ASSESSMENT OF ECOLOGICAL STATUS OF ECONOMICALLY IMPORTANT PLANTS IN UDHAYAGIRI HILLS, NAGARCOIL

Jenil Prabha, K* and R. Asir Selin Kumar  
Postgraduate and Research Department of Botany  
Scott Christian College (Autonomous), Nagercoil-629 003, Tamil Nadu, India  
*E.mail: jenilnagercoil@gmail.com

ABSTRACT

The present ecological investigation was carried out in the understorey of tropical moist deciduous forest of Udhayagiri fort hills, Kanyakumari, Tamil Nadu. A total number of 171 species were documented in the understorey of the study area and among them 163 species were recognized as economically important. The secured value of ecological attribute, importance value index (IVI) indicates that the species like Tephrosia purpurea, Clerodendron infortunatum, Acalypa indica, Aerva lanata, Asystasia gangetica, Belpharis maderaptensis, Cleome viscosa, Dodonia viscose, Glycosmis pentaphylla, Leucas aspera, Limnophila indica, Martynia annua, Oldenlandia umbellate, Pavetta indica, Phyllanthus amarus and Rhynchosia minima are well established in the study area. On the other hand, 55 plant species are considered to be ecologically weaker in the community. Hence priorities must be given to these species for natural regeneration and hence their conservation as well.

Keywords: Ecological status, Udhayagiri hills, Importance value index.

1. INTRODUCTION

Western Ghats is among the ecologically richest of India, next to the Himalaya in the diversity of its biological species (Gadgil, 1984). It encompasses many types of ecosystems such as tropical wet evergreen forests, dry deciduous forests, moist deciduous forests, thorny scrub jungles and the fragile montane shafts with associated grasslands (Champion and Seth, 1968). Among the different types of vegetations in the Western Ghats, the present study area, Udhayagiri Hills is dominated by the tropical moist deciduous forests. A large number of herbs, shrubs and climbers is commonly occupying in the understorey of the study area. Udhayagiri Hills under semi-arid climatic condition in many parts hold more number of economically and medicinally important plants due to the presence of diverse secondary metabolites. However, works on phytosociological analysis in the understorey of this region have been limited. Hence, the present ecological investigation was carried out to enlist economically important plants and to assess their ecological position through phytosociological analysis in the understorey of the study area.

2. MATERIALS AND METHODS

2.1. Study area

The present study area, Udhayagiri fort hills is situated in the Kanyakumari district of Tamil Nadu and lies at a distance of 14 km from the town of Nagercoil. The Udhayagiri covers a huge area of 22.50 hectares which is surrounded by isolated hills. The elevation of the study area is 97 m above msl. The geographical location of Udhayagiri fort hills lies between 8°14' 38.4 N attitude and 77°19' 55.2 E longitude.

2.2. Experimental methods

Phytosociological analysis was carried out during the rainy month of September, 2013 in the understorey of the study forest, Udhayagiri hills. At the time of sampling, 50 random quadrats each with the size of 1m² were laid to encounter the species and their individuals. The quantitative characters such as frequency, density, abundance, relative frequency, relative density, relative dominance and importance value index were calculated according to the following formulae proposed by Cottam and Curtis (1956):

- Frequency (%) = \( \frac{\text{Number of quadrats in which the species present}}{\text{Total number of quadrats studied}} \times 100 \)
- Density = \( \frac{\text{Total number of individuals of the species in all quadrats}}{\text{Total number of quadrats studied}} \)
- Abundance = \( \frac{\text{Total number of individuals of the species in all quadrats}}{\text{Number of quadrats of occurrence of the species}} \)

Since most of the stems are cylindrical, the basal area was calculated by using the formula:

\[ \text{Basal area} = \pi r^2 \]
Where, \( \pi = 3.14 \) and ‘\( r \)’ is the radius of the stem at the point of emergence.

Relative frequency, relative density, and relative dominance were calculated from the following formulae:

Relative frequency (%) = \( \frac{\text{Number of occurrence of the species}}{\text{Number of occurrence of all species}} \times 100 \)

Relative density (%) = \( \frac{\text{Number of individuals of the species}}{\text{Number of individuals of all species}} \times 100 \)

Relative dominance (%) = \( \frac{\text{Total basal area of the species}}{\text{Total basal area of all species}} \times 100 \)

Importance value Index (IVI) is the sum of quantities of relative frequency, relative density and relative dominance expressed per 300.

3. RESULTS AND DISCUSSION

A total number of 171 species were documented in the understory of the study area and among them 163 were recognized as economically important (Table 1). This may be explained that the study area has favourable microclimate for better growth and development of more number of species and also potential habitat for the plants of economic importance. Puri et al. (1989) stated that the continuous availability of moisture in the soils of shoals in Western Ghats enables the appearance of more number species. Despite the presence of suitable microclimate, the constituent species in the understory of shoals in Western Ghats showed wide variation in distribution level, population size and basal area between them (Padmavathy, 2005).

In the present study, the ecological position for highly and poorly established plants alone is highlighted in terms of expressing their frequency, density, basal area and importance value index (Table 2). The dicot species such as Acalypha indica, Asystasia gangetica, Cleome viscosa, Leucas aspera, Phyllanthus amarus and Sida cardata showed maximum frequency value of 100% in the community and certain other herbaceous species viz., Aerva lanata, Belpharis maderaptensis, Mollugo pentaphylla, Oldenlandia umbellate, Stylolanthus hamate and Tephrosia purpurea also showed higher distribution (around 85% frequency value) during rainy month of September. The higher seed output and greater reproductive potential exist in these species may be the possible reasons for this fact (Usher, 1991).

Many species in the understory of the study area like Amaranthus spinosus, Amaranthus virigidis, Barleria buxifolia, Biophytum sensitivum, Croton zeylanicus, Crotalaria pallida, Curculigo orchioides, Plumbago zeylanica and Rauvolfia serpentina have exhibited poor distribution. The external factors like topography, soil conditions and the biotic disturbance and some intrinsic factors like dispersal mechanism, longevity of seeds, duration of dormancy and germination efficiency are some of the environmental variables generally determine the degree of distribution of any plant species (Belsky, 1988).

The plant species such as Tephrosia purpurea, Acalypha indica, Aerva lanata, Asystasia gangetica, Belpharis maderaptensis, Cleome viscosa, Clerodendron infortunatum, Leucas aspera, Phyllanthus amarus, Sida cardata, Mollugo pentaphylla and Oldenlandia umbellata were present in the study area with higher densities. This may be due to the presence of continuous wetness, a favourable factor for the better growth of these species in the soil of moist deciduous forest (Saxena, 1991). On the other hand, many species like Rauvolfia serpentina, Cardiopteris halicacabum and Borreria articularies, Andrographis paniculata, Boerhavia diffusa, Blainvillia acmella, Cleome rutidesperma, Cleome rutidesperma, Croton zeylanicus, Desmodium illoinensis, Rungia repens, Sida cordifolia, Barleria cuspidata, Aerva lanata, Amaranthus virgatus, Clitoria ternate, Corchorus aetuius and Croton bonplandianum, Belpharis maderaptensis, Gymnema sylvestre, Heydyotos pterita, Ocimum americanum, Ludwigia octovalvis etc., have always present with low densities in the study area. The poor reproductive potential with less seed output and weaker competitive ability may lead the species with low density in the communities (Chandrasakaran and Swamy, 1995).

