RESEARCH ARTICLE

DIVERSITY STATUS AND MEDICINAL PLANT SPECIES PRESENT IN THE NATURAL VEGETATION OF KONGUNADU ARTS AND SCIENCE COLLEGE CAMPUS, COIMBATORE

Venkatachalapathi, A., M. Gokulakrishnan, V. Sushmitha, R. Uma Maheswari, L. Kaveri and S. Paulsamy*

Department of Botany, Kongunadu Arts and Science College, Coimbatore – 641029, India.

ABSTRACT

The present study is aimed to identify the diversity status and medicinal plant species present in natural vegetation of Kongunadu Arts and Science College Campus, Coimbatore. The study was conducted during the period between October, 2015 and February, 2016 through exploration was made periodically at weekly intervals in all vegetation areas of Kongunadu Arts and Science College, Coimbatore to enlist the species. A total of 50 plant species belongs to 47 genera which are included in 29 families are present in the campus. The total number of species in herbs is higher (27) followed by the trees and climbers with 8 species, shrubs with 4 species in the college campus. The documentation of this floristic list along with the economic uses of plants may be considered as a baseline data for future management and perspective of plant species diversity.

Keywords: Diversity status, Medicinal plants, Kongunadu Arts and Science College.

1. INTRODUCTION

Institutional premises in the past few decades are becoming most conductive habitats for rich variety of wild plant species as the management authorities are giving considerable attention to plant conservation. Despite the severe exploitation on wild bioresources in natural ecosystem, the premises of educational institutions generally have considerable green cover contributed by many number of plant species of different life-forms due to the habitat protection offered by the authorities. The communities being maintained in the educational institutions are economically efficient, ecologically sound and biologically sustainable systems. Campus plant communities have attained characteristics which can be useful for making interesting models for research and design of sustainable ecosystems. Some of the characteristics include efficient nutrient cycling, high biodiversity, low use of external inputs and soil conservation potential (1). The nature and organization of plant communities and ecological features of constituent species are generally vary from place to place according to the local physical environment (2). In biodiversity point of view, the first step for effective conservation of species is the documentation of all available species followed by preparing databases for every possible local areas, which can enable to prepare regional and national biodiversity map. Categorization of documented species into various groups according to their economic uses is another important requisite to offer species specific conservation strategy.

Kongunadu Arts and Science College, Coimbatore is a most popular educational institution in Tamil Nadu, India that attained top rank in NACC reaccreditation. College management authorities and staff and students forums give more attention for establishing indoor gardens and also maintaining the natural plant communities in a well manner inside the campus. Around seven hectares of habitat with natural plant communities encompassed by different plant species are available in Kongunadu Arts and Science College, Coimbatore. However, documentation of flora for that habitat with economic uses is not completed so far. Therefore, the present study was aimed at to prepare a floristic list along with the medicinal and other economical uses of plants in Kongunadu Arts and Science College with particular reference to wild species. The data obtained can be useful to know the changes in species composition, community dynamics and level of conservation as influenced by the habitat protection in future.

2. MATERIAL AND METHODS

During the period between October, 2015 and February, 2016 through exploration was made periodically at weekly intervals in all vegetation areas of Kongunadu Arts and Science College, Coimbatore to enlist the species. Identification of plant species was made on the basis of guidelines and keys provided by Gamble (3). Herbarium specimens were collected and deposited in the Department of Botany, Kongunadu Arts and Science College, Coimbatore. Medicinal and other economic uses of the plant species were known through

*Correspondence: Dr. S. Paulsamy, Dean, Academic and R&D, Kongunadu Arts and Science College, Coimbatore – 641029, India. E-mail ID: paulsami@yahoo.com
literature survey and information from local traditional healers by adequate interagations. The level of anthropogenic disturbances caused to the communities of the college campus was mentioned regularly.

3. RESULTS AND DISCUSSION

The vegetation of college campus is heterogenous composed by various types of lifeforms such as trees, shrubs, herbs, climbers, creepers, parasites, etc. As the climatic condition is semi-arid, the plants are mostly mesophytic in the college campus. Generally, the herbs are distributed in patches and also all along the length of the hedges. The tree species such as Delonix regia, Albizia amara, Azadirachta indica, Morinda tinctoria, Peltophorum ferrugineum, Pongamia pinnata, Samanea saman and Spathodea campanulata are raised by college management and they are nearly 35 years old in age.

