<i>Urochloa panicoides</i> P.Beauv.	Poaceae	H	UA	F	1372
<i>Vanda tessellata</i> (Roxb) Hook. Ex G. Don	Orchidaceae	Ep	UA	Or	#
<i>Ventilago maderaspatana</i> Gaertn.	Rhamnaceae	C	UA	M	1350
<i>Vernonia cinerea</i> (L.) Less.	Asteraceae	H	UA	We	1330
<i>Vitex leucoxydon</i> L.f.	Verbenaceae	H	UA	M	#
<i>Vitex negundo</i> L.	Verbenaceae	S	UA	M	#
<i>Waltheria indica</i> L.	Sterculiaceae	H	UA	M	1411
<i>Wrightia tinctoria</i> R.Br.	Apocyanaceae	T	UA	Ot	#
<i>Ziziphus oenopolia</i> (L.) Mill.	Rhamnaceae	S	A	M	#

Abbreviations: A-Armed; C-Climber; Ed-Edible; Ep-Epiphyte; F-Fodder; H-Herb; L-Liana; M-Medicine; Or-Ornamental; Ot-Others; S-Shrub; T-Tree; Ti-Timber; UN-Unarmed; VN-Voucher number; We-Weed; #- Specimens not collected due to permission issues.

**Table 2. Familywise distribution of plant species in the Udayagiri Fort**

Family	Genus	Species	Family	Genus	Species
Fabaceae	17	21	Cucurbitaceae	1	2
Acanthaceae	12	21	Moringaceae	1	2
Poaceae	16	19	Piperaceae	1	2
Euphorbiaceae	9	18	Talinaceae	1	2
Rubiaceae	11	16	Alangiaceae	1	1
Lamiaceae	9	13	Apiaceae	1	1
Malvaceae	8	13	Aristolochiaceae	1	1
Apocynaceae	10	11	Bambucaceae	1	1
Verbenaceae	7	11	Basellaceae	1	1
Caesalpiaceae	6	9	Bromeliaceae	1	1
Asteraceae	9	9	Cactaceae	1	1
Moraceae	3	9	Capparaceae	1	1
Mimosaceae	6	8	Caricaceae	1	1
Rutaceae	7	7	Casurinaceae	1	1
Asparagaceae	6	7	Cannanaceae	1	1
Amaranthaceae	6	6	Clochiaceae	1	1
Arecaceae	6	6	Costaceae	1	1
Convolvulaceae	3	6	Crassulaceae	1	1
Solanaceae	3	6	Cycadaceae	1	1
Asclepidaceae	5	5	Elaeocarpaceae	1	1

Family	Genus	Species	Family	Genus	Species
Bignoniaceae	5	5	Flacourtiaceae	1	1
Cyperaceae	4	5	Icacinaceae	1	1
Myrtaceae	4	5	Leythidaceae	1	1
Lauraceae	3	5	Linaceae	1	1
Menispermaceae	4	4	Loganiaceae	1	1
Araceae	3	4	Lythraceae	1	1
Annonaceae	2	4	Magnoliaceae	1	1
Combretaceae	1	4	Meliaceae	1	1
Anacardiaceae	3	3	Molluginaceae	1	1
Clusiaceae	3	3	Musaceae	1	1
Nyctaginaceae	3	3	Myristicaceae	1	1
Sterculiaceae	3	3	Oleraceae	1	1
Commelinaceae	2	3	Orchidaceae	1	1
Vitaceae	2	3	Papaveraceae	1	1
Cleomaceae	1	3	Passifloraceae	1	1
Amaryllidaceae	2	2	Pedaliaceae	1	1
Boraginaceae	2	2	Periplocaceae	1	1
Loranthaceae	2	2	Plantaginaceae	1	1
Melastomataceae	2	2	Plumbaginaceae	1	1
Oleaceae	2	2	Rosaceae	1	1
Rhamnaceae	2	2	Santalaceae	1	1
Salvadoraceae	2	2	Sapindaceae	1	1
Sapotaceae	2	2	Scrophulariaceae	1	1
Celastraceae	1	2	Symplocaceae	1	1
			Violaceae	1	1

### Diversity of wild/naturalized plant species

Most plant species of the study area are of considerable ecological and economic importance, useful as bioresources to wild fauna and human beings. Of the total 346 wild/naturalized plant species, most are useful as medicinal plants, and others are valuable as edible fruits, timbers, fuelwood, etc.

