

Full Length Research Paper

Biodiversity survey of trees and ornamental plants in Karunya University, Coimbatore, India

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Biodiversity is the degree of variation of life forms within a given ecosystem, biome, or on an entire planet. Biodiversity is not consistent across the Earth. Western Ghats, older than the Himalayas, is one of the 34 global hotspots of biodiversity – flora, fauna, landscape and ethnicity. Western Ghats, a **narrow 1,700 km strip that stretches from the mouth of Tapti in Dhule district of Maharashtra to Kanyakumari in Tamil Nadu is nature's unique evolutionary laboratory still at work. We did a biodiversity survey for plant species in Karunya university Academic campus, which is located in the southern parts of the Western Ghats in the foothills of Siruvani forest. The campus was divided into four quadrants as North-East (NE), South-East (SE), South-West (SW) and North-West (NW) and collected plant samples from each quadrant were analysed, photographed and preserved as herbaria and deposited in the Biotechnology Department. We gave a unique code number to each plant that gives information about its location in the campus. We have identified different trees from 27 families (53 genera) and ornamental plants from 32 families (58 genera) and studied their properties and uses and the details are presented. The total area of Karunya university campus constitutes about 0.001770% of the total area of the Western Ghats. If a small part of the Western Ghats is so diverse, then one can imagine the biodiversity of the whole Western Ghats. This is the first attempt to explore the flora of Karunya campus.**

Key words: Biodiversity, Western Ghats, Karunya university academic campus.

INTRODUCTION

Biodiversity is one measure of the health of biological systems. Life on earth today consists of many millions of distinct biological species. Biodiversity is not consistent across the earth. It is consistently rich in the tropics and it is less rich in polar regions where conditions support much less biomass. A complex relationship exists among the different diversity levels. Identifying one level of diversity in a group of organisms does not necessarily indicate its relationship with other types of diversities (Sahney et al., 2010). Rapid environmental changes typically cause extinctions (Drummond and Strimmer, 2001). Most species that have existed on earth are now extinct (WGBH Educational Foundation, 2001). The period since the emergence of humans has displayed an ongoing reduction in biodiversity. Named the Holocene extinction, the reduction is caused primarily by human

impacts, particularly the destruction of plant and animal habitats.

Western Ghats

Western Ghats, older than the Himalayas, is one of the 34 Global Hotspots of Biodiversity – flora, fauna, landscape and ethnicity. Geologically the Western Ghats may be divided into two segments. The hills north of the Krishna basin (largely Maharashtra and Gujarat) with fragile basaltic rocks are results of the same processes that gave rise to the Deccan trap.

Arising abruptly from the narrow Konkan and Malabar coasts, these hills run 1600 km north-south between the river Tapti in Gujarat and Kanyakumari in Tamilnadu covering an area approximately equal to 160,000 sq km. In the east, they slope gently towards the Deccan Plateau. In the Nilgiris, Palanis and parts of Karnataka, the Western Ghats extend considerably eastwards,

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locally merging with the Eastern Ghats. Towards the south, the hill chain is divided into two by the Palghat Gap (a mere 13 km gap at its narrowest) rendering a physically homogeneous high altitude plateau into two rather distinct biogeographic units, namely, the Nilgiris complex in the north and the Anaimalai-Palnis complex in the south.

Climatic conditions in the Western Ghats vary with the altitude and physical proximity to the Arabian Sea and the equator. Although the Western Ghats experience a tropical climate - being warm and humid during most of the year with mean the temperature ranging from 20°C in the south to 24°C in the north, the higher elevations experience subtropical climates and on occasions frost. Further, it has been observed that the coldest periods in the southern Western Ghats coincide with the wettest. Whereas rainfall peaks of 9000 mm and above per year, are known locally, annual rainfall as low as 1000 mm are frequent in the east bringing the average to around 2500 mm. Much of the rainfall is received during the southwest monsoon season. Peak period of rainfall is July to August (Daniels, 2011).

Need for biodiversity conservation

Conservation is the protection, preservation, management, or restoration of wildlife and natural resources such as forests and water. Through the conservation of biodiversity the survival of many species and habitats which are threatened due to human activities can be ensured. Other reasons for conserving biodiversity include securing valuable Natural Resources for future generations and protecting the well being of eco-system functions. Plant genetic resources are the product of natural evolution and human intervention (Kannaiyan and Gopalam, 2007). *In-situ* biodiversity conservation includes the conservation of habitats, species and ecosystems where they naturally occur. The conservation of element of biodiversity out of the context of their natural habitats is referred as *ex-situ* biodiversity conservation (Kannaiyan and Gopalam, 2007). Concentration of genetic diversity comprising native species and landraces occurs more in Western Ghats, Northern Himalayas, Southern plateau, Central India and Northwestern Himalayas (Khoshoo, 1995).

Karunya university academic campus

Karunya University Academic Campus is located in the southern parts of the Western Ghats in the foothills of Siruvani forest. The coordinates are 10° 58' 10.10" N and 76° 44' 38.69" E with elevation 1538 ft. The total area of university campus is 700 acre. The temperature during both summer and winter varies anywhere between 37 to 24°C. Highest temperature is 39°C and lowest is 12°C.