The basal cover of certain plant species such as Tephrosia purpurea, Clerodendron infortunatum, Acalypha indica and Pavetta indica was greater in the understory of studied forest. Among them, due to shrubby habit two species namely Clerodendron infortunatum and Pavetta indica were occupied higher basal cover in comparison to other constituent species. This feature may lead to the occupation of higher basal cover in the communities. The lower basal cover attained by many species such as Aerva javanica, Alternanthera sessilis, Asparagus racemosus, Centella asiatica, Clitoria ternate, Desmodium adscendens, D. triflorus, Evolvlus alsinoides, E. nummularis, Indigofera hirsuta, I. glandulosa, Justicia glauca, and Oldenlandia corymbosa might be due to their poor ecological characters like lower density and less basal area per individual.
Table 1. The constituent species in the study area, Udhayagiri hills with their ecological status and economic importance.

| S. No. | Species                          | Ecological status | Parts used     | Medicinal/Other economic importance                                                                 | Mode of administration |
|--------|----------------------------------|-------------------|----------------|-----------------------------------------------------------------------------------------------------|------------------------|
| 1      | *Abras pulchellus*                | Common            | Leaves         | Cure fever, cough, cold                                                                            | Juice                  |
| 2      | *Abulition indicum* (L.). Sw      | Common            | Root           | Piles                                                                                                | Extract                |
| 3      | *Acalypha indica* L.             | Common            | Leaves         | Headache, wounds, itching                                                                         | Juice, paste           |
| 4      | *Acanthospermum hispidum* DC.    | Common            | Root           | Jaundice                                                                                            | Decoction              |
| 5      | *Achyranthus aspera* Linn.        | Common            | Spike          | Poisonous insect bites.                                                                           | Paste                  |
| 6      | *Aerva javanica*                 | Common            | Whole plant    | Swelling                                                                                            | Decoction              |
| 7      | *Aerva lanata* (L.) Juss.ex.Shut. | Common            | Root           | Piles                                                                                                | Paste                  |
| 8      | *Alternanthera pungens* Kunth.    | Common            | Whole plant    | Gonorrhea                                                                                            | Decoction              |
| 9      | *Alternanthera tenella*           | Common            | Inflorescences | Earache                                                                                            | Ash                    |
| 10     | *Amaranthus spinosus* L.          | Common            | Whole plant    | Thorns                                                                                                | Paste                  |
| 11     | *Amaranthus viridis* Linn.        | Common            | Leaves, root   | Scorpion sting, diuretic, laxative, retention of urine, treat gonorrhea                             | Decoction, paste       |
| 12     | *Andrographis echioides* (Burm.f.) Nees | Common         | Leaf           | Head ache                                                                                            | Paste                  |
| 13     | *Andrographis paniculata* (Burn.F) Wall.ex.Nees. | Common  | Root, leaves   | Fever, liver complaints and jaundice                                                                 | Decoction, paste       |
| 14     | *Asparagus racemosus* Wild. (L)   | Common            | Root tubers    | Kidney stone, week end immunity                                                                     | Powder, paste          |
| 15     | *Asystasia gangetica* (L.) T. Anderson in Thwaites. | Common    | Whole plant    | Rheumatism                                                                                            | Juice                  |
| 16     | *Barleria buxifolia* (L.)         | Common            | Leaves         | Viral fever, urinary affection, stomach disorders                                                   | Juice                  |
| 17     | *Barleria cuspidate*              | Common            | Leaves, flower | Viral fever                                                                                         | Decoction              |
| 18     | *Barleria lupulina*               | Rare, endemic     | Leaves         | Urinary tract infection                                                                             | Juice                  |
| 19     | *Belpharis maderaptensis* (L.) B. Heyne. Ex. Roth. Nov. | Common  | Leaves         | Bone fracture                                                                                       | Paste                  |
| 20     | *Biophytum sensitivum*            | Common            | Leaves, roots  | Bite poisoning, wound                                                                              | Paste                  |
| 21     | *Blainviella acmella*             | Common            | Leaves         | Alcohol deaddiction                                                                                 | Juice                  |
| 22     | *Boerhavia diffusa* L.            | Common            | Root           | Asthma, sugar in urine                                                                               | Decoction, juice       |
| 23     | *Borreria latifolia*              | Common            | Leaves, stem   | Body pain                                                                                            | Crushed                |
| 24     | *Bryphyllum pinnatum* (lam) oken. Alleg | Common     | Leaves         | Dysentery cuts and wounds, head ache.                                                                 | Juice, paste           |
| 25     | *Cardiospermum halicacabum* L.    | Common            | Leaves         | Cough piles, arthritis, joint pains, skin diseases                                                  | Decoction              |
| 27     | *Celosia argentea* L.             | Common            | Whole plant    | Urinary stones                                                                                        | Decoction              |
| No. | Scientific Name                                      | Common Name | Part Used     | Medical Uses                               | Preparation |
|-----|------------------------------------------------------|-------------|---------------|--------------------------------------------|-------------|
| 28  | *Centella asiatica* (Linn) Urban.                   | Common      | Whole plant   | Typhoid                                    | Juice       |
| 29  | *Cheilocostus specios*                              | Endangered  | Root          | Head ache, diarrhea, stop vomiting         | Powder      |
| 30  | *Chromolaena odorata* (L) King & Robi.              | Common      | Whole plant   | Wounds and rashes                          | Paste       |
| 31  | *Cleome aspera*                                     | Endemic     | -             |                                            | -           |
| 32  | *Cleome gynandra* L.                                | Common      | Leaf          | Wounds, fever                              | Paste, decoction |
| 33  | *Cleome monophylla*                                 | Endemic     | Leaves, root  | Vomit                                     | Powder      |
| 34  | *Cleome rutidesperma*                               | Common      | Whole plant   | To relieve general sickness and uneasiness of the body | Infusion |
| 35  | *Cleome viscosa* L.                                 | Common      | Leaves        | Earache, wound                            | Juice, paste |
| 36  | *Clerodendram infortunatum* auct. Non L.            | Common      | Leaves        | Tumors, hair growth, wounds and fungal infection. | Paste |
| 37  | *Clitoria ternata* L.                               | Common      | Whole plant   | Snake bite, cause abortion                 | Extract     |
| 38  | *Commelina benghalensis* Linn.                     | Common      | Whole plant   | Leprosy, jaundice                         | Paste, juice |
| 39  | *Corchorus aequans* L. Syst. Nat                    | Common      | Leaves        | Head ache                                 | Poultice    |
| 40  | *Corchorus olitorius* L.                            | Vulnerable  | Seed          | Stomach ache                              | Powder      |
| 41  | *Croton mysorensis* Roth.                           | Common      | Leaf, fruit   | Stomach ache and stomach ulcer            | Paste       |
| 42  | *Crotalaria pallid*                                 | Common      | Seed, leaf, whole plant | Skin diseases, ring worm, itches, stomach pain | Paste, decoction |
| 43  | *Crotalaria verrucosa* L.                           | Common      | Leaves        | Skin allergies                            | Extract     |
| 44  | *Croton bonplandiam* Bail.                          | Rare, endemic | Latex       | Bleeding and venereal sores, headache     | Juice       |
| 45  | *Croton hirtus*                                     | Common      | -             |                                            | -           |
| 46  | *Croton zeylanicus*                                 | Common      | Bark          | Stomachache                               | Juice       |
| 47  | *Cuphea hyrsopifolia*                               | Common      | Leaves        | Cold                                      | Infusion    |
| 48  | *Curculigo orchioides* Gaertn.                      | Common      | Root          | Ulcer, treat asthma, piles, jaundice, diarrhea, and gonorrhea | Juice |
| 49  | *Cyanotis axilaris*                                 | Common      | Whole plant   | Rheumatism, joint pain                    | Decoction   |
| 50  | *Cyanotis tuberos*                                  | Common      | Tubers        | Relief cough                              | Eaten       |
| 51  | *Cynodon doctylon* L. Panicum Dactylon Linn.       | Common      | Whole plant   | Diuretic                                  | Extract     |
| 52  | *Cyperus rotundus* L.                               | Common      | Tuber         | Stomach ache                              | Paste       |
| 53  | *Cyrtococcum patens*                                | Common      | -             |                                            | -           |
| 54  | *Datura metal* L.                                   | Common      | Leaves        | Asthma, chronic ulcer                     | Juice       |
| 55  | *Desmodium adscendens*                              | Common      | Leaves        | Wounds, venereal sores                    | Powder      |
| 56  | *Desmodium illinoensis*                             | Common      | Leaves        | Itches                                    | Boiled      |
| 57  | *Desmodium triflorum* (Linn.) Dc.                   | Common      | Leaves, root  | Diarrhea, cough, asthma                   | Paste, juice |
| 58  | *Dodonaea viscosa* L. Jacq                          | Common      | Leaves        | Tooth ache                                | Juice       |
| No. | Scientific Name                        | Common Name          | Part Used     | Uses                                    | Preparation |
|-----|--------------------------------------|----------------------|---------------|-----------------------------------------|-------------|
| 59  | Ecbolium viride acut. Non (Frossk) Alston. | Common               | Leaves, root  | Jaundice, rheumatism                     | Decoction   |
| 60  | Echinochloa colona (L.) Link.         | Common               | -             | Jaundice                                | -           |
| 61  | Eclipta prostrate L.                 | Common               | Leaves        | Diarrhea                                | Decoction   |
| 62  | Emilia sonchifolia                   | Common               | Root          | Jaundice, rheumatism                     | Juice       |
| 63  | Euphorbia hirta Linn.                | Common               | Leaves        | Blood in urine, pita aggravation        | Paste       |
| 64  | Euphorbia serpens Kunth              | Common               | -             | Jaundice                                | Paste       |
| 65  | Euphorbia thymifolia                 | Common               | Whole plant   | Gastric problem                        | Extract     |
| 66  | Evolulus alsinoides L.               | Common               | Whole plant   | Leucoderma, hair growth                 | Paste       |
| 67  | Evolulus nummularis (L.) L.           | Common               | Whole plant   | Leucoderma, hair growth                 | Paste       |
| 68  | Glycosmis pentaphylla (Retz.) DC     | Endangered           | Leaf          | Jaundice                                | Powder      |
| 69  | Gomphrena serrata                    | Common               | Flowers       | Baby grip cough, diabetes and cooling   | Boiled      |
| 70  | Gymnema sylvestre (Retz.) R.         | Common               | Root, leaf    | Leucoderma, hair growth                 | Powder      |
| 71  | Hedyotis diffusa                     | Common               | Whole plant   | Cold                                    | Juice       |
| 72  | Hedyotis pterita                     | Common               | Root          | Ulcer                                   | Juice       |
| 73  | Heliotropium indicum L.              | Vulnerable           | Leaves        | Snake bite, scorpion bite               | Juice       |
| 74  | Hemidesmus indicus (L) R. Br. In Aiton | Common               | Root          | Leucoderma, abdominal tumors, eruptions of tongue of children | Paste, decoction, powder |
| 75  | Hibiscus micranthus L.F.             | Common               | Root          | Head ache                               | Paste       |
| 76  | Hibiscus surattensis L.              | Common               | Leaves, stem  | Venereal sores, arthritis               | Infusion    |
| 77  | Hibiscus vitifolius                  | Common               | Whole plant   | Breast to cure mastitis (maruti ubale)  | Paste       |
| 78  | Hybanthus enneaspermus L.            | Common               | Root          | Body pain                               | Paste       |
| 79  | Hygrophila auriculata                | Common               | Root          | Edema patients                          | Powdered    |
| 80  | Hyptis suaveolens (L.) Poit. Ann.    | Common               | Root, leaf    | Malaria fever, bleeding from nose cuts and wounds | Decoction. Powder, juice |
| 81  | Imperata cylindrica L.               | Rare, endemic        | Root          | Fever                                   | Infusion    |
| 82  | Indigofera asplanthoides Vahl ex DC  | Common               | Whole plant   | Skin diseases                           | Ash         |
| 83  | Indigofera glandulosa Wendl          | Common               | Fruit         | Stomach ache                            | Powder      |
| 84  | Indigofera hirsute L.                | Common               | Whole plant   | Asthma, whooping cough                  | Juice       |
| 85  | Indigofera uniflora Buch. Ham.ex Roxb. | Common               | Leaf          | Skin diseases                           | Paste       |
| 86  | Ipomoea carnea Jaqc                  | Common               | Leaves        | Hardened pimples                        | Crushed     |