Ecologically the non-woody species provide fleshy fruit resources to fauna, indicating the extent of the faunal dependence of plants for various ecological processes. Some of the wild and naturalized edible fruit trees in the park are *Artocarpus heterophyllus*, *A. hirsutus*, *Anacardium occidentale*, *Mangifera indica*, *Schleichera oleosa*, *Syzygium cuminii*, etc. The medicinally and commercially important species, *Santalum album* is widely distributed in the Biodiversity Park.

Leaves of several species are edible to folivores, several flowers yield nectar which is fed upon by a diverse group of nectarivores, especially sun birds and insects, particularly butterflies and moths. Various ecological services including pollination and dispersal are rendered by the faunal communities, utilizing plant rewards in the process. Of the total 346 wild and naturalized plants, about 85% species are dispersed by the autocorous mode and the remaining species are wind-dispersed with winged fruits/seeds or seeds with tuft of hairs atop.

Some of the most striking plant species of the Udayagiri Fort include the deciduous tree *Artocarpus hirsutus*, wild edible *Syzygium cuminii* and the representative element of tropical dry evergreen forest *Schleichera oleosa* among trees, the shrub *Dodonaea angustifolia* and the endemic herb *Sansevieria roxburghiana*. Lianas, the woody climbers, are dominated by *Cissus vitiginea*, *Coccinia grandis*, *Capparis zeylanica*, *Ichnocarpus frutescens*, *Rivea hypocrateriformis*, *Zizyphus oenoplia* and the semi-parasitic twiner, the laurel dodder *Cassytha filiformis*. In scrub savannas, dense growth of grasses such as *Aristida setacea*, *Apluda mutica* and *Heteropogon contortus*, with clumps of thorny bushes characterized by *Albizia lebbeck* as the central tree and surrounded by the endemic thorny, dwarf palm species *Phoenix pusilla*, and a diverse group of twiners and herbs enriching bush diversity, is a common feature in undisturbed areas of the Fort.

### Economically important plants

Most of the plants recorded from Udayagiri fort of Kanyakumari district are economically important. The medicinal plant ranked first with 191 species, 50 species having ornamental value, 13 species had timber value, edible 11 species and 58 species were regarded for green manure. Many multipurpose species were also reported from fort. Of these, 6 species are used as timber, medicine, and minor forest produce (Figure 7).