The regular monsoon starts from October lasting till early November. These monsoons are brought about by the retreating North-eastern monsoon. The campus area has annual average rainfall of 1000 mm. Soil in this area is red loamy type which is more fertile than sandy soil, its porosity allows high moisture retention and air circulation. Overall this place is God gifted in all the natural ways.

METHODOLOGY

700 acres of campus area was divided in four quadrants as North-East (NE), South-East (SE), South-West (SW) and North-West (NW) (Figure 1). Plants are collected from each quadrant and tagged with a unique code number that gives information about its location in campus. Photographs of plant habitat and plant specimen were taken. Plant samples were treated with 0.05% HgCl₂ for 5 min and 70% ethanol for 10 min. News papers were used to remove moisture content and they were changed every day. Weight was kept on the stack of news paper containing plant samples to accelerate moisture removal and to make them flat.

The identification of plants was done through various available resources including World Wide Web and expertise available in the department. Authentication was done with the help of expertise available in the Institute of Forest Genetics and Tree Breeding (IFGTB), Tamil Nadu Agricultural University (TNAU), Coimbatore.

RESULTS

We have identified different trees from 53 genera belonging to 27 families and ornamental plants from 58 genera belonging to 32 families and have studied their properties and uses. Trees and ornamental plants are arranged according to their family (Tables 1 to 4).

There are many trees and ornamental plants which are rare in Karunya University campus, such plants are planted in different parts of campus and monitored for proper growth (Figures 2 and 3). Plants which are having frequency less than 0.1% were chosen for conservation these are *Acacia ferruginea* DC. (0.0625), *Artocarpus heterophyllus* Lam.(0.0208), *Butea monosperma* (Lam.)Taub.(0.0417), *Caryota urens* L. (0.0573), *Cycas revoluta* L.(0.0730), *Ficus elastica* Roxb.(0.0312), *Ficus sp.*(0.0157), *Ficus sp.* (0.0104), *Madhuca longifolia* L. (0.0260), *Michelia champaca* L. (0.0417), *Millingtonia hortensis* L. f. (0.0625), *Mimusops elengi* L. (0.0208), *Musa acuminata* Colla (0.0521), *Phyllanthus acidus* (Linn.) Skeels (0.0208), *Spathodea campanulata* Buch.-Ham. ex DC (0.0417), *Syzygium cumini*(L.) Skeels. (0.0157), *Callistemon brachyandrus* Lindl (0.0384) and *Hymenocallis occidentalis* (Leconte) Kunth (0.0768). Some plants are chosen for vegetative propagation that includes, *Butea monosperma* (Lam.)Taub., *Ficus sp.*, *Michelia champaca* L., *Musa acuminata* Colla, *Phyllanthus acidus* (Linn.) Skeels etc.

South East (SE) and South West (SW) area of University campus is rich in *Eucalyptus* spp. and the species found in this area includes *Eucalyptus gigantea* Dehnh (13.037), *Eucalyptus glauca* Dc. (26.076), *Eucalyptus*

