

Floristic diversity and Phyto-sociological studies of Indrakiladri Sacred Grove in Krishna district, Andhra Pradesh, India.

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Abstract: *The floristic diversity and phyto-sociological studies of the Indrakiladri sacred grove, Krishna district, Andhra Pradesh, India were investigated. More than one hectare of forest stands on four sides of the sacred grove selected and 15 sample quadrates' 1m × 1m for herbs, 5m × 5m for shrubs and 10m × 10m for trees, were laid down randomly for vegetation analysis. Floristic analysis revealed that a total of 146 species belonging to 129 genera and 47 families were observed in the sacred grove. Total number of species encountered in four sides was 115, 72, 55, and 59 in east, west, north and south side respectively. Total density of all species ranged from 50.5 plant m² to 93.6 plant m² and total basal area of all species between 5.13 cm²m⁻² to 28.66 cm²m⁻². Important value index revealed that *Azadirachta indica* was predominant in east side and west side, *Leucaena leucocephala* was dominant species in south side and north side. The Simpson value index for dominance and Shannon-weiver index of herbs and shrubs showed highest species diversity in east side. These diversity indices reduced on more disturbed side than fewer disturbances. The questionnaire with local inhabitants on human impact of sacred grove biodiversity reveals that more urbanization, encroachment and modernization of the temple are main cause for loss of biodiversity. With the above findings it is concluded that conservation practices are immediately needed and recommended for the local community participation for successful conservation.*

Keywords: *Sacred grove, Biodiversity conservation, Diversity index, Floristic diversity*

I. Introduction

A culturally preserved forest is known as sacred grove. They are important ecological centers to study the potential vegetation. In India Gadgil & Vartak [1] open the way for scientific study of sacred groves. These are tract of virgin forest harbouring rich biodiversity protected by the local people on the basis of religious and cultural beliefs. Biodiversity is the very basis of human survival and economic development [2] and upon which communities, countries and future generations depended [3]. Plant biodiversity accounting for 0.40 millions of species [4] play the important part in the cycle of nature. National bio-resources development board (NBDB, 2010) [5], Government of India states the Eastern Ghats as one of the priority areas for systematic inventorying of plant diversity in the country. Eastern Ghats are discontinuous range of hills and comprises over 1400 sacred groves [6, 7]. Scientific exploring of the biodiversity is utmost necessity in preserving, restoring and proper management of the existing groves in consideration of the ecological values. In this context plant diversity inventories in the sacred groves are studied by Nipunage et al., Lakshminarayana and Venkaiah et al., Ramanujam et al., Mishra et al., Vinothkumar et al. [8, 9,10,11,12,] etc. Khasim and Basha, Naidu and Khasim [13, 14] have studied the floristic diversity and ethnobotanical aspects of the Eastern Ghats. The Eastern Ghats sacred groves are put to pressure from large scale road construction and extension activities, temple modernization, urbanization and tourism etc. Forest degradation is considered as one of the most serious environmental and economic problems for many countries in the tropical and subtropical regions of the globe [15, 16]. The current study concentrated on systematic attempt towards quantitative assessment of the plant resources, disturbances and proposes strategies for the effective conservation of plant resources.

The study area Indrakiladri (Kanakadurga) sacred grove is situated in Vijayawada city of Krishna district, Andhra Pradesh, India (Figure 1). The sacred grove is bounded by the river Krishna on South side (Plate 1). The vegetation is dry deciduous type (Plate 1) and height of the hill is ca 212 m on which Kanaka Durga temple is located. The climate of the area is divided in to 3 categories, on the basis of temperature and rainfall, rainy (Aug-Oct), winter (Nov-Feb) and summer (Mar-July). The area experiences a longer summer period compared to the other two seasons and peak temperature is 49° C noted during May-June months. The average humidity of the area is 78% and average annual rainfall is 103 cm. Goddess Kanaka Durga is the chief deity of the sacred grove. Annual celebrations are held in sacred grove for nine days during the festival of Dassera (in October month). Many people from various regions of the state and towns attend the festivals.

II. Materials and Methods

Floristic diversity and phyto-sociological study was conducted during January 2012 to 2014. Floristic compositions of trees, shrubs along with herbs were recorded. Plant specimens were collected, poisoned, pressed, dried and stitched on standard herbarium sheets of 28 × 42 cm according to Jain and Rao [17]. The specimens were identified with the help of standard Floras [18, 19, 20 and 21] and deposited in Acharya Nagarjuna University Botany Herbarium (ANUBH), Guntur. The soil physico-chemical characteristics of the study area were analyzed using the methods of Allen et al. [22]. In depth interviews were conducted randomly on selected inhabitants around sacred grove area from 2012 to 2014 about their knowledge towards sacred grove biodiversity with the help of written questionnaire. Phyto-sociological studies were carried out by using quadrat method. The quadrates were laid down four sides of the sacred grove in random manner. The size and number of quadrats needed were determined by using species area curve [23]. Fifteen sample quadrats of 1 m × 1 m size were placed for herbs, 5 m × 5 m size for shrubs and 10 m × 10 m size for trees laid down randomly at each side of the forest stand for vegetation analysis. Frequency, density and basal area were calculated following Misra [23]. Relative frequency, relative density, relative dominance and important value index (IVI) for individual species were calculated according to Cottom and Curtis [24]. The diversity indices were calculated using the software 'BIODIVERSITY PRO' [25].

III. Results

3.1 Soil physicochemical properties

The soil sample of Indrakiladri sacred grove was analyzed and parameters listed in table 1. The data indicates that the soils are dense type. A high concentration of organic carbon and phosphorous were observed in west side and very low content was observed in north side of the sacred grove.

3.2 Floristic diversity

The floristic diversity of Indrakiladri sacred grove is presented in Table 2. Taxonomically, a total of 146 species belonging to 129 genera and 47 families was identified in the sacred grove. Analysis of flora showed a comparatively higher representation of herbaceous species (58) followed by trees (48) and shrubs (40). A comparative analysis was made for various taxa encountered in four sides (East, West, North and South) showed that a maximum of 115 plant species were recorded in east side followed by 72 species in west side, 55 species in north side and 59 species in South side.

When all the four sides pooled together, the dominant families were Fabaceae representing 17 species, followed by Acanthaceae (8), Amaranthaceae (5), Apocyanaceae (6), Caesalpiniaceae, Convolvulaceae (6), Euphorbiaceae (8), Lamiaceae (5), Malvaceae (8), Mimosaceae (9), Verbenaceae (5). The families which are having lowest number of species are Anacardiaceae, Annonaceae, Caricaceae, Combretaceae, Cordiaceae, Elaeocarpaceae, Lythraceae, Molluginaceae, Moringaceae, Passifloraceae, Periplocaceae, Plumbaginaceae, Polygonaceae, Rhamanaceae, Rubiaceae, Sapotaceae, Sterculiaceae and Turneraceae, etc.

Basic life forms and their percentage to the total life forms of the study are shown in table 3. In East side 54 (46.95%) herb species were observed followed by West side 26 (36.11%), North side 26 (41.27%), South side 25 (42.37%). Among the four sides, shrubs species 23 (20%) in East side, 17 (23.61%) in East side 13 (23.63%) in North side and South side 15 (25.42%) were recorded. A higher representation of tree species were recorded in East side 38 (33.04%) followed by West side 29 (40.27%), North side 16 (29.09%) and South side 19 (32.2%) (Table 3).

3.3 Phyto-sociological Studies

3.3.1 Density and Basal area

A total density of East side was 93.6 plant m², out of which *Sida rhomboidea* shared 6.1% followed by *Azadirachta indica* and *Prosopis julifera* (3.6%). Total basal area occupied by all the species in East side was 28.66 cm² m², out of which *Ficus religiosa* contributed 43.84% and *Tamarindus indica* (8.8%) (Table 4). The density of all species in the West side was 83.2 plant m². Highest density was shown by *Aerva lanata* (9.3%), followed by *Hyptis suaveolens* (7.6%) and *Achyranthes aspera* (5.2%). These three species together accounted for nearly (23%) of the total under storey density (Table 5). Total basal area covered by all the species was 10.67 cm² m², of which *Ficus religiosa* contributed 8.9% followed by *Pongamia pinnata* (7.97%). These two species together shared nearly 17% of the West side basal area (Table 4). The other 62 species shared 83% of the basal area.

Total density in North side was 59.3 plant m², of which *Pavonia zeylanica* exhibited highest density (7.5%). Total basal area of North side was 5.87 cm² m² (Table 6), of which *Thespesia populina* and *Delonix regia* occupied 20%. In South side total density was 50.5 plant m². The three highest contributor species together shared 17.5% of South side density (Table 7). Total basal area occupied by the South side was 5.13 cm² m², of which 24% was shared by *Enterolobium saman* and *Mangifera indica*.

3.3.2 Imporatant value index (IVI)

Based on the contributed IVI value of species dominant species on each side was recorded. In East side *Ficus religiosa* (17.24%) and *Azadirachta indica* (12%) are the dominant tree species; among shrubs *Sida rhomboidea* (10.2%) and *Grewia asiatica* (9.5%) and *Antigonon leptopus* (6.18%), *Tephrosia villosa* (5.31%) are dominant in herbs. In West side *Azadirachta indica* (13%) had highest IVI and the dominant shrub species were *Hyptis suaveolens* (17.6%), *Gmelina asiatica* (10.2%). *Capparis horrida* (10.1%) and *Oscimum sanctum* (9.8%) were exhibited highest IVI among herb species.