| 87  | Ipomoea obscura (L.) Ker Gawler      | Common               | Leaf          | Snake bite                              | Juice       |
| 88  | Justicia adhatoda                    | Common               | Root          | Asthma and fever                        | Extract     |
| No. | Plant Name                                    | Common Name | Part Used                  | Uses                              | Preparation                  |
|-----|----------------------------------------------|-------------|----------------------------|-----------------------------------|------------------------------|
| 89  | *Justicia gluca* Rott                       | Common      | Leaves                     | Back ache                         | Juice                        |
| 90  | *Justicia simplex* D. Don.                  | Common      | Leaves                     | Strengthening of bones            | Extract                      |
| 91  | *Justicia tranquebariensis* L.f.            | Common      | Leaves                     | Jaundice. Skin aliments           | Juice, paste                 |
| 92  | *Kyllinga odorata*                          | Common      | Root, leaf                 | Diarrhea                          | Poultice                     |
| 93  | *Lagasca mollis* Cav                         | Common      | Whole plant                | Chest and throat to cure cold     | Paste                        |
| 94  | *Lantana camera* Linn.                      | Common      | Leaves                     | Measles and chicken pox, malarial fever, ring | Decoction, paste |
| 95  | *Leucas aspera* (Wild). Link, Enum.         | Common      | Leaf, flower               | Itch scabies, blockage of nose, head ache | Paste                        |
| 96  | *Leucas grandis*                            | Common      | Flower                     | Alleviate fever                   | Paste                        |
| 97  | *Linderina crustacea*                       | Common      | Leaves                     | Ring worm                         | Paste                        |
| 98  | *Lindernia ciliate*                         | Common      | Leaves, whole plant        | Ring worm, clear stomach          | Paste, juice                 |
| 99  | *Ludwigia octovalvis* (Jacq.) Raven.        | Common      | Whole plant                | Fungal infection of toes          | Paste                        |
| 100 | *Ludwigia peruviana*                        | Common      | Leaves                     | Urine problem of children         | Decoction                    |
| 101 | *Malvastrum coromandelianum* (L.) Garcke    | Common      | Leaves                     | Wounds and dysentery              | Decoction                    |
| 102 | *Martynia annua*                            | Common      | Root, leaves               | Snake bite, epilepsy, tuberculosis | Decoction, juice              |
| 103 | *Melhania hamiloiana*                       | Common      | Leaves                     | Dysentery, wounds                 | Decoction                    |
| 104 | *Melochia corchorifolia* L.                 | Common      | Leaves                     | Stomach disorders                 | Decoction                    |
| 105 | *Merremia tridentate* (L.) Hallier          | Common      | Leaf, root                 | Growth of the hair, diabetes      | Paste, decoction             |
| 106 | *Microstachys chamaelea*                    | Common      | Whole plant                | Head ache                         | Paste                        |
| 107 | *Mimosa pudica* L.                          | Common      | Root                       | Whylous urine, veterinary         | Decoction, paste             |
| 108 | *Mollugo pentaphylla* L.                    | Common      | Leaf                       | Cooling purpose, urinary troubles | Boil, juice                  |
| 109 | *Naregamia alata* Wight & Arn              | Common      | Whole plant, root          | Itch and contagious skin diseases and dysentery | Extract, decoction, juice |
| 110 | *Ocimum americanum* L.                      | Rare, endemic| Leaf                      | Cuts and wounds                   | Juice                        |
| 111 | *Ocimum basilicum* L.                       | Common      | Leaf                       | Acne vulgarism, pimples, earache, nasal congestion | Juice |
| 112 | *Ocimum gratissimum* L.                     | Endemic     | Leaves                     | Cough, fever, nasal catarrh       | Infusion                     |
| 113 | *Ocimum tenuiflorum*                        | Common      | Whole plant, leaf          | Leucoderma, common fever, cold and cough | Paste, decoction, juice |
| 114 | *Oldenlandia corymbosa* L.                  | Common      | Whole plant                | Liver trouble, urinary disorder in children, jaundice, fever and bilious infection. | Juice |
| 115 | *Oldenlandia umbellate* L.                  | Common      | Leaf, root                 | Asthma, bronchitis                | Extract, paste               |
| 116 | *Orthosiphon thymiflorus* (Roth) Sleesen, Reinwandtia | Common | Leaves                     | Skin eruption                     | Juice                        |
| 117 | *Osbeckia aspera*                           | Common      | -                          | -                                 | -                            |
| 118 | *Pavetta indica* L.                         | Common      | Root, leaves               | Urinary diseases, ulcerated nose  | Decoction                    |
| No. | Species                                      | Habitat | Part Used                  | Medicinal Uses                                                                 |
|-----|---------------------------------------------|---------|----------------------------|--------------------------------------------------------------------------------|
| 119 | *Pedalium murex* L.                        | Common  | Leaves                     | Gonorrhea                                                                      |
| 120 | *Pergularia daemia* Forssk.                | Common  | Leaf                       | Head ache and asthma                                                           |
| 121 | *Peristrophe paniculate* (Forsk). Burnm.    | Common  | Fruit                      | Eye problem                                                                     |
| 122 | *Persicaria hydropiper* L.                 | Common  | Leaves                     | Cold and cough                                                                  |
| 123 | *Phryma laptoestachya*                     | Common  | Root                       | Skin diseases                                                                   |
| 124 | *Phyla nodiflora* (L.)Greene.              | Endemic | Leaves                     | Leucorrhoea, dandruff                                                          |
| 125 | *Phyllanthus amarus* Schumach & Thonn.     | Common  | Whole plant, root          | Skin diseases, body heat, fever, jaundice                                      |
| 126 | *Phyllanthus debilis* Klein ex willed.     | Common  | Leaves                     | Sickle cell anemia                                                             |
| 127 | *Phyllanthus maderraspensis* L.            | Common  | Fruits                     | Teeth diseases                                                                  |
| 128 | *Phyllanthus myrtifolius*                  | Common  | Root                       | Jaundice                                                                        |
| 129 | *Phyllanthus virgatus* G.Forest.Fl.        | Common  | Leaves                     | Eye diseases                                                                     |
| 130 | *Physalis minima* L.                       | Common  | Leaf                       | Stomach to cure boils                                                           |
| 131 | *Plumbago zeylanica* Linn.                 | Common  | Roots                      | Fever, skin diseases, diuretic, rheumatism and dyspepsia.                      |
| 132 | *Polycarpaea corymbosa* (L.) Lam.          | Common  | Leaf                       | Jaundice                                                                        |
| 133 | *Polygala chinensis*                       | Common  | Leaves                     | Stopping mother feeding                                                         |
| 134 | *Portulaca quadrifida*                     | Common  | Leaves                     | Swellings erysipelas, burns, scalds                                             |
| 135 | *Psuedarthria viscida* (L) Wight & Arn.    | Common  | Root                       | Asthma, fever, diarrhea, worms, piles                                           |
| 136 | *Rauvolfia serpentine* (Linn.)Benth.ex Kurz| Endangered | Root, rhizome, leaves       | Dysentery                                                                      |
| 137 | *Rhinacanthus nasutus* (L.) Kurz. J.Asiat  | Endemic | Leaf, root                 | Snake and skin diseases.                                                       |
| 138 | *Rhynchosia minima* (L.) DC.               | Common  | Whole plant                | Delivery for body care                                                          |
| 139 | *Rulliea prostrate*                        | Common  | Whole plant                | Diabetes                                                                        |
| 140 | *Rulliea tuberosa* L.                      | Common  | Leaves                     | Asthma, sinking of ribs                                                         |
| 141 | *Rungia repens* (L.) Nees.                 | Endemic | Whole plant                | Bronchitis, fever                                                               |
| 142 | *Scoparia dulcis* Linn.                    | Common  | Seed, leaf                 | Kidney stone, common fever, throat sore                                         |
| 143 | *Senna absus*                              | Endemic | Leaves, seeds              | Cough, ringworm, skin diseases                                                  |
| 144 | *Senna occidentalis*                       | Common  | Seed, leaf, root           | Skin disease, head bone fractures                                               |
| 145 | *Sida acuta* Burm F.Fl.                    | Common  | Leaves                     | Wounds, cure eczema                                                             |
| 146 | *Sida cordata* (Burm.f). Borss.Waalk.      | Common  | Roots                      | Nervous, urinary diseases                                                        |
| No.  | Scientific Name                          | Common Name     | Part Used           | Uses                                                                                      | Preparation |
|------|-----------------------------------------|-----------------|---------------------|-------------------------------------------------------------------------------------------|-------------|
| 147  | *Sida cordifolia* L.                    | Common          | Root                | Refrigerant                                                                              | Paste       |
| 148  | *Solanum melongena*                     | Common          | Seeds, leaves       | Cold, cough, phlegm accumulation, gum infection, tooth ache.                             | Powder      |
| 149  | *Solanum torvum* Swartz                 | Common          | Fruit               | Anemia, chest congestion cough, cold.                                                    | Paste       |
| 150  | *Solanum virginianum*                   | Common          | Fruits, whole plant | Cough, asthma, tooth ache, chest pain                                                     | Decoction, juice |
| 151  | *Spermacoce articulareis*               | Common          | Whole plant         | Head ache                                                                                 | Decoction   |
| 152  | *Spermacoce hispida*                    | Common          | Root                | Urinary infection, headache, internal heat                                               | Decoction   |
| 153  | *Spermacoce ocymoides* Burm.F            | Common          | Leaves              | Diarrhea and dysentery                                                                     | Infusion    |
| 154  | *Spermacoce pusilla*                     | Common          | Roots               | Urinary infection, headache, internal heat                                               | Decoction   |
| 155  | *Stashyropheta jamaicensis* (L.) Vahl. Enum. | Common      | Whole plant         | Stomach pains                                                                             | Decoction   |
| 156  | *Stylosanthes fruticosas*               | Common          | Whole plant         | Febrifuge                                                                                 | Infusion    |
| 157  | *Stylosanthes hamata*                   | Common          | Whole plant         | Diarrhea and cold                                                                         | Juice       |
| 158  | *Synederella nodiflora* (L.) Gaertn. Fruct. Sem. | Common      | Leaves              | Itch scabies                                                                              | Juice       |
| 159  | *Tephrosia purpurea* (L.) Pers.          | Common          | Root, flower        | Dyspepsia, eye inflammation                                                               | Decoction, juice |
| 160  | *Triandha portulacastrum* Linn          | Common          | Leaf                | Urinary troubles                                                                          | Juice       |
| 161  | *Tribulus terrestris* Linn              | Common          | Fruit, whole plants | Urinary problem, kidney stones, stomach ache                                             | Powder, extract |
| 162  | *Trichodesmus indicum* (L.) R.Br         | Common          | Leaf, root          | Scabies, swelling of joints                                                               | Paste, powder |
| 163  | *Tridax procumbens* L.                  | Common          | Leaves              | Head ache, cuts, wounds                                                                   | Juice, paste |
| 164  | *Triumfetta rhomboidea* Jacq. Enum. Sy st. | Common      | Roots               | Bone fracture                                                                              | Paste       |
| 165  | *Urena lobata* Linn.                    | Common          | Root                | Body edema                                                                                | Paste       |
| 166  | *Urena sinuate* L.                      | Common          | Root                | Urinary disease                                                                            | Decoction   |
| 167  | *Vernonia cinerea* (L.) Less. Linnaea.   | Common          | Whole plant         | Wounds                                                                                     | Paste       |
| 168  | *Vigna triblobata* (L.) Verde.          | Rare            | Root                | Till the person vomits in snake bite                                                     | Powder      |
| 169  | *Waltheria indicum* L.                  | Vulnerable      | Roots, leaves       | Washing wounds                                                                             | Decoction   |
| 170  | *Xanthium stumarium*                    | Common          | Leaves              | Infection fingers                                                                          | Paste       |
| 171  | *Zorina diphylla* (L.) Pers.             | Common          | Whole plant         | Breast to cure mastitis (maruti ubale)                                                   | Paste       |

