THE ENCHANTED GROVE: REVEALING THE MYSTERIES OF NATURE

Abstract

Sacred groves are typical conservational method followed by traditional people in their spiritual rituals, and it has a role in conservation of biodiversity. I believe that it is a relevant topic, so I conducted a study on sacred grove of Shri Ayiravillan Mahadevar Temple, Kuzhiyam, Chanthanathope, Kollam, and Kerala. This paper work mainly emphasis on the Floral Diversity, Phytosociology and Quantitative analysis of nutrients in the soil. Quantitative analysis of nutrients in the soil is a comparative study between different soil samples, one from the respected sacred grove and other from the plot near to it. While analysing the floral diversity of the sacred grove, a total of 30 vascular plants which was under 21 families were identified, it includes 15 trees, 8 climbers, 4 shrubs and 3 herbs. Fabaceae and Euphorbiaceae were the dominant families reported. Among the total identified plants, five are rare species, which are *Cinnamomum malabathrum* (Burm.fil.) J.Presl, *Dalbergia horrida* (Dennst.) Mabb, *Diospyros candolleana* Wight, *Strychnos minor* Dennst, *Syzygium travancoricum* Gamble. For the Phytosociological studies, quadrant size of 1x1 was taken. By analysing the data obtained from the quadrat study, Density, Frequency (%), Abundance, Importance Value Index, Maturity Index Value, Relative Density, Relative Frequency, Relative Abudance were calculated. *Pothos scandens*, *Dalbergia horrida*, *Borassus flabellifer*, *Centrosema molle* showed high Density, Frequency, Abudance, Relative Density, Relative Frequency Values, Importance Value Index.In Quantitative analysis of nutrients in the soil, soil sample taken from the adjacent plot to the sacred grove shows high mg/100gm ratio for Calcium (Ca), Sodium (Na), Iron (Fe), Zinc (Zn), Copper (Cu), Magnesium (Mg), Nitrogen (N).

Key Words: Sacred Grove, Conservation, Diversity, Nutrients, Ecology.

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I. INTRODUCTION

Sacred groves are regarded as primitive practices of nature conservation. They are regarded as sacred because of certain beliefs. So they are considered as a well-protected or maintained area by practicing certain beliefs by local communities. They are the areas of land and bodies of water with considerable socio-cultural and ecological value (Sankar, 2020). They remain in undisturbed state due to certain beliefs. They are also considered as the natural museums because of their type of preservation. A sacred grove has several religious purposes from one place to another. Mostly they are protected or conserved as burial land as their belief. But in other cases, they are considered as a management system to conserve some medicinal plants or as a water management system. Sacred groves are maintained as a site for ancestral worship in some places. They resemble forest biodiversity due to their closely packing of trees. In sacred groves, ordinary trees are not seen as much. Due to their type of certain beliefs some types of trees is most valuable than others (Singh*et al.*, 2020). Sacred groves are seen associated with temple and church and also they are protected as a traditional belief also. Sacred grove is more than a nature reserve but it forms an integral part of the lives of local peoples. The concept of sacred grooves is well known from 3000 BC onwards. Sacred grove is more than a nature reserve but it forms an integral part of the lives of local peoples. Some believes that sacred groves are houses of non-existent or evil spirits where sacrifices are offered to make the gods, ancestors and others believes that the sacred groves serve as holy or spiritual places; they are also abodes of the gods, rare plants and animals which are strictly conserved for appropriate reasons. In some countries in the world sacred groves may also be considered as specific forest areas consists with powers beyond those of humans and they are also considered as homes to mighty spirits that can take or give life. Sacred groves vary in their size from few meters to greater than 100 ha. Floristic distribution in sacred groves varies throughout in different geographically distinct areas.

The concept of sacred grove in India is well known even before the Vedic age. Vedas are the only remaining representation of ancient Aryans who migrated into India. By the migration of ancient Vedic people into India, several new environmental values are imposed on native Indians by them. Also Vedic people incorporated into their value system the concept of ‘Sacred grove’ from the natives of India. Already existing ecosystem level concept of the ‘Sacred grove’ of the natives of India was extended by the Vedic migrants down to the ‘species’ level on one extreme of the scale and to the level of the ‘landscape’ on the other extreme. After several years, conservation practices and ecological philosophy came into existence and thereby formed the present rituals related to sacred groves.Several cultures and folk taboos are practicing in the sacred groves in India like the governance of respected sacred grove only by the local surrounding community and nearby villagers, even a falling twigs and leaves on the ground of sacred groves are not allowed to collect, women are strictly prohibited from entering sacred forest during menstrual cycle and pregnancy, lower castes are prohibited to enter the sacred forests and only by the permission of the local authorities, before entering in sacred groves, the people stop taking onion, garlic, egg and meat. Even collection or removal of a single twig is considered as a taboo in several places. So in many sacred groves, the removal of such materials is prohibited.

It is also regarded as a climax vegetation that preserved by the local people for certain beliefs (Pillai*et al.* 2021).They are regarded as patches of forests that are protected and used by local people for their cultural and religious reasons (Rath*et al.*, 2020). They are rich in biological diversity and consist of many endangered plant species including rare herbs and medicinal plants. It includes landscape, vegetation, life forms and geographical feature. It is also considered as an ecosystem because of their diversity. Sacred groves are considered as the repositories of rare flora and fauna and are sites of immense socio-cultural significance. Sacred groves possess large gene pool of many forest species. Some species of sacred groves are considered as sacred because of the religious impact on them. Sacred groves are rich in medicinal plants, fruit yielding plants, fuel woods, spices etc. Sacred groves represent the best option for protecting the biodiversity. Through conservation of sacred groves preservation of different plant species used for curing many diseases can be done. Sacred groves help to maintain a more natural balance of the ecosystem over a wide area.

The ecological role of sacred groves promotes the purification and stabilization of the environment through the protection of the water bodies, conservation of wildlife species by providing its natural habitat and natural purification of polluted systems by natural decomposition (Tiimub*et al.,* 2020). They serve as a home for breeding populations of bird that control insects and mammal pest on farm lands. They play a vital role in nutrient cycle that exists in nature. Though sacred groves consists of thick and closely packed trees, it plays a vital role in carbon cycling and it leads to the reduced CO_2 content in the atmosphere. The water bodies conserved in sacred groves helps to increase the humidity that leads to cooling effect inside the sacred groves. Some of the sacred groves reduce the risk of forest fire due to their water retention capacity through conserving water bodies like ponds or rivers. Physicochemical properties of the soil have been found to be superior in sacred groves because of the litter accumulation in the soil (Pillai*et al.,* 2021).

With the ignition of changing belief among younger generation, sacred groves are in the way of extinction by the less protection of traditional sacred groves. Severe degradation has been observed in the smaller groves due to anthropogenic activities and change in climate. The belief that sacred groves are houses of non-existent or evil spirits where sacrifices are offered to make the gods, ancestors lead the community members wrongly impressed and it leads to the urban construction as a substitution. Anthropogenic activities lead to the loss of habitat in the sacred groves. Exploitation of timber also affects the diversity of plants and animals of sacred groves by disappearance of timber valuable trees that also serves as habitat for several animals (Pillai*et al.*, 2021). They are also disappearing due to the cultural change and industrial growth taking place. That is the gradual process of urbanization and industrialization will lead to the destruction of sacred groves. In most cases the habitat degradation and the exploitation of resources leading to the disappearance of sacred grooves. Invasive approach of certain weeds also leads to the diminishing of existing valuable trees in the sacred groves. Although the major reason for the disappearance of sacred groves is increasing human impact on it. The major threat to the sacred groves in Kerala includes the disappearance of the tharavadu system, grazing, poaching, antisocial activities; changing socioeconomic scenario etc (forest.kerala.gov.in).Conservation of sacred grove alternatively maintains the local and regional biodiversity.Conservation and restoration of aged and degrading sacred groves must be considered.

There is a need to convert the traditional beliefs of the local people who use the sacred groves for their religious and spiritual activities into effective conservation values behind the beliefs that need to be explained to the villagers (Singh *et al.*, 2020). Community ownership of sacred grooves and government surveillance can protect the sacred groves more than individual ownership. Certain rules and regulations should be possessed among local peoples who utilize sacred groves for their benefit (Pillai*et al.*, 2021). The conversion of the sacred groves to ecotourism centres gives better care and management to the sacred grove and leads to the conservation of both the medicinal and non-medicinal plants species. Any investment from outside should be considered and utilize for proper conservation and maintenance of sacred groves. Government authorities should take proper conservation of fauna and flora at the groves. The existence of a separating zone between sacred groves and surroundings helps them from minimum disturbance by keeping a distance between them. Prevention of intruders which leads to the destruction of sacred groves should be done by local authorities. Local people should be encouraged to establish wood from outside the groves to serve as alternative energy sources. This will prevent them from relying on groves for timber and firewood (Tiimub*et al.*, 2020). In many sacred groves, plants are conserved because of their traditional beliefs and respect to nature. Religious importance of certain plants leads to their individual conservation in many sacred groves.Nursery techniques, both ex-situ and in-situ conservation and management must be taken for the native and threatened species that are belonged to sacred groves. The diversity of plant and animal species should be improved through planting of harsh weather tolerant plant species and the introduction of adaptive wild animals. Sacred groves play a vital role in ecological balance. Some sociologically conserved plants are later known as sacred plants. Biodiversity rich sacred groves are highly significant in balancing the ecosystem.

Sacred groves have religious values, economic values and ecological values like water conservation, soil conservation, nutrient cycling etc. Sacred grove is typical *in-situ* conservation. Sacred groves also serve as seed banks and carbon sinks. Rare, endangered, threatened and endemic species are concentrated in the sacred groves. So there is a need to conserve them. Several medicinal plants are protecting in sacred groves by the local authorities in order to conserve them from the extinction. Nowadays man overexploiting the economically important plants for their benefit leads to the extinction of them. So there is a need to conserve them. For this, overexploiting plants should be introduced into the sacred grove and conserve the whole sacred grove.

Generally sacred groves include ethno botanically relevant plants. That is, the practical use of the plants in many aspects of life. They are used as medicines, foods, for clothing, shelter, dyes, oils, fibres, timber, soaps, gums, waxes, tannins, latex etc. Among these medicinal plants are more utilised nowadays. Plants which are rich in certain ingredients are used in drug development for pharmacological and therapeutic values are considered as medicinal plants. Trees present in sacred groves have timber value also. Because majority of trees present in sacred groves are tall perennial woody plant having a main trunk and branches. But by the relevant protection acts of sacred groves, timber valued plants inside the sacred grove are not exploiting. There are many endemic species are existing in present sacred groves. That is, they are existing only in one geographical region like, to a particular continent or an island or a country or a state or a small area. In many sacred groves, species that is very likely to become extinct in near future (endangered species) are conserving. Sacred groves are the ideal place for conserving such plants, because of the less impact of human on them.

In India, sacred grooves are known in different names as kavu or sarpakavu in Kerala and Tamil Nadu, Devarakadu in Karnataka, Dev van in Madhya Pradesh, Himachal Pradesh, Sarnas in Bihar and Oran in Rajasthan. India has the highest concentration of sacred forests in the world. Majority of them have an open canopy. However in some places sacred groves are comes under the governance of government agencies other than the local community groups (Pillai *et al.*, 2021). Sacred grooves are found in all regions of India with respective to their unique religious views. Most of the well-known and exploited sacred groves are seen in Central India and in Western Ghats.

In Kerala, sacred grove is known as kavu and is highly significant to state's culture. 'Kavutheendiyalkulamvattum' (desecrate the sacred grove, and the pond will go dry) is an adage in Malayalam, portraying the ecological significance of sacred groves in Kerala (Sankar, 2020). Generally in Kerala, the tallest tree in the grove is worshipped in the belief that is the incarnation or abode of god. In Kerala, trees in the sacred groves are considered as the objects of veneration. According to the survey of Kerala Forest Department, there are approximately 1500 sacred groves are present in Kerala. A smallest known sacred grove varies from one cent area. Largest sacred grove in Kerala is 'Iringolekavu' consisting of more than 20 ha and the second largest is 'Kunnathurpadikavu, Payyannur' consisting of 18.211 ha. Third largest sacred groove in Kerala is 'Theyyottukavu, Kannur district consisting of 16.187 ha (forest.kerala.gov.in). Thrissur is considered as the cultural capital of Kerala, for its 'rich history, cultural heritage and archaeological wealth'. 'PambumekkatMana', the 'most famous Serpent worship centre in Kerala' is in Thrissur. It is highly influenced to its local peoples.

The Kollam district has a total area of 2491 sq km and located near the shore of Arabian Sea. Kollam, Karunagapally, Kunnathur, Kottarakkara, Pathanapuram and Punalur are the six taluks in the Kollam district. There are 895 sacred groves covering an extent of around 98 ha of vegetative cover were reported in Kollam district according to Kerala Forest and Wildlife Department. Largest sacred grove reported from the district is Thiravoor kavu having 2.5 acres in Karunagapally taluk.In Kollam taluk, 147 sacred groves extent up to 43 Acres of land and high concentration of sacred groves are reported in Thrikkarava, Mulavana, Perinad and Mundackal. Custodians of Sacred Groves in the district include Private Management like Kudumbakavu, Kudumba Trust, Community Management and Public Management like Public Committee, Public Trust, Devaswam Board. People have a belief that the spirits inhabiting the kavu would manifest their displeasure in different ways adversely affecting the people unless certain rituals to propitiate the spirit are conducted. So there are certain rituals being followed in Kollam District like Noorum palum, Kalamezhuthu, Animal sacrifice, Vayana, Sarpamthullal etc. (Comprehensive study on sacred groves in Kerala, Kollam district, 2015).

1. Sacred grove of Shri Ayiravillan Mahadevar Temple, Kuzhiyam, Chanthanathope, Kollam, Kerala.

This sacred grove (latitude 8º56´13.1´´ N and longitude 76º38´00.8´´E) is located in Kollam taluk and 9.1 Km (Fastest route) from Kollam Railway Station (latitude 8º53´07.8´´ N andlongitude 76º35´42.8´´E). From Kollam Railway Station, Head east on Chemmanmukku Railway Station Road toward Q.A.C. Road (Pass 1.0 Km) and Turn left onto Kappalandimukku-Kadappakkada Road (Pass 650 m). Then Turn right at

Kadappakkada Junction onto NH744 (Pass 6.1 Km) and Turn left onto Market Road (Pass 400 m). After that, Turn right (Pass 200m), Turn left onto Chanthanathope Road (Pass 550 m), Turn left onto Ayiravillan Temple Road (Pass 230 m) and Turn left (Pass 30m) is Ayiravillan Mahadevar Temple.

Shri Ayiravillan Mahadevar Temple spread over 3 acres of land and consists of two distinctly located sacred groves with attached to it. First one is comparatively large sacred grove that of other is closely attached to the temple (Plot 1) and consists of approximately 1.20 acres of land. Second one is of approximately 0.90 acre that is located near the entrance to the temple (Plot 2) and also away from the temple. For the Floral studies, Large Sacred grove that is attached to the temple (Plot 1) was selected.The studies were performed during the month of March 2021 - April 2021.Plants were identified with the help of authentic book, Flora of presidency of madras by Gamble.The identification of doubtful species was confirmed with the help of consulting to the taxonomic experts in botany.

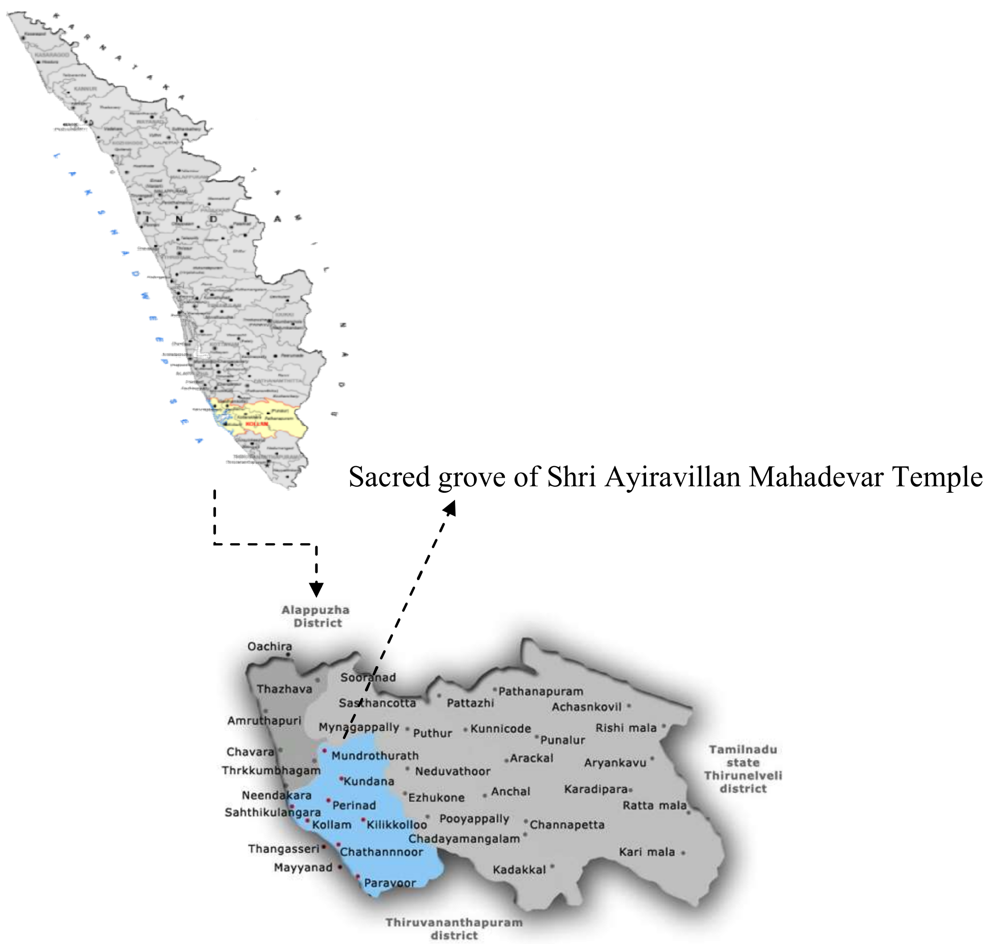


Figure 1.1: Selected study site

According to findings based on oral history, it is believed that this sacred grove is evolved centuries ago. But it is renovated with the temple only in 1970s. Later in 2020, this Sacred grove is included in the ‘Sacred grove Conservation Plan’ of Kerala Forest Department for 2020-2025 by Social Forestry, Kollam. It avails financial support for the conservation of diversity of sacred groves, protection of rare species of plants and animals and for constructing bio-fences.

Figure 1.2: Study area

The floor of the sacred grove is accumulated with leaf litters from the deciduous plant species. Litters in the floor play a crucial role in maintaining the fertility of the soil. They are the sources of nutrients and by transferring energy between plants and soil they plays a crucial role in maintaining biogeochemical cycle of nutrients also. By the decomposition of litters, the uppermost layer of the soil is always fertile. It also enhances the moisture retention capacity of the soil by cooling the ground and holding the water content in the decomposing litters itself.