In North side and South side *Leucaena leucocephala* had the highest IVI 29.9% in trees. Among shrubs and herbs of North side *Agava Americana* (16.2%), *Pavonia zeylanica* (13.65%), *Datura stramonium* (12%) and *Parthenium hysterophorus* (9.5%) are the dominant species. In South side *Cassia auriculata* (13.3%), *Lantana camera* (12%) is the dominant shrub species. Among the herbs *Pupalia lappaceae* had the highest IVI 14.5%.

3.3.3 Diversity indices

The Shannon–Wiever index (H') value in the present study area was ranged from 2.226 to 3.65. The diversity in Indian forests was ranged between 0.83 to 4.1 [26, 27 and 28]. The diversity index of the present study was lies within the range reported for Indian forest. The Shannon – Wiever index (H') value was higher in herbs compared to shrubs and trees (Table 8). Among the four sides studied H' was highest at East side for herbs and shrubs, where as trees higher in West side. The Concentration dominance (Simpson index) for herbs and shrubs was higher in East side than in other three sides. More Simpson index for trees was recorded in West side. The concentration of dominance of the study area was ranged from 0.83 to 0.97.

The opinion of local inhabitants on the present disturbed status of the sacred grove was compiled and tabulated (Table 9). Among the respondents 72% believe that disturbance was due to encroachment, 58% were mentioned that due to urbanization and modernization of the temple. Among all the respondents most of the elder people believe that change of people attitude on socio-cultural practices and erosion of religious beliefs and traditional value are main reason for loss sacred grove biodiversity. Only 22.8% of the public are having awareness about sacred grove biodiversity in present study area.

IV. Discussion

Soil analysis indicates minimum level of organic carbon content noticed in the all four sides. A high concentration of organic carbon observed in good vegetation side. A thick vegetation having potential of high carbon sequestration and there by contributing to reduced concentration of CO_2 in the atmosphere [29]. The number of families, genera and species in East side is higher than the other three sides. Large scale of deforestation for construction of houses has been recorded in many areas. The number of trees and shrubs was lesser in North side and South side, it indicates that the intense human activity that has been going on in this area. It is well documented that the richness, composition and diversity are affected by disturbance [30]. Intensive encroachment of households and temple areas reflect the distribution and composition of species [31]. Increased human disturbance in a land tends to eliminate native species and promote alien ones that become naturalized [32]. At the same time the species like *Azadirachta indica* and *Oscimum sanctum* represent ecologically important keystone species enhances biodiversity, which determine nutrient cycling patterns and soil fertility [33]. In the present investigation, human interference has significant impact on floristic composition of the region. For example, some of the plants such as *Helicteres isora*, *Sarcostemma secamone* are found only in East side. Similarly *Agave americana* found in Northside only, *Declapias hamiltoni* found in Westside. Annual fires in the sacred grove effect natural regeneration of trees, which causes extreme damage to the seeds regenerating young seedlings, herbs and thus accelerating soil erosion. It suggests that utmost care has been taken by the locals to regenerate these species. The studied floral data represented that sacred grove is the reservoir for diversity of plant species. Similar studies have been conducted in floristic composition of sacred groves in different parts of India viz., Karnataka [34], Kerala [35], Pondicherry [36, 37] and Meghalaya [38, 39]. A comparative analysis of dominant families of the study area is compared with Krishna district Flora. The family Fabaceae is the dominating in both District flora and study area. Indrakiladri sacred grove is a treasure house for potential medicinal plant species. Interestingly, maximum plant species were found in the area with medicinal properties. These are depleting rapidly because of unsustainable harvesting and lack of awareness [40, 41]. Major medicinal plant species, such as *Abrus precatorius*, *Aerva lanata*, *Andrographis echinoides*, *Azadirachta indica*, *Eclipta alba*, *Plumbago zeylanica*, *Sida rhomboidea*, *Wrightia tinctoria*, *Lepidagathis cristata*, *Phyllanthus amarus*, *Elytraria acaulis* and *Muntingia calabura* etc., (Plate 2) were used as medicines by the elder people of the study area.

The total density of all species (Plant m^{-2}) was highest in the East side (93.6) followed by the West side (83.2), North side (59.2) and South side (50.5). More density of species in the least disturbance side, i.e. the

East side, accelerated erosion along hill slopes can be attributed to the invasion of alien species and forest fires [42]. This suggests that establishment of vegetation in the disturbed side is needed.

The total Basal area of all species ($\text{cm}^2 \text{m}^{-2}$) highest for the East side (28.66), followed by the West side (10.67), North side (5.87) and South side (5.13). Maximum basal area in the East side may be attributed to higher plant diversity. It suggests that East side is less disturbed side than other three sides. The important value index (IVI) combines relative frequency, relative density and relative dominance and this measure can be used to indicate the ecological influence of each species in the forest [43]. Analysis of IVI indicated that the four sides studied represented different combination of species with different dominant and co-dominants. *Azadiracta indica* is dominant species in both East and West side, which is a culturally protected tree. Similarly *Leucaena leucocephala* was dominant in both North and South side, it contribute to improvement of soil fertility [44]. According to Parthasarthy et al. [26], Visalakshi [28] the value of concentration of dominance for tropical forests of India varies from 0.21 to 0.92. Similar type of results was observed in the present study. High diversity and low Simpson index of dominance in different sides due to variation in anthropogenic pressure. Less species diversity (Shannon – Wiever index (H')) in South side which was less protected, may be due to decreased resource availability [45]. The poor species diversity is due to indiscriminate logging in these areas and poor site conditions. East side and West side had higher H' compared to North side and South side. Moreover, higher concentration of dominance was present in a few individuals only. This may be due to sharing of large portion of resources by a few species. The findings of local interviews on sacred grove biodiversity indicated that very few people having awareness on biodiversity. Similar types of observations were reported by Kellert [46] among Japanese people. A society which is having environmental awareness called as ideal society [47]. This survey suggests that general awareness and perception about sacred grove biodiversity is useful for successful implementation of conservation strategy to improve biodiversity in the study area by involving local inhabitants.

V. Conclusion and Recommendations

The present study suggests that major threats faced by the Indrakiladri sacred grove is due to developmental activities, encroachment, urbanization and changing socio-economic values. Reconstruction or Modernization of temple halls at the expense of the vegetation of the grove has also led to their degradation to some extent. It was observed that the exotic species like *Lantana camara*, *Prosopis julifera*, *Hyptis suaveolens* have been noticed in the sacred grove. Invasion of these weeds become a serious problem in the ecological functioning of the sacred grove and leads to depletion of biodiversity. Hence eradication of these species is utmost necessary for sacred grove vulnerability. Sacred grove forests viewed as traditional method of in-situ conservation practice. Change in the human attitude towards the biodiversity is critical for the success of conservation efforts. The following conservation /management strategies are suggested for effective conservation of sacred grove. 1) Recognize sacred grove as prioritized biodiversity conservation areas in urban area and include these forest patches as reserve forest zone in urban area; 2) The State Government should promote sacred grove conservation area management committee (SGCAMC) to protect the forest patch from denudation; 3) Provide necessary financial, legal managements and support to sacred grove managers to afford total protection from encroachment, illegal biomass harvest, unscientific developmental programmes which are detrimental their biodiversity and effective management; 4) Provide incentives in the form of awards or financial rewards to encourage local communities/management involved in effective conservation of sacred groves; 5) Survey all sacred groves as mark their boundaries in the cadastral map to avoid further encroachment; 6) Organize training programmes for sacred grove managers for the effective management of sacred groves; 7) A thorough floristic survey of all sacred groves of Andhra Pradesh should be done immediately to prevent further loss of Rare, endemic and endangered species; 8) Forest department pay attention on urban area forest patches for eco-restoration of diversity with the collaboration of local people; 9) Provide necessary technical Know-how and plating materials of suitable species and other support for the rehabilitation of degraded sacred grove; 10) By giving geo-tag to every tree in sacred grove forest, it is easy to eradicate illegal cutting of trees and corruption of plantation projects; 11) The University- Environment- Forest- Science collaboration programme promotes university participation in environment protection and forest conservation.