A total of 50 plant species belongs to 47 genera which are included in 29 families are present in the campus (Table 1). Euphorbiaceae is the dominant family in terms of species richness consists six species followed by Asteraceae with four species and Asclepiadaceae, Mimosaceae, Poaceae and Solanaceae with three species each in the community of college campus. Twenty three families such as Acanthaceae, Aizoaceae, Amaranthaceae, Apocynaceae, Bignoniaceae, Combretaceae, Commelinaceae, Convolvulaceae, Cucurbitaceae, Cyperaceae, Fabaceae, Malvaceae, Meliaceae, Menispermaceae, Myrtaceae, Nyttaginaeae, Passifloraceae, Rubiaceae, Sapindaceae, Sterculiaceae, Tiliaceae, Verbenaceae and Zygophyllaceae contributed one species each to the community is also varying widely (Fig. 1). The total number of species in herbs is higher (27) followed by the trees and climbers with 8 species, shrubs with four species in the college campus.

In the floristic list of college campus, interestingly all the 50 species (100%) recognized as medicinally important (Table 1). This may be explained due to the existence of semi-arid climatic condition inside the campus, a favourable environment for many constituent plant species (4,5). It has been observed further that the medicinal uses of the plants in the campus are diverse and multifaceted (Table 1). A higher number of 18 plants which include the species like Calotropis gigantea, Calotropis procera, Chloris barbata, Citoria ternatea, Cynodon dactylon, Cyperus rotundus, Datura metel, Hibiscus micranthus, Justicia tranquambriensis, Lantana camara, Oldenlandia umbellata, Pergularia daemia, Physalis minima, Quisqualis indica, Sida acuta, Tinospora cordifolia, Vernonia cinerea and Waltheria indica are known to have curing the fever. This may be attributed to high variety of flavonoids, the active principle compounds naturally present in high amount in the species of semi-arid climatic condition (6,7). Next to curing fever, a sizable number of 13 species such as Albizia amara, Brachia ramose, Chloris barbata, Euphorbia hirta, E. microphylla, Eucalyptus tereticornis, Justicia tranquambriensis, Phyllanthus maderaspatensis, Pergularia daemia, Quisqualis indica, Samanea saman, Vernonia cinerea and Waltheria indica are used for the treatment of diarrhea. Twelve species such as Acalypha indica, Azadirachta indica, Corchorus tridens, Datura metel, Euphorbia heterophylla, Lantana camara, Peristrophe bicalculata, Prosopis cineraria, Tabernaemontana divaricata, Tinospora cordifolia, Vernonia cinerea and Walthneria indica are reported to have property of curing skin diseases. Seven species such as Alternanthera pungens, Corchorus tridens, Hibiscus micranthus, Justicia tranquambriensis, Spathodea campanulata, Tabernaemontana divaricata and Tridax procumbens are reported to have anti-inflammatory property. Seven species such as Acalypha indica, Brachia ramose, Euphorbia hirta, E. microphylla, Pongamia pinnata, Solanum nigrum and Tridax procumbens are used for treating ulcer. Seven species such as Calotropis gigantea, Calotropis procera, Datura metel, Millingtonia hortensis, Oldenlandia umbellata, Passiflora foetida and Solanum nigrum are generally used for curing asthma. The 7 species such as Cardioperum halicacabum, Cyperus rotundus, Euphorbia hirta, Euphorbia heterophylla, Mukia maderaspatana, Phyllanthus amarus and Vernonia cinerea are prescribed abdominal/stomach disorders treatment.