*Ahmedullah, M. and Nayar, M.P. (1987); Nayar, M.P. and Sastry, A. R. K. (1987-1990); Maheshwari, J.K. (2000); *Anonymous (1940-1976); Singh S. K. (2004); Viswanathan, M.B. (2004).
Table 2. Number of individuals in 50 quadrats (1 x 1m each) and quantitative characters such as frequency, density, abundance, basal area, relative frequency, relative density, relative dominance and IVI of constituent species in the study forest during the rainy month of September 2013.

| S. No | Species                        | 2013 SEP | Frequency | Density (indi./m2) | Abundance (sq.mm/50quad.) | Basel area (sq.mm/50quad.) | Relative frequency (%) | Relative density (%) | Relative dominance (%) | IVI |
|-------|--------------------------------|----------|-----------|-------------------|--------------------------|---------------------------|----------------------|---------------------|----------------------|-----|
| 1     | Abrus pulchellus               | 42(29)   | 58        | 0.84              | 1.45                     | 2.41                      | 0.86                 | 0.96                | 0.16                 | 1.98|
| 2     | Abutilion indicum             | 32(25)   | 50        | 0.64              | 1.28                     | 8.61                      | 0.74                 | 0.73                | 0.57                 | 2.04|
| 3     | Acalypa indica                | 61(50)   | 100       | 1.22              | 1.22                     | 42.84                     | 1.49                 | 1.39                | 2.81                 | 5.69|
| 4     | Acanthospermum hispidum       | 29(15)   | 30        | 0.58              | 1.93                     | 3.74                      | 0.45                 | 0.66                | 0.25                 | 1.35|
| 5     | Achyranthus aspera            | 40(29)   | 58        | 0.8               | 1.38                     | 4.08                      | 0.86                 | 0.91                | 0.27                 | 2.04|
| 6     | Aerva javanica                | 19(10)   | 20        | 0.38              | 1.90                     | 0.27                      | 0.30                 | 0.43                | 0.02                 | 0.75|
| 7     | Aerva lanata                  | 70(49)   | 98        | 1.4               | 1.43                     | 4.01                      | 1.46                 | 1.60                | 0.26                 | 3.32|
| 8     | Alternanthera pungens         | 20(15)   | 30        | 0.4               | 1.33                     | 2.58                      | 0.45                 | 0.46                | 0.17                 | 1.07|
| 9     | Alternanthera tenella         | 17(15)   | 30        | 0.34              | 1.13                     | 0.68                      | 0.45                 | 0.39                | 0.04                 | 0.88|
| 10    | Amaranthus spinosus           | 15(10)   | 20        | 0.3               | 1.50                     | 4.04                      | 0.30                 | 0.34                | 0.26                 | 0.90|
| 11    | Amaranthus virigidis          | 16(12)   | 24        | 0.32              | 1.33                     | 3.08                      | 0.36                 | 0.36                | 0.20                 | 0.92|
| 12    | Andrographis echioides        | 20(15)   | 30        | 0.4               | 1.33                     | 3.85                      | 0.45                 | 0.46                | 0.25                 | 1.16|
| 13    | Andrographis paniculata       | 12(9)    | 18        | 0.24              | 1.33                     | 6.19                      | 0.27                 | 0.27                | 0.41                 | 0.95|
| 14    | Asparagus racemosus           | 14(10)   | 20        | 0.28              | 1.40                     | 0.09                      | 0.30                 | 0.32                | 0.01                 | 0.62|
| 15    | Asystasia gangetica          | 62(50)   | 100       | 1.24              | 1.24                     | 2.47                      | 1.49                 | 1.41                | 0.16                 | 3.06|
| 16    | Barleria cuspidata            | 19(13)   | 22        | 0.32              | 1.45                     | 14.68                     | 0.33                 | 0.36                | 0.96                 | 1.66|
| 17    | Barleria buxifolia           | 16(11)   | 26        | 0.38              | 1.46                     | 14.64                     | 0.39                 | 0.43                | 0.96                 | 1.78|
| 18    | Barleria lupulina            | 26(19)   | 38        | 0.52              | 1.37                     | 18.26                     | 0.57                 | 0.59                | 1.20                 | 2.36|
| 19    | Belpharis maderaptensis       | 69(49)   | 98        | 1.38              | 1.41                     | 5.38                      | 1.46                 | 1.57                | 0.35                 | 3.39|
| 20    | Biophytum sensitivum          | 9(7)     | 14        | 0.18              | 1.29                     | 2.06                      | 0.21                 | 0.21                | 0.14                 | 0.55|
| 21    | Blainviella acmella          | 15(11)   | 22        | 0.3               | 1.36                     | 7.74                      | 0.33                 | 0.34                | 0.51                 | 1.18|
| 22    | Boerhavia diffusa            | 18(13)   | 26        | 0.36              | 1.38                     | 1.83                      | 0.39                 | 0.41                | 0.12                 | 0.92|
| 23    | Borreria latifolia           | 20(17)   | 34        | 0.4               | 1.18                     | 8.15                      | 0.51                 | 0.46                | 0.54                 | 1.50|
| No. | Species                  | V1   | V2   | V3   | V4   | V5   | V6   | V7   | V8   | V9   |
|-----|-------------------------|------|------|------|------|------|------|------|------|------|
| 24  | *Bryophyllum pinnatum*  | 20(16)| 32   | 0.4  | 1.25 | 16.85| 0.48 | 0.46 | 1.11 | 2.04 |
| 25  | *Cardiospermum halicabum* | 15(10)| 20   | 0.3  | 1.50 | 3.44 | 0.30 | 0.34 | 0.23 | 0.87 |
| 26  | *Cassia absus*          | 27(25)| 50   | 0.54 | 1.08 | 2.11 | 0.74 | 0.62 | 0.14 | 1.50 |
| 27  | *Celosia argentea*      | 18(15)| 30   | 0.36 | 1.20 | 5.62 | 0.45 | 0.41 | 0.37 | 1.23 |
| 28  | *Centella asiatica*     | 15(13)| 26   | 0.3  | 1.15 | 0.10 | 0.39 | 0.34 | 0.01 | 0.74 |
| 29  | *Chelioctus speciosus*  | 16(13)| 26   | 0.32 | 1.23 | 14.68| 0.39 | 0.36 | 0.96 | 1.72 |
| 30  | *Chromolaena odorata*   | 14(12)| 24   | 0.28 | 1.17 | 8.05 | 0.36 | 0.32 | 0.53 | 1.20 |
| 31  | *Cleome aspera*         | 20(11)| 22   | 0.4  | 1.82 | 4.59 | 0.33 | 0.46 | 0.30 | 1.08 |
| 32  | *Cleome gynandra*       | 25(15)| 30   | 0.5  | 1.67 | 14.37| 0.45 | 0.57 | 0.94 | 1.96 |
| 33  | *Cleome monophylla*     | 19(12)| 24   | 0.38 | 1.58 | 5.93 | 0.36 | 0.43 | 0.39 | 1.18 |
| 34  | *Cleome rutidesperma*   | 18(13)| 26   | 0.36 | 1.38 | 6.45 | 0.39 | 0.41 | 0.42 | 1.22 |
| 35  | *Cleome viscosae*       | 65(50)| 100  | 1.3  | 1.30 | 37.36| 1.49 | 1.48 | 2.45 | 5.42 |
| 36  | *Clerodendran infortutum* | 72(48)| 96   | 1.44 | 1.50 | 60.65| 1.43 | 1.64 | 3.98 | 7.05 |
| 37  | *Clitoria ternate*      | 13(11)| 22   | 0.26 | 1.18 | 0.19 | 0.33 | 0.30 | 0.01 | 0.64 |
| 38  | *Commelina benghalensis*| 15(10)| 20   | 0.3  | 1.50 | 1.93 | 0.30 | 0.34 | 0.13 | 0.77 |
| 39  | *Corchorus aestuans*    | 15(13)| 26   | 0.3  | 1.15 | 1.93 | 0.39 | 0.34 | 0.13 | 0.86 |
| 40  | *Corchorus olitorius*   | 25(23)| 46   | 0.5  | 1.09 | 10.19| 0.68 | 0.57 | 0.67 | 1.92 |
| 41  | *Crotalaria myurosensis*| 12(11)| 22   | 0.24 | 1.09 | 10.11| 0.33 | 0.27 | 0.66 | 1.26 |
| 42  | *Crotalaria pallida*    | 16(12)| 24   | 0.32 | 1.33 | 17.22| 0.36 | 0.36 | 1.13 | 1.85 |
| 43  | *Crotalaria verrucosa*  | 25(19)| 38   | 0.5  | 1.32 | 14.37| 0.57 | 0.57 | 0.94 | 2.08 |
| 44  | *Croton bonplandianum*  | 12(9) | 18   | 0.24 | 1.33 | 5.52 | 0.27 | 0.27 | 0.36 | 0.90 |
| 45  | *Croton hirtus*         | 13(9) | 18   | 0.26 | 1.44 | 7.47 | 0.27 | 0.30 | 0.49 | 1.05 |
| 46  | *Croton zeylanicus*     | 9(7)  | 14   | 0.18 | 1.29 | 4.64 | 0.21 | 0.21 | 0.30 | 0.72 |
| 47  | *Cuphea hyssopifolia*   | 19(15)| 30   | 0.38 | 1.27 | 2.45 | 0.45 | 0.43 | 0.16 | 1.04 |
| 48  | *Curculigo orchioides*  | 10(8) | 16   | 0.2  | 1.25 | 7.71 | 0.24 | 0.23 | 0.51 | 0.97 |
| 49  | *Cyanotis axillaries*   | 13(9) | 18   | 0.26 | 1.44 | 1.32 | 0.27 | 0.30 | 0.09 | 0.65 |
| 50  | *Cyanotis tuberosa*     | 18(14)| 28   | 0.36 | 1.29 | 1.40 | 0.42 | 0.41 | 0.09 | 0.92 |
| 51  | *Cynodon doctylon*      | 34(19)| 38   | 0.68 | 1.79 | 1.95 | 0.57 | 0.78 | 0.13 | 1.47 |
| 52  | *Cyperus rotundus*      | 35(26)| 52   | 0.7  | 1.35 | 2.73 | 0.77 | 0.80 | 0.18 | 1.75 |
| 53  | *Cyrtococcus patens*    | 28(25)| 50   | 0.56 | 1.12 | 6.42 | 0.74 | 0.64 | 0.42 | 1.80 |
| 54  | *Datura metal*          | 19(12)| 24   | 0.38 | 1.58 | 18.91| 0.36 | 0.43 | 1.24 | 2.03 |
| No. | Species                  | Count (Height) | Diameter | Mass | Width | Height | Width | Mass | Width | Mass |