High humidity present inside the sacred grove promotes the growth of several plant species. Ground portion is occupied by herbs, shrubs and lianas. Topmost portion looks like an open canopy by the presence of tall trees which leave open sunlit areas within woodland.

Flora includes ethno botanically relevant plants (medicinal plants), economically important plants, endemic species, endangered species etc. Woody plants are the dominant species which includes trees and lianas.

Figure 1.3: A-D; Kuzhiyam Sacred grove

This paper includes the floral study, Phytosociological analysis and Nutrient study of the soil of sacred grove of Shri Ayiravillan Mahadevar Temple, Kuzhiyam, Chanthanathope, Kollam, and Kerala.

Floral study includes the analysis of general floristic composition of vegetation of the respected sacred grove. Generally sacred groves consist of low level evergreen forest like vegetation. Trees present in sacred groves are generally mixed with shrubs. The ground portion of sacred groves is covered with litter. Macro-fungus and ferns are generally abundant. There are variations present in the floristic diversity of sacred groves by the human impact and climatic changes. Different species occupies dominance in top canopy and ground layer. Generally ground layer is occupied by shrubs, climbers etc. Majority of fungus occupies dead trunks of fallen trees. Generally, sacred groves consist of evergreen trees. Sometimes, deciduous and semi deciduous trees are also seen. In most of the cases, trees present in sacred groves has morphological adaptations like the elongation of branches to the top most region, enormous heights with tall bole etc. (forest.kerala.gov.in).

Phytosociological studies are useful to collect the characteristics, classification, relationship and distribution of plant communities. It is helpful to describe the population dynamics of each species studied and how they are related to the other species in the same community. It is essential for protecting the natural plant communities and biodiversity as well as understanding the changes experienced in the past and continuing on in to the future (Chandran*et al.*, 2020). In this work the quadrat method was applied for phytosociological analysis of the respected vegetation. The quadrat method is a sampling method by which the organisms in a certain proportion of the habitat are counted directly. The quadrat position are chosen randomly or they are placed along a transect.

Soil is a major source of nutrients needed by plants for their growth. Important nutrients in the soil include nitrogen, phosphorous, potassium, calcium, magnesium, sulphur etc. Nutrients are essential for plants for germination, for growth, for biotic and abiotic resistance, for reproduction etc. So nutrient analysis of soil gives the amount of available nutrients present in that soil and thereby provides which nutrient is responsible for the respected growth of the respected plant or vegetation. This paper includes the chemical analysis of Calcium, Nitrogen, Sodium, Iron, Zinc, Copper, and Magnesium in the soil sample from the sacred grove. Calcium is essential for growth of new roots and root hairs, root health and development of leaves. Nitrogen is more important than any other element for plant. It is used to synthesise chlorophyll, enzymes needed for plants. It gives plants the energy to grow. Sodium aids in metabolism and synthesis of chlorophyll. But it is not an essential element, because it only needs in small amounts to plants. Over content of Sodium in soil causes stunted growth in plants. Iron is present in many compounds that regulate and promote growth and are responsible for chlorophyll production and nitrogen fixation. Zinc helps in the production of auxins that is responsible for stem elongation and leaf expansion and it helps the plant to withstand cold temperatures. Copper is present in several enzymes of plants that is essential in photosynthesis, plant respiration and in metabolism of carbohydrates. Magnesium plays a crucial role in photosynthesis as it is a key component of chlorophyll and its shortage results in stunted plant growth. Among these Nitrogen, Calcium and Magnesium are regarded as the major elements required in large quantities for plants and Iron, Copper, Zinc and Sodium are the trace elements that are required in small quantities for plants.

II. OBJECTIVES

- To study the present status of floral diversity at Kuzhiyam Sacred grove.
- Phytosociological analysis of the flora.
- Quantitative analysis of Nutrients in the Soil.

III. REVIEW OF LITERATURE

Protection of natural resources has been a part of the world's different cultures and it is necessary for conservation. Through only conducting different studies on interested areas will promotes its conservation. In olden days, sacred groves are considered as a traditional conservation method by people. So they have to protect sacred groves as a method to conserve biodiversity from invaders. But now a day, sacred groves have no such importance in conservation of biodiversity. It is likely because of the lack of awareness about role of sacred groves in conserving biodiversity in present generation. So it is important to conduct different studies on sacred groves to extent the information about the role of sacred groves in biodiversity conservation to the present generation. Studies conducted in any forest or conserved area other than sacred grove will promote the conservation of sacred grove directly or indirectly in one way or another way. Because any conservational method of biodiversity or simply trees are related with sacred groves, though they are the traditional method for conserving trees or biodiversity.

So studies conducted on a conserved area will promote the conservation of scared groves. Though it is necessary to extent the information about sacred groves to the present generations. Though sacred groves and forests are the traditional method for conservation of biodiversity, it is necessary to quote sacred groves and forest in a same work. It will enhance awareness of conserving biodiversity. Discussed below are such works related to conserving biodiversity through the study of sacred groves and forest.

Ramya *et al*. (2020) conducted a phyto-sociological study in the tropical moist deciduous forest of Manar beat and identified nineteen tree species belongs to 13 families. *Pongamia pinnata* and *Terminalia arjuna* showed the highest important value index which defined the dominant species. Community indices like, Shannon diversity, Simpson index, Margalef index, Menhinick's index and equitability of evenness of the tree species in the community indicated the status of biodiversity of tree species and *Dalbergia latifolia* and *Santalum album* species comes under vulnerable category and these species were observed in the ecological survey of sampling plots.

Usharani*et al.* (2018) reported a phyto-sociological study on the diversity of plants in natural and protected subtropical forest of Manipura and reported a total of 79 species of trees and shrubs belonging to 35 families. Quantitative features such as Frequency, Density, Basal area, Important Value Index (IVI), Distribution pattern were evaluated. *Schima wallichii*, *Lantana camara*, was the dominant tree and shrub species of natural forest whereas *Ficus benjamina, Lantana camara*, were the dominant tree and shrub species of protected forest.

Galan*et al.* (2020) carried out a phyto-sociological study in the montane rainforests of Peru. They developed a cluster, using the Sorensen index, to know the similarities between the forests and their parallelism with bioclimatic conditions and they established different communities and phyto-sociological units for Peru. They described seven associations, that are gathered in the new order Saurauio peruvianae-Condaminetalia corymbosae of the new class Morello pubescentis-Myrsinetea coriaceae and two associations have been described within the class Pruno rigidae-Oreopanacetea floribundae and three for the class Alnetea acuminatae.

Barros*et al.* (2018) conducted a phyto-sociological survey of the weed community present in organic and conventional vegetable growing systems of Alagoas state, in Brazil. Quantitative features such as calculation of Frequency, Density, Abundance, Relative Frequency, Relative Density, Similarity Index (SI) and Importance Value Index (IVI) for each species were evaluated. There were 299 weed species identified and are grouped under 11 botanical families such as Amaranthaceae, Asteraceae, Commelinaceae, Cyperaceae, Euphorbiaceae, Malvaceae, Molluginaceae, Phyllantaceae, Poaceae, Rubiaceae and Solanaceae. A major diversity of weed species was observed in organic cultivation, being superior to conventional one in all phyto-sociological parameters.

Majority of plants have their own significance. Sometimes it may be their medicinal values. Traditionally, most of the plants conserved in sacred groves have medicinal values.

Wild types of such medicinal plants can be explored through studying the floral diversisty of respected sacred grove. Nepal is a typical place where plants are more exploited for medicinal purpose. For the keeping of its wild variety they conserved these plants in an isolated area such as sacred groves. Now a days, several studies are gone through the sacred groves in Nepal. These studies will help to explore the medicinally important plants. Such a study was conducted by Ripu and his assosciates in 2019 in Nepal Sacred Landsacape. Here it is;

Kunwar*et al.* (2019) reported a phytosociological studies and community interviews in the Darchula and Baitadi districts of the Kailash Sacred Landscape Nepal to know how people use plant resources in the context of availability and accessibility of plants and habitats, and diversity of culture. Plant availability was assessed by using phytosociological indicators and the accessibility was tested by using the use values of plants with reference to the site-specific explanatory variables. Plant use value was influenced by ecological indicators such as Shannon diversity and species richness, and cultural indicators such as preference for specific products and recognition and they varied at the level of use category such as medicinal and non-medicinal.

Rahman*et al.* (2020) carried out a study to evaluate the influence of environmental gradients upon the structure of plant communities and to highlight their respective indicators in subalpine pastures of the Himalaya, Pakistan. To quantify the vegetation structure of the study area, Line transect method and to determine the climatic gradients, Weather station data were used. GPS data was used to record the geographic and physiographic gradients. Plant species recorded from sampling sites, were grouped into plant communities with the help of environmental gradients such as edaphic and climatic factors. The highest number of plant species, maximum alpha diversity and beta diversity was reported in Sibbaldia- Rheum-Bergenia community, but Pielou‟s evenness was highest in Juniperus-Sibbaldia-Poa.

Kunev*et al.* (2020) conducted a study to presents new data on the distribution, floristic and ecological structure and phytosociological affinities of *Genista lydia Boiss.*in the territory of south Bulgaria and northeast Greece. Unweighted pair–group method with arithmetic averages and correspondence analysis was used to the syntaxonomical decision. Three new associations and the new alliance *Genistion lydiae* have been described and classified within the order *Lavandulo stoechadis-Hypericetalia olympici* Mucina *of the class Cisto-Lavanduletea stoechadis* Br.-Bl.

Ighbareyeh*et al.* (2021) carried out a study on the vegetation of the Wadi Al-Quf Nursery Reserve territories of the west-north of Hebron-Palestine. They reported existence of 82 species, of which 16 are endemic and ninety plots of vegetation distributed in this area. Braun- Blanquet methodology was used to analysis and phyto-sociological studies, and used classification of the land for Salvador Rivas Martinez to analysis of the physical factors of the bioclimate and climate. They collected 300 samples of different plant species and in the statistical treatment they reported two large groups in the cluster; group (A), representing forests, copses and high shrub lands influenced by climate and group (B), representing pino copses which are influenced by climate.

Uddin*et al.* (2019) conducted a study on the vegetation in four Village Common Forests (VCFs) of Khagrachori district, Chittagong Hill Tracts, Bangladesh. They used quadratic method (10x10 m) for every VCF following three plots in each of base, mid and top of the hill and they reported 124 species belonging to 44 families. Importance value index indicated that the dominant species was Oroxylum indicum. The value of Shannon-wiener diversity index, Simpson index and Evenness index of VCFs were also noted. VCFs of Khagrachori district harbored eight least concerned and three threatened species of the country. The dominant family was Euphorbiaceae followed by Moraceae and Rubiaceae.

Anwar*et al.* (2019) reported phyto-sociological studies of weeds of wheat crop under edaphic variation in tehsil Razar district Swabi, Khyber Pakhtunkhwa, Pakistan. They used 200 quadrats (1x1 m) in 20 randomly selected wheat fields. Analytical quantitative characters like density, frequency and cover were calculated for each weed species and 20 weed communities were recognized on the basis of highest importance value of three leading species. Total important value of three dominant species and the remaining associated species were also noted, and Sorensen's index was used to study similarity between the weed communities. Higher similarity was recorded between Veronica-Papaver-Phalaris community and Trifolium-Cynodon-Melilotus community and lower similarity was recorded between Anagallis-Emex-Phalaris community and Veronica-Cerastium-Anagallis community. Physico-chemical analysis of soil showed that soil texture, pH, electrical conductivity, Calcium carbonates and organic matter were strong edaphic variables that give rise to diverse weed species composition, richness and distribution.

Patel*et al.* (2020) carried out a phytosociological study of some weeds in agriculture crop field in Sami Taluka, Patan District of Gujarat, India. Density, frequency and abundance were used to know the distribution of plant species. They reported 47 weeds plant species belonging to 45 genera and 21 families. Abundance, Density, Frequency were used as the ecological parameters for finding the distribution of plant species. There were 40 species belongs to Dicotyledone and 7 species belongs to Monocot, Asteraceae is the leading plant family with 8 number of plant.

Patel (2021) conducted a phytosociological analysis of tree species of Sebhargog region of reserve forest of Vadgam Taluka, Banaskantha District of Gujarat, India. They reported 34 tree species, and *Acacia nilitica*L., *Butea monosperma*L., *Acacia chundra*L., is the most dominant in this area and *Delonix regia* (Bojer ex Hook.) Refin, *Morinda tomentosa*Lam. and *Moringa oleifera*Lam. are the minimum number in this area. Relative Frequency, Relative Density, Abundance, Importance Value Index, Girth at breast height was used as the ecological parameters for finding the distribution of plant species.

Mera *et al.* (2021) reported a phyto-sociological classification of the Peruvian vegetation. They reported 218 associations belong to 34 phytosociological classes and four of them are described for the first time. In addition, 5 new orders, and 7 new alliances are also described. Phyto-sociological plot accompanied by an abundance dominance index were used for the phyto-sociological study.

Chandran *et al.* (2020) reported Phytosociological studies of three terrestrial ecosystems of Wayanad Wildlife Sanctuary, Kerala, India. 85 quadrats (10 x 10 m) were used in each vegetation type. They reported 96 plant species in natural forest and 70 and 66 respectively in plantation and vayal. They reported that Fabaceae was the dominant family in all the three vegetation types. *Chromolaena odorata*, followed by *Lantana camara,Mimosa* *pudica*, *Terminalia elliptica,Glycosmis pentaphylla* dominates the natural forests and *Arundinella leptochloa* followed by *Chromolaena odorata*, *Kyllinga nemoralis*, *Sporobolus tenuissimus* dominates the vayal. Highest Simpson Diversity Index was showed by the vayal and the highest Berger-Parker Dominance Index value was showed by plantation. Natural forests recorded highest Margalef's Richness Index and the least was in vayal, and the highest Pielou's Wiener Equitability Index was showed by vayal.

Goncharenko (2020) conducted a Phyto-sociological study of the forest vegetation of Kyiv urban area in Ukraine. They reported 18 syntaxa within 7 classes, 7 orders, 8 alliances and 3 new associations. They analyzed vegetation data using quantitative approaches of ordination and phytoindication, and the clustering algorithm of Distance-Ranked Sorting Algorithm was used to classify vegetation matrix. The study contains large-scale comparative floristic analysis of syntaxa from different regions and countries and summarized in differentiating tables.

Silva Martinez*et al.* (2020) carried out a phyto-sociological survey of spontaneous plants in the agro ecological maize crop cultivated with intercalary cover plants in the summer and fall/winter harvest. Experimental design used was of randomized blocks with subdivided plots in the time 4x2x2, with 5 replicates. Frequency, Abundance, and Density of plants per linear meter and the importance value index were determined in a 1 m^2 area. The study shows that *Commelina benghalensis,* L. and *Leonorus sibiricus,* L. were the plants with the highest IVI for the crop modalities maize + pigeon pea and maize + showy rattlepod.

Jeeshna (2020) conducted a Floral Diversity and Phyto-sociological Analysis of Sree Narayana College Campus, Thottada, Kannur, Kerala, India. Floristic surveys were used for the floral study. There were 213 vascular plants falling under 181 genera and 72 families and out of which, 210 members constitute the angiosperms, while two were Pteridophytes and only one gymnosperm. They reported 91 herbs, 40 shrubs, 54 trees, 21 climbers, 1 epiphyte, 1 climbing fern, 4 creepers and 1 climbing shrub with respect to their habit. Phyto-sociological study includes the evaluation of Frequency, Density and Abundance.

Santana*et al.* (2020) conducted a Phyto-sociological study of the shrub-arboreal stratum of the Ibura National Forest, North-eastern Brazil to evaluate the natural regeneration of a forest fragment in 35 years of time. The main objective of this study was to analyze the composition and phytosociological parameters of shrub and tree vegetation in areas of plantation of *Corymbia citriodora* and areas of native forest in the Ibura National Forest. 20 plots were sampled and it revealed 821 individuals in the forest area and 1,000 in the eucalyptus area. These reported individuals represent 84 species.

Manzoor (2021) reported a Phyto-sociological study and Distribution pattern study of trees associated with agroforestry in Poonch district of Jammu & Kashmir, India. The quadrat method (10x10m) is used to collect the data. They reported 26 tree species belonging to 16 families and 21 genera with *Grewia optiva*, *Pyrus persica* and *Celtis australis* being the tree species in dominance. *Grewia optiva* was the densest species of tree that is recorded with a high density value o followed by *Pyrus persica*. *Buxus wallichiana* was the least dense species recorded.

Cano*et al.* (2020) conducted a Phyto-sociological Study, Diversity and Conservation Status of the Cloud Forest in the Dominican Republic and it reveals the presence of four types of vegetation formations. They used the Shannon diversity index to characteristic, companion, non-endemic, and endemic species. This study has made it possible to significantly increase the botanical knowledge of this important habitat.

Verma (2020) carried out a Phyto-sociological Analysis and study on Biodiversity of Plants around the embarkment area of Daha River in Siwan. The river is polluted due to discharge of sugar factories wastes and distilley effluents and as a result as the river contains low dissolved oxygen, high BOD and COD values and low pH. Species were identified with different stages of growth in the three selected sites and the number of species at three different sites was grouped seasonally in summer, rainy and winter. All the species present at the study sites have shown maximum values of frequency, density and abundance in rainy season in comparison to that of summer and winter seasons and were influenced by the climatic, anthropogenic and biotic stresses in the sites.

Zervas*et al.* (2020) conducted a Phytosociological survey of aquatic vegetation in the main freshwater lakes of Greece and investigates the relationship between aquatic plant communities and lake environmental parameters, including eutrophication levels and hydro-morphological conditions. Multiple regression analysis was applied to investigate the relationship between vegetation syntaxa and environmental parameters of lakes like physico-chemical parameters and water level fluctuation. They reported 99 plant taxa belonging to 30 families and based on their ecological characteristics, diagnostic taxa and syntaxonomical status, 46 vegetation types were identified and described.

Fanelli*et al.* (2020) carried out a Phytosociological study of the Fagus and Corylus forests in Albania. They used a dataset of 284 published and unpublished releves and were classified using the Ward's minimum variance. To analyze the ecological gradients, NMDS ordination was conducted. Random Forest was also used to define the potential distribution of the identified forest groups in Albania. They identified 7 groups of forests in Albania and they were also grouped into four main types. Their study supports an ecological classification of mesophilous forests of Albania at the level of sub alliance.

Raut *et al.* (2020) conducted an experiment during the rainy season of 2016 and 2017 at Dapoli, Maharashtra, to study the influence of different age of seedling age, levels and methods of fertilizers application on growth, yield, nutrients content, uptake and economics in *Oryza sativa*, L. The result revealed that the 20 days old seedling showed the highest content of N, P, K and total uptake of N, P, K, Zn, Cu and B as compared to 30 days and 40 days old seedling during both the years of study.