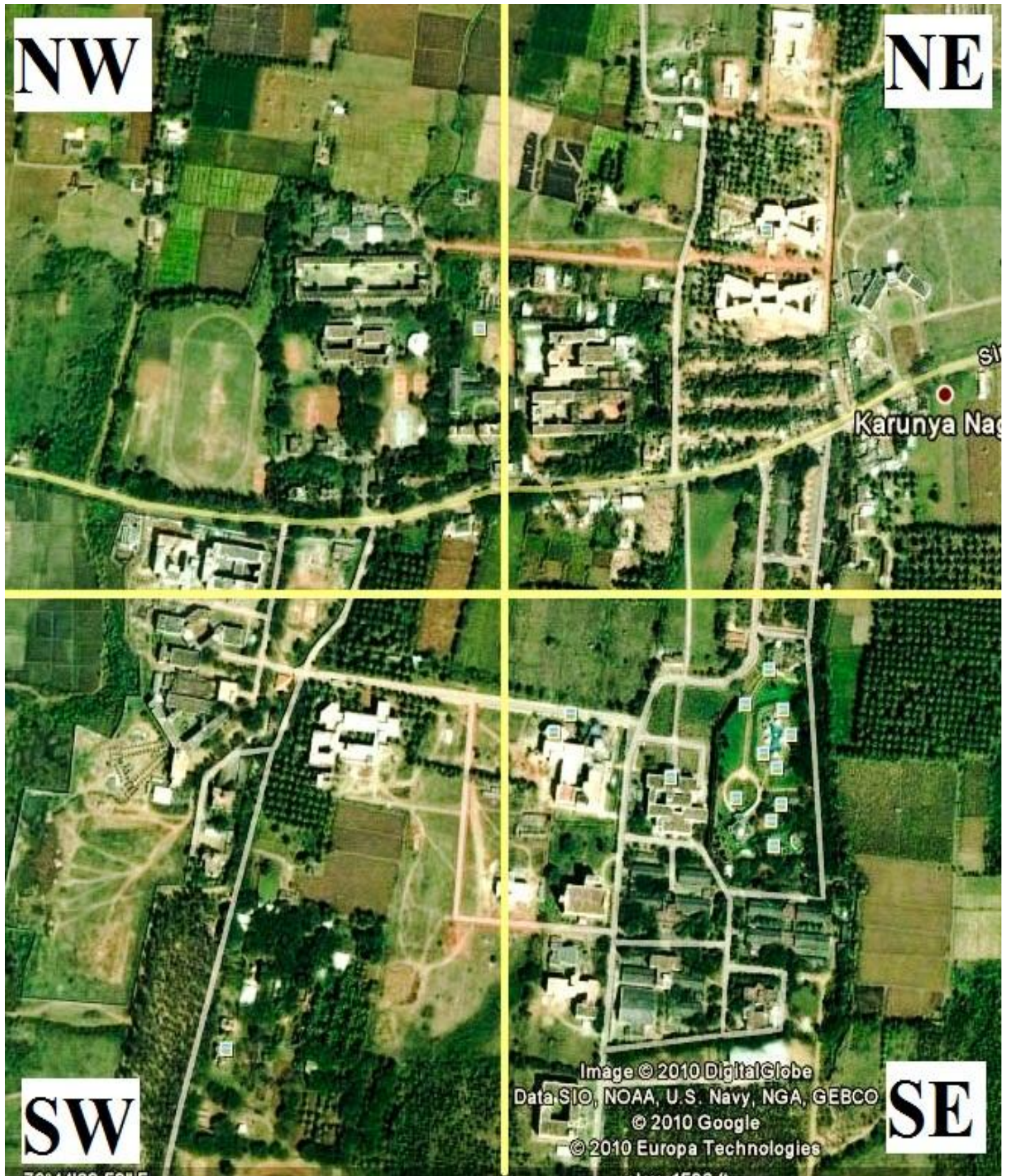


Figure 1. Area of Karunya university campus (NE: north-east, SE: south –east, SW: south-west, NW: north-west).

Table 1. Family wise arrangement of trees with code no, name and remarks.

| Code No. | Name | Remarks |
|--------------------------------|---|--|
| Family: Alangiaceae | | |
| SE – 37 | <i>Alangium salvifolium</i> (L.f) Wangerin | Anti-arthritic activity |
| Family: Anacardiaceae | | |
| NE – 11 | <i>Mangifera indica</i> L. | Delicious fruit |
| Family: Annonaceae | | |
| NE – 54 | <i>Polyalthia longifolia</i> (Sonn.) Thwaites | Used to reduce noise pollution, leaf extract have cytotoxic activity |
| NE – 61 | <i>Artabotrys odoratissimus</i> R. Br. ex Ker-Gawl. | Extremely fragrant, used in perfumes |
| Family: Apocynaceae | | |
| SE – 40 | <i>Thevetia peruviana</i> (Pers.) K. Schum. | Medicinal tree, milky juice and seeds are highly toxic |
| Family: Araucariaceae | | |
| NE – 40 | <i>Araucaria</i> sp. | |
| Family: Arecaceae | | |
| NE – 21 | <i>Archontophoenix cunninghamiana</i> H.Wendl. and Drude | Grow in shade with high humid condition |
| NE – 31 | <i>Caryota urens</i> L. | Fish tail like leaves |
| SW – 10 | <i>Cocos nucifera</i> L. | Sacred tree, edible fruit |
| Family: Bignoniaceae | | |
| NE – 6 | <i>Millingtonia hortensis</i> L. f. | Ornamental tree, flowers used in perfume preparation |
| NE – 14 | <i>Tabebuia rosea</i> DC. | Medicinal plant, bark has high tannin content |
| NE – 41 | <i>Spathodea campanulata</i> Buch.-Ham. ex DC | Ornamental as well as medicinal |
| Family: Bombacaceae | | |
| NW – 7 | <i>Bombax ceiba</i> L. | Timber is used in construction |
| Family: Boraginaceae | | |
| NE – 4 | <i>Cordia sebestena</i> L. | One of the threatened tree species, high drought tolerance also high flooding tolerance |
| Family: Caesalpiniaceae | | |
| NE – 39 | <i>Cassia fistula</i> L. | Showy, pale yellow flowers |
| NE – 10 | <i>Peltophorum pterocarpum</i> (DC.)K.Heyne | The bark is used medicinally and contains a yellow/brown dye |
| NW – 2 | <i>Caesalpinia pulcherrima</i> (L.)Sw. | Ornamental tree, ripen seeds yield tannin and yellow (with alum) or black (with iron) dye, leaves induce abortion. |
| Family: Combretaceae | | |
| NE – 8 | <i>Terminalia catappa</i> Linn. | Oil rich and edible seeds |
| Family: Cycadaceae | | |
| NE – 96 | <i>Cycas revoluta</i> L. | Ornamental, slow growing tree |
| Family: Euphorbiaceae | | |

Table 1. Contd.