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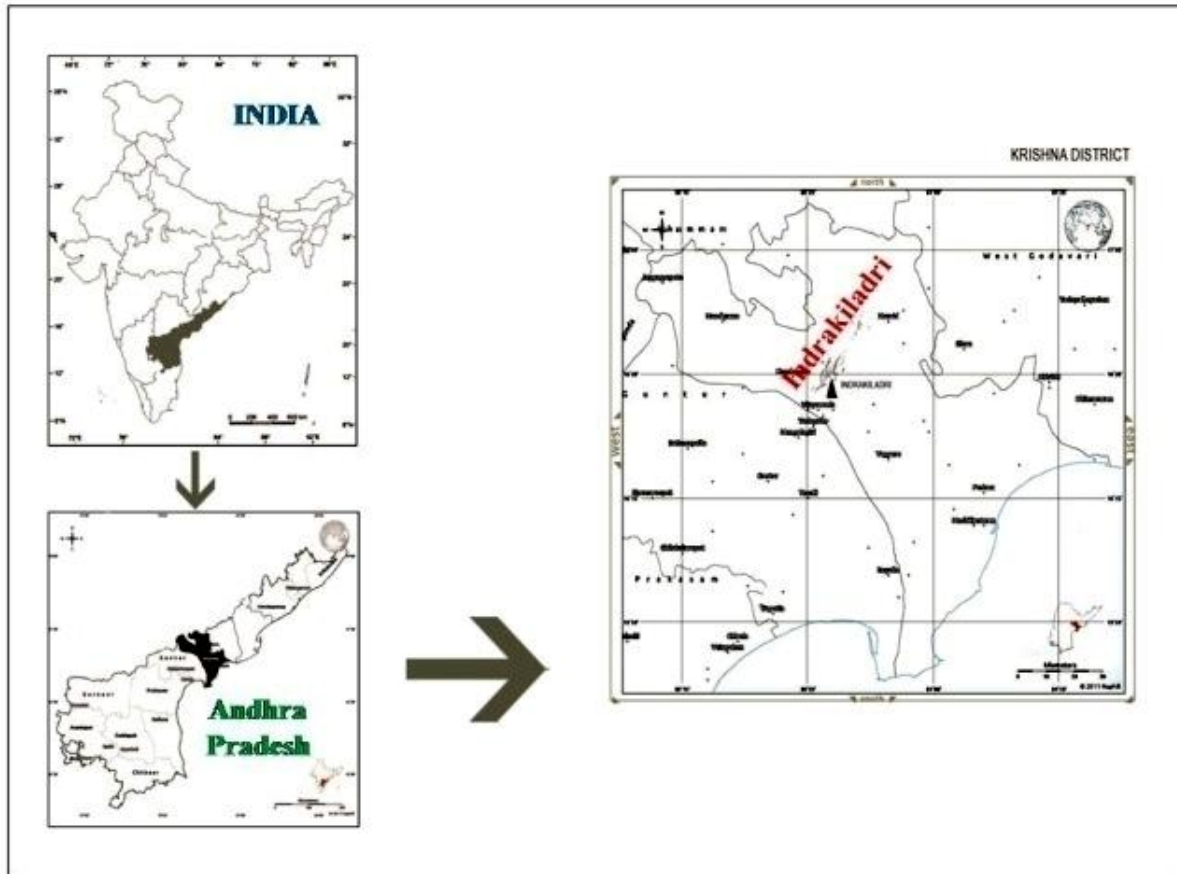


Fig. 1 Location of Indrakiladri sacred grove

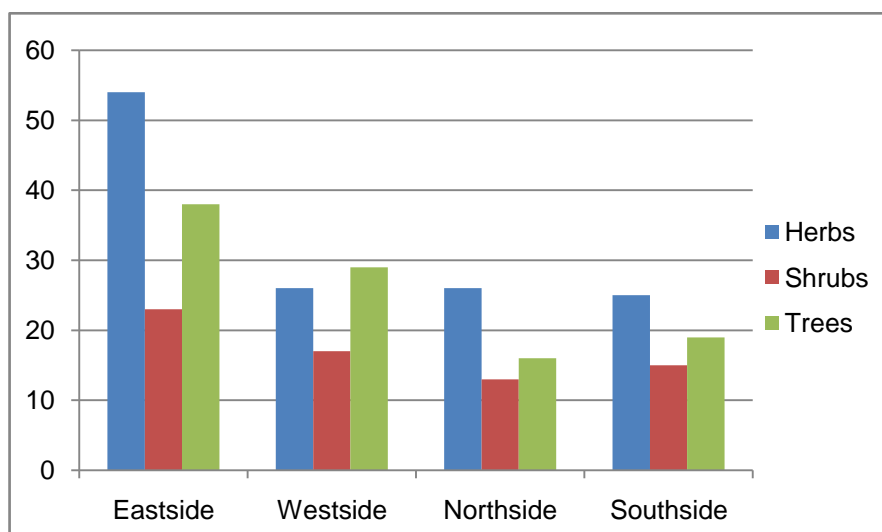


Fig. 2 Comparative analysis of basic life forms of four sides of sacred grove

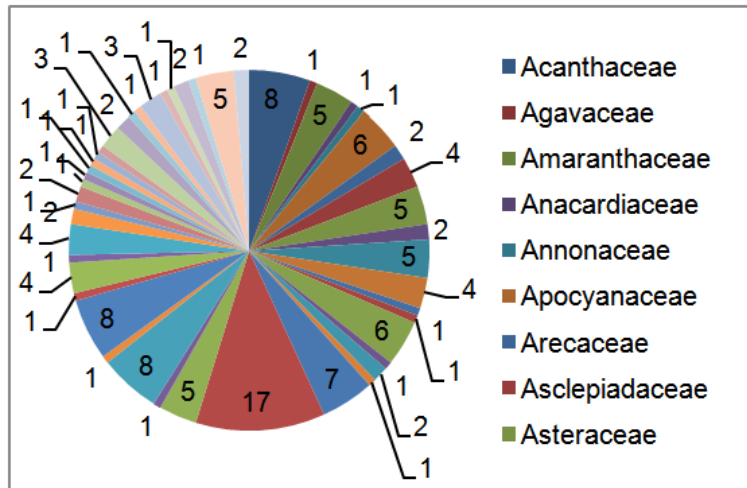


Fig. 3 Family wise analysis of the species in study area

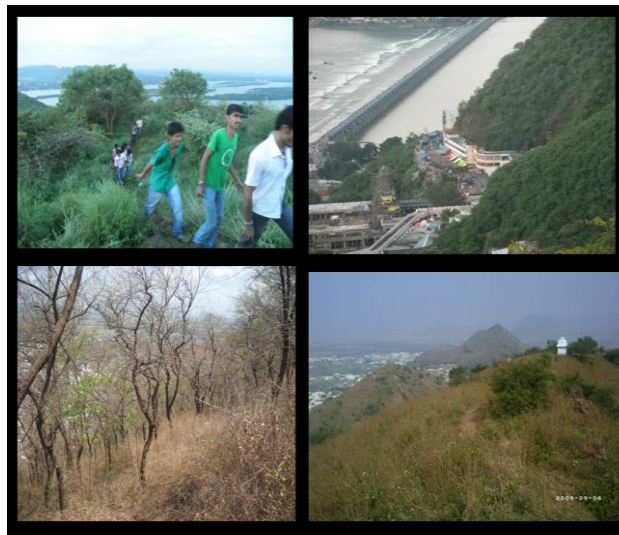


Plate 1. Indrakiladri Sacred Grove



Plate 2. Some of the plants of study area

Table 1. Soil Physicochemical properties

Soil parameter	East side	West side	North side	South side
Soil type	Dense soil	Dense soil	Dense soil	Dense soil
pH	8.6	8.0	7.5	7.5
Electrical conductivity	0.29	0.16	0.08	0.14
Organic carbon	Medium	High	Low	Medium
Potassium (kg/h)	≥ 260	231	122	≥ 260
Phosphorus (kg/h)	33	36	Low	17
Zinc (ppm)	1.222	1.442	1.714	2.724
Iron (ppm)	4.428	6.968	9.190	7.444
Manganese(ppm)	17.98	19.24	37.08	33.84
Sulphur (ppm)	20	50	13	5 (Low)
Copper (ppm)	2.478	1.974	2.676	2.710

Table 2. Floristic composition of the study sites

S. No	Botanical name of the Plant	Family	Basic life form*	Eastside	Westside	Northside	Southside
1	<i>Abrus precatorius</i> L. ANUBH01101	Fabaceae	S		+		
2	<i>Abutilon indicum</i> (L.)Sweet. ANUBH01052	Malvaceae	S	+	+		
3	<i>Acacia eburnea</i> (L.f.)Willd. ANUBH01078	Mimosaceae	T	+	+		+
4	<i>Acacia nilotica</i> (L.)Willd. Ex. Del. ANUBH01122	Mimosaceae	T	+		+	
5	<i>Acalypha indica</i> L. ANUBH01111	Euphorbiaceae	H	+		+	
6	<i>Achyranthes aspera</i> L. ANUBH01110	Amaranthaceae	H	+	+	+	-
7	<i>Aegle marmelos</i> (L.)Corr.Serr. ANUBH01153	Rutaceae	T	+			
19	<i>Aerva lanata</i> , (L.)Juss. ANUBH01112	Amaranthaceae	H	+	+	+	+
8	<i>Agave americana</i> L. ANUBH01188	Agavaceae	S			+	
9	<i>Albizia lebeck</i> (L.)Benth. ANUBH01054	Mimosaceae	T	+	+		+
11	<i>Alternanthera sessilis</i> (L.)R.Br.ex Dc. ANUBH01081	Amaranthaceae	H				+
10	<i>Alysicarpus monilifer</i> (L.)Dc. ANUBH01189	Fabaceae	H	+			
12	<i>Amaranthus spinosus</i> L. ANUBH01063	Amaranthaceae	H	+	+	+	
13	<i>Andrographis echinoides</i> , (L.)Nees. ANUBH01064	Acanthaceae	H	+	+	-	-
14	<i>Anisomeles cornosis</i> ,R.Br. ANUBH01053	Lamiaceae	H	+	+		
15	<i>Annona squamosa</i> L. ANUBH01127	Annonaceae	T	+	+		+
16	<i>Antigonon leptopus</i> , Hook& Arn. ANUBH01065	Polygonaceae	H	+	-	-	-
17	<i>Artocarpus heterophyllus</i> Lam. ANUBH01066	Moraceae	T	+			
18	<i>Atylosia scarabaeoides</i> (L.)Benth. ANUBH01067	Fabaceae	H	+	+		
20	<i>Azadirachta indica</i> A Juss. ANUBH01113	Meliaceae	T	+	+	+	+
21	<i>Barleria cristata</i> Linn. ANUBH01055	Acanthaceae	S		+	+	
22	<i>Barleria prionitis</i> L. ANUBH01056	Acanthaceae	S			+	+
23	<i>Boerhaavia diffusa</i> L. ANUBH01115	Nyctaginaceae	H	+	+	+	+
24	<i>Bougainvillea spectabilis</i> ,Willd. ANUBH01078	Nyctaginaceae	S			+	
25	<i>Cadaba indica</i> Lam. ANUBH01057	Capparidaceae	S		+		
26	<i>Caesalpinia pulcherrima</i> (L.)Sw. ANUBH01068	Caesalpinaceae	S	+			
27	<i>Callistemon lanceolatus</i> (Smith) Sweet. ANUBH01049	Myrtaceae	T		+		
28	<i>Calotropis gigantea</i> (L.)R.Br. ANUBH01131	Asclepiadaceae	S	+			+
29	<i>Capparis horrida</i> Linn. ANUBH01048	Capparidaceae	S		+		
30	<i>Caralluma umbellata</i> Haw. ANUBH01047	Asclepiadaceae	H	+	+		
31	<i>Cardiospermum halicacabum</i> L. ANUBH01022	Sapindaceae	H	+		+	+
32	<i>Carica papaya</i> L. ANUBH077	Caricaceae	T	+			
33	<i>Carissa carandas</i> L. ANUBH01069	Apocyanaceae	T		+		
34	<i>Cascabela thevetia</i> (L.)Lipp. ANUBH01044	Apocyanaceae	T				+
35	<i>Cassia auriculata</i> L. ANUBH0132	Caesalpinaceae	S	+	+	+	
36	<i>Cassia occidentalis</i> L. ANUBH01133	Caesalpinaceae	S			+	+
37	<i>Cassia siamea</i> L. ANUBH01020	Caesalpinaceae	T			+	
38	<i>Catharanthus roseus</i> (L.)G. Don. ANUBH01021	Apocyanaceae	S	+			+
39	<i>Cestrum nocturnum</i> L. ANUBH01043	Solanaceae	S	+			
40	<i>Chloris barbata</i> , (L.)Sw. ANUBH01058	Poaceae	H	+	+	+	+
41	<i>Citrus aurantium</i> L. ANUBH01079	Rutaceae	T	+			
42	<i>Cleome gynandra</i> L. ANUBH01060	Capparidaceae	H	+	+		
43	<i>Cleome viscosa</i> L. ANUBH01061	Capparidaceae	H	+	+	+	+
44	<i>Clitoria ternatea</i> L. ANUBH01059	Fabaceae	H	+			