Patel (2021) conducted a phytosociological analysis of tree species of sebhargog region of reserve forest of Vadgam Taluka in North Gujarat, India and recorded 34 tree species from this range. Most abundant tress are *Acacia nilitica,* L., *Butea monosperma,*L., *Acacia chundra* L. and less are *Delonix regia,* (Bojer ex Hook.) Refin., *Morinda tomentosa,* Lam and *Moringa oleifera*, L.

Ming*et al.* (2021) carried out a study on soil degradation subtropical area of southwest China with intensive vegetable cropping. They compared the nutrient status and soilquality parameters; soil organic carbon, total nitrogen, C/N ratio, pH, phosphorus, potassium, calcium, and magnesium between vegetable fields and land still used for paddy rice-oilseed rape rotation that are typical of southwest China. In the VF, fertilizer application was often several times higher than the crop needs or recommended by the local extension service.

Studies on the sediment composition and metals in the vegetation of Manori and Thane creeks by Lina *et al*. (2019) indicated that the study area was moderately polluted with Cu and Pb. Based on the degree of contamination, the core sediments were found to be considerably contaminated with metals. Arindam *et al*. (2018) highlighted the distribution and nature of the organic carbon which showed the highest affinity for clay-sized fraction of the sediment. Alteration of sediment texture resulted in changed the distribution pattern in the lake after the construction of the bund. Based on the geo accumulation index, heavy metal contamination in mudflat and sediments showed that the estuarine and creek regions are recipients of industrial and domestic wastes, displaying moderate pollution (Lina and Nayak, 2019).

Behera *et al*. (2020) opined that the pollution in the soil is due to the presence of heterotrophs, free-living N fixers, nitrifiers, denitrifiers, phosphate solubilisers, cellulose 2 degraders and sulphur oxidisers. Changes in natural yeast populations in sediments were the result of human disturbance (Eva, 2019). Genetic variability of yeasts isolated from a natural sediment and the ecosystem by RAPD-PCR profiles revealed more yeast genotype in natural sediment implying that, the anthropogenic activities have modified and reduced the diversity of yeasts to fewer genotypes.

The geochemical assessment of heavy metal contamination in mangrove ecosystem showed that the heavy metal contamination was higher in the upper layer of mangrove sediments compared to mudflats (Kumar Goutam and Ramanathan, 2020). Manzoor *et al*. (2021) plotted the concentrations of heavy metals in different samples of mangrove sediments along the coastal areas of Pakistan and found that concentration of heavy metals in the mangrove sediments near to Lyari and Malir river discharge points were at much higher level than the mangrove sediments of Port Qasim area. Spatial and Temporal Variation of organic carbon in mangrove sediment of Rembau- Linggi estuary was determined by Muhammad *et al*. (2021). There were no significant correlations between organic carbon content in mangrove sediment with the water quality parameters. The variability in OC content in each station indicated that anthropogenic activities and land uses in the area influenced on the distribution of OC content in this estuary.

The sources of Organic Matter in typical ecosystem of Cochin were assessed by Manju *et al*. (2020). The biochemical composition of sedimentary organic matter revealed a dominance of lipids over proteins and carbohydrates. Presence of significant amount of polyunsaturated fatty acids in the sediments confirmed the freshness of organic matter. Ratheesh Kumar (2020) evaluated the degree of anthropogenic influence on heavy metal concentration in the sediments of the land adjacent ecosystem using enrichment factor and geo accumulation index. The analysis disclosed the increase of Pb and Zn in sediments. The geo accumulation index exhibited very low values for all metals except Zn, indicating the sediments of the ecosystem were unpolluted to moderately pollute by anthropogenic activities.

Sacred groves contribute significantly to the storage of organic carbon in biomass and restoration of soil health. Sanjitha and Binoy (2020) investigated the rate of carbon sequestration in the sacred groves of Manipur by analyzing the amount of organic carbon stock in soil under them. The soil samples were collected using soil corer up to 30 cm depth. The rate of sequestration of carbon differed due to the variation in physico-chemical characteristics of the soil and steepness of the slope. Species composition also affected the productivity.

The soil quality comparative study between selected sacred and non-sacred groves in the Central Western Ghats was analysed by Saira *et al*. (2019). Physical analyses revealed that the soils in both the sacred and non-sacred groves have high moisture content and bulk density, as the samples were collected during the peak of the monsoon season. Bulk density values were highest in Kattalekan region and least in Torme kan.

The Electrolytic Conductivity of the Hosagunda kan soil was the highest and the least value was found at Mooruru and Vibuthi non kans. The available Potassium value was highest at Hosagundakan area and least in Heravalli non kan. The soil sodium values were highest in Kattalekan region and least in Baruru non kan region.

A study carried out by Jincy and Subin (2021) revealed that the parameters like floral density, relative density and relative frequency and total basal area of tree species were considerably higher at Sree Sankulangara sacred grove compared to adjacent disturbed non-sacred grove land. The values of moisture content, water holding capacity, porosity and electrical conductivity were recorded high in sacred grove region while values of bulk density and pH were recorded low when compared to adjacent disturbed non-sacred grove region.

Analysis of temperature and humidity related to soil and atmosphere in the study sites showed that low temperature and humidity is maintained within the grove region compared to non-sacred grove region.

IV. MATERIALS AND METHODS

1. Survey of the Flora of Sacred Grove

- Analysis of Flora
- Identification
- Nomenclature of plants

2. Standard Phytosociological Methods – by Quadrat Method

- **Density:**

$$\text{Density} = \frac{\textit{Total number of individuals of a species in all quadrats}}{\textit{Total number of quadrats studied}}$$

- **Frequency (%):**

$$\text{Frequency (\%)} = \frac{Number\ of\ quadrats\ in\ which\ the\ species\ occured}{Total\ number\ of\ quadrats\ study} \times 100$$

- **Abundance:**

$$\text{Abundance} = \frac{Total\ number\ of\ individuals\ of\ a\ species\ in\ all\ quadrats}{Total\ number\ of\ quadrats\ in\ which\ the\ species\ occurred}$$

- **Importance Value Index:**

IVI = Relative Frequency + Relative Abundance + Relative Density

- **Maturity Index Value:**

$$\text{MIV} = \frac{\text{Frequency of all species}}{\text{No.of species studied}} \times 100$$

- **Relative Density:**

$$\text{Relative Density} = \frac{Number\ of\ individual\ of\ the\ species}{Number\ of\ individual\ of\ all\ the\ species} \times 100$$

- **Relative Frequency:**

$$\text{Relative Frequency} = \frac{Number\ of\ occurrenc\ \ of\ the\ species}{Number\ of\ occurrence\ of\ all\ the\ species} \times 100$$

- **Relative Abundance:**

$$\text{Relative Abundance} = \frac{Total\ number\ of\ species}{Total\ number\ of\ individual\ plants} \times 100$$

3. Diversity Indices

- **Margalef's index of richness:**

'Margalef's index of richness' (Dmg)
Dmg = (S-1)/ In N
Where,
S = Total number of species.
N = Total number of individuals.

- **Shannon–Weaver Index of Diversity:**

H' = – Σ *p*i In *p*i
Where, H' = Shannon index of diversity
*P*i= the proportion of important value of the ith species (*p*i =*n*i / N, *n*i is the important value index of ith species and N is the important value index of all the species).

- **Simpson Index of Dominance:**

  D = Σ (*p*i)2
  Where, D = Simpson index of dominance
  *P*i = the proportion of important value of the ith species (*p*i = *n*i/ N, *n*i is the important value index of ith species and N is the important value index of all the species).

- **Pielou's Evenness Index:**

$$J' = \frac{H'}{\ln(S)},$$

  Where, J' = Pielou's evenness Index
  H′ represents the observed value of Shannon index
  S is the total number of species observed.

V. QUANTITATIVE ANALYSIS OF NUTRIENTS IN THE SOIL

1. **Analysis of Soils: Extractable Cations:** There are several different extracting solutions used to determine extractable cations in soils. A 0.05N HC1 in 0.025N H_2SO_4, solution (Double Acid) or a 0.IN HCI solution is common. These are suitable for elements, including calcium, copper, iron, magnesium, sodium and zinc.

- **Sample Preparation:** Place 5.0g of an air-dried, ground and sieved sample in an Erlenmeyer flask. Add 20 mL of extracting solution (0.05N HCI+0.025N H_2SO_4). Place in a mechanical shaker for 15 minutes. Filter through Whatman 42 filter paper into a 50 mL volumetric flask and dilute to 50 ml with extracting solution.

- **Working Standard Solutions:** All working standards should be prepared using the extracting solution. Dilute aliquots of stock solution with 10% HCl to make working standard solution of each element within the range of determination.

Calcium (Ca)	**4 ppm**
Sodium (Na)	**4 ppm**
Iron (Fe)	**6 ppm**
Zinc (Zn)	**I ppm**
Copper (Cu)	**4 ppm**
Magnesium (Mg)	**0.3 ppm**

- **Analysis of Soil:**

  Determine the concentration of the elements of using Atomic Absorption Spectroscopy (AAS).

$$\textbf{Metal (mg/ kg)} = \frac{\textbf{Metal concentration(ppm) in sample x 10}}{\textbf{Weight of sample}}$$

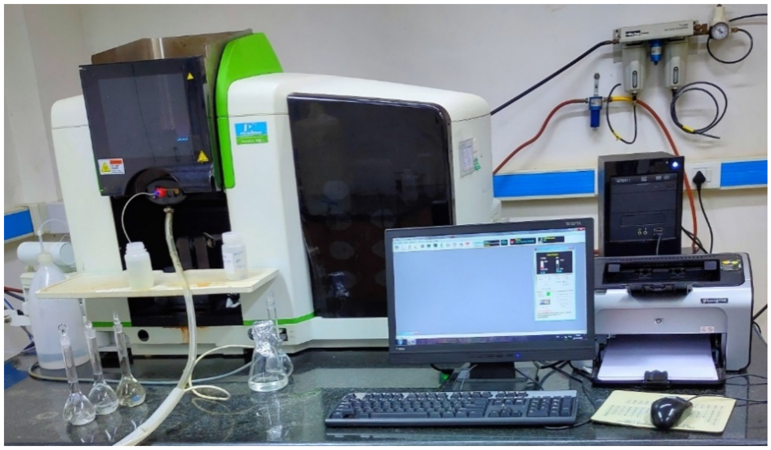


Figure 3.1: Atomic Absorption Spectroscopy

2. **Determination of Nitrogen (N) By the Kjeldahl Method Using the Kjeltec Instrument:** The Kjeldahl method determines the total nitrogen in the given soil sample.

- **Apparatus**
  - ➢ Kjeldahl flasks
  - ➢ Kjeltec unit
  - ➢ 250 ml conical flasks
  - ➢ Burette

- **Reagents**
  - ➢ Concentrated sulphuric acid
  - ➢ Catalyst tables
  - ➢ 40% Sodium hydroxide solution
  - ➢ 2% Boric acid/indicator solution
  - ➢ 0.1M Sulphuric or hydrochloric acid
  - ➢ 30% Hydrogen peroxide

- **Procedure:** Transfer approximately 0.8-1.2gm of given soil sample, accurately weighed, to a digestion tube. Add two Kjeldahl tablets and concentrated sulphuric acid from an automatic dispenser. Place the tube in the preheated digester at 420°C for about 30 min until a clear solution is obtained (Where frothing is encountered, resulting in carbonisation in the upper parts of the tube, the addition of 5 ml of 30% hydrogen peroxide immediately before digestion and of an additional 1 ml towards the end of the digestion process may improve the efficiency of the digestion process.

  Particular care, however, needs to be taken in the use of this oxidant.)After digestion, remove the tubes from the digester, cool and dilute with water. Place the tube with the digested and diluted sample in the distillation unit.

Place a conical flask containing 25 ml of boric acid (containing indicator) under the condenser outlet. Dispense the alkali (25 ml of 40% NaOH) and distil for 4 minutes.

Titrate the ammonium borate solution formed with either 0.1 M sulphuric acid to a purplish-grey end point.

- **Calculation:** Using 0.1M sulphuric acid for titration.

$$\%\ \text{Nitrogen content} = \frac{0.28 \text{ x B}}{\text{weight of food in grams}}$$

Where B= volume (ml) of 0. IM sulphuric acid used in the titration.

Figure 3.2: Kjeltec Instrument

VI. OBSERVATION AND RESULTS

1. **Survey of the Flora of Sacred Grove:** In the present study, a total of 30 vascular plants falling under 21 families were identified. With respect to their habit there are 15 trees, 8 climbers, 4 shrubs and 3 herbs (Table 4.1.1).Dominating families were Fabaceae (5), Euphorbiaceae (3), Vitaceae (2), Loganiaceaea (2), Asteraceae (2) etc. (Fig 4.1.1). A total of 30 species were identified in 1.20 acre area of the sacred grove studied. Plant species recorded from the sacred grove are given in the table below (Table 4.1.1).

   Based on their habit, they were grouped under trees, climbers, shrubs and herbs (Table 4.1.2 - Table 4.1.5). Five rare plants were reported from the sacred grove and they are given in the Table 4.1.6.

Table 4.1.1: Floral diversity in the sacred grove

Sl. No	Plant	Common name	Habit	Family
1	*Adenanthera pavonina* L.	Manchadi	Tree	Fabaceae
2	*Ailanthus triphysa* (Dennst.) Alston	Perumaram, Matti	Tree	Simaroubaceae
3	*Asparagus racemosus* Willd.	Sathavari	Climber	Asparagaceae
4	*Borassus flabellifer* L.	Karimbana, Kulachipana	Tree	Arecaceae
5	*Carica papaya* L.	Papaya	Tree	Caricaceae
6	*Cayratia pedata* (Wall.) Gagnep.	Oonjalvalli, Chorivally	Climber	Vitaceae
7	*Centrosema molle* Mart. ex Benth.	Kattupayar, Kattushangupushpm	Herb	Fabaceae
8	*Chassalia curviflora* (Wall.) Thwaites	vellakurinji	Shrub	Rubiaceae
9	*Cinnamomum malabathrum* (Burm.fil.) J.Presl	Vayana, Therali	Tree	Lauraceae
10	*Cissus latifolia* Lam.	Chunnambuvalli	Climber	Vitaceae
11	*Coccinia grandis* (L.) Voigt	Koval	Climber	Cucurbitaceae
12	*Dalbergia horrida* (Dennst.) Mabb.	Anamullu	Climber	Fabaceae
13	*Diospyros candolleana* Wight	Karimaram	Tree	Ebenaceae
14	*Eupatorium odoratum* L.	Communistpacha	Shrub	Asteraceae
15	*Euphorbia tithymaloides* (L.) Poit.	Thatha chedi	Shrub	Euphorbiaceae
16	*Gliricidia sepium* (Jacq.) Steud.	Sheemakonna	Tree	Fabaceae
17	*Hopea ponga* (Dennst.) Mabb.	Kambakam, Thambakam	Tree	Dipterocarpaceae
18	*Lannea coromandelica* (Houtt.) Merr.	Udhi, Karasam	Tree	Anacardiaceae
19	*Macaranga peltata* (Roxb.) Müll.Arg.	Vatta	Tree	Euphorbiaceae
20	*Manihot esculenta* Crantz	Maracheeni	Shrub	Euphorbiaceae
21	*Mimosa pudica* L.	Thottavadi	Herb	Fabaceae

22	*Mimusops elengi* L.	Elengi	Tree	Sapotaceae
23	*Pothos scandens* L.	Paruvakkodi	Climber	Araceae
24	*Strychnos minor* Dennst.	Vallikanjiram	Climber	Loganiaceae
25	*Strychnos nux-vomica* L.	Kanjiram	Tree	Loganiaceae
26	*Swietenia macrophylla* G.King	Mahogani	Tree	Meliaceae
27	*Syzygium travancoricum* Gamble	Vathamkollimaram	Tree	Myrtaceae
28	*Tectona grandis* L.f.	Teak, Thek	Tree	Lamiaceae
29	*Tinospora cordifolia* (Willd.) Miers.	Chittamruhu	Climber	Menispermaceae
30	*Tridax procumbens* L.	Kumminnippacha, Kurikootticheera	Herb	Asteraceae

PLATE 4.1.1: (A) *Cinnamomum malabathrum* (Burm.fil.) J.Pre. (B) *Strychnos minor* Dennst. (C) *Tinospora cordifolia* (Willd.) Miers. (D) *Cayratia pedata* (Wall.) Gagnep.

PLATE 4.1.2: (A) *Chassalia curviflora* (Wall.) Thwaites. (B) *Pothos scandens* L. (C) *Cissus latifolia* Lam. (D) *Gliricidia sepium* (Jacq.) Steud.

PLATE 4.1.3: (A) *Coccinia grandis* (L.) Voigt. (B) *Euphorbia tithymaloides* (L.) Poit. (C) *Borassus flabellifer* L. (D) *Dalbergia horrida* (Dennst.) Mabb.

PLATE 4.1.4: *Diospyros candolleana* Wight.