| | | |
|------------------------------|--|--|
| SW – 5 | <i>Phyllanthus acidus</i> (Linn.) Skeels | Edible fruits, medicinal plant |
| Family: Fabaceae | | |
| NE – 1 | <i>Pongamia Pinnata</i> (L.) Pierre | Nitrogen fixing tree |
| NE – 60 | <i>Bauhinia purpurea</i> L. | Ornamental tree |
| NW – 1 | <i>Acacia ferruginea</i> DC. | Threatened plant species |
| NW – 4 | <i>Sesbania sesban</i> (L.) Merr | High fodder value |
| SE – 26 | <i>Acacia nilotica</i> (L.) Delile | Medicinal plant, bark and fruit rich in tannin |
| Family: Leguminosae | | |
| NE – 12 | <i>Cassia siamea</i> Lam. | Timber is used for many purposes |
| Family: Magnoliaceae | | |
| NE – 65 | <i>Michelia champaca</i> L. | Flowers with nice fragrance |
| Family: Malvaceae | | |
| NE – 101 | <i>Thespesia populnea</i> Soland ex Correa | cultivated as a shade tree |
| Family: Meliaceae | | |
| NE – 71 | <i>Azadirachta Indica</i> L. | Medicinal plant |
| Family: Mimosaceae | | |
| NE – 18 | <i>Samanea saman</i> (Jacq.) Merr | Grown as ornamental plant |
| Family: Moraceae | | |
| NE – 69 | <i>Ficus</i> sp. | Edible fruits, broad leaves |
| NE – 102 | <i>Artocarpus heterophyllus</i> Lam. | Economically important fruit |
| SE – 1 | <i>Ficus</i> sp. | Ornamental tree |
| SE – 2 | <i>Ficus elastica</i> Roxb. | Ornamental tree, resistance to draught |
| Family: Myrtaceae | | |
| NE – 13 | <i>Syzygium cumini</i> (L.) Skeels. | Edible fruits, medicinal plant |
| SE – 23 | <i>Eucalyptus globules</i> Labill. | Medicinal plant, volatile oil rich |
| Family: Papilionaceae | | |
| SE – 38 | <i>Butea monosperma</i> (Lam.) Taub. | Sacred tree, It is used for timber, resin, fodder, medicine, and dye |
| Family: Poaceae | | |
| NE – 7 | <i>Dendrocalamus strictus</i> (Roxburgh) Nees | Found in tropical and subtropical asia |
| NE – 124 | <i>Bambusa glaucescens</i> (Willd.) Sieb. ex Munro | Commonly known as Golden Goddess Bambu |
| Family: Rubiaceae | | |
| NE – 99 | <i>Morinda tinctoria</i> Roxb. | Source of Morindone dye and alkaloids |
| Family: Sapotaceae | | |
| NE – 16 | <i>Madhuca longifolia</i> L. | Latex producing tree |
| Family: Ulmaceae | | |

Table 1. Contd.

| | | |
|----------------------------|--|--|
| NE – 2 | <i>Holoptelea integrifolia</i> (Roxb.) Planch. | Medicinal plant, used in skin diseases and intestinal disorders. |
| Family: Verbenaceae | | |
| NW – 3 | <i>Tectona grandis</i> Linn. | Economically important tree, wood is used for furniture |

Table 2. Different tree species with their count and frequency with respect to total number of tree species.

| Serial No. | Code No. | Scientific name | No. of Plants | Frequency (%) |
|------------|----------|--|---------------|---------------|
| 1 | NW – 5 | <i>Acacia auriculiformis</i> A. Cunn. ex Benth | 32 | 0.1668 |
| 2 | NW – 1 | <i>Acacia ferruginea</i> DC. | 12 | 0.0625 |
| 3 | SE – 26 | <i>Acacia nilotica</i> (L.)Delile | 195 | 1.0169 |
| 4 | NE – 5 | <i>Adenantha pavonina</i> L. | 102 | 0.5319 |
| 5 | SE – 37 | <i>Alangium salvifolium</i> (L.f)Wangerin | 27 | 0.1408 |
| 6 | NE – 40 | <i>Araucaria</i> sp. | 36 | 0.1877 |
| 7 | NE – 21 | <i>Archontophoenix cunninghamiana</i> H.Wendl. & Drude | 67 | 0.3494 |
| 8 | NE – 61 | <i>Artabotrys odoratissimus</i> R. Br. ex Ker-Gawl. | 22 | 0.1147 |
| 9 | NE – 102 | <i>Artocarpus heterophyllus</i> Lam. | 4 | 0.0208 |
| 10 | NE – 71 | <i>Azadirachta Indica</i> L. | 216 | 1.1264 |
| 11 | NE – 124 | <i>Bambusa glaucescens</i> (Willd.) Sieb. ex Munro | 120 | 0.6258 |
| 12 | NE – 60 | <i>Bauhinia purpurea</i> L. | 542 | 2.8265 |
| 13 | NW – 7 | <i>Bombax ceiba</i> L. | 37 | 0.1929 |
| 14 | SE – 38 | <i>Butea monosperma</i> (Lam.)Taub. | 8 | 0.0417 |
| 15 | NW – 2 | <i>Caesalpinia pulcherrima</i> (L.)Sw. | 27 | 0.1408 |
| 16 | NE – 31 | <i>Caryota urens</i> L. | 11 | 0.0573 |
| 17 | NE – 39 | <i>Cassia fistula</i> L. | 109 | 0.5684 |
| 18 | NE – 12 | <i>Cassia siamea</i> Lam. | 88 | 0.4589 |
| 19 | NE – 77 | <i>Casuarina cunninghamiana</i> Miquel | 689 | 3.5932 |
| 20 | SW – 10 | <i>Cocos nucifera</i> L. | 240 | 1.2516 |
| 21 | NE – 4 | <i>Cordia sebestena</i> L. | 35 | 0.1825 |
| 22 | NE – 96 | <i>Cycas revoluta</i> L. | 14 | 0.0730 |
| 23 | NE – 98 | <i>Delonix regia</i> | 69 | 0.3598 |
| 24 | NE – 7 | <i>Dendrocalamus strictus</i> (Roxburgh) Nees | 194 | 1.0117 |
| 25 | SE – 50 | <i>Eucalyptus gigantea</i> Dehnh | 2500 | 13.037 |
| 26 | SW – 12 | <i>Eucalyptus glauca</i> Dc. | 5000 | 26.076 |
| 27 | SE – 23 | <i>Eucalyptus globules</i> Labill. | 2500 | 13.040 |
| 28 | SW – 13 | <i>Eucalyptus perfoliata</i> Desf. | 1000 | 5.2160 |
| 29 | SW – 14 | <i>Eucalyptus pulverulenta</i> Link | 1500 | 7.8226 |
| 30 | SE – 2 | <i>Ficus elastica</i> Roxb. | 6 | 0.0312 |
| 31 | NE – 69 | <i>Ficus</i> sp. | 3 | 0.0157 |
| 32 | SE – 1 | <i>Ficus</i> sp. | 2 | 0.0104 |
| 33 | NE – 2 | <i>Holoptelea integrifolia</i> (Roxb.) Planch. | 92 | 0.4797 |
| 34 | NE – 16 | <i>Madhuca longifolia</i> L. | 5 | 0.0260 |
| 35 | NE – 11 | <i>Mangifera indica</i> L. | 33 | 0.1720 |
| 36 | NE – 65 | <i>Michelia champaca</i> L. | 8 | 0.0417 |
| 37 | NE – 6 | <i>Millingtonia hortensis</i> L. f. | 12 | 0.0625 |
| 38 | SW – 29 | <i>Mimusops elengi</i> L. | 4 | 0.0208 |
| 39 | NE – 99 | <i>Morinda tinctoria</i> Roxb. | 35 | 0.1825 |
| 40 | SW – 11 | <i>Musa acuminata</i> Colla | 10 | 0.0521 |
| 41 | NE – 10 | <i>Peltophorum pterocarpum</i> (DC.)K.Heyne | 71 | 0.3702 |