A 5 species such as Acalypha indica, Chloris barbata, Phyllanthus maderaspatensis, Spathodea campanulata and Quisqualis indica are used for their anti-rheumatism. Five species such as Alternanthera pungens, Phyllanthus amarus, Physalis minima, Tinospora cordifolia and Tribulus terrestris are used for the treatment of kidney disorders. Five species such as Calotropis gigantea, Lantana camara, Mollugo nudicaulis, Mukia maderaspatana and Waltheria indica are used to reduce cough. Five species such as Chloris barbata, Gomphrena decumbens, Hibiscus micranthus, Justicia tranquambriensis and Tinospora cordifolia are reported to have anti-diabetic property. Five species such as Justicia tranquambriensis, Millingtonia hortensis, Mollugo nudicaulis, Phyllanthus amarus and Solanum nigrum are used to treat liver and spleen disorders. Four species such as Euphorbia microphylla, Eucalyptus tereticornis, Lantana camara and Parthenium hysterophorus are used for the control of dysentery.
Table 1. List of plant species in Kongunadu Arts and Science College campus, Coimbatore with their medicinal uses.

| S. No. | Bionomial Name                  | Common Name | Family               | Habit | Part Used            | Medicinal Uses                                                                 |
|-------|---------------------------------|-------------|----------------------|-------|----------------------|-------------------------------------------------------------------------------|
| 1     | *Acalypha indica* L.            | Kuppaimeni  | Euphorbiaceae        | Herb  | Leaf, root and flowers| Ulcers, snake bite, skin diseases and rheumatism.                              |
| 2     | *Albizia amara* (Roxb.) B.Boivin.| Arapu       | Mimosaceae           | Tree  | Flower and seeds     | Piles, diarrhea, gonorrhea, leprosy, leucoderma, erysipelas and abscesses.     |
| 3     | *Alternanthera pungens* Kunth.  | Ponnaganni  | Amaranthaceae        | Herb  | Leaf                 | Blood Purification, anti-inflammatory and kidney disorders.                    |
| 4     | *Azadirachta indica* A. Juss.   | Veppai      | Meliaceae            | Tree  | Whole plant          | Leprosy, intestinal helminthiasis and skin infections.                         |
| 5     | *Blumea obliqua* (Linn) Druce.  | Kakronda    | Asteraceae           | Herb  | Leaf                 | Insect repellent.                                                             |
| 6     | *Boerhavia diffusa* L.          | Mukaratte kirai | Nyctaginaceae        | Herb  | Leaf, root and seed  | Cooling, bowels complaint and blood purification.                              |
| 7     | *Brachiaria ramosa* (L.) Stapf. | Chamapothaval | Poaceae              | Shrub | Leaf                 | Ulcers and diarrhea.                                                          |
| 8     | *Calotropis gigantea* L.        | Eruku       | Asclepiadaceae       | Shrub | Leaf, root, bark, seed and flower | Fever, rheumatism, cough, cold and asthma.                                    |
| 9     | *Calotropis procer* (Aiton) W.T.Aiton. | Eruku       | Asclepiadaceae       | Shrub | Leaf, root, bark, seed and flower | Fevers, asthma, vomiting, nose and indigestion.                               |
| 10    | *Cardiospermum halicacabum* L.  | Mudakattan kirai | Sapindaceae         | Climber | Whole plant | Arthritis, constipation and abdominal problems.                                |
| 11    | *Chloris barbata* SW.           | Mayil kondai pul Thuthi | Poaceae              | Herb  | Whole plant          | Skin disease, fever, diarrhea and diabetes.                                   |
| 12    | *Clitoria ternatea* L.          | Kanangkozai  | Commelinaceae        | Herb  | Whole plant          | Antimicrobial, antipyretic, analgesic and diuretic.                            |
| 13    | *Commelina benghalensis* L.     | Umathai     | Solanaceae           | Herb  | Leaf, seeds and flowers | Mouth ulcer, psychosis, epilepsy, nose blockage in child.                     |
| 14    | *Corchorus tridens* L.          | Yennai chedi | Tiliaceae            | Herb  | Leaf                 | Anti-inflammatory, gonorrhea and headache.                                   |
| 15    | *Cynodon dactylon* Dress.      | Arugampull  | Poaceae              | Herb  | leaf and stem        | Eye disorder and antipyretic.                                                 |
| 16    | *Cyperus rotundus* L.           | Korai       | Cyperaceae           | Herb  | Leaf and tuber       | Fever, digestive system disorders and dysmenorrhea.                           |
| 17    | *Datura metel* L.               | Umathai     | Solanaceae           | Herb  | Leaf, seeds and flowers | Asthma, skin diseases and fever.                                              |