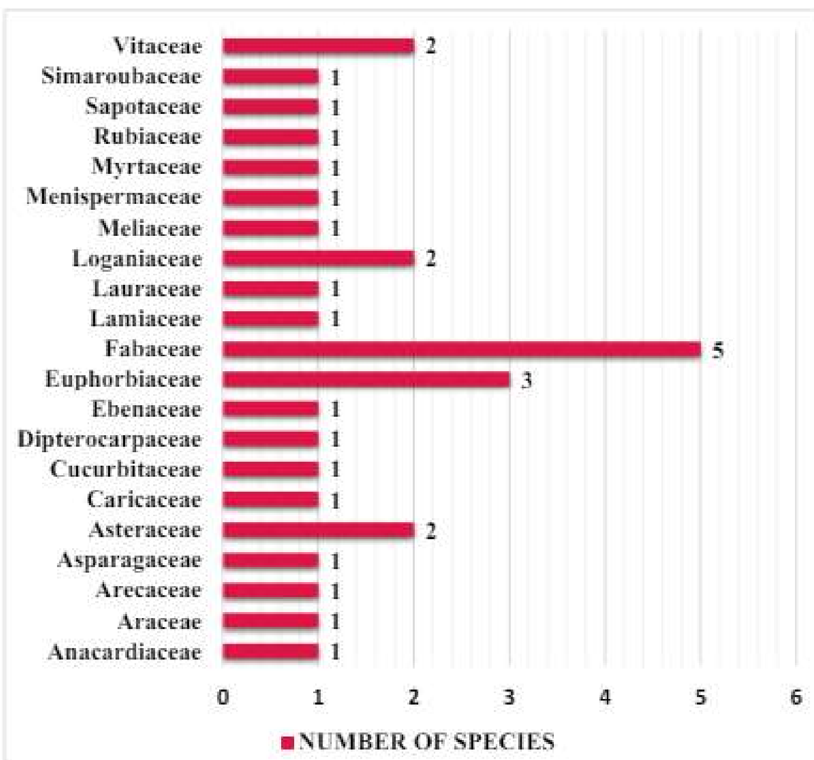


Figure 4.1.1: Number of Plant species distributed according to their families

Table 4.1.2: Representation of Tree Species

Sl. No.	Plant	Family
1	*Adenanthera pavonina* L.	Fabaceae
2	*Ailanthus triphysa* (Dennst.) Alston	Simaroubaceae
3	*Borassus flabellifer* L.	Arecaceae
4	*Carica papaya* L.	Caricaceae
5	*Cinnamomum malabathrum* (Burm.fil.) J.Presl	Lauraceae
6	*Diospyros candolleana* Wight	Ebenaceae
7	*Gliricidia sepium* (Jacq.) Steud.	Fabaceae
8	*Hopea ponga* (Dennst.) Mabb.	Dipterocarpaceae
9	*Lannea coromandelica* (Houtt.) Merr.	Anacardiaceae
10	*Macaranga peltata* (Roxb.) Müll.Arg.	Euphorbiaceae
11	*Mimusops elengi* L.	Sapotaceae
12	*Strychnos nux-vomica* L.	Loganiaceae
13	*Swietenia macrophylla* G.King	Meliaceae
14	*Syzygium travancoricum* Gamble	Myrtaceae
15	*Tectona grandis* L.f.	Lamiaceae

Table 4.1.3: Representation of Climbers

Sl. No.	Plant	Family
1	*Asparagus racemosus* Willd.	Asparagaceae
2	*Cayratia pedata* (Wall.) Gagnep.	Vitaceae
3	*Cissus latifolia* Lam.	Vitaceae
4	*Coccinia grandis* (L.) Voigt	Cucurbitaceae
5	*Dalbergia horrida* (Dennst.) Mabb.	Fabaceae
6	*Pothos scandens* L.	Araceae
7	*Strychnos minor* Dennst.	Loganiaceae
8	*Tinospora cordifolia* (Willd.) Miers	Menispermaceae

Table 4.1.4: Representation of Shrubs

Sl. No.	Plant	Family
1	*Chassalia curviflora* (Wall.) Thwaites	Rubiaceae
2	*Eupatorium odoratum* L.	Asteraceae
3	*Euphorbia tithymaloides* (L.) Poit.	Euphorbiaceae
4	*Manihot esculenta* Crantz	Euphorbiaceae

Table 4.1.5: Representation of Herbs

Sl. No.	Plant	Family
1	*Centrosema molle* Mart. ex Benth.	Fabaceae
2	*Mimosa pudica* L.	Fabaceae
3	*Tridax procumbens* L.	Asteraceae

Table 4.1.6: Rare Plants Reported from the Sacred Grove

Sl. No.	Plant	Common Name	Habit	Family
1	*Cinnamomum malabathrum* (Burm.fil.) J.Presl	Vayana, Therali	Tree	Lauraceae
2	*Dalbergia horrida* (Dennst.) Mabb.	Anamullu	Climber	Fabaceae
3	*Diospyros candolleana* Wight	Karimaram	Tree	Ebenaceae
4	*Strychnos minor* Dennst.	Vallikanjiram	Climber	Longaniaceae
5	*Syzygium travancoricum* Gamble	Vathamkollimaram	Tree	Myrtaceae

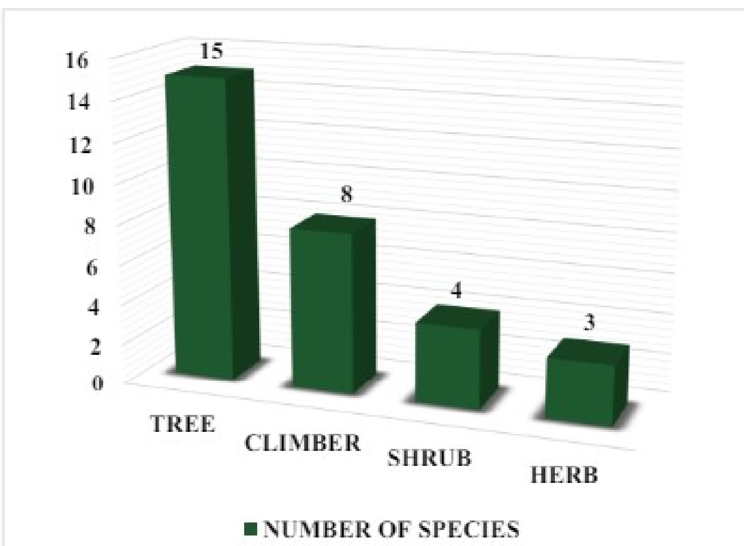


Figure 14.2: Number of plant species distribution according to their habi

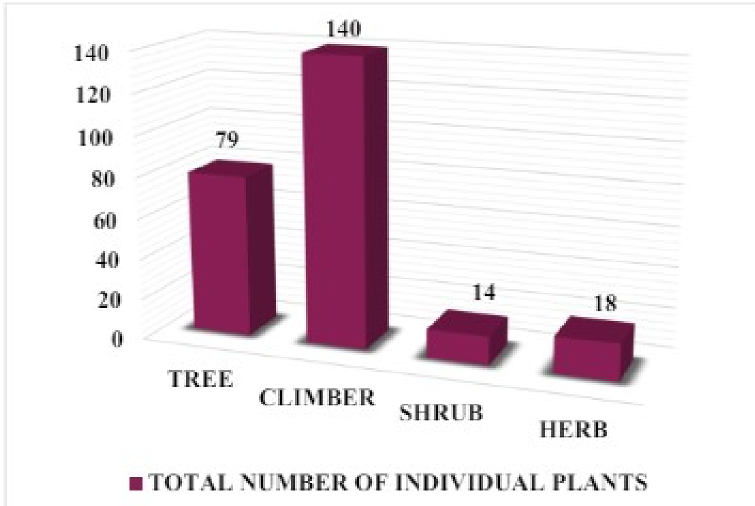


Figure 4.1.3: Total number of individual plant distribution according to their habit

The distribution of plant species identified from the sacred grove, tree species dominated among the total number of species (Fig 4.1.2) and climbers showed the largest number of individual plants (Fig 4.1.3).

VII. STANDARD PHYTOSOCIOLOGICAL METHODS - BY QUADRAT METHOD

The quadrat method has been used for phytosociological analysis. The quadrat is a square sample plot for detailed analysis of vegetation studies. The minimum quadrat size of 1mx1m was taken for the study. The number of quadrats taken was 10 and was laid by the randomized method in the site. The numerical data obtained were used to analyze Density, Frequency, Abundance, Relative Density, Relative Frequency, Relative Abundance Diversity indices etc.Among the quadrat study, quadrat 2 (20) showed the highest species diversity and quadrat 6 (8) indicated the lowest species diversity (Figure 4.2.3). The number of individual plants outraced in quadrat Q 2, while comparing other quadrats Q 3, Q 9, Q 10, Q 8, Q 1, Q 4 etc. (Fig 4.2.1). Survey of the flora of sacred grove by using quadrat method is given in the Table 4.2.1.

Table 4.2.1: Distribution of individual plants on each quadrat

Plant	Q 1	Q 2	Q 3	Q 4	Q 5	Q 6	Q 7	Q 8	Q 9	Q 10
Adenanthera pavonina L.		1		1	1					
Ailanthus triphysa (Dennst.) Alston			1		1				1	1
Asparagus racemosus Willd.			2	1						
Borassus flabellifer L.	3	3	2	2	2	1	2	2	2	2
Carica papaya L.		2								
Cayratia pedata (Wall.) Gagnep.		2	2	1	1		2	1	1	
Centrosema molle Mart. ex Benth.	4	2	1	1	2	1		1	2	1
Chassalia curviflora (Wall.) Thwaites	2	5	2	1						

Cinnamomum malabathrum (Burm.fil.) J.Presl	4	2	2			1		1		1
Cissus latifolia Lam.	1	2	1	4		2	2	2		
Coccinia grandis (L.) Voigt	1	2	2	1			4	2	2	2
Dalbergia horrida (Dennst.) Mabb.	1	2	1	2	2	2	1	2	8	4
Diospyros candolleana Wight.		1	1							
Eupatorium odoratum L.					1					
Euphorbia tithymaloides (L.) Poit.		1	1							
Gliricidia sepium (Jacq.) Steud.	2									
Plant	**Q 1**	**Q 2**	**Q 3**	**Q 4**	**Q 5**	**Q 6**	**Q 7**	**Q 8**	**Q 9**	**Q 10**
Hopea ponga (Dennst.) Mabb.				1	1	1				1
Lannea coromandelica (Houtt.) Merr.		1	1							1
Macaranga peltata (Roxb.) Müll.Arg.	2	1								
Manihot esculenta Crantz	1									
Mimosa pudica L.					1					
Mimusops elengi L.			1			1				1
Pothos scandens L.	1	8	8	9	2	2	1	9	10	9
Strychnos minor Dennst.		1	1				2	1	2	
Strychnos nux-vomica L.		1	1							
Swietenia macrophylla G.King							2	3	2	2
Syzygium travancoricum Gamble		1	1							
Tectona grandis L.f.							2	2	2	2
Tinospora cordifolia (Willd.) Miers	1	1	2	1						2
Tridax procumbens L.	1	1								

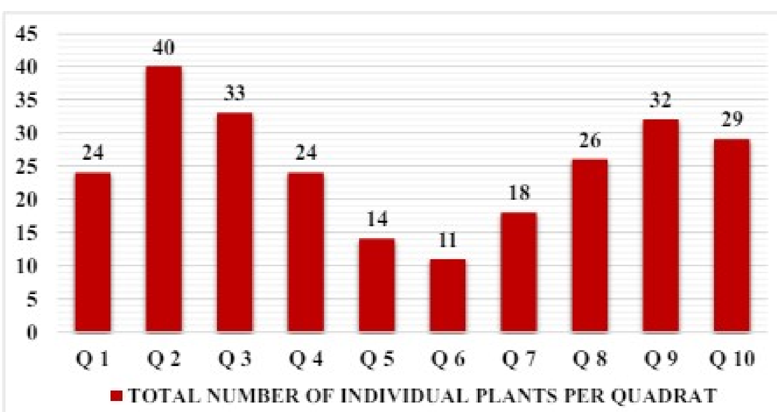


Figure 4.2.1: Distribution of individual plants in each quadrat

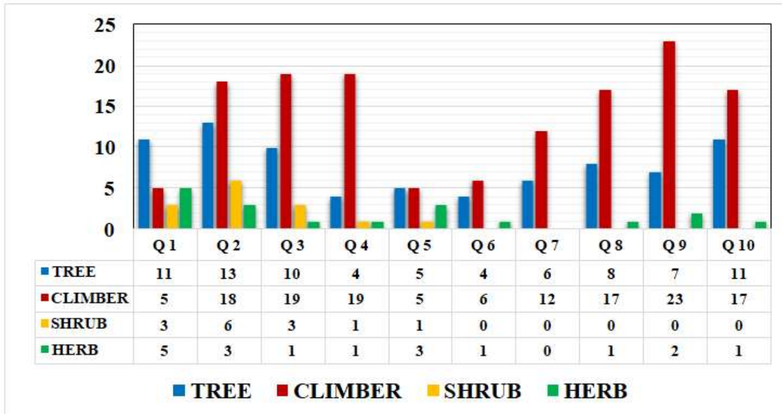


Figure 4.2.2: Distribution of individual plants in each quadrat by their habit

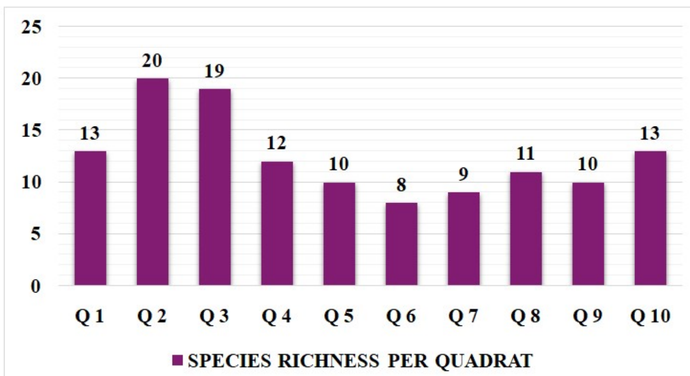


Figure 4.2.3: Distribution of plant species in each quadrat

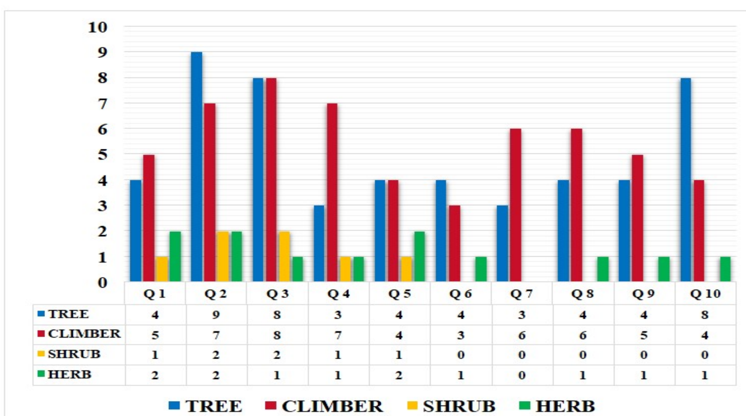


Figure 4.2.4: Distribution of plant species in each quadrat by their habit.

Phytosociological analysis of the plants are grouped under the table given below (Table 4.2.2).

Table 4.2.2: Phytosociological analysis of the data obtained by quadrat method

Sl.No	Plant	Tot. No. of Plants	Tot. No. of Quadats in which species occur	Tot. No Quadrats studied	D	F	A	RD	RF	IVF
1	*Adenanthera pavonina* L.	3	3	10	0.3	0.3	1	1.20	2.4	15.54
2	*Ailanthus triphysa* (Dennst.) Alston	4	4	10	0.4	0.4	1	1.60	3.2	16.74
3	*Asparagus racemosus* Willd.	3	2	10	0.3	0.2	1.5	1.20	1.6	14.74
4	*Borassus flabellifer* L.	21	10	10	2.1	1	2.1	8.36	8	28.31
Sl. No.	Plant	Tot. No. of Plants	Tot. No. of Quadats in which species occur	Tot. No Quadrats studied	D	F	A	RD	RF	IVF
5	*Carica papaya* L.	2	1	10	0.2	0.1	2	0.80	0.8	13.54
6	*Cayratia pedata* (Wall.) Gagnep.	10	7	10	1	0.7	1.42	3.98	5.6	21.53
7	*Centrosema molle* Mart. ex Benth.	15	9	10	1.5	0.9	1.66	5.97	7.2	25.12
8	*Chassalia curviflora* (Wall.) Thwaites	10	4	10	1	0.4	2.5	3.98	3.2	19.13
9	*Cinnamomum malabathrum*	11	6	10	1.1	0.6	1.83	4.38	4.8	21.13

	(Burm.fil.) J.Presl									
10	*Cissus latifolia* Lam.	14	7	10	1.4	0.7	2	5.57	5.6	23.12
11	*Coccinia grandis* (L.) Voigt	16	8	10	1.6	0.8	2	6.37	6.4	24.72
12	*Dalbergia horrida* (Dennst.) Mabb.	25	10	10	2.5	1	2.5	9.96	8	29.91
13	*Diospyros candolleana* Wight	2	2	10	0.2	0.2	1	0.80	1.6	14.34
14	*Eupatorium odoratum* L.	1	1	10	0.1	0.1	1	0.4	0.8	13.15
15	*Euphorbia tithymaloides* (L.) Poit.	2	2	10	0.2	0.2	1	0.8	1.6	14.34
16	*Gliricidia sepium* (Jacq.) Steud.	2	1	10	0.2	0.1	2	0.8	0.8	13.54
17	*Hopea ponga* (Dennst.) Mabb.	4	4	10	0.4	0.4	1	1.6	3.2	16.74
18	*Lannea coromandelica* (Houtt.) Merr.	3	3	10	0.3	0.3	1	1.2	2.4	15.54
19	*Macaranga peltata* (Roxb.) Müll.Arg.	3	2	10	0.3	0.2	1.5	1.2	1.6	14.74
20	*Manihot esculenta* Crantz	1	1	10	0.1	0.1	1	0.4	0.8	13.15
21	*Mimosa pudica*	1	1	10	0.1	0.1	1	0.4	0.8	13.15

	L.									
Sl.No	**Plant**	**Tot. No. of Plants**	**Tot. No. of Quadrats in which species occur**	**Tot. No Quadrats studied**	**D**	**F**	**A**	**RD**	**RF**	**IVF**
22	*Mimusops elengi* L.	3	3	10	0.3	0.3	1	1.2	2.4	15.54
23	*Pothos scandens* L.	58	10	10	5.8	1	5.8	23.1	8	43.05
24	*Strychnos minor* Dennst.	7	5	10	0.7	0.5	1.4	2.78	4	18.74
25	*Strychnos nux-vomica* L.	2	2	10	0.2	0.2	1	0.80	1.6	14.34
26	*Swietenia macrophylla* G.King	9	4	10	0.9	0.4	2.25	3.58	3.2	18.73
27	*Syzygium travancoricum* Gamble	2	2	10	0.2	0.2	1	0.8	1.6	14.34
28	*Tectona grandis* L.f.	8	4	10	0.8	0.4	2	3.18	3.2	18.33
29	*Tinospora cordifolia* (Willd.) Miers	7	5	10	0.7	0.5	1.4	2.78	4	18.74
30	*Tridax procumbens* L.	2	2	10	0.2	0.2	1	0.8	1.6	14.34

D - Density, F - Frequency, A - Abudance, RD - Relative density, RF - Relative Frequency, IVF - Importance value index

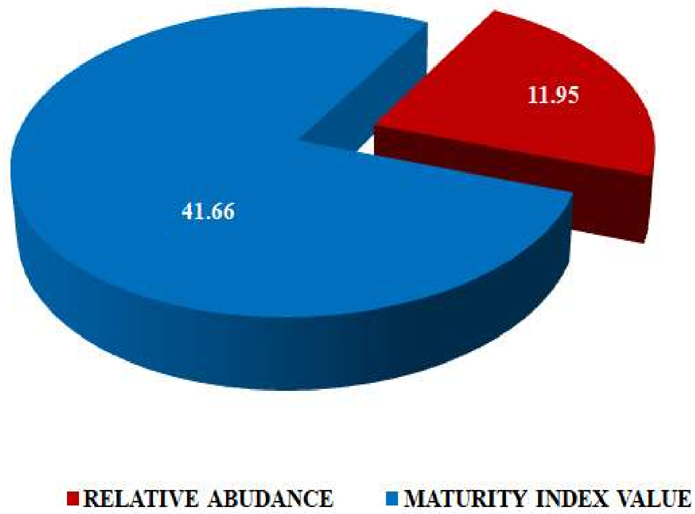


Figure 4.2.5: Pie chart showing Relative Abundance and Maturity Index Value

The calculated density of the quadrat analysis, *Pothos scandens* showed highest density, and the species namely *Dalbergia horrida*, *Borassus flabellifer*, *Coccinia grandis*, *Centrosema molle*, and *Cissus latifolia* showed a density ranged beneath under *Pothos sacdens* (Fig 4.2.6). And finally, according to their habit, climber dominated over the trees in case of density (Fig 4.2.7).