Table 2. Contd.

| | | | | |
|----|----------|---|-----|--------|
| 42 | SW – 5 | <i>Phyllanthus acidus</i> (Linn.) Skeels | 4 | 0.0208 |
| 43 | NE – 54 | <i>Polyalthia longifolia</i> (Sonn.) Thwaites | 171 | 0.8917 |
| 44 | NE – 1 | <i>Pongamia Pinnata</i> (L.) Pierre | 61 | 0.3181 |
| 45 | NE – 18 | <i>Samanea saman</i> (Jacq.) Merr | 81 | 0.4224 |
| 46 | NW – 4 | <i>Sesbania sesban</i> (L.) Merr | 37 | 0.1929 |
| 47 | NE – 41 | <i>Spathodea campanulata</i> Buch.-Ham. ex DC | 8 | 0.0417 |
| 48 | NE – 13 | <i>Syzygium cumini</i> (L.) Skeels. | 3 | 0.0157 |
| 49 | NE – 14 | <i>Tabebuia rosea</i> DC. | 41 | 0.2140 |
| 50 | NE – 8 | <i>Terminalia catappa</i> Linn. | 99 | 0.5170 |
| 51 | NW – 3 | <i>Tectona grandis</i> Linn. | 362 | 1.8880 |
| 52 | NE – 101 | <i>Thespesia populnea</i> Soland ex Correa | 24 | 0.1251 |
| 53 | SE – 40 | <i>Thevetia peruviana</i> (Pers.) K. Schum. | 107 | 0.5580 |

Table 3. Different ornamental plants with unique code no, name and remarks.

| Code No. | Name | Remarks |
|-------------------------------|---|---|
| Family : Acanthaceae | | |
| NE – 56 | <i>Eranthemum spp</i> | |
| Family: Amaranthaceae | | |
| NE – 86 | <i>Gomphrena globosa</i> L. | Cultivar have diff colours |
| NE – 108 | <i>Gomphrena serrata</i> L. | Annual herb with fibrous roots |
| Family: Amaryllidaceae | | |
| NE – 26 | <i>Hymenocallis occidentalis</i> (Leconte) Kunth | Contains various alkaloids and are allergic |
| Family : Apocynaceae | | |
| NE – 94 | <i>Catharanthus roseus</i> (L.) G. Don | Medicinal plant |
| SE – 22 | <i>Calotropis gigantean</i> Aiton | Has clusters of waxy flowers |
| SE – 41 | <i>Nerium oleander</i> L. | Most poisonous of commonly grown garden plant |
| Family : Araceae | | |
| NE – 51 | <i>Aglaonema spp</i> | Poisonous plant |
| Family : Araucariaceae | | |
| NE – 40 | <i>Araucaria heterophylla</i> (Salisb.) | Popular cultivated species |
| Family : Arecaceae | | |
| NE – 21 | <i>Archontophoenix cunninghamiana</i> H. Wendl and Drude | Known as bungalow palm with flower colour violet and red fruits |
| NE – 31 | <i>Caryota urens</i> | Fish tail like leaves |
| Family : Asclepidaceae | | |
| NE – 22 | <i>Asclepias spp.</i> | Herbaceous perennial, dicotyledonous plants |
| Family : Asteraceae | | |
| NE – 48 | <i>Tarconanthus trilobus</i> var. <i>Galpinii</i> | Have dense spreading crown of decorative, bi-coloured leaves. |
| NE – 57 | <i>Gaillardia pulchella</i> Fougroux | Draught resistance |
| SE – 6 | <i>Tridax procumbens</i> L. | Medicinal plant |