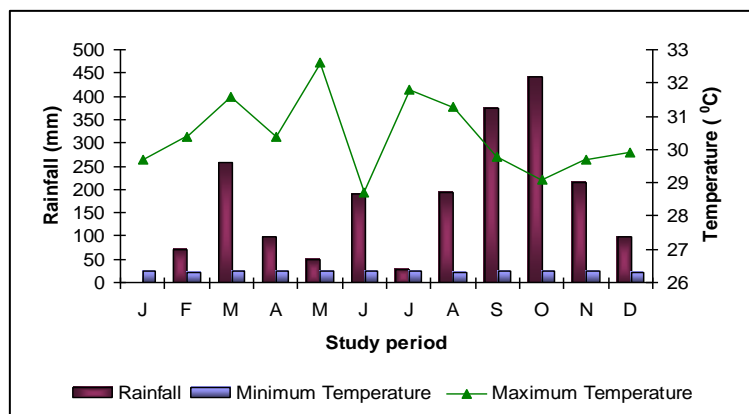


Figure 1: Figure showing the climate of the study area

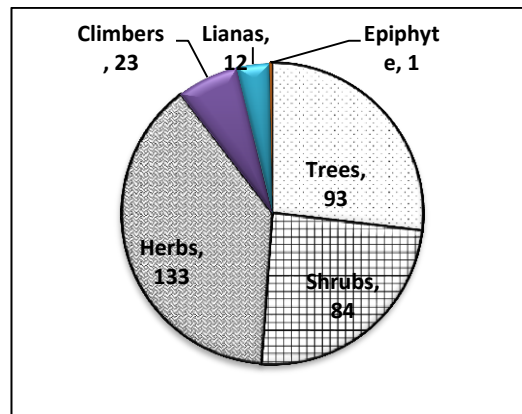


Figure 2: Habitwise distribution of plant species in the Udayagiri Fort

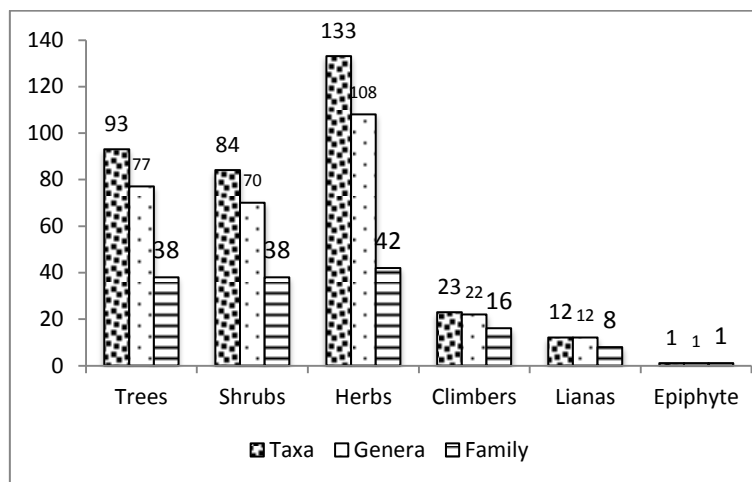


Figure 3. Life-form classification of plant species collected from the park.

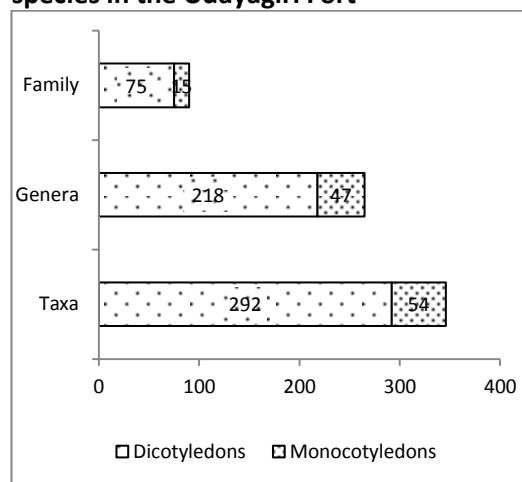


Figure 4. Taxonomic classification of the taxa collected from the study area.

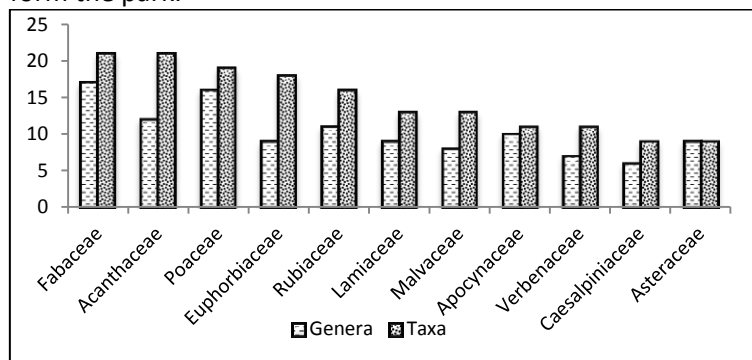


Figure 5. Distribution pattern of top ten families of the study area.