In tree habit, *Swietenia macrophylla* indicated highest density (Fig 4.2.20). In shrubs, *Chassalia curviflora* displayed highest density (Fig 4.2.21).

In herbs, *Centrosema molle* exhibited highest density (Fig 4.2.22). In climbers, *Pothos scandens* showed highest density (Fig 4.2.23).

From the studies, *Pothos scandens* had the highest frequency, and other species namely, *Dalbergia horrida*, *Borassus flabellifer*, and *Centrosema molle*are were below frequency range (Fig 4.2.9). Among these, climbers surpass the tree in frequency (Fig 4.2.8). In tree habit, *Cinnamomum malabathrum*revealed highest frequency (Fig 4.2.20).

In shrubs, *Chassalia curviflora* showed highest frequency (Fig 4.2.21). In herbs, *Centrosema molle* pointed out the highest frequency (Fig 4.2.22). In climbers, *Pothos scandens* and *Dalbergia horrid* indicated highest frequency (Fig 4.2.23).*Pothos scandens* exhibited the highest importance value index, and it was followed by *Dalbergia horrida*, *Borassus flabellifer* (Fig 4.2.17).

While evaluating the importance value index, tree dominated over climbers, shrubs and herbs (Fig 4.2.16).Relative Abundance and Importance Index Value are 11.95219 and 41.66667 respectively (Fig 4.2.5).