Table 3. Contd.

| | | |
|-------------------------------|--|--|
| NE – 23 | <i>Zinnia spp</i> | popular garden flowers |
| Family: Balsaminaceae | | |
| NE – 24 | <i>Impatiens walleriana Hook. F</i> | Flowers are variable in size and colour |
| Family : Boraginaceae | | |
| NE – 4 | <i>Cordia sebestena L.</i> | Draught resistance |
| Family : Cannaceae | | |
| NE – 52 | <i>Canna indica Musafolia</i> | Widely cultivated garden plant |
| Family : Casuarinaceae | | |
| NE – 77 | <i>Casuarina cunninghamiana Miquel</i> | An attractive evergreen tree with fine greyish green needle-like foliage |
| Family: Commelinaceae | | |
| NE – 30 | <i>Rhoeo discolor</i> | Have alkaloids, flavonoids, steroids, saponins, tannins |
| NE – 25 | <i>Commelina spp</i> | Flowers have short life |
| Family: Convolvulaceae | | |
| NE – 114 | <i>Ipomoea pes-tigridis L</i> | Plant with hairy covering |
| SE – 3 | <i>Ipomoea purpurea</i> | Trumpet-shaped flowers |
| Family : Cupressaceae | | |
| NE – 33 | <i>Thuja aurea Hort. ex Carrière</i> | Fan shaped evergreen tree |
| Family : Cycadaceae | | |
| NE – 96 | <i>Cycas revolute</i> | Slow growing palm |
| Family : Cyperaceae | | |
| NE – 35 | <i>Carex phyllocephala T.Koyama</i> | Leaves nearly in whorls, cane-like stems. |
| Family: Euphorbiaceae | | |
| NE – 20 | <i>Acalypha wilkesiana C.L</i> | Foliage is more colourful than many flowers |
| NE – 27 | <i>Codiaeum variegatum (L.) Blume</i> | Found in many brilliant colours |
| NE – 44 | <i>Euphorbia milii Des Moul.</i> | Succulent climbing shrub |
| SE – 19 | <i>Euphorbia heterophylla Linn.</i> | Allergic latex producing plant |
| Family : Fabaceae | | |
| NW – 2 | <i>Caesalpinia pulcherrima (L.)Sw.</i> | Ornamental tree, ripen seeds yield tannin and yellow (with alum) or black (with iron) dye, leaves induce abortion. |
| NW – 5 | <i>Acacia auriculiformis Benth</i> | Fast growing ornamental tree |
| SE – 25 | <i>Crotalaria pallida Linn.</i> | Medicinal plant |
| Family : Lamiaceae | | |
| NE – 90 | <i>Ocimum tenuiflorum L.</i> | Sacred, medicinal plant |
| SE – 28 | <i>Leucas lavandulifolia</i> | An annual herb |
| Family : Liliaceae | | |

Table 3. Contd.

| | | |
|---------------------------------|---|--|
| NE – 38 | <i>Asparagus spp.</i> | Most popular ornamental plant |
| Family : Malpighiaceae | | |
| NE – 76 | <i>Galphimia glauca Hort. ex Bartl</i> | Small evergreen tropical shrub |
| Family : Malvaceae | | |
| NE – 101 | <i>Thespesia populnea L.</i> | Small ornamental tree |
| NE – 93 | <i>Hibiscus mutabilis L.</i> | Ornamental flowers with various colours. |
| Family : Moraceae | | |
| SE – 2 | <i>Ficus elastica</i> | Latex producing tree |
| Family: Myrsinaceae | | |
| NE – 66 | <i>Ardisia japonica</i> | Spreading very quickly evergreen shrub |
| Family : Myrtaceae | | |
| NE – 81 | <i>Callistemon brachyandrus Lindl</i> | It is a shrub species with crimson flower |
| Family : Poaceae | | |
| NE – 74 | <i>Cynodon dactylon (L.)Pers .</i> | Known as Burmuda grass |
| SE – 7 | <i>Dactyloctenium aegyptium L</i> | Grass with straight shoot |
| SE – 34 | <i>California fescue</i> | |
| SE – 36 | <i>Panicum virgatum L.</i> | A perennial warm season grass |
| Family: Rubiaceae | | |
| NE – 59 | <i>Pentas lanceolata</i> | Planted in butterfly gardens |
| Family: Scrophulariaceae | | |
| NE – 68 | <i>Russelia equisetiformis Schltld. and Cham.</i> | Leafless shrub |
| Family : Turneraceae | | |
| NE – 85 | <i>Turnera ulmifolia L.</i> | Antibacterial activity |
| Family: Verbenaceae | | |
| NE – 19 | <i>Duranta repens L</i> | Shrubs and an evergreen |
| NE – 88 | <i>lantana camara L</i> | Known as Spanish Flag or West Indian Lantana |

Table 4. Different ornamental plants with their count and frequency with respect to total number ornamental plants in the campus.