| 18    | *Eucalyptus tereticornis* SM.   | Thaila maram | Myrtaceae            | Tree  | Leaf                 | Diarrhea and dysentery.                                                       |
| 19    | *Euphorbia heterophylla* L.     | Pall peruki  | Euphorbiaceae        | Herb  | Leaf                 | Stomachache.                                                                 |
| 20    | *E. hirta* L.                   | Amman       | Euphorbiaceae        | Herb  | Leaf                 | Diarrhea, peptic ulcers and stomach disorders.                                |
| 21    | *E. microphylla* B.Heyne ex Roth. | Pall peruki | Euphorbiaceae        | Herb  | Leaf                 | Jaundice, diarrhea, dysentery and ulcer.                                      |
| 22    | *Evolvulus alsinooides* L.      | Visnu kanthi | Convolvulaceae       | Herb  | Whole plant          | Nerves tonic and memory loss.                                                 |
| 23    | *Gomphrena decumbens* Jacq.     | Chengkruk    | Amaranthaceae        | Herb  | Whole plant          | Diabetes.                                                                     |
| No. | Scientific Name                        | Common Name                           | Family       | Life Form | Parts Used                       | Uses                                                                 |
|-----|--------------------------------------|---------------------------------------|--------------|-----------|----------------------------------|----------------------------------------------------------------------|
| 24  | *Hibiscus micranthus* L.             | Sitramutti                            | Malvaceae    | Herb      | Leaf, fruit and flowers          | Hypoglycemia agent, anti pyretic, anti inflammatory and tumor.        |
| 25  | *Justicia tranquebariensis* L.       | Thavasi murungai                      | Acanthaceae  | Herb      | Leaf                            | Fever, inflammation, diabetes, diarrhea and liver disease.            |
| 26  | *Lantana camara* L.                 | Unni chedi                            | Verbenaceae  | Shrub     | Leaf, bark, root and flower.     | Itching, cold, cough, fever, dysentery and jaundice.                 |
| 27  | *Millingtonia hortensis* L.          | Maramalli                             | Bignoniaceae | Tree      | Whole plant                      | Asthma, sinusitis, cholagogue and tonic.                               |
| 28  | *Mollugo nudicaulis* Lam.            | Parpadakpulu                          | Aizoaceae    | Herb      | Leaf                            | Whooping cough, wound healing and liver disorders.                   |
| 29  | *Mukia maderaspatana* (Linn.) M. Roemer. | Mosumouskai                         | Cucurbitaceae| Climber   | Stem, bark and root              | Cough, gas trouble and tooth ache.                                   |
| 30  | *Oldenlandia umbellata* L.           | Chaaya chedi                          | Rubiaceae    | Herb      | Whole plant                      | Asthma and febrifuge.                                                |
| 31  | *Parthenium hysterophorus* L.        | Parthenium                            | Asteraceae   | Herb      | Root                            | Dysentery and anti tumor.                                            |
| 32  | *Passiflora foetida* L.              | Mossukkattan                          | Passifloraceae| Climber   | Whole plant                      | Asthma.                                                             |
| 33  | *Pergularia daemia* (Forssk.) Chiov. | Veliparuthi                           | Asclepiadaceae| Climber   | Leaf and root                    | Laxative, antipyretic, diarrhea and malaria.                          |
| 34  | *Peristerope bicalyculata* (Retz.)   | Chebisa                               | Acanthaceae  | Herb      | Whole plant                      | Skin diseases.                                                      |
| 35  | *Phyllanthus amarus* Schum. & Thonn. | Sirunelli                             | Euphorbiaceae| Herb      | Whole plant                      | Stomachache, liver, kidney and spleen disorders.                     |
| 36  | *P. maderaspatensis* L.              | Arunelli                              | Euphorbiaceae| Herb      | Whole plant                      | Diarrhea, menstrual problems and rheumatism.                        |
| 37  | *Physalis minima* L.                 | Kupanti                               | Solanaceae   | Herb      | Leaf, stem, root, fruit          | Diuretic, laxative, head ache, fever and abscesses.                  |
| 38  | *Pongamia pinnata* (L.) Pierre.      | Pungai                                | Fabaceae     | Tree      | Whole plant                      | Bleeding hemorrhoids and ulcer.                                      |