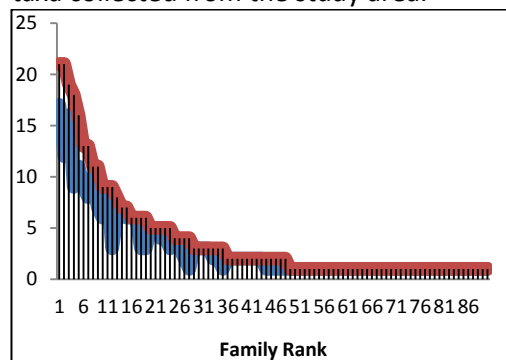


Figure 6. Familywise distribution of plant taxa of the study area.

The important medicinal plants growing in the Udayagiri Fort include *Abutilon indicum*, *Achyranthes aspera*, *Adhatoda zeylanica*, *Aegle marmelos*, *Albizia lebbek*, *Ammania baccifera*, *Andrographis paniculata*, *Azadirachta indica*, *Bauhinia purpurea*, *Boerhaavia diffusa*, *Calotropis procera*, *C. gigantea*, *Cassia fistula*, *C. occidentalis*, *C. tora*, *Centella asiatica*, *Clerodendrum viscosum*, *Coccinia grandis*, *Commelina benghalensis*, *Costus speciosus*, *Cynodon dactylon*, *Eclipta alba*, *Evolvulus*

*alsinoides*, *Ficus glomerata*, *F. religiosa*, *Hyptis suaveolens*, *Elephantopus scaber*, *Hemidesmus indicus*, *Leucas aspera*, *Melia azedarach*, *Moringa oleifera*, *Ocimum canum*, *Oldenlandia corymbosa*, *Oxalis corniculata*, *Phyllanthus niruri*, *Physalis minima*, *Pongamia pinnata*, *Scoparia dulcis*, *Sida veronicaefolia*, *Solanum nigrum*, *S. xanthocarpum*, *Streblus asper*, *Syzygium cuminii*, *Tephrosia purpurea*, *Terminalia arjuna*, *T. bellerica*, *Trianthema monogyna*, *Tribulus terrestris*,

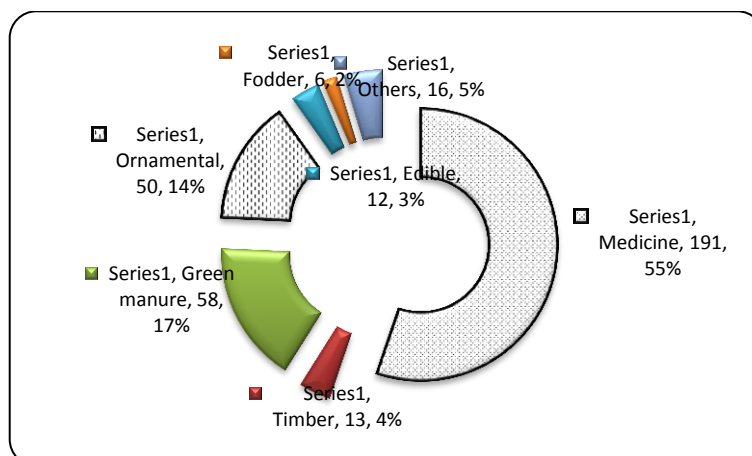


Figure 7. Distribution of economically important plant in the study area.

*Urena lobata* and *Wrightia tinctoria*. *Dalbergia sissoo*, *Albizia lebeck*, *Azadirachta indica*, *Tamarindus indica*, *Bombax ceiba* and *Syzygium cuminii* are the important timber-yielding tree species.