|-----|-------------------------|----------------|----------|------|-------|--------|-------|------|-------|------|
| 55  | Desmodium adscendens    | 19(17)         | 34       | 0.38 | 1.12  | 0.27   | 0.51  | 0.43 | 0.02  | 0.96 |
| 56  | Desmodium illinoensis   | 15(12)         | 24       | 0.3  | 1.25  | 4.04   | 0.36  | 0.34 | 0.26  | 0.96 |
| 57  | Desmodium triflorum     | 17(12)         | 24       | 0.34 | 1.42  | 0.24   | 0.36  | 0.39 | 0.02  | 0.76 |
| 58  | Dodonia viscosa         | 30(26)         | 52       | 0.6  | 1.15  | 25.27  | 0.77  | 0.68 | 1.66  | 3.12 |
| 59  | Echinocloa colona       | 25(22)         | 44       | 0.5  | 1.14  | 12.90  | 0.65  | 0.57 | 0.85  | 2.07 |
| 60  | Eclipta prostrata       | 17(14)         | 28       | 0.34 | 1.21  | 9.77   | 0.42  | 0.39 | 0.64  | 1.45 |
| 61  | Ecobolium viride        | 18(15)         | 30       | 0.36 | 1.20  | 6.45   | 0.45  | 0.41 | 0.42  | 1.28 |
| 62  | Emilia sonchifolia      | 25(20)         | 40       | 0.5  | 1.25  | 5.73   | 0.60  | 0.57 | 0.38  | 1.54 |
| 63  | Euphorbia hirta         | 16(13)         | 26       | 0.32 | 1.23  | 6.52   | 0.39  | 0.36 | 0.43  | 1.18 |
| 64  | Euphorbia serpens       | 26(23)         | 46       | 0.52 | 1.13  | 2.03   | 0.68  | 0.59 | 0.13  | 1.41 |
| 65  | Euphorbia thymifolia    | 29(17)         | 34       | 0.58 | 1.71  | 7.80   | 0.51  | 0.66 | 0.51  | 1.68 |
| 66  | Evolulus alsinoides     | 15(12)         | 24       | 0.3  | 1.25  | 0.38   | 0.36  | 0.34 | 0.03  | 0.72 |
| 67  | Evolulus nummularis     | 13(10)         | 20       | 0.26 | 1.30  | 0.33   | 0.30  | 0.30 | 0.02  | 0.62 |
| 68  | Glycosmis pentaphylla   | 30(25)         | 50       | 0.6  | 1.20  | 29.86  | 0.74  | 0.68 | 1.96  | 3.39 |
| 69  | Gomphrena serata        | 26(23)         | 46       | 0.52 | 1.13  | 2.03   | 0.68  | 0.59 | 0.13  | 1.41 |
| 70  | Gymnema sylvestre       | 16(9)          | 18       | 0.32 | 1.78  | 11.24  | 0.27  | 0.36 | 0.74  | 1.37 |
| 71  | Hedyotis diffusa        | 19(15)         | 30       | 0.38 | 1.27  | 8.74   | 0.45  | 0.43 | 0.57  | 1.45 |
| 72  | Hedyotis pterita        | 14(10)         | 20       | 0.28 | 1.40  | 5.71   | 0.30  | 0.32 | 0.37  | 0.99 |
| 73  | Heliotrophium indicum   | 29(23)         | 46       | 0.58 | 1.26  | 24.43  | 0.68  | 0.66 | 1.60  | 2.95 |
| 74  | Hemidesmus indicus      | 19(14)         | 28       | 0.38 | 1.36  | 3.66   | 0.42  | 0.43 | 0.24  | 1.09 |
| 75  | Hibiscus micranthus     | 13(9)          | 18       | 0.26 | 1.44  | 5.98   | 0.27  | 0.30 | 0.39  | 0.96 |
| 76  | Hibiscus surrattensis   | 16(12)         | 24       | 0.32 | 1.33  | 9.20   | 0.36  | 0.36 | 0.60  | 1.33 |
| 77  | Hibiscus vitifolius     | 15(12)         | 24       | 0.3  | 1.25  | 4.04   | 0.36  | 0.34 | 0.26  | 0.96 |
| 78  | Hybanthus ennaespermum  | 13(10)         | 20       | 0.26 | 1.30  | 1.68   | 0.30  | 0.30 | 0.11  | 0.70 |
| 79  | Hygrophila auriculata   | 28(25)         | 50       | 0.56 | 1.12  | 6.42   | 0.74  | 0.64 | 0.42  | 1.80 |
| 80  | Hyptis suvaledens       | 25(17)         | 34       | 0.5  | 1.47  | 14.37  | 0.51  | 0.57 | 0.94  | 2.02 |
| 81  | Imperata cylindrical    | 29(18)         | 36       | 0.58 | 1.61  | 24.43  | 0.54  | 0.66 | 1.60  | 2.80 |
| 82  | Indigofera asplanthoides| 32(27)         | 54       | 0.64 | 1.19  | 1.83   | 0.80  | 0.73 | 0.20  | 1.65 |
| 83  | Indigofera glandulosa   | 20(9)          | 18       | 0.4  | 2.22  | 1.15   | 0.27  | 0.46 | 0.08  | 0.80 |
| No. | Species                        | No. of Species | % of Species | % of Observations | % of Observations | % of Observations | % of Observations | % of Observations | % of Observations | % of Observations | % of Observations |
|-----|--------------------------------|----------------|--------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| 84  | *Indigofera hirsute*           | 29             | 50           | 0.58             | 1.16             | 0.74             | 0.74             | 0.66             | 0.05             | 1.45             |                  |
| 85  | *Indigofera uniflora*          | 29             | 34           | 0.58             | 1.71             | 0.42             | 0.51             | 0.66             | 0.03             | 1.19             |                  |
| 86  | *Ipomea carnea*                | 13             | 16           | 0.26             | 1.63             | 1.32             | 0.24             | 0.30             | 0.09             | 0.62             |                  |
| 87  | *Ipomea obscura*               | 22             | 32           | 0.44             | 1.38             | 1.72             | 0.48             | 0.50             | 0.11             | 1.09             |                  |
| 88  | *Justicia adothoda*            | 12             | 16           | 0.24             | 1.50             | 12.92            | 0.24             | 0.27             | 0.85             | 1.36             |                  |
| 89  | *Justicia gluca*               | 32             | 52           | 0.64             | 1.23             | 6.17             | 0.77             | 0.73             | 0.40             | 1.91             |                  |
| 90  | *Justicia simplex*             | 18             | 26           | 0.36             | 1.38             | 1.03             | 0.39             | 0.41             | 0.07             | 0.87             |                  |
| 91  | *Justicia tranquibariensis*    | 26             | 40           | 0.52             | 1.30             | 1.49             | 0.60             | 0.59             | 0.10             | 1.29             |                  |
| 92  | *Kyllinga odorata*             | 29             | 38           | 0.58             | 1.53             | 0.74             | 0.57             | 0.66             | 0.05             | 1.28             |                  |
| 93  | *Lagascea mollis*              | 26             | 40           | 0.52             | 1.30             | 2.65             | 0.60             | 0.59             | 0.17             | 1.36             |                  |
| 94  | *Lanata camera*                | 20             | 30           | 0.4              | 1.33             | 19.90            | 0.45             | 0.46             | 1.31             | 2.21             |                  |
| 95  | *Leucas aspera*                | 55             | 100          | 1.1              | 1.10             | 14.80            | 1.49             | 1.25             | 0.97             | 3.71             |                  |
| 96  | *Leucasgrandis*                | 19             | 28           | 0.38             | 1.36             | 7.75             | 0.42             | 0.43             | 0.51             | 1.36             |                  |
| 97  | *Linderina ciliate*            | 19             | 30           | 0.38             | 1.27             | 3.66             | 0.45             | 0.43             | 0.24             | 1.12             |                  |
| 98  | *Linderina crustacea*          | 26             | 40           | 0.52             | 1.30             | 3.35             | 0.60             | 0.59             | 0.22             | 1.41             |                  |
| 99  | *Ludwiga octovalis*            | 14             | 24           | 0.28             | 1.17             | 1.81             | 0.36             | 0.32             | 0.12             | 0.79             |                  |
| 100 | *Ludwiga peruviana*            | 16             | 20           | 0.32             | 1.60             | 2.06             | 0.30             | 0.36             | 0.14             | 0.80             |                  |
| 101 | *Malvastrum coromandelianum*   | 17             | 24           | 0.34             | 1.42             | 6.09             | 0.36             | 0.39             | 0.40             | 1.14             |                  |
| 102 | *Martynia annua*               | 39             | 60           | 0.78             | 1.30             | 38.81            | 0.89             | 0.89             | 2.55             | 4.33             |                  |
| 103 | *Melania hamiltoniana*         | 29             | 50           | 0.58             | 1.16             | 0.42             | 0.74             | 0.66             | 0.03             | 1.43             |                  |
| 104 | *Melochia corehorifolia*       | 45             | 72           | 0.9              | 1.25             | 12.11            | 1.07             | 1.03             | 0.79             | 2.89             |                  |
| 105 | *Merremia tridentate*          | 30             | 52           | 0.6              | 1.15             | 1.72             | 0.77             | 0.68             | 0.11             | 1.57             |                  |
| 106 | *Microstachys chamaelea*       | 17             | 24           | 0.34             | 1.42             | 1.33             | 0.36             | 0.39             | 0.09             | 0.83             |                  |