| Serial No. | Code No. | Name of ornamental plant | No. of plants | Frequency (%) |
|------------|----------|---|---------------|---------------|
| 1 | NW – 5 | <i>Acacia auriculiformis Benth</i> | 32 | 0.2049 |
| 2 | NE – 20 | <i>Acalypha wilkesiana C.L</i> | 756 | 4.8424 |
| 3 | NE – 51 | <i>Aglaonema spp</i> | 138 | 0.8839 |
| 4 | NE – 40 | <i>Araucaria heterophylla (Salisb.)</i> | 36 | 0.2306 |
| 5 | NE – 21 | <i>Archontophoenix cunninghamiana H.Wendl and Drude</i> | 69 | 0.4419 |
| 6 | NE – 22 | <i>Asclepias spp.</i> | 253 | 1.6203 |
| 7 | NE – 66 | <i>Ardisia japonica 'Chirimen'</i> | 89 | 0.5701 |
| 8 | NE – 38 | <i>Asparagus spp.</i> | 395 | 2.5302 |

Table 4. Contd.

| | | | | |
|----|----------|--|------|--------|
| 9 | NE - 80 | <i>Bougainvillea glabra</i> | 843 | 5.4000 |
| 10 | NE - 41 | <i>Spathodea campanulata</i> Buch.-Ham. ex DC | 8 | 0.0512 |
| 11 | NW - 2 | <i>Caesalpinia pulcherrima</i> (L.) Sw. | 27 | 0.1729 |
| 12 | NE - 81 | <i>Callistemon brachyandrus</i> Lindl | 6 | 0.0384 |
| 13 | SE - 34 | <i>California fescue</i> | 432 | 2.7672 |
| 14 | SE - 22 | <i>Calotropis gigantea</i> Aiton | 192 | 1.2299 |
| 15 | NE - 52 | <i>Canna indica</i> Musafolia | 83 | 0.5316 |
| 16 | NE - 35 | <i>Carex phyllocephala</i> T.Koyama | 56 | 0.3587 |
| 17 | NE - 31 | <i>Caryota urens</i> L. | 11 | 0.0704 |
| 18 | NE - 77 | <i>Casuarina cunninghamiana</i> Miquel | 689 | 4.4135 |
| 19 | NE - 94 | <i>Catharanthus roseus</i> (L.) G. Don | 648 | 4.1509 |
| 20 | NE - 64 | <i>Clerodendrum infortunatum</i> Linn. | 36 | 0.2306 |
| 21 | NE - 27 | <i>Codiaeum variegatum</i> (L.) Blume | 67 | 0.4291 |
| 22 | NE - 25 | <i>Commelina</i> spp | 233 | 1.4925 |
| 23 | NE - 4 | <i>Cordia sebestena</i> L. | 35 | 0.2242 |
| 24 | SE - 25 | <i>Crotalaria pallida</i> Linn. | 134 | 0.8583 |
| 25 | NE - 96 | <i>Cycas revoluta</i> L. | 14 | 0.0896 |
| 26 | NE - 74 | <i>Cynodon dactylon</i> (L.) Pers . | 128 | 0.8199 |
| 27 | SE - 7 | <i>Dactyloctenium aegyptium</i> L | - | - |
| 28 | NE - 19 | <i>Duranta repens</i> L | 2562 | 16.411 |
| 29 | NE - 56 | <i>Eranthemum</i> spp | 234 | 1.4989 |
| 30 | SE - 19 | <i>Euphorbia heterophylla</i> Linn. | 396 | 2.5366 |
| 31 | NE - 44 | <i>Euphorbia milii</i> Des Moul. | 88 | 0.5637 |
| 32 | SE - 1 | <i>Ficus</i> spp. | 2 | 0.0128 |
| 33 | NE - 57 | <i>Gaillardia pulchella</i> Fougeroux | 107 | 0.6854 |
| 34 | NE - 76 | <i>Galphimia glauca</i> Hort. ex Bartl | 129 | 0.8263 |
| 35 | NE - 86 | <i>Gomphrena globosa</i> L. | 549 | 3.5167 |
| 36 | NE - 108 | <i>Gomphrena serrata</i> L. | 312 | 1.9985 |
| 37 | NE - 93 | <i>Hibiscus mutabilis</i> L. | 36 | 0.2306 |
| 38 | NE - 32 | <i>Hibiscus rosa-sinensis</i> L. | 862 | 5.2911 |
| 39 | NE - 26 | <i>Hymenocallis occidentalis</i> (Leconte) Kunth | 12 | 0.0768 |
| 40 | NE - 24 | <i>Impatiens walleriana</i> Hook. F | 252 | 1.6142 |
| 41 | NE - 114 | <i>Ipomoea pes-tigridis</i> L | 538 | 3.4462 |
| 42 | SE - 3 | <i>Ipomoea purpurea</i> | 552 | 3.5359 |
| 43 | NE - 88 | <i>Lantana camara</i> L | 438 | 2.8057 |
| 44 | SE - 28 | <i>Leucas lavandulifolia</i> L | 638 | 4.0870 |
| 45 | SE - 41 | <i>Nerium oleander</i> L | 49 | 0.3148 |
| 46 | NE - 90 | <i>Ocimum tenuiflorum</i> L. | 66 | 0.4237 |
| 47 | SE - 36 | <i>Panicum virgatum</i> L. | - | - |
| 48 | NE - 75 | <i>Pentas lanceolata</i> | 273 | 1.7487 |
| 49 | NE - 30 | <i>Rhoeo discolor</i> | 104 | 0.6669 |
| 50 | NE - 82 | <i>Rosa kordesii</i> | 213 | 1.3654 |
| 51 | NE - 68 | <i>Russelia equisetiformis</i> Schtdl. and Cham. | 93 | 0.5967 |
| 52 | SE - 21 | <i>Stachytarpheta urticifolia</i> Sims | 363 | 2.3252 |
| 53 | NE - 48 | <i>Tarchonanthus trilobus</i> var. <i>Galpinii</i> | 26 | 0.1679 |
| 54 | NE - 101 | <i>Thespesia populnea</i> L. | 24 | 0.1546 |
| 55 | NE - 33 | <i>Thuja aurea</i> Hort. ex Carrière | 54 | 0.3460 |
| 56 | SE - 6 | <i>Tridax procumbens</i> L. | 756 | 4.8427 |
| 57 | NE - 85 | <i>Turnera ulmifolia</i> L. | 126 | 0.8075 |
| 58 | NE - 23 | <i>Zinnia</i> spp | 347 | 2.2228 |