| 39  | *Prosopis cineraria* L.              | Vanni                                 | Mimosaceae   | Tree      | Leaf, bark, pad and flower       | Scorpion bites and eye troubles.                                     |
| 40  | *Quisqualis indica* L.               | Irganun Malli                         | Combretaceae  | Climber   | Leaf, root and fruit             | Fever, rheumatism and diarrhea.                                      |
| 41  | *Samanea saman* (Jacq) Merr.         | Thungumonjimalaram                    | Combretaceae  | Tree      | Whole plant                      | Stomach cancer, colds, diarrhea, head ache and intestinal ailments.  |
| 42  | *Sida acuta* Burm.                  | Palambasi                             | Malvaceae    | Herb      | Leaf and root                    | Fever.                                                              |
| 43  | *Solamum nigrum* L.                 | Manathakkali                          | Solanaceae   | Herb      | Whole plant                      | Liver diseases, mouth ulcer and asthma.                              |
| 44  | *Spathodea campanulata* P. Beauv.    | Neerkaai                              | Bignoniaceae | Tree      | Leaf, root, bark, stem and fruit | Antiinflammatory, malaria and HIV.                                   |
| 45  | *Tabernaemontana divaricata* (L.)    | Nandia vattai                         | Apocynaceae  | Shrub     | Leaf, fruit, flower              | Anti inflammatory, eye disease and skin disease.                     |
| 46  | *Tinospora cordifolia* (Thunb.) Miers.| Senthil kodi                         | Menispermaceae| Climber   | Stem, bark and root              | Fevers, diabetes, dyspepsia, jaundice, urinary problems and skin disease. |
| 47  | *Tribulus terrestris* L.             | Nerunji                               | Zygophyllaceae| Herb     | Leaf and root                    | Gonorrhea and urinary disorders.                                     |
| 48  | *Tridax procumbens* L.               | Vetukaya poondu                       | Asteraceae   | Herb      | Whole plant                      | Inflammation, wound, ulcers and hemorrhoids.                          |
| 49  | *Vernonia cinerea* Less.             | Sahadevi                              | Asteraceae   | Herb      | Whole plant                      | Stomach pain, diarrhea, fever, eczema, ring worm and elephantiasis diseases. |
| 50  | *Waltheria indica* L.                | Shengalipoondu                        | Sterculiaceae| Shrubs    | Leaf and root                    | Diarrhea, infertility, fever and cough.                              |
Four species such as *Calotropis gigantea*, *Lantana camara*, *Commelina benghalensis* and *Samanea saman* are prescribed for the treatment of cold. Three species such as *Albizia amara*, *Pongamia pinnata* and *Tridax procumbens* are recommended to treat the problems of piles/bleeding hemorrhoids. Three species such as *Albizia amara*, *Corchorus tridens* and *Tribulus terrestris* are reported to have anti-gonorrhea property. Three species such as *Corchorus tridens*, *Physalis minima* and *Samanea saman* are prescribed for treating headache. Three species such as *Cynodon dactylon*, *Prosopis cineraria* and *Tabernaemontana divaricata* are used for improving memory disorders. Two species *Euphorbia hirta*, *Evolvulus alsinoides* are having anti-malarial property. Two species such as *Calotropis procera* and *Tinospora cordifolia* are used to control mouth ulcer. Two species such as *Commelina benghalensis* and *Solanum nigrum* are used for reducing obesity and abscesses. Two species such as *Azadirachta indica* and *Mukia maderaspatana* are prescribed for curing leprosy. Two species such as *Evolvulus alsinoides* and *Hibiscus micranthus* are reported to have anti-tumor/anti-cancer property. Two species such as *Albizia amara* and *Azadirachta indica* are prescribed for curing leprosy. Two species such as *Alternanthera pungens* and *Boerhavia diffusa* are good blood purifiers. Two species such as *Commelina benghalensis* and *Samanea saman* are used to treat intestinal helminthiasis/ailments. Two species such as *Pergularia daemia* and *Spathodea campanulata* are having anti-malarial property. Two species such as *Calotropis gigantea* and *Tinospora cordifolia* are used to control vomiting, indigestion and nausea. Two species such as *Commelina benghalensis* and *Solanum nigrum* possesses the property of control mouth ulcer. Two species such as *Commelina benghalensis* and *Evolvulus alsinoides* are used for improving memory disorders. Two species such as *Mollugo nudicaulis* and *Tridax procumbens* are reported to have wound healing property and the other two species such as *Pergularia daemia* and *Physalis minima* are reported to have laxative property.