| 107 | *Mimosa pudica*                | 27             | 38           | 0.54             | 1.42             | 6.19             | 0.57             | 0.62             | 0.41             | 1.59             |                  |
| 108 | *Mollugo pentaphylla*          | 50             | 76           | 1                | 1.32             | 3.90             | 1.13             | 1.14             | 0.26             | 2.53             |                  |
| 109 | *Naregama alata*               | 20             | 32           | 0.4              | 1.25             | 6.24             | 0.48             | 0.46             | 0.41             | 1.34             |                  |
| 110 | *Ocimum americanum*            | 19             | 28           | 0.38             | 1.36             | 13.34            | 0.42             | 0.43             | 0.88             | 1.73             |                  |
| 111 | *Ocimum basilicum*             | 20             | 30           | 0.4              | 1.33             | 19.90            | 0.45             | 0.46             | 1.31             | 2.21             |                  |
| 112 | *Ocimum gratissimum*           | 22             | 28           | 0.44             | 1.57             | 15.45            | 0.42             | 0.50             | 1.01             | 1.93             |                  |
| 113 | *Ocimum tenuiflorum*           | 25             | 40           | 0.5              | 1.25             | 6.73             | 0.60             | 0.57             | 0.44             | 1.61             |                  |
| 114 | *Oldenlandia corymbosa*        | 23             | 42           | 0.46             | 1.10             | 0.33             | 0.63             | 0.52             | 0.02             | 1.17             |                  |
| No. | Species                        | No. 1 | No. 2 | No. 3 | No. 4 | No. 5 | No. 6 | No. 7 | No. 8 | No. 9 |
|-----|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 115 | Oldenlandia umbellate          | 65(46)| 92    | 1.3   | 1.41  | 6.62  | 1.37  | 1.48  | 0.43  | 3.29  |
| 116 | Orthosiphon thymiflorus        | 23(19)| 38    | 0.46  | 1.21  | 19.37 | 0.57  | 0.52  | 1.27  | 2.36  |
| 117 | Osbeckia aspera                | 39(35)| 70    | 0.78  | 1.11  | 10.50 | 1.04  | 0.89  | 0.69  | 2.62  |
| 118 | Pavetta indica                 | 46(28)| 56    | 0.92  | 1.64  | 42.19 | 0.83  | 1.05  | 2.77  | 4.65  |
| 119 | Pedalium murex                 | 45(35)| 70    | 0.9   | 1.29  | 18.34 | 1.04  | 1.03  | 1.20  | 3.27  |
| 120 | Pergularia daemia              | 30(26)| 52    | 0.6   | 1.15  | 6.88  | 0.77  | 0.68  | 0.45  | 1.91  |
| 121 | Peristrophe paniculata         | 32(29)| 58    | 0.64  | 1.10  | 1.83  | 0.86  | 0.73  | 0.12  | 1.71  |
| 122 | Persicaria hydropiper          | 29(23)| 46    | 0.58  | 1.26  | 5.59  | 0.68  | 0.66  | 0.37  | 1.71  |
| 123 | Phryma laptostachya            | 23(19)| 38    | 0.46  | 1.21  | 1.79  | 0.57  | 0.52  | 0.12  | 1.21  |
| 124 | Physla nodiflora               | 15(12)| 24    | 0.3   | 1.25  | 1.17  | 0.36  | 0.34  | 0.08  | 0.78  |
| 125 | Phyllanthus amarus             | 60(50)| 100   | 1.2   | 1.20  | 7.74  | 1.49  | 1.37  | 0.51  | 3.36  |
| 126 | Phyllanthus debilis            | 25(23)| 46    | 0.5   | 1.09  | 3.22  | 0.68  | 0.57  | 0.21  | 1.47  |
| 127 | Phyllanthus maderrapensis      | 23(20)| 40    | 0.46  | 1.15  | 2.34  | 0.60  | 0.52  | 0.15  | 1.27  |
| 128 | Phyllanthus myrtilifolius      | 39(31)| 62    | 0.78  | 1.26  | 3.97  | 0.92  | 0.89  | 0.26  | 2.07  |
| 129 | Phyllanthus virgatus           | 28(21)| 42    | 0.56  | 1.33  | 1.11  | 0.63  | 0.64  | 0.07  | 1.34  |
| 130 | Physalis minima                | 30(25)| 50    | 0.6   | 1.20  | 3.06  | 0.74  | 0.68  | 0.20  | 1.63  |
| 131 | Plumbago zeylanica             | 19(15)| 30    | 0.38  | 1.27  | 2.45  | 0.45  | 0.43  | 0.16  | 1.04  |
| 132 | Polycarpacea corymbosa         | 32(29)| 58    | 0.64  | 1.10  | 7.34  | 0.86  | 0.73  | 0.48  | 2.07  |
| 133 | Polygala chinensis             | 20(16)| 32    | 0.4   | 1.25  | 1.15  | 0.48  | 0.46  | 0.08  | 1.01  |
| 134 | Portulaca quadrifida           | 29(26)| 52    | 0.58  | 1.12  | 24.43 | 0.77  | 0.66  | 1.60  | 3.04  |
| 135 | Psuedathria viscid             | 35(27)| 54    | 0.7   | 1.30  | 3.57  | 0.80  | 0.80  | 0.23  | 1.84  |
| 136 | Rauwolfia serpentine           | 9(7) | 14    | 0.18  | 1.29  | 2.06  | 0.21  | 0.21  | 0.14  | 0.55  |
| 137 | Rhinacanthus nasutus           | 20(15)| 30    | 0.4   | 1.33  | 16.85 | 0.45  | 0.46  | 1.11  | 2.01  |
| 138 | Rhynchosia minima              | 35(30)| 60    | 0.7   | 1.17  | 24.58 | 0.89  | 0.80  | 1.61  | 3.30  |
| 139 | Rulliea prostrate              | 35(29)| 58    | 0.7   | 1.21  | 16.11 | 0.86  | 0.80  | 1.06  | 2.72  |
| 140 | Rulliea tuberosa               | 19(17)| 34    | 0.38  | 1.12  | 10.92 | 0.51  | 0.43  | 0.72  | 1.66  |
| 141 | Rungia repens                 | 15(11)| 22    | 0.3   | 1.36  | 2.89  | 0.33  | 0.34  | 0.19  | 0.86  |
| 142 | Scoparia dulcis                | 29(20)| 40    | 0.58  | 1.45  | 20.36 | 0.60  | 0.66  | 1.34  | 2.59  |
| 143 | Senna uniflora                | 12(10)| 32    | 0.4   | 1.25  | 10.32 | 0.48  | 0.46  | 0.68  | 1.61  |
| 144 | Senna oxidentalis             | 20(16)| 20    | 0.24  | 1.20  | 4.30  | 0.30  | 0.27  | 0.28  | 0.85  |
|   | Species                           | No. of Samples | Presence (%) | Frequency | Dominant |
|---|----------------------------------|---------------|--------------|-----------|----------|
| 145 | Sida acuta                       | 15(10)        | 20           | 0.3       | 1.50     | 1.93     | 0.30 | 0.34 | 0.13 | 0.77 |
| 146 | Sida cordata                     | 59(50)        | 100          | 1.18      | 1.18     | 2.35     | 1.49 | 1.35 | 0.15 | 2.99 |
| 147 | Sida cordifolia                  | 15(12)        | 24           | 0.3       | 1.25     | 12.64    | 0.36 | 0.34 | 0.83 | 1.53 |
| 148 | Solanum melongena                | 16(10)        | 20           | 0.32      | 1.60     | 5.73     | 0.30 | 0.36 | 0.38 | 1.04 |
| 149 | Solanum torvum                   | 20(13)        | 26           | 0.4       | 1.54     | 11.50    | 0.39 | 0.46 | 0.75 | 1.60 |
| 150 | Solanum virginianum              | 25(19)        | 38           | 0.5       | 1.32     | 11.50    | 0.57 | 0.57 | 0.76 | 1.89 |
| 151 | Spermacoce articularis           | 17(13)        | 26           | 0.34      | 1.31     | 1.73     | 0.39 | 0.39 | 0.11 | 0.89 |
| 152 | Spermacoce hispida               | 22(19)        | 50           | 0.64      | 1.28     | 3.26     | 0.74 | 0.73 | 0.21 | 1.69 |
| 153 | Spermacoce ocymoides             | 15(10)        | 38           | 0.44      | 1.16     | 2.84     | 0.57 | 0.50 | 0.19 | 1.25 |
| 154 | Spermacoce pusilla               | 32(25)        | 20           | 0.3       | 1.50     | 1.93     | 0.30 | 0.34 | 0.13 | 0.77 |
| 155 | Stashytropheta jamensia          | 29(19)        | 38           | 0.58      | 1.53     | 26.60    | 0.57 | 0.66 | 1.75 | 2.97 |
| 156 | Stylosanthes fruticoma           | 19(15)        | 30           | 0.38      | 1.27     | 2.45     | 0.45 | 0.43 | 0.16 | 1.04 |
| 157 | Stylosantus hamate               | 46(39)        | 78           | 0.92      | 1.18     | 4.69     | 1.16 | 1.05 | 0.31 | 2.52 |
| 158 | Syndrella nodiflora              | 19(13)        | 26           | 0.38      | 1.46     | 5.11     | 0.39 | 0.43 | 0.34 | 1.16 |
| 159 | Tephrosia purpurea               | 77(48)        | 96           | 1.54      | 1.60     | 82.89    | 1.43 | 1.76 | 5.44 | 8.62 |
| 160 | Trianthema portulacastrum        | 29(22)        | 44           | 0.58      | 1.32     | 16.67    | 0.65 | 0.66 | 1.09 | 2.41 |
| 161 | Tribulus terrestris              | 29(19)        | 38           | 0.58      | 1.53     | 7.80     | 0.57 | 0.66 | 0.51 | 1.74 |
| 162 | Trichodesmium indicum            | 35(29)        | 58           | 0.7       | 1.21     | 18.06    | 0.86 | 0.80 | 1.19 | 2.85 |
| 163 | Tridax procumbens                | 30(27)        | 54           | 0.6       | 1.11     | 23.12    | 0.80 | 0.68 | 1.52 | 3.01 |
| 164 | Triumfetta rhomboids             | 29(21)        | 42           | 0.58      | 1.38     | 14.96    | 0.63 | 0.66 | 0.98 | 2.27 |
| 165 | Urena lobata                     | 29(23)        | 46           | 0.58      | 1.26     | 7.80     | 0.68 | 0.66 | 0.51 | 1.86 |
| 166 | Urena sinuate                    | 27(22)        | 44           | 0.54      | 1.23     | 11.01    | 0.65 | 0.62 | 0.72 | 1.99 |
| 167 | Vernonia cinerea                 | 35(27)        | 54           | 0.7       | 1.30     | 8.03     | 0.80 | 0.80 | 0.53 | 2.13 |
| 168 | Vigna trilobata                  | 30(26)        | 52           | 0.6       | 1.15     | 9.36     | 0.77 | 0.68 | 0.61 | 2.07 |
| 169 | Waltheria indica                 | 25(18)        | 36           | 0.5       | 1.39     | 10.19    | 0.54 | 0.57 | 0.67 | 1.77 |
| 170 | Xanthium stumarium               | 26(21)        | 42           | 0.52      | 1.24     | 21.90    | 0.63 | 0.59 | 1.44 | 2.66 |
| 171 | Zorina diphyllea                 | 20(15)        | 30           | 0.4       | 1.33     | 4.59     | 0.45 | 0.46 | 0.30 | 1.20 |