45	<i>Coccinia grandis</i> (L.)Voigt. ANUBH01062	Cucurbitaceae	H	+		+	+
46	<i>Cocos nucifera</i> L. ANUBH01080	Arecaceae	T	+	+		
47	<i>Corchorus tridentata</i> L. ANUBH01042	Tiliaceae	H	+			
48	<i>Cordia dichotoma</i> Forst.f. ANUBH01076	Cordiaceae	T		+		
49	<i>Crotalaria hebecarpa</i> (Dc.) Rudd. ANUBH01024	Fabaceae	H	+			
50	<i>Daemea extensa</i> (Jacq.)R.Br. ANUBH01108	Asclepiadaceae	H	+			+
51	<i>Dalbergia sisso</i> Roxb. ANUBH01023	Fabaceae	T	+			
52	<i>Datura stramonium</i> L. ANUBH01118	Solanaceae	H	+		+	+
53	<i>Decalepis hamiltonii</i> Wt.&Arn. ANUBH01025	Periplocaceae	S				+
54	<i>Delonix regia</i> Rafin. ANUBH01026	Caesalpiniaceae	T			+	+
91	<i>Dichrostachys cinerea</i> (L.) Wight & Arn. ANUBH01051	Mimosaceae	S	+			
55	<i>Eclipta alba</i> (L.)Hassk. ANUBH01119	Asteraceae	H		+		
56	<i>Elytraria acaulis</i> (L.f.)Lindau. ANUBH01027	Acanthaceae	H	+			+
57	<i>Enterolobium saman</i> (Jacq.) prain. ANUBH01028	Mimosaceae	T	+	+		+
58	<i>Eucalyptus globules</i> Labill. ANUBH01029	Myrtaceae	T	+			+
59	<i>Euphorbia hirta</i> (L.) ANUBH01120	Euphorbiaceae	H	+	+	+	+
60	<i>Evolvulus alsinoides</i> (L.) ANUBH01030	Convolvulaceae	H	+		+	
61	<i>Ficus benghalensis</i> L. ANUBH01045	Moraceae	T	+	+		+
62	<i>Ficus hispida</i> L.f. ANUBH01046	Moraceae	T	+	+		+
63	<i>Ficus religiosa</i> L. ANUBH01134	Moraceae	T	+	+		+
64	<i>Gliricidia sepium</i> (Jacq.)Kunth ex Walp. ANUBH00986	Fabaceae	T	+		+	
65	<i>Gmelina asiatica</i> L. ANUBH01015	Verbenaceae	S		+		
66	<i>Gossypium herbaceum</i> L. ANUBH01016	Malvaceae	S	+	+		+
67	<i>Grewia asiatica</i> Mast. ANUBH01017	Tiliaceae	S	+	+		
68	<i>Helicteres isora</i> L. ANUBH01005	Sterculiaceae	T	+	+		
69	<i>Hibiscus cannabinus</i> L. ANUBH01018	Malvaceae	S				+
70	<i>Hibiscus micranthes</i> L. ANUBH01019	Malvaceae	S	+		+	+
71	<i>Hybanthus enneaspermus</i> (L.) F. Muell. ANUBH01102	Violaceae	H	+			
72	<i>Hyptis suaveolens</i> (L.)Poir. ANUBH01003	Lamiaceae	S		+	+	+
73	<i>Indigofera cordifolia</i> Heyne ex Roth. ANUBH01006	Fabaceae	H	+			
74	<i>Indigofera linnaei</i> Ali. ANUBH01007	Fabaceae	H	+	+		
75	<i>Indigofera trita</i> L.f. ANUBH01008	Fabaceae	S	+			
76	<i>Inoidium suffruticosum</i> Ging. ANUBH01090	Violaceae	S	+			
77	<i>Ipomoea cordata</i> L. ANUBH01039	Convolvulaceae	H	+			+
78	<i>Ipomoea hederifolia</i> L. ANUBH01040	Convolvulaceae	H	+			
79	<i>Ipomoea pes-tigridis</i> L. ANUBH01038	Convolvulaceae	H	+			+
80	<i>Jacquemontia violaceae</i> (Jacq.)G.Don. ANUBH01001	Convolvulaceae	H				+
81	<i>Jatropha curcas</i> L. ANUBH01002	Euphorbiaceae	S	+			+
82	<i>Justicia vahli</i> L. ANUBH01004	Acanthaceae	H	+	+	+	
83	<i>Lantana camara</i> L. ANUBH01009	Verbenaceae	S			+	+
84	<i>Lawsonia inermis</i> L. ANUBH01103	Lythraceae	T	+	+		
85	<i>Lepidagathis cristata</i> Willd. ANUBH01091	Acanthaceae	H	+			+
86	<i>Leucaena leucocephala</i> (Lam.) de Wit. ANUBH01092	Fabaceae	T	+	+	+	+
87	<i>Leucas aspera</i> (Willd.)Spreng. ANUBH01050	Lamiaceae	H	+		+	
88	<i>Mangifera indica</i> L. ANUBH01093	Anacardiaceae	T	+	+	+	+
89	<i>Memordica charantia</i> L. ANUBH01075	Cucurbitaceae	H	+		+	
90	<i>Merremia aegyptica</i> (L.) ANUBH00986	Convolvulaceae	H	+			
92	<i>Millingtonia hortensis</i> L.f. ANUBH01097	Bignoneaceae	T	+			
93	<i>Mimosa pudica</i> L. ANUBH01104	Mimosaceae	S	+			
94	<i>Mimusops elengi</i> L. ANUBH01094	Sapotaceae	T	+			+
95	<i>Mollugo nudicaulis</i> Lamk. ANUBH01036	Molluginaceae	H	+			
96	<i>Moringa oleifera</i> Lamk. ANUBH01037	Moringaceae	T	+	+	+	
97	<i>Muntingia calabura</i> L. ANUBH01012	Elaeocarpaceae	T	+	+		
98	<i>Murraya koenigii</i> (L.)Spreng. ANUBH01013	Rutaceae	T	+	+		
99	<i>Ocimum americanum</i> L. ANUBH01014	Lamiaceae	H	+			+
100	<i>Ocimum sanctum</i> L. ANUBH01107	Lamiaceae	H	+	+	+	+
101	<i>Oldenlandia umbellate</i> L. ANUBH01071	Rubiaceae	H	+		+	
102	<i>Parthenium hysterophorus</i> L. ANUBH01070	Asteraceae	H	+	+	+	
103	<i>Passiflora foetida</i> L. ANUBH01098	Passifloraceae	H	+	+	+	+
104	<i>Pavonia zeylanica</i> (L.)Cav. ANUBH01099	Malvaceae	S	+		+	
105	<i>Pedilanthus tithymaloides</i> (L.)Poit. ANUBH000952	Euphorbiaceae	S		+		
106	<i>Peltophorum pterocarpum</i> (Dc) K.Heyne.	Fabaceae	T	+	+		+