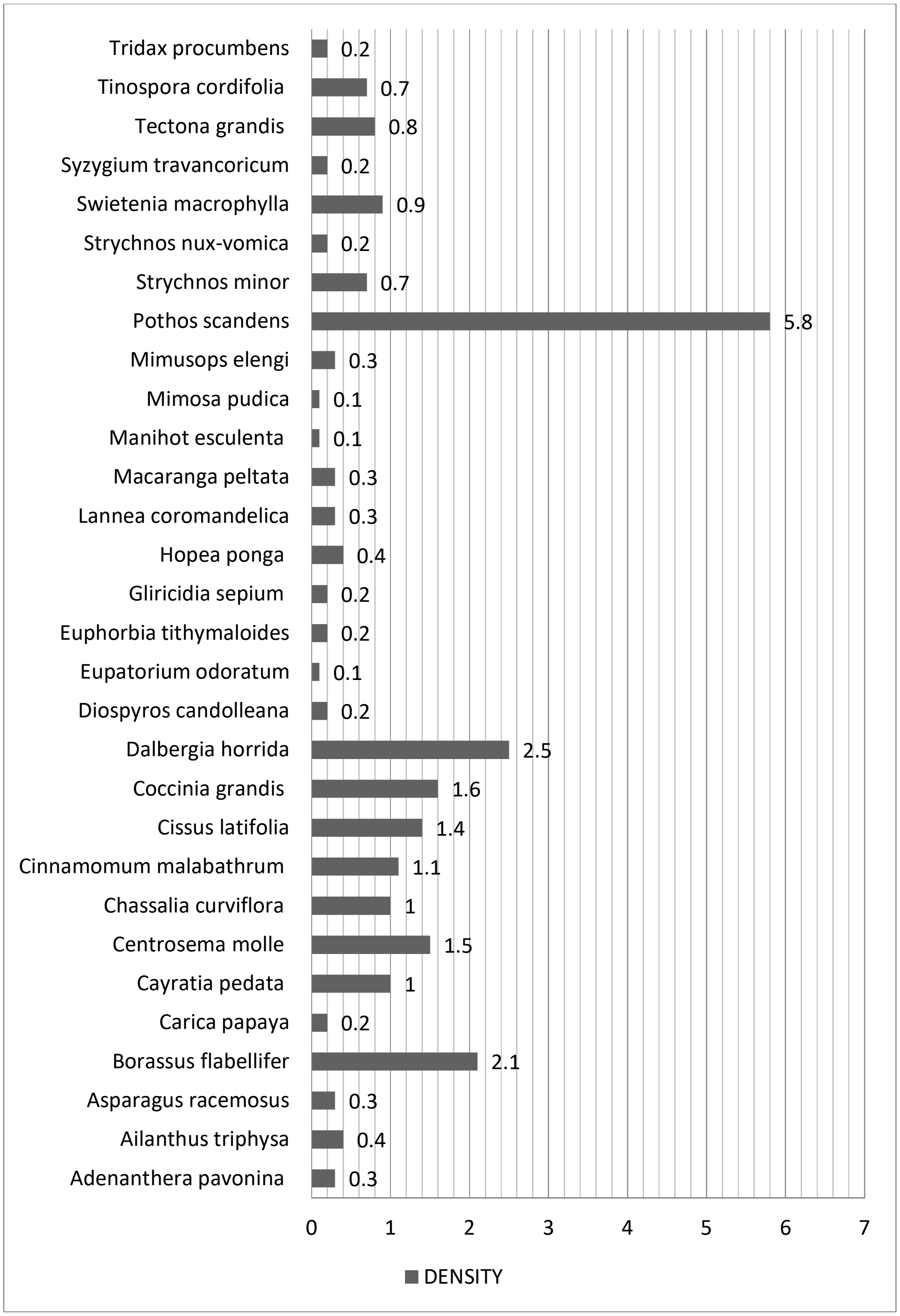


Figure 4.2.6: Density of plant species

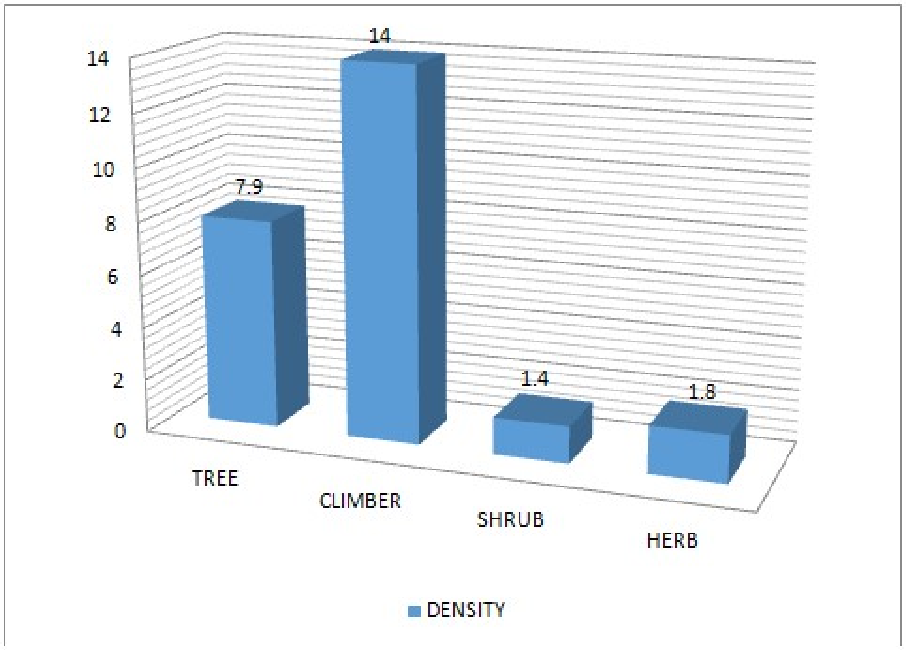


Figure 4.2.7: Distribution of Density of plants species based on habit

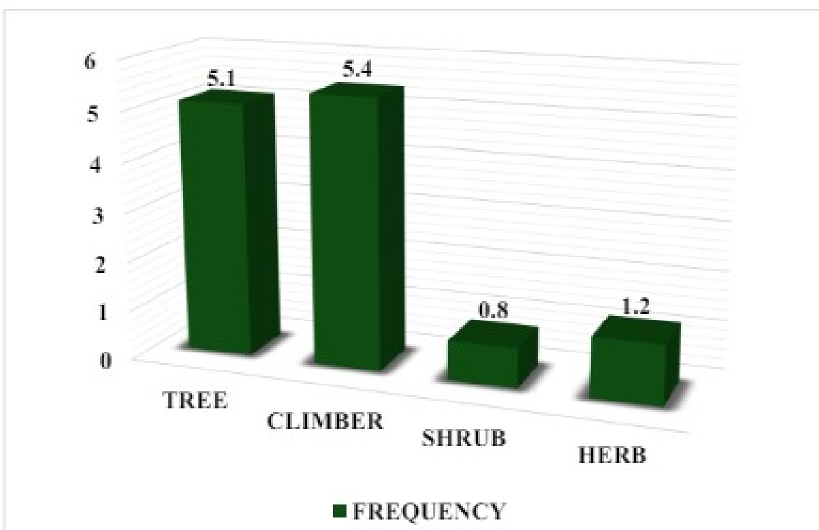


Figure 4.2.8: Distribution of Frequency of plants species based on habit

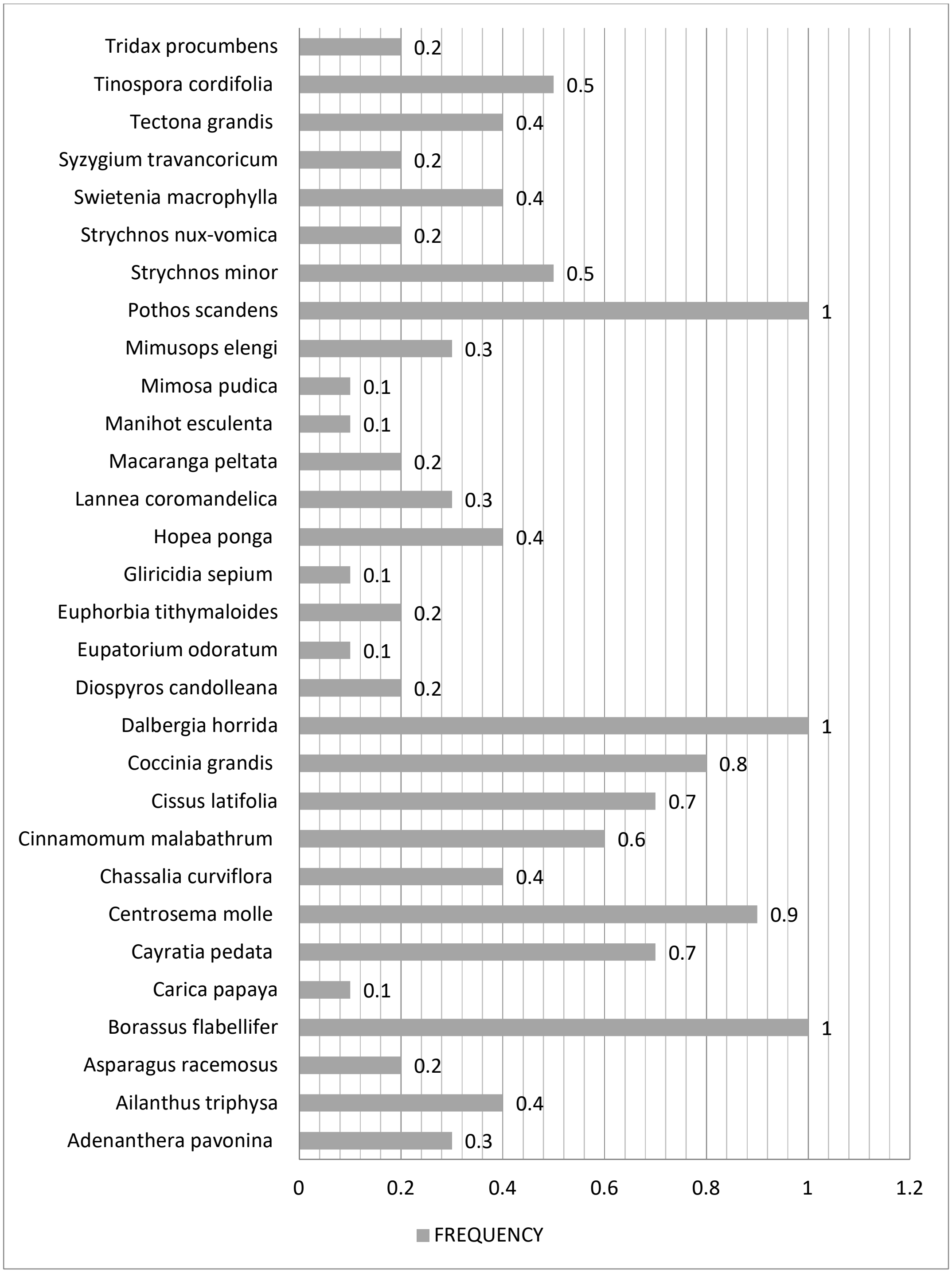


Figure 4.2.9: Frequency of selected plant species

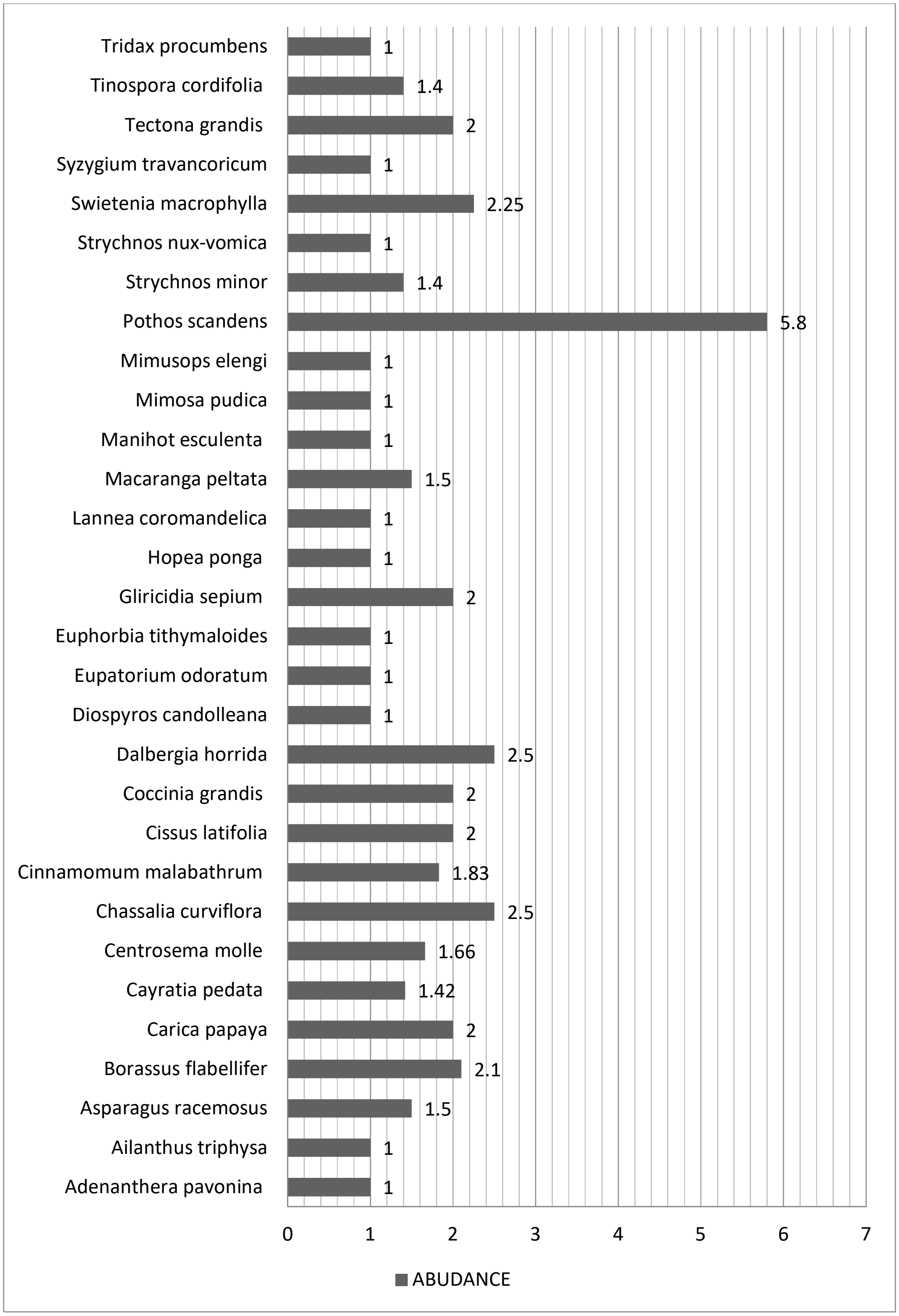


Figure 4.2.10: Abundance of plant species

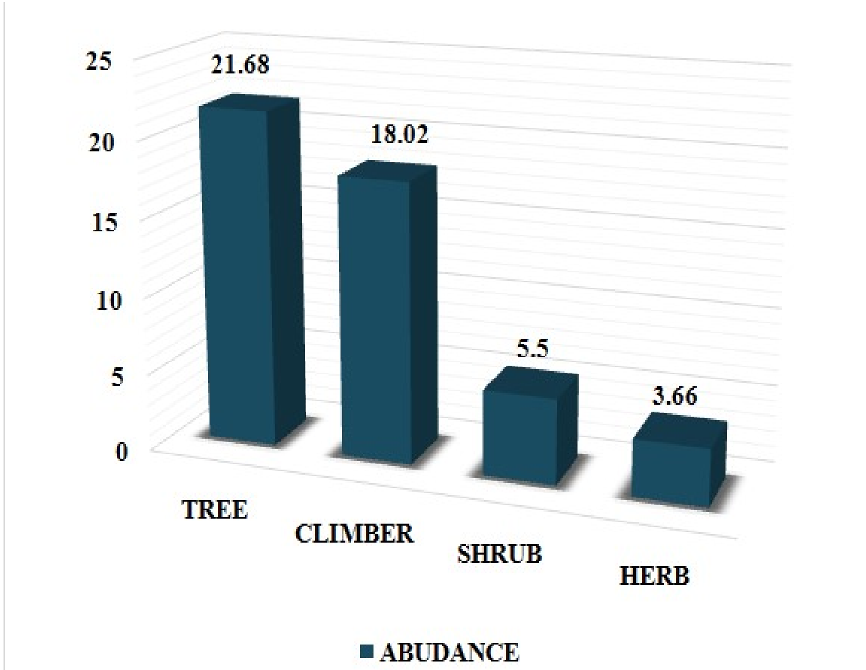


Figure 4.2.11: Distribution of Abundance of plants species based on habit

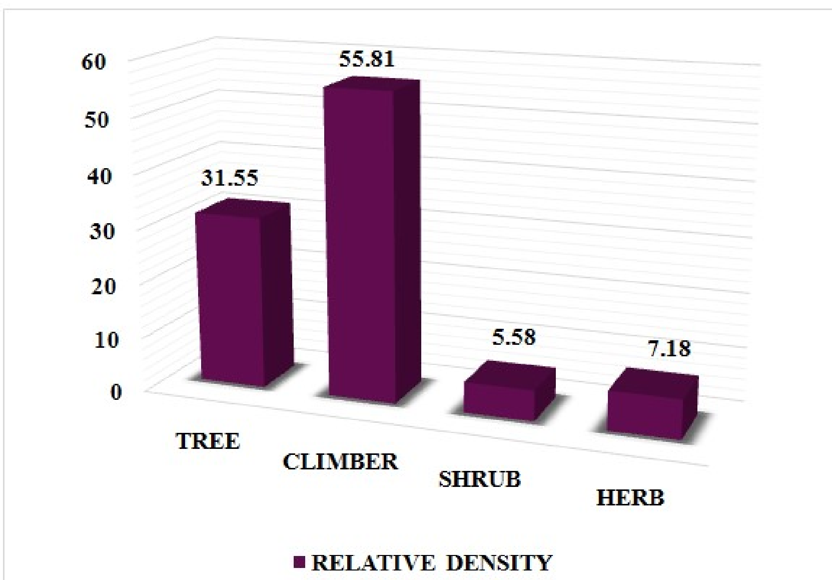


Figure 4.2.12: Distribution of Relative Density of plants species based on habit

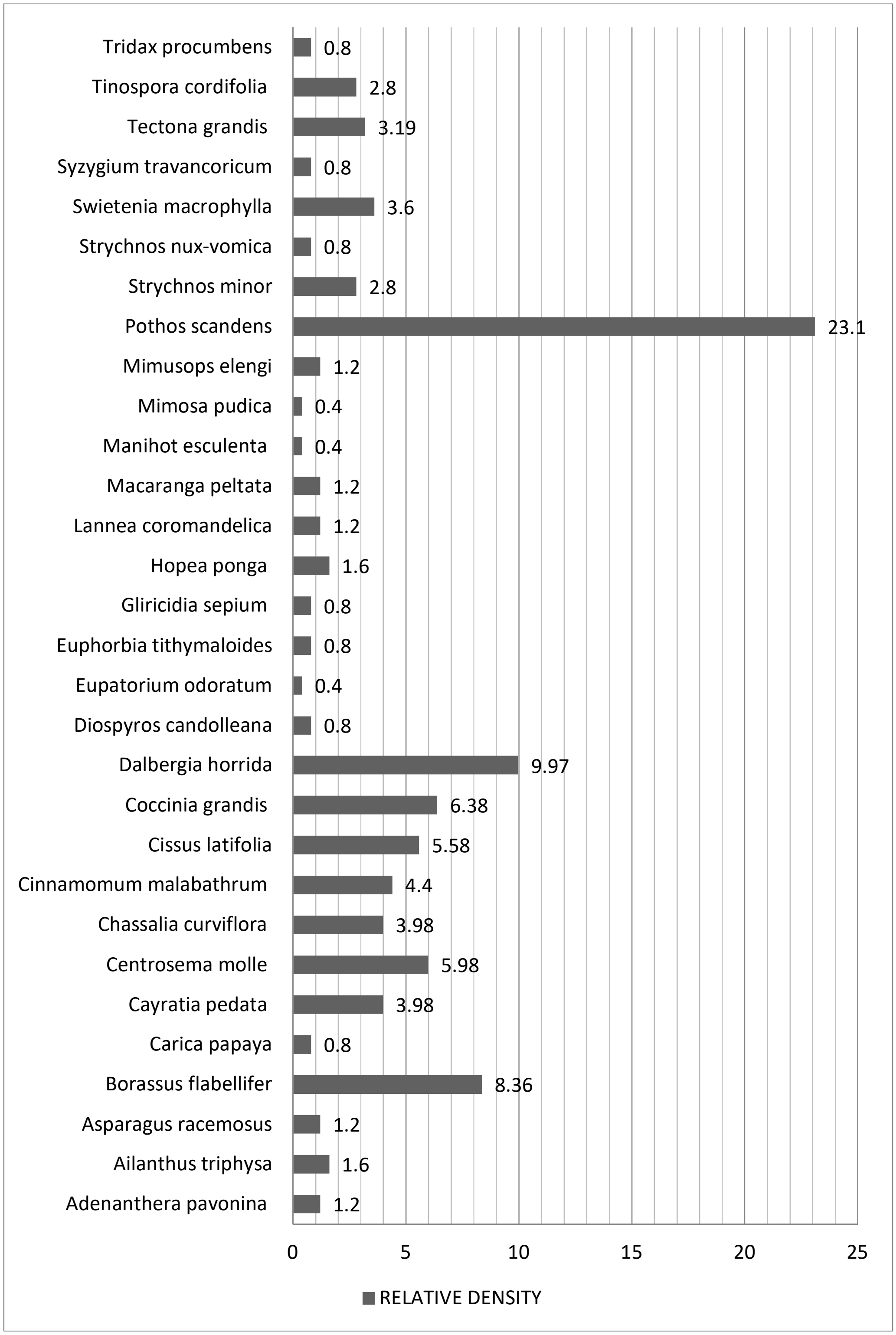


Figure 4.2.13: Relative Density of Plant species

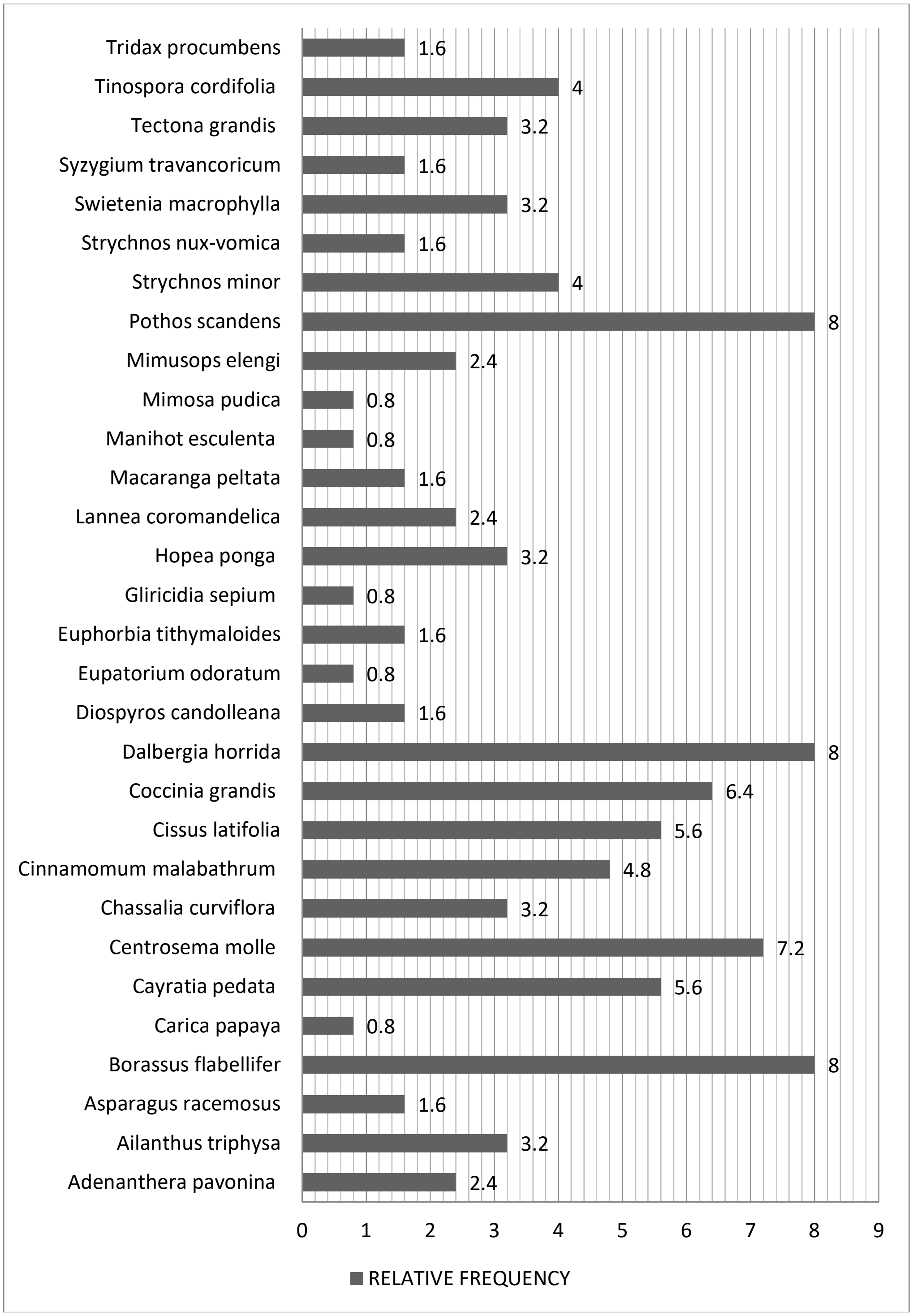


Figure 4.2.14: Relative Frequency of Plant species

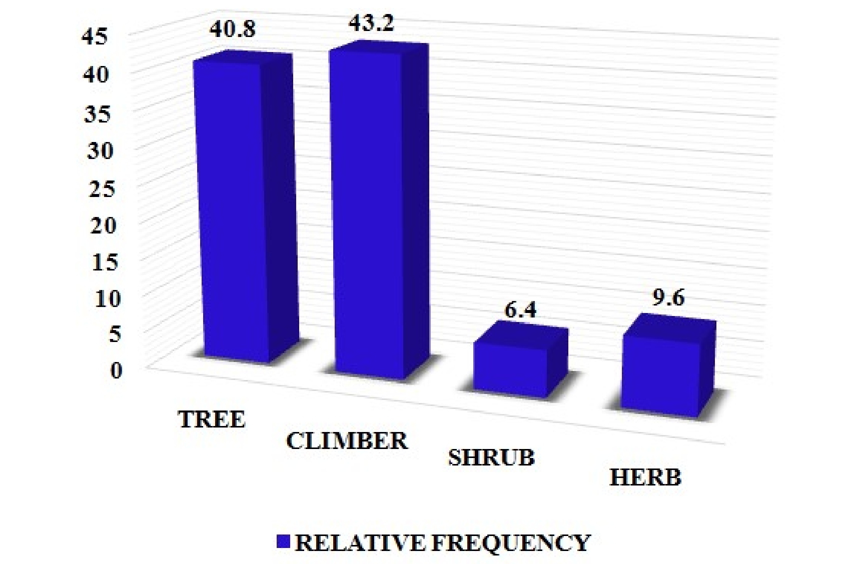


Figure 4.2.15: Distribution of Relative Frequency of plants species based on habit

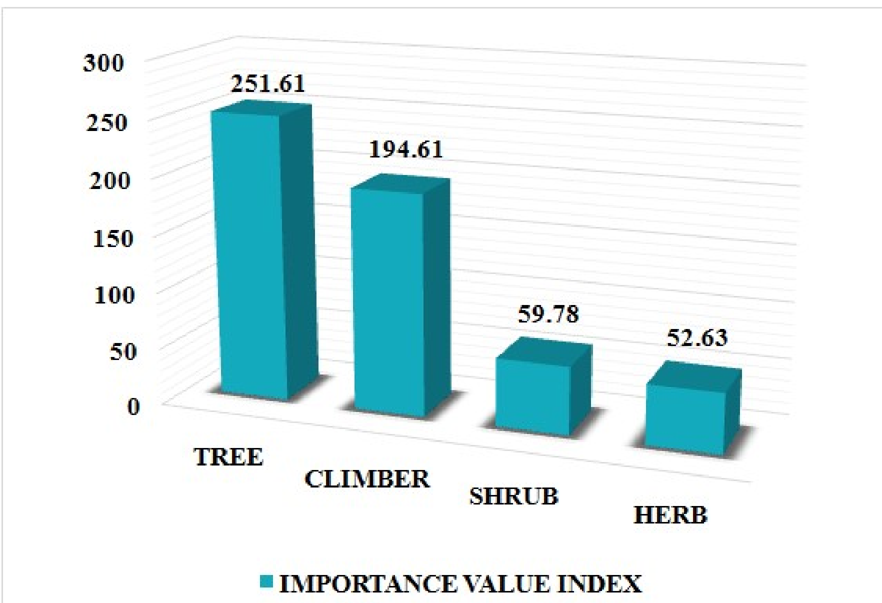


Figure 4.2.16: Distribution of Importance Value Index of plants species based on habit