**Total** | 6720 | 87.68 | 227.34 | 1523.65 | 100.00 | 100.00 | 100.00 | 300.00
The higher IVI contributed by many species like Tephrosia purpurea, Clerodendron infortunatum, Acalypa indica, Aerva lanata, Asystasia gangetica, Belharis madapertensis, Cleome viscosa, Dodonia viscosa, Glycosmis pentaphylla, Leucas aspera, Limnophila indica, Martynia annua, Oldenlandia umbellate, Pavetta indica, Phyllanthus amarus and Rhynchosia minima in the present study area indicates their stronger perpetuation and higher functional role in the ecosystem.

Many species like Alteranthera pungens, Amaranthus spinosus, Desmodium illinoensis, Evolvulus nummularis, Hybanthus enneaspermus, Justicia simplex, Ocimum basilicum, Plumbago zeylanica, Phyla nodiflora, Rauvolfia serpentina, Rungia repens, Solanum melongena, Acanthospermum hispidum, Aerva javanica, Amaranthus viridis, A. spinosus, Andrographis paniculata, Asparagus racemosus, Barleria buxifolia, B. lupulina, B. mysoensis, Biophytum sensitivum, Blainvillea trinervia, Borreria arcticarlis, Boerhavia diffusa, Centella asiatica, Chromolaena oederata, Cleome aspera, C. tetrandra, C. rutidasperma, Clitoria ternate, Commelina benghalensis, Corchorus aetuans, Croton hirtus, C. bonplandiam, C. sparsiflorus, Curculigo orchioides, Cyanotis axillaris, Cyanotis viscos, Desmodium adscendens, Desmodium triflorum, Evolvolus alsinoides, Ecobolium viride, Euphorbia hirta, Heydyois petarita, Hibiscus vitifolius, H. micranthus, Indigofera glandulosa, Ipomea carnea, Justicia glauca, Ludwigia octovalvis, L. peruviana, Phyllanthus virgatus, Sebastiana chamaelea, Sida acuta, Spermacoce articulare, and S. hispida were weaker in ecological attributes and secured poor IVI in the communities of studied forest. In addition to these species, the killing of young individuals by frost in winter may be ascribed as reason for this fact (Agarwal et al., 1961). Hence it is suggested that priority must be given to these species for conservation by employing proper macro micro propagation techniques.