	ANUBH000953							
107	<i>Phoenix dactylifera</i> L. ANUBH000986	Arecaceae	T		+			
108	<i>Phyllanthus emblica</i> L. ANUBH000957	Euphorbiaceae	T	+				+
109	<i>Phyllanthus maderaspatensis</i> L. ANUBH000958	Euphorbiaceae	H	+	+	+		+
110	<i>Pithecellobium dulce</i> (Roxb.)Benth. ANUBH000959	Mimosaceae	T		+	+		
111	<i>Plumbago zeylanica</i> L. ANUBH01143	Plumbaginaceae	S		+			
112	<i>Plumeria rubra</i> L. ANUBH000960	Apocyanaceae	T	+				
113	<i>Pongamia pinnata</i> (L.)Pierre. ANUBH01142	Fabaceae	T	+	+	+		+
114	<i>Prosopis julifera</i> (Sw.)Dc. ANUBH00954	Mimosaceae	T	+	+	+		+
115	<i>Psidium guajava</i> L. ANUBH00961	Myrtaceae	T	+	+			
116	<i>Pupalia leppacea</i> (L.)Juss. ANUBH01012	Amaranthaceae	H	+	+	+		+
117	<i>Rhynchosia suaveolens</i> (L.f.)Dc. ANUBH01035	Fabaceae	S	+				
118	<i>Ricinus communis</i> L. ANUBH01141	Euphorbiaceae	S	+		+		+
119	<i>Ruellia tuberosa</i> L. ANUBH00962	Acanthaceae	H	+				
120	<i>Rungia repens</i> (L.)Nees in Wall. ANUBH00963	Acanthaceae	H	+	+	+		+
121	<i>Sapindus trifoliatus</i> Hiern. ANUBH01072	Sapindaceae	T	+		+		
122	<i>Sarcostemma secamone</i> (L.) ANUBH00964	Asclepiadaceae	S	+				
123	<i>Sesamum indicum</i> L. ANUBH01011	Pediliaceae	H	+				
124	<i>Sesamum laciniatum</i> L. ANUBH00965	Pediliaceae	H	+				
125	<i>Sida cordata</i> (Brum.f.)Borss. ANUBH00966	Malvaceae	S		+			
126	<i>Sida rhomboidea</i> Roxb.ex Fleming. ANUBH00967	Malvaceae	S	+	+	+		+
127	<i>Solanum surattense</i> Burm.f. ANUBH00968	Solanaceae	S	+				
128	<i>Spilanthes acemella</i> auct.non (L.) Murr. ANUBH00969	Asteraceae	H	+	+			
129	<i>Stachytarpheta jamaicensis</i> (L.) Vahl. ANUBH00970	Verbenaceae	H	+				
130	<i>Striga asiatica</i> (L.) Kuntze. ANUBH00981	Scrophulariaceae	H	+				
131	<i>Syzygium jambolanum</i> (Lamk.)Dc. ANUBH00982	Myrtaceae	T	+				
132	<i>Tabernemontana divaricata</i> (L.) R.Br. ANUBH00983	Apocyanaceae	S	+	+			
133	<i>Tamarindus indica</i> L. ANUBH00984	Mimosaceae	T	+				
134	<i>Tecoma stans</i> (L.) Juss.ex.HBK. ANUBH01074	Bignoniaceae	S	+	+	+		+
135	<i>Tectona grandis</i> L.f. ANUBH00985	Verbenaceae	T	+		+		+
136	<i>Tephrosia purpurea</i> (L.) Pers. ANUBH01095	Fabaceae	H	+	+	+		+
137	<i>Tephrosia villosa</i> (L.)Pers. ANUBH01096	Fabaceae	H	+	+	+		+
138	<i>Terminalia catappa</i> L. ANUBH00986	Combretaceae	T	+		+		
139	<i>Thespesia populnea</i> (L.)Soland.ex correa. ANUBH00971	Malvaceae	T	+		+		+
140	<i>Tridax procumbens</i> L. ANUBH00972	Asteraceae	H	+	+	+		+
141	<i>Turnea ulmifolia</i> L. ANUBH01073	Turneraceae	S		+	+		
142	<i>Vernonia cinerea</i> (L.)Less. ANUBH01031	Asteraceae	H	+	+	+		+
143	<i>Vigna aconitifolia</i> (Jacq.)Marech. ANUBH01032	Fabaceae	H	+	+			
144	<i>Vitex negundo</i> Linn. ANUBH01033	Verbenaceae	S	+				
145	<i>Wrightia tinctoria</i> R.Br. ANUBH01034	Apocyanaceae	T		+			
146	<i>Zizyphus jujuba</i> Lamk. ANUBH01010	Rhamnaceae	T	+	+	+		

*H = Herb, S= Shrub, T= Tree

Table 3. Analysis of basic life forms on four sides of sacred grove

Life form	East side	Percentage	West side	Percentage	North side	Percentage	South side	Percentage
Herbs	54	46.95	26	36.11	26	41.27	25	42.37
Shrubs	23	20	17	23.61	13	23.63	15	25.42
Trees	38	33.04	29	40.27	16	29.09	19	32.2
Total	115		72		55		59	

Table 4. Biodiversity Indices of Eastside of the sacred grove

SPECIES NAME	D	RD	F	RF	Dominance	RDM	SIV/IVI
TREES							
<i>Acacia auriculata</i>	1.1	5.5	0.2	3.448276	0.180979	0.648787	9.5970633
<i>Acacia eburnea</i>	1.1	5.5	0.3	5.172414	0.196375	0.703979	11.376393
<i>Albizia lebbek</i>	0.3	1.5	0.2	3.448276	0.384895	1.3798	6.3280756
<i>Anona squamosa</i>	2.8	14	0.6	10.34483	0.152073	0.545162	24.889989
<i>Azadiracta indica</i>	3.4	17	1	17.24138	0.50272	1.802187	36.043567
<i>Careca papaya</i>	0.8	4	0.1	1.724138	0.7855	2.815918	8.5400558
<i>Cocos nucifera</i>	0.1	0.5	0.1	1.724138	0.636255	2.280893	4.5050314
<i>Dalbergia sisoo</i>	0.1	0.5	0.1	1.724138	0.636255	2.280893	4.5050314
<i>Enterlobium saman</i>	0.2	1	0.2	3.448276	0.196375	0.703979	5.1522553
<i>Eucalyptus globulus</i>	0.2	1	0.2	3.448276	1.13112	4.054922	8.5031976
<i>Ficus hispida</i>	0.6	3	0.2	3.448276	0.229052	0.821122	7.2693975
<i>Ficus religiosa</i>	0.3	1.5	0.3	5.172414	12.568	45.05469	51.727099
<i>Glyricidia maculata</i>	0.4	2	0.1	1.724138	0.384895	1.3798	5.1039377
<i>Helicteres isora</i>	0.2	1	0.1	1.724138	0.554249	1.986912	4.7110496
<i>Lawsonia inermis</i>	0.1	0.5	0.1	1.724138	0.264242	0.947275	3.1714127
<i>Leucaena leucocephala</i>	1.4	7	0.3	5.172414	0.28278	1.01373	13.186144
<i>Millingtonia hortensis</i>	1.5	7.5	0.1	1.724138	0.50272	1.802187	11.026325
<i>Moringa olifera</i>	0.1	0.5	0.1	1.724138	0.7855	2.815918	5.0400558
<i>Phyllanthus emblica</i>	0.1	0.5	0.1	1.724138	1.767375	6.335815	8.5599531
<i>Plumeria rubra</i>	0.1	0.5	0.1	1.724138	0.636255	2.280893	4.5050314
<i>Pongamia pinnata</i>	0.2	1	0.2	3.448276	0.608291	2.180647	6.6289226
<i>Prosopis julifera</i>	3.4	17	0.4	6.896552	0.363215	1.30208	25.198632
<i>Psidium guavaja</i>	0.1	0.5	0.1	1.724138	0.384895	1.3798	3.6039377
<i>Sapindus trifoliatus</i>	0.1	0.5	0.1	1.724138	0.554249	1.986912	4.2110496
<i>Sarcostema secamone</i>	0.1	0.5	0.1	1.724138	0.196375	0.703979	2.9281174
<i>Tamarindus indica</i>	0.1	0.5	0.1	1.724138	2.54502	9.123574	11.347712
<i>Thespesia populina</i>	0.2	1	0.1	1.724138	0.384895	1.3798	4.1039377
<i>Ziziphus zizuba</i>	0.9	4.5	0.2	3.448276	0.080435	0.28835	8.2366258
	20	100	5.8	100	27.89499	100	300
SHRUBS							
<i>Abutilon indicum</i>	0.7	2.734375	0.2	3.076923	0.2545	3.347557	9.158855
<i>Caesalpinia pulchearima</i>	1.1	4.296875	0.3	4.615385	0.80435	10.57993	19.49219
<i>Calotropis gigantea</i>	0.7	2.734375	0.3	4.615385	0.07855	1.033196	8.382956
<i>Cassia auriculata</i>	1.5	5.859375	0.4	6.153846	0.45245	5.951212	17.96443
<i>Catharanthus roseus</i>	1.2	4.6875	0.3	4.615385	0.03849	0.506266	9.809151
<i>Cestrum nocturnam</i>	0.1	0.390625	0.1	1.538462	1.80979	23.80485	25.73393
<i>Gossypium herbaceum</i>	1	3.90625	0.4	6.153846	0.61583	8.10026	18.16036
<i>Grewia asiatica</i>	1	3.90625	0.3	4.615385	1.52073	20.00268	28.52432
<i>Hibiscus cannabinus</i>	1.3	5.078125	0.2	3.076923	0.05027	0.661246	8.816294
<i>Hybanthus enneasperms</i>	2.9	11.32813	0.4	6.153846	0.01257	0.165311	17.64728
<i>Indigofera trita</i>	0.9	3.515625	0.3	4.615385	0.00962	0.126567	8.257576
<i>Inodium suffruticosum</i>	1.6	6.25	0.3	4.615385	0.00661	0.086892	10.95228
<i>Jatropha curcas</i>	0.6	2.34375	0.4	6.153846	0.01964	0.258299	8.755895
<i>Mimosa pudica</i>	0.5	1.953125	0.2	3.076923	0.00314	0.041328	5.071376
<i>Pavonia zeylanica</i>	2.1	8.203125	0.5	7.692308	0.01521	0.200027	16.09546
<i>Rhyncosia suaveolens</i>	0.6	2.34375	0.2	3.076923	0.00707	0.092988	5.513661
<i>Ricinus communis</i>	0.8	3.125	0.3	4.615385	0.02828	0.371951	8.112335
<i>Sarcostemma secamone</i>	0.1	0.390625	0.1	1.538462	0.09162	1.20512	3.134207
<i>Sida rhomboidea</i>	5.8	22.65625	0.5	7.692308	0.02124	0.279376	30.62793
<i>Solanum surettense</i>	0.3	1.171875	0.2	3.076923	0.01257	0.165311	4.41411
<i>Tabernaemontana divercatum</i>	0.5	1.953125	0.4	6.153846	0.61583	8.10026	16.20723
<i>Vitex negundo</i>	0.3	1.171875	0.2	3.076923	1.13426	14.91936	19.16815
	25.6	100	6.5	100	7.60262	99.99998	300
HERBS							
<i>Acalypha indica</i>	2	4.1667	0.3	2.16	0.00754394	0.625292	6.9502316
<i>Achyranthus aspera</i>	1.6	3.3333	0.3	2.16	0.02061466	1.708679	7.2002854
<i>Aerva lanata</i>	2.8	5.8333	0.5	3.6	0.00407203	0.337517	9.7679724
<i>Amaranthus spinosus</i>	0.8	1.6667	0.3	2.16	0.00754394	0.625292	4.4502316
<i>Andrographis echinoides</i>	0.8	1.6667	0.2	1.44	0.02061466	1.708679	4.8141943