The following species such as *Acalypha indica* used to treat snake bite, *Albizia amara* used to treat leucoderma and erysipelas, *Blumea oblique* used as insect repellent, *Boerhavia diffusa* used for body cooling and to treat bowels complaint, *Cardiospermum halicacabum* is used to treat arthritis and constipation, *Clitoria ternatea* used for antimicrobial and anti-analgesic, *Commelina benghalensis* used to treat psychosis and epilepsy, *Evolvulus alsinoides* used to treat nervous problem, *Millingtonia hortensis* used to cure sinusitis and as tonic, *Mukia maderaspatana* used to treat toothache, *Prosopis cineraria* is used to treat scorpion bite, *Vernonia cinerea* used to cure eczema, ring worm and elephantiasis diseases and *Waltheria indica* used to treat infertility.

The plant parts used for treating the ailments also varying according to the types of ailments (Fig. 2). Among them leaf part for the higher number of (32%) plant species followed by whole plants (19%), root (18%), flower (11%), seed (6%), fruit (5%), stem and bark (4% each) and tuber (1%). It is explained that leaf is the primary site of photosynthesis and produce many secondary metabolites, in addition to reserves like carbohydrates which attributes the higher number of species for leaf as medicinal part (8-10).

Many species present in the community of college campus are multifaceted in medicinal and other economic uses. Such species are *Acalypha indica*, *Albizia amara*, *Alternanthera pungens*, *Azadirachta indica*, *Boerhavia diffusa*, *Brachiaria ramose*, *Calotropis gigantea*, *C. procera*, *Cardiospermum halicacabum*, *Chloris barbata*, *Clitoria ternatea*, *Commelina benghalensis*, *Corchorus tridens*, *Cynodon dactylon*, *Cyperus rotundus*, *Datura metel*, *Euphorbia hirta*, *E. microphylla*, *Eucalyptus tereticornis*, *Evolvulus alsinoides*, *Hibiscus micranthus*, *Justicia truncanebriensis*, *Lantana camara*, *Millingtonia hortensis*, *Mollugo nudicaulis*, *Mukia maderaspatana*, *Oldenlandia umbellata*, *Phyllanthus...
amarus, P. maderaspatensis, Parthenium hysterocephorus, Pergularia daemia, Physalis minima, Pongamia pinnata, Prosopis cineraria, Quisqualis indica, Samanea saman, Solanum nigrum, Spathodea campanulata, Tabernaemontana divaricata, Tinospora cordifolia, Tribulus terrestris, Tridax procumbens, Vernonia cinerea and Waltheria indica which are used in the treatment of various ailments. This may be explained due to the various phytochemicals and nutraceuticals in these species (11-14). The rich diversity of plant species in the college campus may be due to the presence of different microclimatic sites like open habitats, shaded habitats by broad tree canopy coverage, slightly ever wet places, hedges with the habitat of more soil organic matter etc in the common macroclimate of semi-arid condition. In addition, very little or no disturbance by biotic factor including man is being caused to the vegetation may also be a possible factor for this high species richness in the college campus.

4. CONCLUSION

It is concluded from the observation that the campus of Kongunadu Arts and Science College, Coimbatore is a habitat for various plant species of different taxonomic categories. Furthermore, it is a place of vegetation that contains many species with different medicinal uses. Hence, the campus may be considered as a potential site for many medicinal species sue to its divers microclimatic conditions. In addition to the establishment of many indoor plants, the perpetuation of natural vegetation with high species richness adds still more significance to the biodiversity conservation. Documentation of this floristic list along with the economic uses of plants may be considered as a baseline data for future management and perspective of plant species diversity.

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