REFERENCES
Agarwal, S.C., U.S. Madan, S. Chinnamani and N.D. Rege, (1961). Ecological studies in the Nilgiris. Indian Forester 87(6): 376-389.
Ahmedullah, M. and M.P. Nayar, (1987). Endemic Plants of the Indian Region. Vol.1. Botanical Survey of India, Howrah.
Anonymous, (1940-1976). The wealth of India; A dictionary of Indian Raw Materials and Industrial Products Raw Materials. Vols. 1-11/ C.S.I.R., New Delhi.
Belal, A.J. (1988). Regional influence on small scale vegetation heterogeneity within grasslands in the Serengeti National Park, Tanzania. Vegetatio 74: 7-10.
Champion, H.G. and S.K. Seth. (1968). A revised survey of the forest types of India. Government of India Press. Nasik, India. pp. 404.
Chandrasekaran, S. and P.S. Swamy, (1995). Changes in the herbaceous vegetation following disturbance due to biotic interference in natural and man-made ecosystems, Western Ghats. Tropical Ecology. 36: 213-220.
Cottam, G. and J.T. Curtis, (1956). The use of distance measures in phytosociological sampling. Ecology 37: 451-460.
Gadgil, M. (1984). An approach to ecodevelopment of Western Ghats. The Administrator 29(4): 339-379.
Garkoti, S.C. and S.P. Singh, (1997). Structure and function of herbaceous vegetation in high mountains of central Himalaya. Tropical Ecology 38(1): 153-156.
Maheshwari, J.K. (2000). Ethnobiology and Medicinal Plants of Indian Subcontinent. Scientific Publications, Jodhpur.
Nayar, M.P. and Sastri, A.R.K. (1987-1990). Red Data Book of Indian Plants. Vols. 1-3: Botanical Survey of India, Howrah.
Padmavathy, S. (2005). Biological investigations for the identification of plants of conservation importance in the understories of certain shola forests at Manjun, the Nilgiris, Western Ghats, India. Ph.D., thesis, Bharathiar University, Coimbatore, India.
Puri, G.S., Gupta, R.K. and Meher-Homji, V.M. (1989). Temperate forests of India including tropical montane forests. In: G.S. Puri (ed.) Forest Ecology Vol. 2: 49-55.
Saxena, K.G. (1991). Biological invasions in the Indian subcontinent: Review of invasion by plants. In: P.S. Ramakrishnan (ed.). Ecology of biological invasion in the tropics. International Scientific Publications, New Delhi.
Singh, S.K. (2004). Ethnomedicinal plants of Kullu Valley, Himachal Pradesh. Journal of Non Timber Forest Products 11(1): 74-79.
Usher, M.B. (1991). Biological invasions into tropical nature. In: Ecology of Biological invasion in the Tropics. (Ed.) Ramakrishnan, P.S. International Scientific Publications, New Delhi. p. 21-34.