<i>Anisomeles cornosis</i>	0.9	1.875	0.3	2.16	0.0452448	3.750186	7.7834599
<i>Antigonon leptopus</i>	0.4	0.8333	0.3	1.44	0.196375	16.27685	18.549033
<i>Arylosia scarabaeoides</i>	0.4	0.8333	0.1	0.72	0.00196375	0.162769	1.7155263
<i>Boerhaavia diffusa</i>	1.8	3.75	0.5	3.6	0.00407203	0.337517	7.6846391
<i>Caraluma umbellata</i>	1.6	3.3333	0.2	1.44	0.1018008	8.43792	13.210102
<i>Cardiospermum helicacabum</i>	1.4	2.9167	0.4	2.88	0.02061466	1.708679	7.5030432
<i>Cleome gynandra</i>	0.6	1.25	0.4	1.44	0.00754394	0.625292	3.3141404
<i>Cleome viscosa</i>	0.9	1.875	0.2	1.44	0.00407203	0.337517	3.6513657
<i>Clitoria turnata</i>	0.4	0.8333	0.2	2.16	0.00407203	0.337517	3.3291235
<i>Coccinia grandis</i>	0.4	0.8333	0.3	2.88	0.00754394	0.625292	4.3363227
<i>Corchorus tridentata</i>	0.7	1.4583	0.4	1.44	0.02061466	1.708679	4.605861
<i>Crotalaria hebecarpa</i>	1	2.0833	0.2	2.16	0.00407203	0.337517	4.5791235
<i>Daemia extensa</i>	1	2.0833	0.3	2.16	0.0452448	3.750186	7.9917932
<i>Datura stromonium</i>	1.4	2.9167	0.3	2.16	0.070695	5.859666	10.934606
<i>Elytraria aculis</i>	1.4	2.9167	0.2	2.16	0.00196375	0.162769	5.2377086
<i>Euphorbia hirta</i>	1.4	2.9167	0.3	2.88	0.00196375	0.162769	5.957133
<i>Evolvulus alsinoides</i>	1.1	2.2917	0.4	2.16	0.00196375	0.162769	4.6127086
<i>Hybanthus enneaspermus</i>	1.2	2.5	0.3	2.16	0.00407203	0.337517	4.9957902
<i>Indigofera cordifolia</i>	0.4	0.8333	0.3	0.72	0.04909375	4.069213	5.6219706
<i>Indigofera linmaei</i>	0.8	1.6667	0.1	1.44	0.0452448	3.750186	6.8557021
<i>Ipomea cordifolia</i>	0.3	0.625	0.2	1.44	0.00407203	0.337517	2.4013657
<i>Ipomea hederifolia</i>	0.6	1.25	0.2	1.44	0.01286963	1.06672	3.7555686
<i>Ipomea pes-tigridis</i>	0.2	0.4167	0.2	0.72	0.00754394	0.625292	1.7613826
<i>Justicia vahli</i>	0.9	1.875	0.1	2.16	0.00754394	0.625292	4.6585649
<i>Lepidagathis cristata</i>	1	2.0833	0.3	2.16	0.00407203	0.337517	4.5791235
<i>Lucas aspera</i>	1.1	2.2917	0.3	2.16	0.02061466	1.708679	6.1586188
<i>Memordica carantia</i>	0.4	0.8333	0.3	2.16	0.00407203	0.337517	3.3291235
<i>Mollugo nudicaulis</i>	0.8	1.6667	0.3	2.16	0.0254502	2.10948	5.93442
<i>Oldenlandia umbellata</i>	0.9	1.875	0.3	1.44	0.0201088	1.66675	4.9805985
<i>Oscimum americanum</i>	0.4	0.8333	0.2	2.16	0.070695	5.859666	8.8512731
<i>Oscimum sanctum</i>	0.7	1.4583	0.3	2.16	0.070695	5.859666	9.4762731
<i>Parthenium hysterophorus</i>	0.6	1.25	0.3	2.16	0.04909375	4.069213	7.4774862
<i>Passiflora foetida</i>	0.4	0.8333	0.3	2.16	0.00407203	0.337517	3.3291235
<i>Spilanthus acemella</i>	2.2	4.5833	0.3	2.88	0.00080435	0.06667	7.5277012
<i>Phyllanthus maderaspatensis</i>	1.4	2.9167	0.5	3.6	0.00407203	0.337517	6.8513058
<i>Pupalia lappaceae</i>	2.4	5	0.4	2.88	0.00196375	0.162769	8.0404664
<i>Ruellia tuberosa</i>	0.6	1.25	0.2	1.44	0.00754394	0.625292	3.3141404
<i>Rungia repens</i>	0.8	1.6667	0.4	2.88	0.02061466	1.708679	6.2530432
<i>Tephrosia villosa</i>	1.1	2.2917	0.3	2.16	0.1385622	11.48495	15.934886
<i>Tridax procumbens</i>	2.8	5.8333	0.7	5.04	0.0113112	0.937547	11.806851
<i>Vernonia cinerea</i>	0.4	0.8333	0.2	1.44	0.0201088	1.66675	3.9389318
<i>Vigna aconitifolia</i>	0.8	1.6667	0.3	2.16	0.00196375	0.162769	3.9877086
	48	100	13.9	100	1.2064683	100	300.00003

Table 5. Biodiversity Indices of Westside of the sacred grove

SPECIES NAME	D	RD	F	RF	Dominance	RDM	SIV/IVI
TREES							
<i>Azadiracta indica</i>	2.8	22.58065	0.5	14.28571	0.166212	1.699407	38.56577
<i>Accasia eburnea</i>	0.6	4.83871	0.2	5.714286	0.246333	2.518592	13.07159
<i>Albizia lebeck</i>	0.4	3.225806	0.2	5.714286	0.363215	3.713639	12.65373
<i>Anona squamosa</i>	0.8	6.451613	0.2	5.714286	0.229052	2.341905	14.5078
<i>Cordia dichotoma</i>	0.2	1.612903	0.1	2.857143	0.321741	3.28959	7.759636
<i>Carissa caraundus</i>	0.5	4.032258	0.2	5.714286	0.180979	1.850394	11.59694
<i>Callistemon lanceolatus</i>	0.2	1.612903	0.2	5.714286	0.580956	5.939894	13.26708
<i>Enterolobium saman</i>	0.1	0.806452	0.1	2.857143	0.636255	6.505292	10.16889
<i>Ficus religiosa</i>	0.4	3.225806	0.1	2.857143	0.950455	9.717782	15.80073
<i>Ficus hispida</i>	0.6	4.83871	0.1	2.857143	0.119475	1.221549	8.917402
<i>Helicteres isora</i>	0.7	5.645161	0.1	2.857143	0.159064	1.626323	10.12863
<i>Lawsonia inermis</i>	0.4	3.225806	0.1	2.857143	0.321741	3.28959	9.372539
<i>Leucaena leucocephala</i>	0.7	5.645161	0.2	5.714286	0.28278	2.891241	14.25069
<i>Muntingia calabura</i>	0.1	0.806452	0.1	2.857143	0.407203	4.163387	7.826982
<i>Murraya paniculata</i>	0.2	1.612903	0.1	2.857143	0.384895	3.9353	8.405346
<i>Mangifera indica</i>	0.3	2.419355	0.1	2.857143	0.664847	6.797629	12.07413
<i>Prosopis julifera</i>	1.2	9.677419	0.3	8.571429	0.453705	4.638836	22.88768
<i>Pithacalobium dulci</i>	0.2	1.612903	0.1	2.857143	0.554249	5.666832	10.13688
<i>Pongamia pinnata</i>	0.3	2.419355	0.1	2.857143	0.849597	8.686573	13.96307
<i>Phoenix dactylifera</i>	0.8	6.451613	0.1	2.857143	0.664847	6.797629	16.10638
<i>Tectona grandis</i>	0.2	1.612903	0.1	2.857143	0.608291	6.219381	10.68943
<i>Writia tctoria</i>	0.3	2.419355	0.1	2.857143	0.453705	4.638836	9.915333
<i>Ziziphus zizuba</i>	0.4	3.225806	0.1	2.857143	0.180979	1.850394	7.933344