Figure 2. Different trees with their unique code number.



Figure 3. Different ornamental plants with their unique code number.

globules Labill (13.040). *Eucalyptus perfoliata* Desf. (5.2160), *Eucalyptus pulverulenta* Link (7.8226).

DISCUSSION

Biodiversity survey was done by many researchers but biodiversity survey of university campus situated in Western Ghats of India is still neglected by many science and technology colleges-Universities. Current study was aimed for identification of different trees and ornamental plants in Karunya University campus.

Generally biodiversity survey is done by quartet method, which includes wooden strips which covers a 1 m² area. To simply work and to identify plants easily the campus was divided into four quadrants and plants were named according to the quadrant. This four quadrant method was first developed and used to study biodiversity.

Muthuchelian et al. (2007) explained about *in-situ* and *ex-situ* methods of biodiversity conservation. In our study we selected some plants for vegetative propagation and some plants are planted in different areas of the campus and monitored for proper growth. The selection of plants for conservation is based on their frequency (less than 0.1%).

SUMMARY AND CONCLUSIONS

The total area of Karunya University Campus constitutes about 0.001770% of the total area of the Western Ghats. This area has total 15611 ornamental plants belonging to 32 families (58 genera) and total 19175 trees belonging to 27 families (53 genera). South east (SE) and south west (SW) area of University campus was found to be rich in *Eucalyptus* spp. and the species found in this area includes *Eucalyptus gigantea* Dehnh (13.037), *Eucalyptus glauca* Dc. (26.076), *Eucalyptus globules Labill* (13.040), *Eucalyptus perfoliata* Desf. (5.2160), *Eucalyptus pulverulenta* Link (7.8226). Plants with frequency less than 0.1% selected for the conservation by *in-situ* and *ex-situ* method.

The natural ecosystems hold important plant genetic resources of endemic and threatened wild trees and ornamental plant relatives. Many of these wild plants and wild relatives are not maintained sustainably. Unique and

particular diverse populations of these genetic resources must be protected in *in situ* conditions (Paroda et al., 1999). The biodiversity of Western Ghats should be studied in more depth. It is very necessary to save the biodiversity of Western Ghats by *in-vivo* and *in-vitro* propagation.

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REFERENCES

- Daniels RRJ (2011). "Biodiversity of Western Ghats – An Overview", published on http://oldwww.wii.gov.in/envis/rain_forest/chapter2.htm.
- Drummond A, Strimmer K (2001). Frequently Asked Questions About Evolution, "Evolution Library", (Oxford, England) (WGBH Educational Foundation) ISSN 1367-4803, PMID 11448888, <http://www.pbs.org/wgbh/evolution/library/faq/cat03.html>, retrieved 2008-01-23, Bioinformatics, 17(7)662: 3.
- Kannaiyan S, Gopalam A (ed) (2007). Biodiversity in India – Issues and Concerns. Associated Publishing Company, New Delhi p. 430. (In press).
- Kannaiyan S, Gopalam A (eds) (2007). Agrobiodiversity volume II. Associated Publishing Company, New Delhi, p. 372 (In press).
- Khoshoo TN (1995). Biodiversity, Bioproductivity and Biotechnology. In: Farmers Rights and Plant Genetic Resources – Recognition and Rewards: A dialogue (eds) M.S. Swaminathan, Mac Millan India Ltd. pp.156-159.
- Muthuchelian K, Kannaiyan S, Gopalam A (2007). Forest Biodiversity Vol-II. Associated Publishing Company, New Delhi, p. 329.
- Paroda RS, Mangala R, Gautam PL (1999). National Action Plan on Agrobiodiversity in India. Indian Council of Agricultural Research, New Delhi, p. 55.
- WGBH Educational Foundation (2001). Roundtable: Mass Extinction", Evolution: a journey into where we're from and where we're going, <http://www.pbs.org/wgbh/evolution/extinction/massex/index.html>, retrieved 2008-01-23.
- Sahney S, Benton MJ, Ferry Paul (2010). "Links between global taxonomic diversity, ecological diversity and the expansion of vertebrates on land". Biology Letters <http://rsbl.royalsocietypublishing.org/content/early/2010/01/22/rsbl.2009.1024.abstract>.