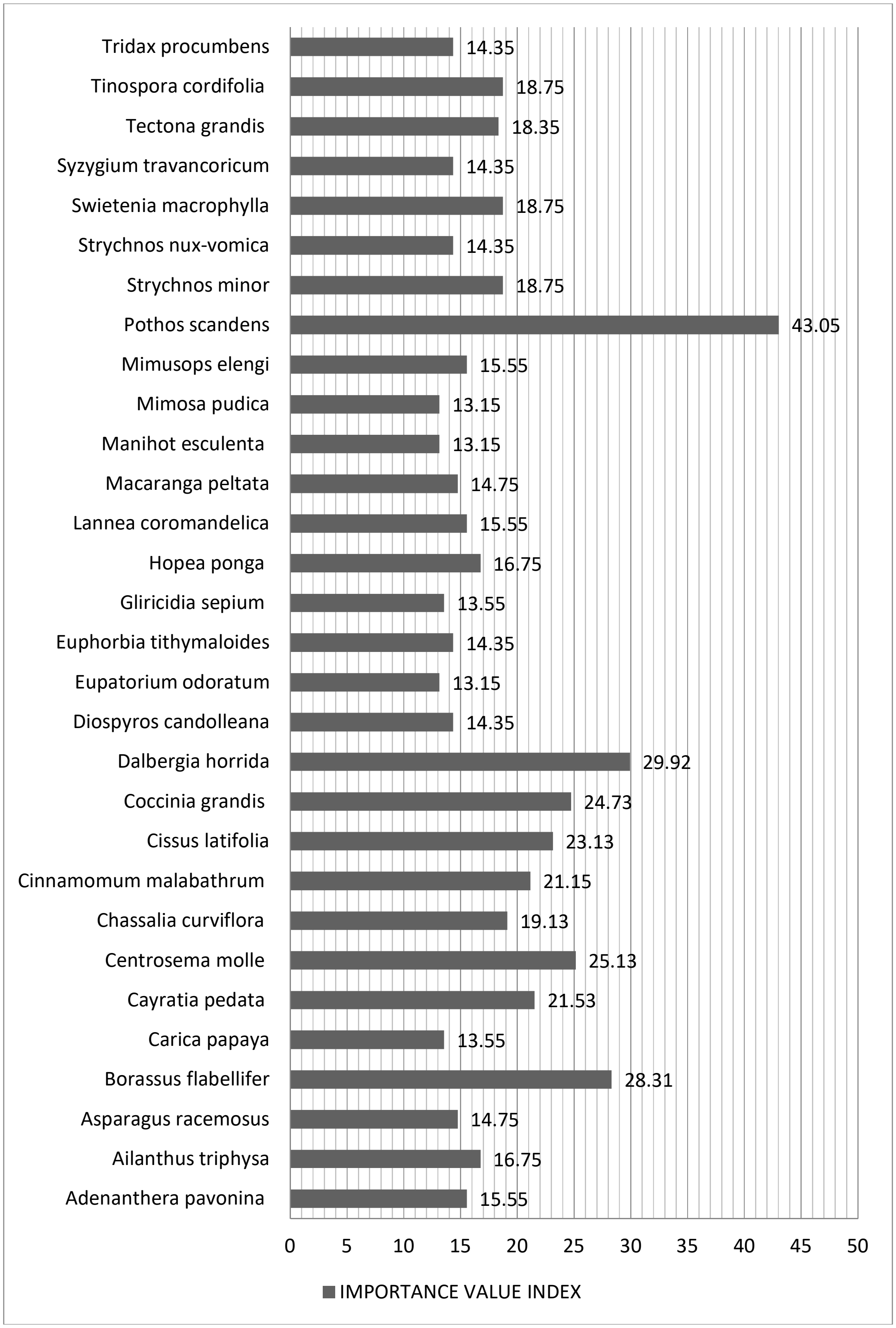


Figure 4.2.17: Importance Value Index of plant species

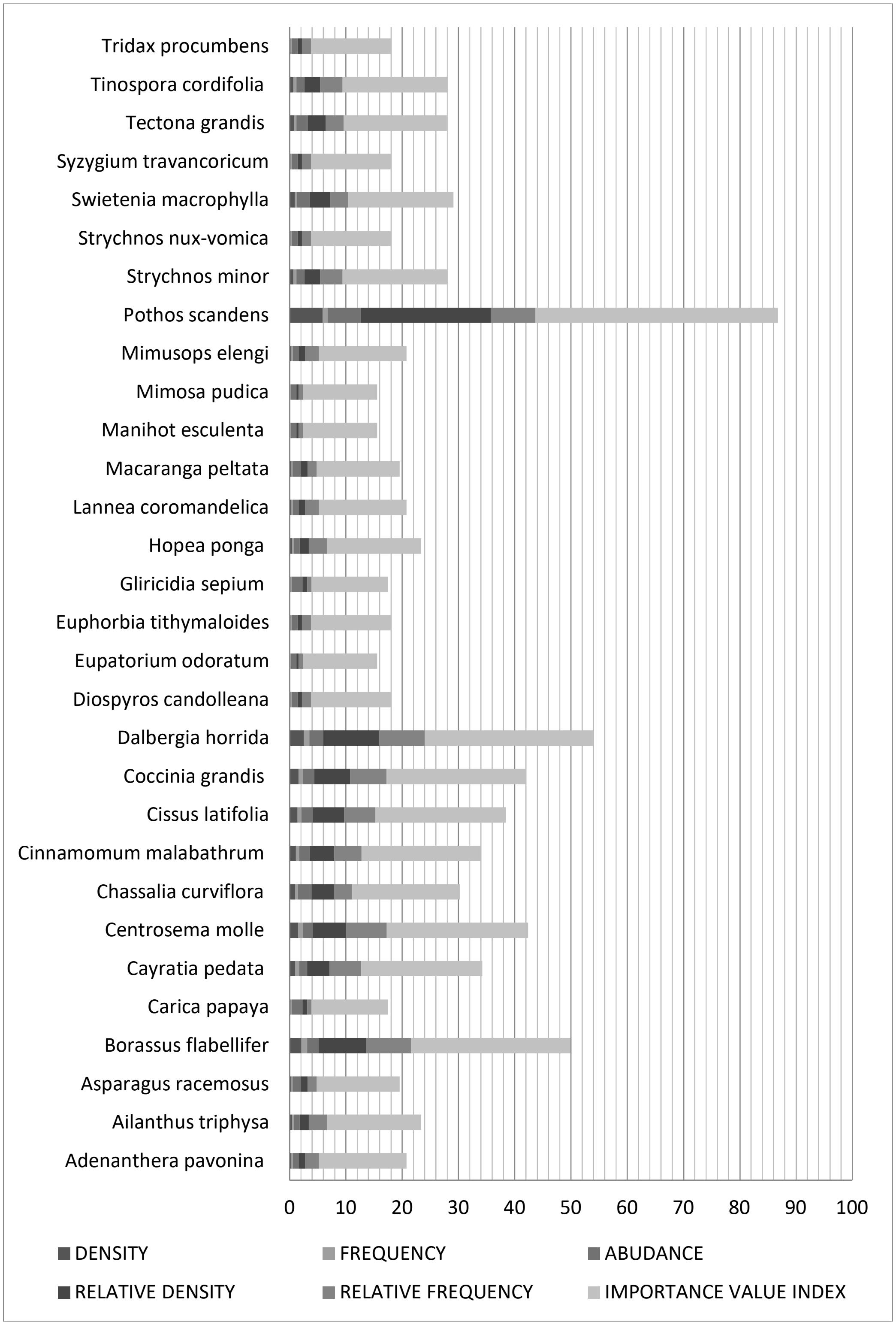
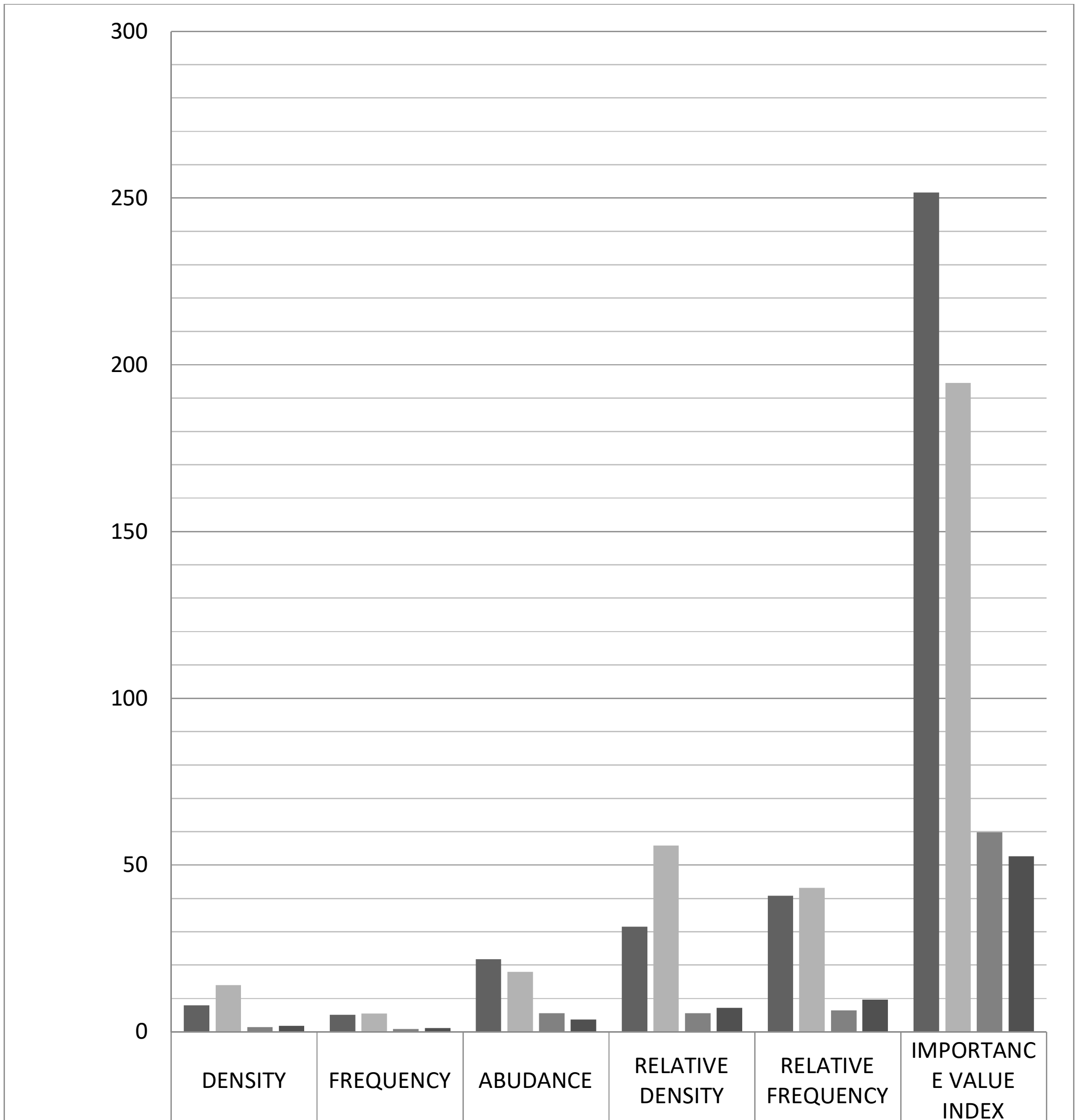


Figure 4.2.18: Phytosociological Attributes of Plant species



	DENSITY	FREQUENCY	ABUDANCE	RELATIVE DENSITY	RELATIVE FREQUENCY	IMPORTANCE VALUE INDEX
TREE	7.9	5.1	21.68	31.55	40.8	251.61
CLIMBER	14	5.4	18.02	55.81	43.2	194.61
SHRUB	1.4	0.8	5.5	5.58	6.4	59.78
HERB	1.8	1.2	3.66	7.18	9.6	52.63

Figure 4.2.19: Total Phytosociological Analysis based on habit

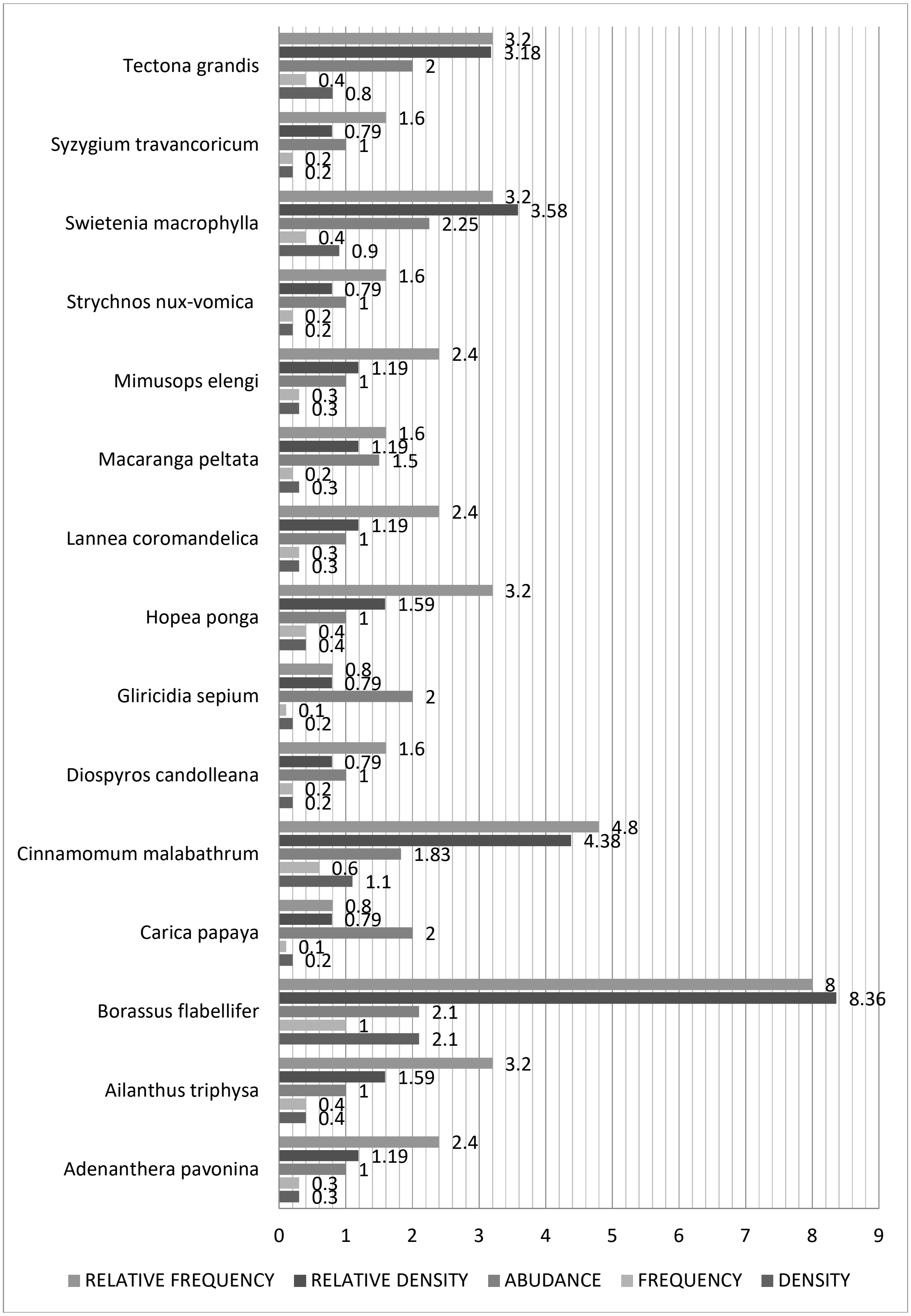


Figure 4.2.20: Phytosociological Attributes of Tree species

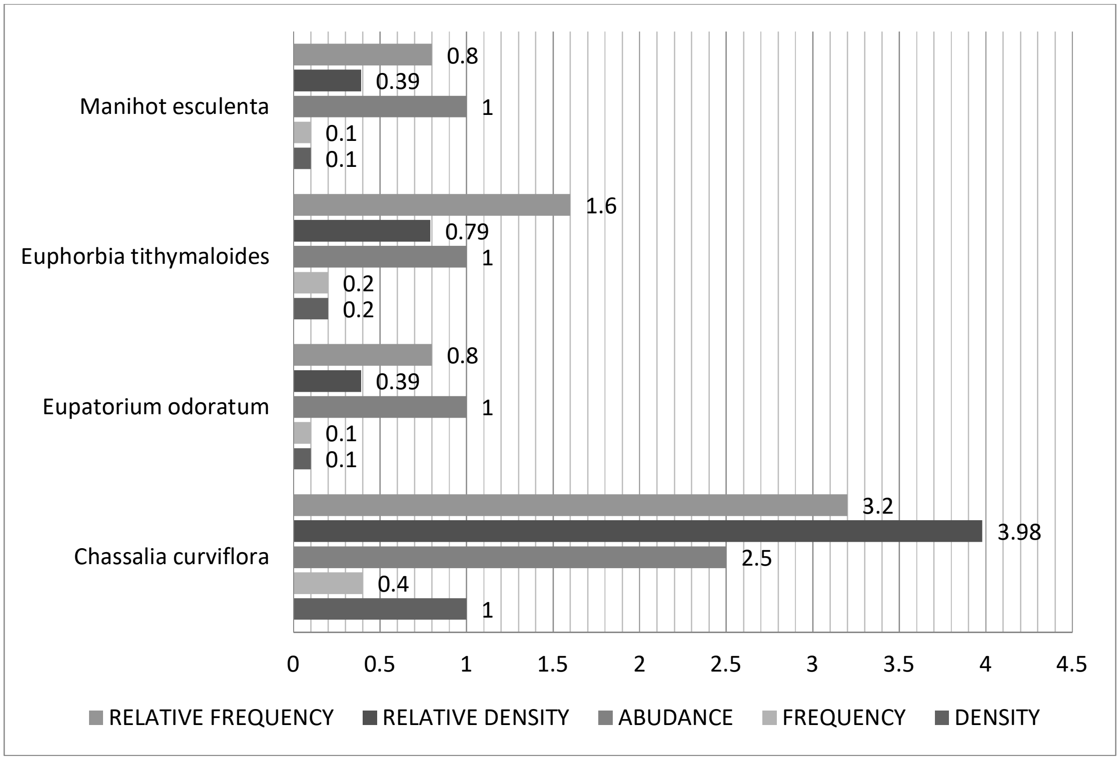


Figure 4.2.21: Phytosociological Attributes of Shrubs

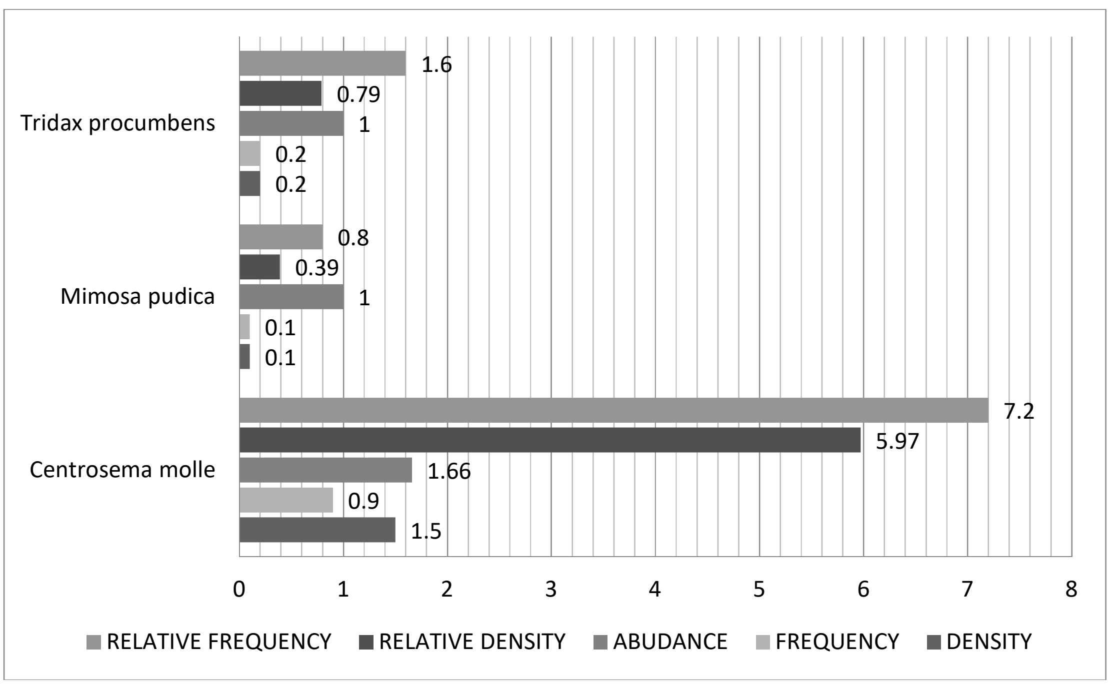


Figure 4.2.22: Phytosociological Attributes of Herbs

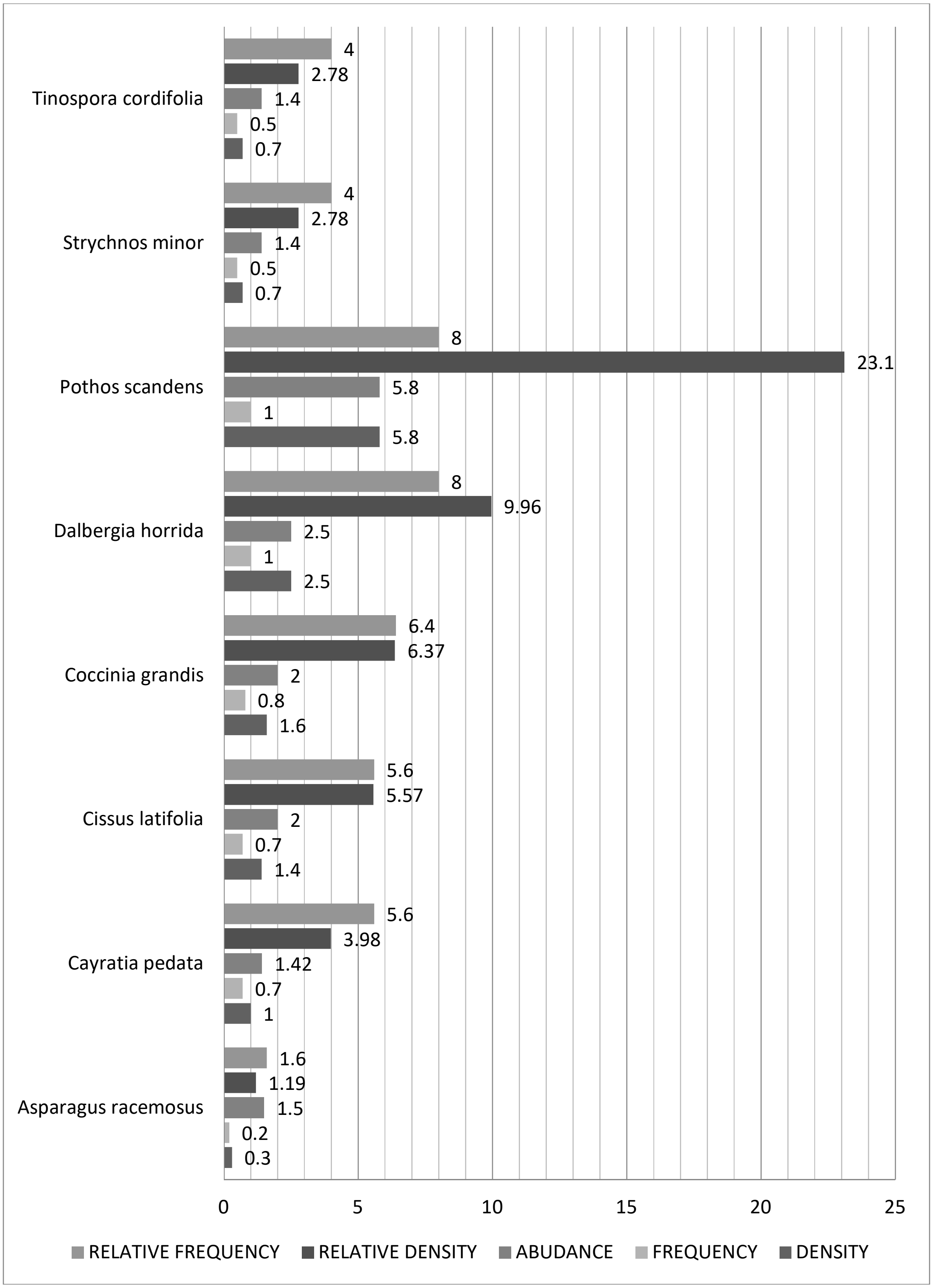


Figure 4.2.23: Phytosociological Attributes of Climbers

VIII. DIVERSITY INDICES

Diversity indices; such as Shannon index exhibited 2.14 and Simpson index showed 18.47. Margalef's Index showed 2.09 and Pielon's Index showed 1.15 (Table 4.3.1).