	12.4	100	3.5	100	9.780575	100	300
SHRUBS							
<i>Abrus precatorius</i>	1.2	5.504587	0.4	6.66667	0.615832	6.9913	19.163
<i>Abutilon indicum</i>	2	9.174312	0.4	6.66667	0.201088	2.2829	18.124
<i>Barleria cristata</i>	2.6	11.92661	0.6	10	0.050272	0.5707	22.497
<i>Cadaba indica</i>	0.6	2.752294	0.4	6.66667	0.804352	9.1314	18.55
<i>Capparis horrida</i>	1	4.587156	0.6	10	1.385622	15.73	30.317
<i>Cadaba trifoliata</i>	0.8	3.669725	0.4	6.66667	1.018008	11.557	21.893
<i>Gmelina asiatica</i>	0.8	3.669725	0.4	6.66667	1.809792	20.546	30.882
<i>Grewia asiatica</i>	0.6	2.752294	0.4	6.66667	1.385622	15.73	25.149
<i>Hypis suaveolens</i>	6.4	29.3578	1	16.6667	0.615832	6.9913	53.016
<i>Pedilanthus tithymaloides</i>	1.6	7.33945	0.2	3.33333	0.113112	1.2841	11.957
<i>Plumbago zeylanica</i>	1.2	5.504587	0.2	3.33333	0.063626	0.7223	9.5602
<i>Tabernamontana divercatum</i>	1.2	5.504587	0.6	10	0.70695	8.0257	23.53
<i>Turnera sternata</i>	1.8	8.256881	0.4	6.66667	0.03849	0.437	15.361
	21.8	100	6	100	8.808597	100	300
HERBS							
<i>Achyranthus aspera</i>	4.4	8.9796	0.7	6.863	0.007544	0.8479	16.69021
<i>Aerva lanata</i>	7.8	15.918	0.7	6.863	0.004072	0.4577	23.23877
<i>Amaranthus spinosus</i>	1	2.0408	0.2	1.961	0.007544	0.8479	4.849475
<i>Andrographis echinoides</i>	1.1	2.2449	0.2	1.961	0.020615	2.3169	6.522592
<i>Anisomeles cornosis</i>	1.2	2.449	0.3	2.941	0.03142	3.5313	8.921493
<i>Atylosia scarabaeoides</i>	1.8	3.6735	0.3	2.941	0.001964	0.2207	6.835354
<i>Boerhaavia diffusa</i>	1.5	3.0612	0.5	4.902	0.004072	0.4577	8.420847
<i>Caraluma umbellata</i>	1.4	2.8571	0.2	1.961	0.12568	14.125	18.94328
<i>Chloris barbata</i>	3.2	6.5306	0.4	3.922	0.000804	0.0904	10.54258
<i>Cleome gynandra</i>	1.1	2.2449	0.4	3.922	0.020615	2.3169	8.483377
<i>Cleome viscosa</i>	0.9	1.8367	0.4	3.922	0.045245	5.0851	10.84343
<i>Eclipta alba</i>	1.2	2.449	0.5	4.902	0.004072	0.4577	7.808602
<i>Euphorbia hirta</i>	3	6.1224	0.5	4.902	0.007544	0.8479	11.87228
<i>Indigofera linnæi</i>	1.2	2.449	0.2	1.961	0.152073	17.092	21.50143
<i>Justicia vahli</i>	1	2.0408	0.3	2.941	0.004072	0.4577	5.439654
<i>Oscimum sanctum</i>	1.1	2.2449	0.5	4.902	0.196375	22.071	29.21771
<i>Parthenium hysterophorus</i>	0.6	1.2245	0.3	2.941	0.049094	5.5177	9.68338
<i>Passiflora foetida</i>	0.4	0.8163	0.3	2.941	0.070695	7.9455	11.70301
<i>Phyllanthus maderaspatensis</i>	3.4	6.9388	0.5	4.902	0.004072	0.4577	12.2984
<i>Pupalia lappaceae</i>	3.6	7.3469	0.5	4.902	0.001964	0.2207	12.46961
<i>Rungia repens</i>	1.9	3.8776	0.5	4.902	0.007544	0.8479	9.627386
<i>Sida cordifolia</i>	0.7	1.4286	0.4	3.922	0.004072	0.4577	5.807801
<i>Spilanthus acemella</i>	0.2	0.4082	0.1	0.98	0.001964	0.2207	1.609264
<i>Tephrosia purpurea</i>	1	2.0408	0.4	3.922	0.101801	11.442	17.40392
<i>Tridax procumbens</i>	3.4	6.9388	0.6	5.882	0.01287	1.4464	14.26756
<i>Vigna aconitifolia</i>	0.9	1.8367	0.3	2.941	0.001964	0.2207	4.99862
	49	100	10.2	100	0.889748	100	300

Table 6. Biodiversity Indices of North side of the sacred grove

SPECIES NAME	D	RD	F	RF	Dominance	RDM	SIV/IVI
TREES							
<i>Accacia nolotica</i>	0.4	3.809524	0.1	3.333333	0.384895	7.473614	14.61647
<i>Azadiracta indica</i>	1.3	12.38095	0.3	10	0.196375	3.813068	26.19402
<i>Cassia saimea</i>	0.1	0.952381	0.1	3.333333	0.384895	7.473614	11.75933
<i>Delonix regia</i>	0.1	0.952381	0.1	3.333333	0.636255	12.35434	16.64006
<i>Glyricidia maculata</i>	0.8	7.619048	0.2	6.666667	0.321741	6.247331	20.53305
<i>Leuceana leucocephala</i>	2.4	22.85714	0.4	13.33333	0.246333	4.783113	40.97359
<i>Mangifera indica</i>	0.3	2.857143	0.1	3.333333	0.246333	4.783113	10.97359
<i>Moringa olifera</i>	0.2	1.904762	0.1	3.333333	0.28278	5.490818	10.72891
<i>Pithacalobium dulci</i>	0.2	1.904762	0.1	3.333333	0.608291	11.81136	17.04946
<i>Pongamia pinnata</i>	0.7	6.666667	0.3	10	0.28278	5.490818	22.15749
<i>Prosopis julifera</i>	2	19.04762	0.4	13.33333	0.166212	3.227381	35.60833
<i>Tecoma stans</i>	0.4	3.809524	0.1	3.333333	0.090804	1.763163	8.90602
<i>Tectona grandis</i>	0.2	1.904762	0.1	3.333333	0.101801	1.976695	7.21479
<i>Terminalia catappa</i>	0.2	1.904762	0.1	3.333333	0.50272	9.761455	14.99955
<i>Thespesia populina</i>	0.4	3.809524	0.3	10	0.636255	12.35434	26.16387
<i>Ziziphus zizuba</i>	0.8	7.619048	0.2	6.666667	0.061583	1.195778	15.48149
	10.5	100	3	100	5.150052	100	300
SHRUBS							
<i>Agave americana</i>	1.5	8.474576	0.2	5.714286	2.463328	34.49945	48.6883
<i>Barleria cristata</i>	1.4	7.909605	0.3	8.571429	0.201088	2.816282	19.2973
<i>Barleria prionitis</i>	1.3	7.344633	0.4	11.42857	0.22701	3.179318	21.9525
<i>Bougainvillea spectabilis</i>	0.3	1.694915	0.2	5.714286	1.134262	15.88559	23.2948

<i>Cassia occidentalis</i>	0.7	3.954802	0.2	5.714286	0.03849	0.539054	10.2081
<i>Hyptis suaveolencis</i>	2	11.29944	0.4	11.42857	0.113112	1.584158	24.3122
<i>Lantana camera</i>	0.8	4.519774	0.3	8.571429	0.804352	11.26513	24.3563
<i>Pavania zeylanica</i>	4.5	25.42373	0.5	14.28571	0.050272	0.70407	40.4135
<i>Ricinus communis</i>	0.8	4.519774	0.2	5.714286	0.380182	5.324532	15.5586
<i>Sida rhomboidea</i>	2.6	14.68927	0.3	8.571429	0.028278	0.39604	23.6567
<i>Tecoma stans</i>	0.6	3.389831	0.3	8.571429	1.385622	19.40594	31.3672
<i>Turnera sternata</i>	1.2	6.779661	0.2	5.714286	0.3142	4.40044	16.8944
	17.7	100	3.5	100	7.140195	100	300
HERBS							
<i>Acalypha indica</i>	2	6.430868	20.83	4.902	0.007544	1.1679	12.501
<i>Achyranthus aspera</i>	1.2	3.858521	8.333	1.9608	0.020615	3.1914	9.0107
<i>Aerva lanata</i>	4	12.86174	29.17	6.8627	0.004072	0.6304	20.355
<i>Amaranthus spinosus</i>	0.9	2.893891	12.5	2.9412	0.007544	1.1679	7.003
<i>Boerhaavia diffusa</i>	1.6	5.144695	25	5.8824	0.004072	0.6304	11.657
<i>Cardiospermum helicacabum</i>	0.9	2.893891	25	5.8824	0.020615	3.1914	11.968
<i>Chloris barbata</i>	3	9.646302	20.83	4.902	0.000804	0.1245	14.673
<i>Cleome viscosa</i>	1.2	3.858521	16.67	3.9216	0.004072	0.6304	8.4105
<i>Coccinia grandis</i>	0.5	1.607717	12.5	2.9412	0.007544	1.1679	5.7168
<i>Datura stromonium</i>	0.6	1.92926	12.5	2.9412	0.196375	30.401	35.272
<i>Euphorbia hirta</i>	1.4	4.501608	16.67	3.9216	0.001964	0.304	8.7272
<i>Evolvulus alsinoides</i>	1.1	3.536977	12.5	2.9412	0.001964	0.304	6.7822
<i>Justicia vahli</i>	1.6	5.144695	25	5.8824	0.007544	1.1679	12.195
<i>Lucas aspera</i>	0.6	1.92926	8.333	1.9608	0.020615	3.1914	7.0814
<i>Oldenlandia umbellata</i>	1	3.215434	16.67	3.9216	0.020109	3.1131	10.25
<i>Oscimum sanctum</i>	0.7	2.250804	16.67	3.9216	0.070695	10.944	17.117
<i>Parthenium hysterophorus</i>	1	3.215434	16.67	3.9216	0.138562	21.451	28.588
<i>Passiflora foetida</i>	0.4	1.286174	16.67	3.9216	0.004072	0.6304	5.8381
<i>Phyllanthus maderaspatensis</i>	1.4	4.501608	20.83	4.902	0.004072	0.6304	10.034
<i>Pupalia lappaceae</i>	2	6.430868	16.67	3.9216	0.001964	0.304	10.656
<i>Rungia repens</i>	0.8	2.572347	16.67	3.9216	0.020615	3.1914	9.6853
<i>Tephrosia villosa</i>	0.8	2.572347	16.67	3.9216	0.049094	7.6003	14.094
<i>Tridax procumbens</i>	1.8	5.787781	29.17	6.8627	0.011311	1.7511	14.402
<i>Vernonia cinerea</i>	0.6	1.92926	12.5	2.9412	0.020109	3.1131	7.9835
	31.1	100	425	100	0.645945	100	300