A higher proportion of the exotic flora of the Udayagiri Fort is represented by ornamental plants, which include *Allamanda cathartica*, *Agave neriiifolia*, *Aloe vera*, *Asparagus racemosus*, *Bauhinia purpurea*, *Bougainvillea spectabilis*, *Calendula officinalis*, *Callistemon lanceolatus*, *Canna indica*, *Catharanthus roseus*, *Coleus blumei*, *Delonix regia*, *Euphorbia pulcherrima*, *Gladiolus hybrid*, *Hibiscus rosa-sinensis*, *Jatropha gossypifolia*, *Kalanchoe pinnata*, *Lantana camara*, *Lawsonia inermis*, *Millingtonia hortensis*, *Mirabilis jalapa*, *Mussaenda luteola*, *Polyanthes tuberosa*, *Plumeria rubra*, *Quisqualis indica*, *Ravenala madagascariensis*, *Rhoeo discolor*, *Samanea saman*, *Tagetes erecta*, *T. patula*, *Tecoma stans* and *Thevetia peruviana*. These plant species had been planted for the ornamentation of park managers of the Udayagiri Fort.

Certain species of the exotics are edible fruit-producing plants of the study area. These are represented by *Annona squamosa*, *Artocarpus communis*, *Carica papaya*, *Manilkara zapota*, *Morus alba*, *Passiflora edulis*, *Psidium guajava*, *Punica granatum*, *Vitis vinifera* and *Ziziphus mauritiana*. A large number of exotics are represented by vegetable crops which are chiefly cultivated in kitchen gardens of residential compounds to meet the needs of fresh vegetables. These include *Abelmoschus esculentus*, *Capsicum annum*, *Colocasia antiquorum*, *Dolichos lablab*, *Lactuca sativa*, *Lycopersicon esculentum*, *Phaseolus vulgaris* and *Vigna sinensis*.

The exotics grown as avenue plants in the Udayagiri Fort are represented by *Acacia auriculiformis*, *Acacia mangium*, *Cassia siamea*, *Kigelia africana*, *Melia azedarach*, *Peltophorum pterocarpum*, *Swietenia mahagonii* and *Tamarindus indicus*. Several of the exotics are weeds. These include *Ageratum conyzoides*, *Alternanthera sessilis*, *Amaranthus spinosus*, *Anagallis arvensis*, *Cassia occidentalis*, *C. tora*, *Croton bonplandianum*, *Cynodon dactylon*, *Cyperus rotundus*, *Eclipta prostrata*, *Eragrostis tenella*, *Euphorbia hirta*, *Euphorbia thymifolia*, *Ipomoea fistulosa*, *Melilotus alba*, *Oxalis corniculata*, *Parthenium hysterophorus*, *Phalaris minor*, *Physalis minima*, *Portulaca oleracea*, *Sonchus oleraceus*, *Sphaeranthus indicus*, *Sporobolus diander*, *Taraxacum officinale*, *Tridax procumbens* and *Urena lobata*. These exotic flora are naturalized to Indian conditions and hence grow successfully without any human assistance.

Of the total plant species reported from the fort, *Parthenium hysterophorus* was observed to be harmful to native flora. This American flora has spread very fast in the last couple of decades in the campus, infesting all types of terrestrial habitats and posing a threat to the biodiversity of the campus. Exotics are referred to as biological pollutants due to their destructive effects on natural and man-managed ecosystems (Westbrooks, 1991). Serious ecological effects of the fast-spreading introduced flora have been reported (Di Castri *et al.*, 1990; D' Antonio and Vitousek, 1992; Hobbs and Huenneke, 1992; Punalekar *et al.*, 2010) and non-indigenous plant species are considered a major threat to biodiversity (Mooney, 1988; Lodge, 1993; Huston, 1994; McGeoch *et al.*, 2006).

The study reveals that the campus is rich in exotic flora, represented mostly by ornamental plants, edible fruit trees, food crops, vegetable crops, avenue plants and weeds. Flora of American origin dominates the exotic floristic composition of this campus. Herbaceous exotics dominate the woody exotics. Fabaceae, Asteraceae and Poaceae are the dominant families of the exotic floristic composition of the Biodiversity Park.

In conclusion, the present study shows that, priorities for the conservation of archeological sites and terrestrial biodiversity overlap and are complementary in their targets. Anthropogenic activities can influence native plant biodiversity and landscape heterogeneity. Conservation efforts focused on the local natural and cultural heritages will mutually benefit from the increased protection of archeological site.

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