Table 4.3.1: Diversity Indices of selected plant species

Serial Number	Indices	Value
1	Shannon Index	2.14
2	Simpson Index	18.47
3	Margalef's Index	2.09
4	Pielon's Index	1.15

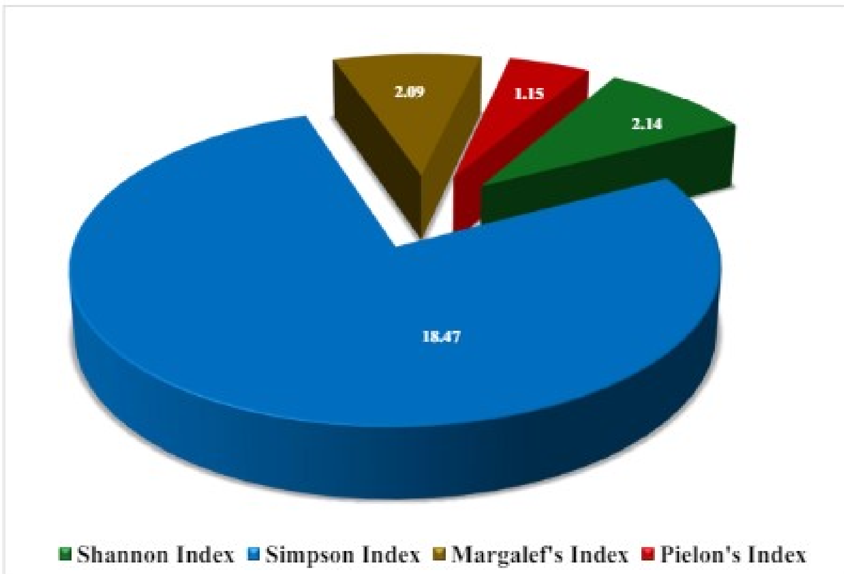


Figure 4.3.1: Pie chart showing different Diversity Indices

IX. QUANTITATIVE ANALYSIS OF NUTRIENTS IN THE SOIL

Comparative analysis of two selected soil samples collected from the study site is depicted here. Sample 1, the plot where the floral study was done and Sample 2, its adjacent plot (Table 4.4.1).

Sample 1exhibited the highest Calcium value than the sample 2 (Fig 4.4.1).The highest Sodiumand Ironcontents were observed in sample 2 (Fig 4.4.3,Fig 4.4.5).Zinc marked almost same value in sample 1 and sample 2 (Fig 4.4.4). Sample 2 proved highest Copper and Magnesiumcontents (Fig 4.4.4,Fig 4.4.5). Total Nitrogen in Sample 1 indicated was 300 mg/100gm and in sample 2 500 mg/100gm (Fig 4.4.2, Fig 4.4.5).

Table 4.4.1: Comparative analysis of nutrients in the two selected soil samples

Sl. No.	Parameters	Results	
		Sample 1 (mg/100gm)	Sample 2 (mg/100gm)
1	Calcium	57.9 ± 0.008	15.295 ± 0.001
2	Sodium	0.4 ± 0.043	12.16 ± 0.008
3	Iron	0.4 ± 0.012	148.7 ± 0.033
4	Zinc	1.1 ± 0.025	1.181 ± 0.330
5	Copper	0.03 ± 0.004	0.511 ± 0.002
6	Magnesium	7.9 ± 0.012	17.64 ± 0.041
7	Nitrogen	300 ± 1.632	500 ± 2.054

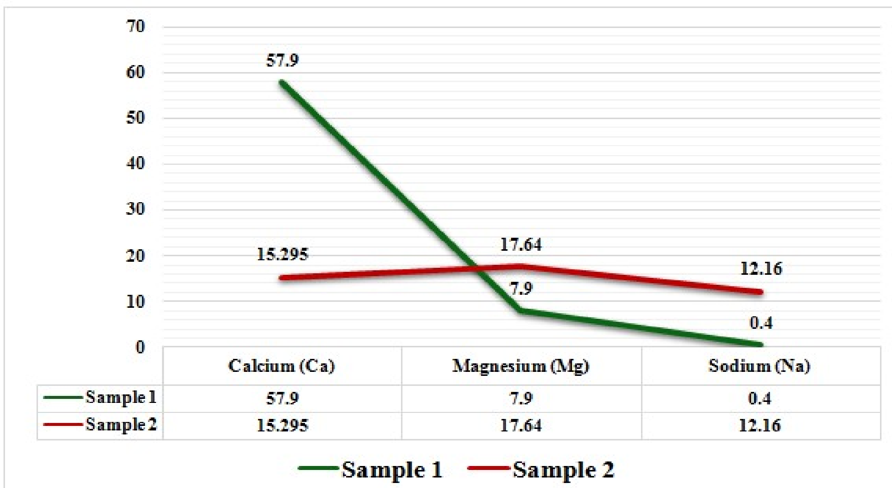


Figure 4.4.1: Comparative analysis of Calcium, Magnesium and Sodium

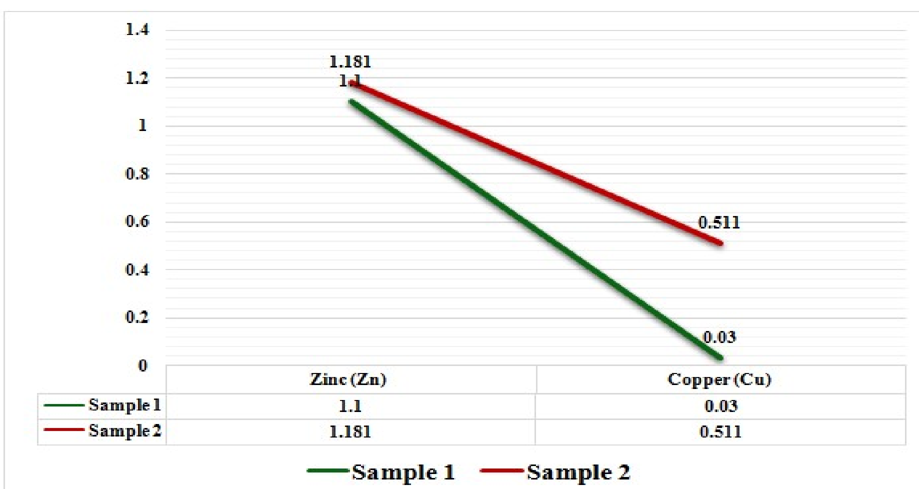


Figure 4.4.2: Comparative analysis of Zinc and Copper

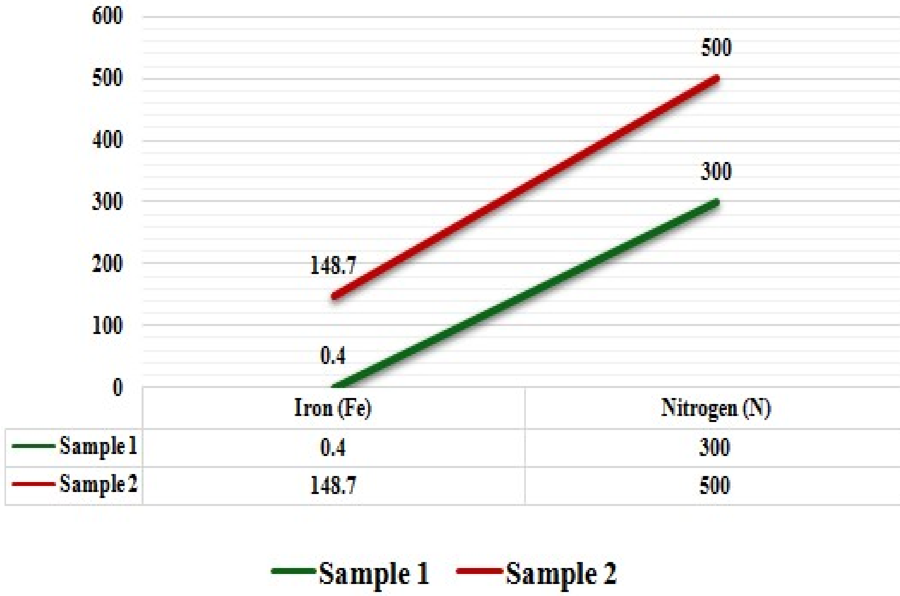


Figure 4.4.3: Comparative analysis of Iron and Nitrogen

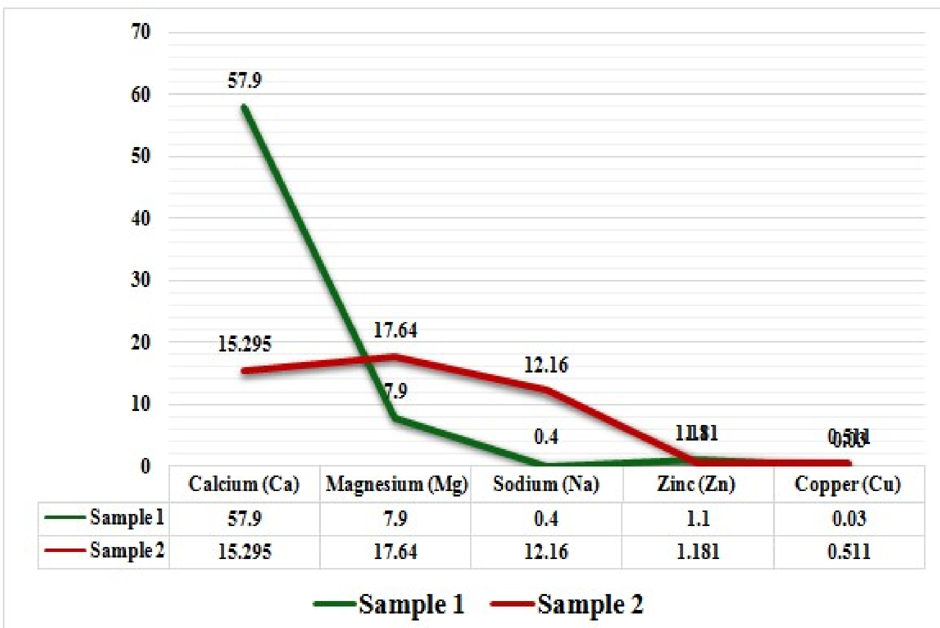


Figure 4.4.4: Comparative analysis of Calcium, Magnesium, Sodium, Zinc and Copper

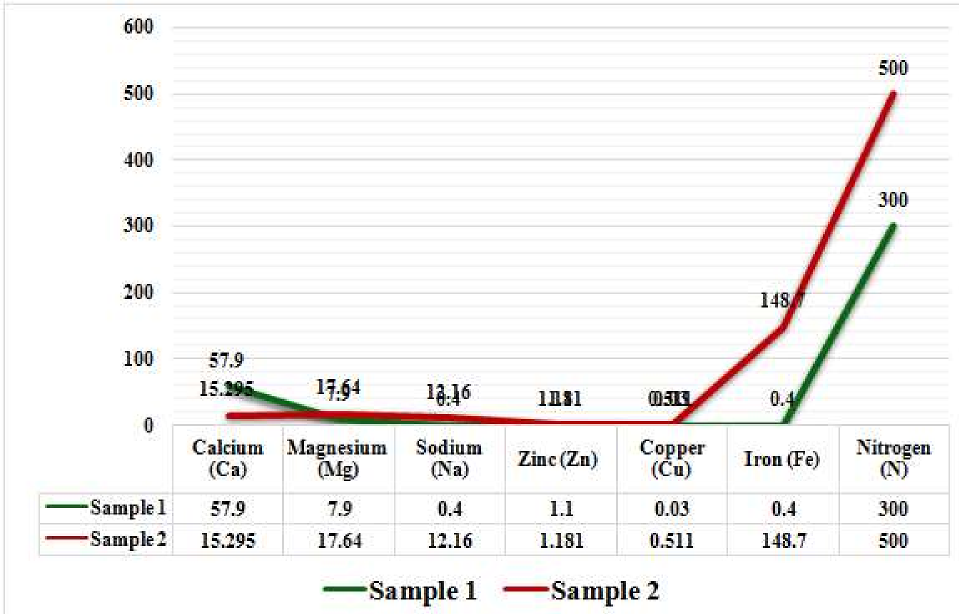


Figure 4.4.5: Comparative analysis of Calcium, Magnesium, Sodium, Zinc, Copper, Iron and Nitrogen

Table 4.4.2: Pearson Correlation Matrix of nutrients in two different samples

	Ca1	Na1	Fe1	Zn1	Cu1	Mg1	TN1
Ca2	**1**						
Na2	**0.411****	**1**					
Fe2	**-0.329**	**0.824****	**1**				
Zn2	**-0.564**	**0.566****	**0.565****	**1**			
Cu2	**-0.211***	**0.879****	**0.814****	**0.570****	**1**		
Mg2	**-0.395****	**0.773****	**0.736****	**0.569****	**0.868****	**1**	
TN2	**-0.317***	**0.918****	**0.795****	**0.575****	**0.727****	**0.810****	**1**

**Correlation is significant at the 0.01 level (2-tailed).
*Correlation is significant at the 0.05 level (2-tailed).

A significant correlation was noticed between nutrients in soil samples 1 and 2. Calcium showed a positive correlation with Sodium (0.411), and it was negatively correlated with Magnesium (-0.395). Copper was highly correlated with Magnesium (0.868). A highly significant positive correlation was observed between Magnesium and Nitrogen (0.810). Calcium showed a negative correlation with Zinc (-0.564). Sodium was highly correlated with Copper (0.879), Magnesium (0.773) and Iron (0.824) (Table 4.4.2).

X. DISCUSSION

Sacred groves are a typical conservational method practiced by earlier society by moderately applying some spiritual rituals. Here the study includes the floral diversity, phytosociological studies and quantitative analysis of soil nutrients in Sacred Grove, Kuzhiyam, Kollam District, and Kerala. A total of 30 plant species belongs to 21 families were identified. Fabaceae is the most dominant family reported from the sacred grove. Only angiosperms were identified from this sacred grove, but in a study conducted in Subramanya Swamy Temple, Maniyoor, Kannur District reveals the presence of 5 pteridophytes and one gymnosperm which is Gnetum ula. Dominating family from Subramanya Swamy Temple, Maniyoor is Poaceae from that of my study is Fabaceae (Pradeep, 2021). In a floral study that was done in Kansari Mavli Sacred grove of Songadh Forest range in Tapi District, Gujarat shows that the dominant family in that sacred grove is Fabaceae. Tree dominates over others in respective to their plant species distribution by habit (Gamit, 2021). Study revealed that Dhwaj sacred grove is an example for the dominance of Rosaceae above all other families which is rarely seen (Singh, 2020).

Pothos scandens, Dalbergia horrida, Chassalia curviflora, Swietenia macrophylla and Borassus flabellifere hold higher values in phytosociological attributes. By analalysing the phytosociological data, it is evident that the Climbers shows nearly equal importance to that of the trees present in the sacred grove. Highest frequency and highest importance value index are shown by Pothos scandens Study in hills around pune city revealed that Dalbergia melanoxylon shows the highest frequency and *Gliricidia sepium* is having highest Importance Value Index (Mahajan, 2021). Study regarding tree diversity in Sacred Groves of Kathmandu Valley, Nepal, reveals that Schima wallichii was found the most critical tree (Shrestha, 2020).

Diversity indices such as Simpson index exceed Shannon index and Margalef's Index. Pielon's Index is relatively low compared to the Margalef's Index. Diversity of trees species in natural stand of Gambari Forest reserve shows Simpson Dominance index and Shanon-weiner Index have the values 0.8945 and 2.6670 respectively (Onilude, 2020).

Nutrient analysis of the soil reveals that the Soil Sample 2 has more amounts of nutrients than the Soil Sample 1, where the floral study was done. Sodium (Na), Iron (Fe), Copper (Cu) Magnesium (Mg) and Nitrogen (N) of Soil Sample 2 shows greater value than that of from the Soil Sample 1. Amount of Zinc (Zn) present in both the samples are almost same. Calcium (Ca) shows considerable variation from the previous result as they are present in more amounts in Soil Sample 1 than that of the Soil Sample 2. Calcium (Ca) contributes to give the plant strong cellular walls, aid in the celldivision and is responsible for the activation of different enzymes. Ca and Mg should be more present in low soil organic matter exchange sites (Oyelowo, 2021).

Sediment is an important abiotic factor regulating an ecosystem. Most of the sediment quality parameters were found to fluctuate with respect to different seasons, sites and sources. pH of the sediment in the region was always found to be acidic in nature while it was varying from acidic to alkaline during post-monsoon seasons. Organic Carbon contents of the sediment showed wide range of seasonal variations. The sediments associated with the flora showed high concentration of nutrients due to inherent biological productivity of the ecosystem. Locations with maximum diversity showed highest nutrient content.

The presence of Organic Matter in the sediment may be due to decomposition of leaf, litters and other dead organisms. There was a direct relationship between available potassium and phosphorous content. The high nutrient content resulted in the increase of available potassium in the sediment during different seasons. Chloride, Ca and Mg content were maximum during post-monsoon seasons. The concentrations of phosphate in sediment were significant and varied with alkalinity. The vegetations played an important role in controlling the biogeochemical behaviour of phosphorus in this ecosystem. The concentration of nitrogen was recorded high during the study, where the sediment is relatively influenced by plant uptake and seasonal change, microbial decomposition, temperature, rainfall etc. The nitrogen absorption was low in terrestrial sediments compared to temperate salt marsh due to the high concentration of Fe and Na. The highest concentrations of sulphate were observed from area with dense mangroves. Silicate was the major constituent in the composition of terrestrial sediments collected from the sacred grove irrespective of the season.

XI. SUMMARY AND CONCLUSION

Sacred groves are isolated patches of forests, conserved as ritualistic sites. The sacred grove of Shri Ayiravillan Mahadevar Temple, Kuzhiyam, Chanthanathope, Kollam, Kerala, was selected for the floral studies and quantitative analysis of nutrientsin the soil. So the present study attempted to document the floral diversity and analyzed the phytosociology ofsacred grove at Kuzhiyam. In the study, there were 30 species of plants reported under 21 families. Concerning the number of species, tree dominated and respected the total number of individual plants, and climbers dominated total flora.

For phytosociological analysis, random quadrat sampling was taken. A total of 10 quadrats were taken from the plot, and quadrat 2 showed high species diversity. In the present study, *Pothos scandens*and climbers have the highest density. The highest frequency was shown by *Pothos scandens* followed by *Dalbergia horrida, Borassus flabellifer, Centrosema molle*, and climber dominated the trees with respect to their frequency. The most abundant species was*Pothos scandens* and followed by *Dalbergia horrida, Chassalia curviflora, Swietenia macrophylla*, *Borassus flabellifere*, and trees have more abundance than the climbers, shrubs and herbs. *Pothos scandens* showed highest relative density and climbers dominated in respective of their relative frequency. *Pothos scandens* revealed the highest relative frequency and importance value index, and it was followed by *Dalbergia horrida*, *Borassus flabellifer*. Simpson index (18.47) showed a highest value than Shannon index (2.14). Margalef's Index and Pielon's Index marked 2.09 and 1.15, respectively.
The total nitrogen in soil sample 1 was 300 mg/ 100 gm and in sample 2 was 500 mg/ 100 gm. The majority of the elements have a higher value in sample 2. So, it wasconcluded that soil sample 2 had more nutrient contents than soil sample 1.

The results indicated that the sacred grove exhibited good biodiversity and consists of 5 rare plants. So, there was an urgent necessity for the conservation of this biodiversity.

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