Table 7. Biodiversity Indices of Southside of the sacred grove

SPECIES NAME	D	RD	F	RF	Dominance	RDM	SIV/IVI
TREES							
<i>Accacia eburnea</i>	0.7	7.526882	0.3	7.317073	0.1256	2.608369	17.45232
<i>Albezia lebeck</i>	0.4	4.301075	0.3	7.317073	0.38465	7.988129	19.60628
<i>Azadiracta indica</i>	0.8	8.602151	0.5	12.19512	0.19625	4.075576	24.87285
<i>Delonix regia</i>	0.1	1.075269	0.1	2.439024	0.22891	4.753752	8.268045
<i>Enterolobium saman</i>	0.2	2.150538	0.2	4.878049	0.63585	13.20487	20.23345
<i>Eucalyptus globulis</i>	0.2	2.150538	0.2	4.878049	0.5024	10.43348	17.46206
<i>Ficus benghalensis</i>	0.1	1.075269	0.1	2.439024	0.07065	1.467207	4.981501
<i>Ficus hispida</i>	0.7	7.526882	0.3	7.317073	0.2826	5.86883	20.71278
<i>Ficus religiosa</i>	0.5	5.376344	0.5	12.19512	0.07065	1.467207	19.03867
<i>Leuceana leucocephala</i>	3.2	34.4086	0.4	9.756098	0.22891	4.753752	48.91845
<i>Mangifera indica</i>	0.3	3.225806	0.2	4.878049	0.63585	13.20487	21.30872
<i>Peltophorum pterocarpum</i>	0.2	2.150538	0.2	4.878049	0.38465	7.988129	15.01672
<i>Pongamia pinnata</i>	0.4	4.301075	0.2	4.878049	0.5024	10.43348	19.6126
<i>Prosopis julifera</i>	1.2	12.90323	0.4	9.756098	0.15896	3.301217	25.96054
<i>Thespesia populina</i>	0.3	3.225806	0.2	4.878049	0.40694	8.451115	16.55497
	9.3	100	4.1	100	4.81527	99.99997	300
SHRUBS							
<i>Barleria prionitis</i>	1.6	12.12121	0.3	8.823529	0.050272	1.6053941	22.5501
<i>Calotropis gigantea</i>	0.9	6.818182	0.3	8.823529	0.13275	4.2392437	19.881
<i>Cassia auriculata</i>	0.2	1.515152	0.2	5.882353	1.018008	32.50923	39.9067
<i>Cassia occidentalis</i>	0.6	4.545455	0.2	5.882353	0.050272	1.6053941	12.0332
<i>Catharanthus roseus</i>	1	7.575758	0.2	5.882353	0.03849	1.2291298	14.6872
<i>Decalepis hamiltonii</i>	1.7	12.87879	0.3	8.823529	0.13275	4.2392437	25.9416
<i>Gossypium herbaceum</i>	0.5	3.787879	0.2	5.882353	0.050272	1.6053941	11.2756
<i>Hyptis suaveolencis</i>	1.4	10.60606	0.3	8.823529	0.113112	3.6121366	23.0417
<i>Jatropha curcas</i>	0.5	3.787879	0.3	8.823529	0.019638	0.6271071	13.2385
<i>Lantana camera</i>	3	22.72727	0.4	11.76471	0.615832	19.666077	36.0974
<i>Ricinus communis</i>	0.6	4.545455	0.3	8.823529	0.055425	1.769947	15.1389
<i>Sida rhomboidea</i>	0.9	6.818182	0.2	5.882353	0.050272	1.6053941	32.3666
<i>Tecoma stans</i>	0.3	2.272727	0.2	5.882353	0.804352	25.686305	33.8414
	13.2	100	3.4	100	3.131443	99.999996	300

HERBS							
<i>Aerva lanata</i>	1.8	6.4286	0.5	5.5556	0.004072	0.7109429	12.6950699
<i>Alternanthera sessilis</i>	1.7	6.0714	0.4	4.4444	0.007544	1.3171095	11.8329825
<i>Boerhaavia diffusa</i>	1.5	5.3571	0.4	4.4444	0.004072	0.7109429	10.5125302
<i>Cardiospermum helicacabum</i>	0.6	2.1429	0.4	4.4444	0.020615	3.5991483	10.1864499
<i>Chloris barbata</i>	2.6	9.2857	0.3	3.3333	0.000804	0.1404332	12.7594808
<i>Cleome viscosa</i>	0.8	2.8571	0.3	3.3333	0.004072	0.7109429	6.90141907
<i>Coccinia grandis</i>	0.6	2.1429	0.4	4.4444	0.004072	0.7109429	7.29824447
<i>Daemia extensa</i>	1.1	3.9286	0.5	5.5556	0.007544	1.3171095	10.8012364
<i>Datura stromonium</i>	1.9	6.7857	0.4	4.4444	0.001964	0.3428544	11.5730131
<i>Elytraria acaulis</i>	1.4	5	0.2	2.2222	0.001964	0.3428544	7.56507662
<i>Euphorbia hirta</i>	1.4	5	0.4	4.4444	0.001964	0.3428544	9.78729884
<i>Ipomea cordata</i>	1.2	4.2857	0.4	4.4444	0.007544	1.3171095	10.0472682
<i>Ipomea pes - tigridis</i>	1.4	5	0.4	4.4444	0.020109	3.510829	12.9552735
<i>Lepidagathis cristata</i>	1	3.5714	0.2	2.2222	0.020615	3.5991483	9.39279914
<i>Oscimum sanctum</i>	0.8	2.8571	0.5	5.5556	0.070695	12.342758	20.7554568
<i>Passiflora foetida</i>	0.8	2.8571	0.5	5.5556	0.004072	0.7109429	9.1236413
<i>Phyllanthus maderaspatensis</i>	1.9	6.7857	0.4	4.4444	0.004072	0.7109429	11.9411016
<i>Pupalia lappaceae</i>	1	3.5714	0.5	5.5556	0.196375	34.28544	43.4124241
<i>Rungia repens</i>	1.2	4.2857	0.4	4.4444	0.020615	3.5991483	12.3293071
<i>Tephrosia villosa</i>	0.5	1.7857	0.3	3.3333	0.138562	24.191806	29.310854
<i>Tridax procumbens</i>	1.6	5.7143	0.5	5.5556	0.011311	1.9748413	13.2446826
<i>Vernonia cinerea</i>	1.2	4.2857	0.7	7.7778	0.020109	3.510829	15.5743211
	28	100	9	100	0.572765	99.999931	299.999931

*D = Density; RD = Relative Density; F= Frequency; RF = Relative Frequency, RDM = Relative Dominance; IVI = Important Value Index

Table 8. Diversity indices of study area

Life forms	Diversity indices	East side	West side	North side	Southside
Herbs	No. of Species	47	26	24	22
	Individuals	480	490	310	280
	Shannon H'	3.678	2.966	3.012	3.014
	Simpson_1- D	0.9707	0.9333	0.9418	0.9474
Shrubs	No. of Species	22	13	12	13
	Individuals	256	109	177	132
	Shannon H'	2.711	2.291	2.252	2.335
	Simpson_1- D	0.9062	0.8636	0.8705	0.883
Trees	No. of Species	28	23	16	15
	Individuals	200	124	105	93
	Shannon H'	2.65	2.787	2.35	2.226
	Simpson_1- D	0.8999	0.9113	0.8733	0.8359

Table 9. Human impact on sacred grove biodiversity reported by local inhabitants of sacred grove

Factors	No. of informants	Total No. of informants	Percentage (%)
Habitat degradation	240	1000	24
Forest fragmentation	160	1000	16
Exploitation of Natural resources	40	1000	8
Change of people attitude on socio-cultural practices	320	1000	32
Erosion of religious beliefs and traditional values	220	1000	22
Forest fires	180	1000	18
Encroachment	720	1000	72
Urbanization and Industrialization	580	1000	58
Lack of education	60	1000	12
I do not know	50	1000	10