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# VEGETAION STUDIES OF SELECTED GRAVEYARDS OF UPPER SWAT

**[1]Siraj Ahmad, [2]Nasrullah Khan, [2]Muhammad Wahab and [2]Kanwal Nazim**

[1]*Department of Botany, Post Graduate Jahanzeb College, Swat Pakistan*
[2]*Department of Botany Federal Urdu University Gulshan-e-Iqbal campus Karachi Pakistan*

## ABSTRACT

The present study deals with the phytosociological analysis of the selected graveyards of Upper Swat. Seven conserved graveyards were sampled and various ecological attributes were obtained. Based on IVI seven different communities were identified, representing 54 families and 95 species. Out of these 95 species 50 species were herbs, 25 shrubs and 20 were trees respectively. The findings show that the vegetation of the selected graveyards is comparatively less disturbed and the floristic composition is different from elsewhere due to religious sanctities. Therefore, it is recommended that these natural forests should be conserved by government agencies involving local communities.

**Key Words:** Phytosociological analysis, graveyards, Upper Swat, IVI and communities

## INTRODUCTION

Conservation of natural forest is very important for land use and forest resource management (Okano, 1996). Natural forests perform many functions in land conservation, water yield, gene bank, and wild life management (Khan *et al*, 2010). For forest planning and conservation it is necessary at first to understand the distribution of natural forest communities. Many researchers have analyzed forest communities' distribution employing several environmental factors and it has been stated that distribution is influenced by climatic, topographic and edaphic factors. Still today in the remote areas like upper Swat forest products resources are used for different purposes like fuel, timber, fruits and for the extraction of certain chemical. Anthropogenic disturbances are reported by various workers from different forests of Pakistan due to which forests are in bad shape (Wahab *et al*, 2008; Ahmed *et al*., 2009; Siddiqui *et al*., 2009). However, graveyards are saved from anthropogenic affects due religious veneration.

Therefore keeping in view the present research was undertaken in the natural graveyards of Swat district. It lies between $34^0\ 50^/$ - $35^0\ 06^/$ N latitude and $72^0\ 12^/$ - $72^0\ 41^/$ E longitude (Anonymous, 1998). The altitude ranges from 980 m at Sherpalam up to 1500 m at Miandam. The area is representing diversified flora especially in the conserved selected graveyards. Although some work has been carried out by various researchers (Champion *et al.*, 1965; Shaukat *et al*., 1981; Ihsan, 1989; Hussian *et al*., 1992; Hussian *et al.*, 1995; Khaliq, 1995; Iqbal, 1997; Shinwari, 2003; Ullah & Rashid, 2004). However, no attention was paid to the vegetation of graveyard. Therefore an attempt has been made to analyze the vegetation of graveyards which will provide baseline information for future studies, planning for the sustainable utilization of plant species and their use as indicator species. It is further expected that such study would be worth seen for the development of plans for maintaining the ecological balance and conservation of species in the area.

## MATERIALS AND METHODS

Quadrate method was used for sampling. Twenty quadrates were randomly examined from each site. Quadrates size was used according to the vegetation types like for herbs 1x1 m and for shrubs 1x5 m quadrates while point centered quarter (PCQ) method was applied for sampling of tree vegetation (Cottam & Curtis 1956). Data of community parameters like density, frequency, canopy coverage, relative density, relative frequency, and relative canopy coverage and importance value index of each species were calculated after McIntosh (1959) and Hussain, (1989).

The **c**overage of herbs and shrubs were calculated after coverage classes of Daubenmire, (1959) and were converted into mid points value and then total canopy cover was calculated by adding all the mid points value for a species in the total sampled area by using the following formula.

$$\text{C. C.} = \frac{\text{Total canopy cover of a species}}{\text{Number of quadrate x Quadrate size}}$$

Relative Canopy Cover (R. C. C.) was calculated from the cover value of a species as a proportion of the total cover values for all species (Brower and Zar, 1977).

$$\text{R. C. C.} = \frac{\text{Canopy cover of a species}}{\text{Total canopy cover of all species}} \times 100$$

For trees, the circumference at breast height was taken and the Dbh was changed into cover by the following formula.

Circumference = $\pi$ D

D= C/ $\pi$

Area = $\pi D^2/4$

A= C x C/ $\pi$ x 4 or A= $C^2/12.56$

Where D is diameter at breast height, while circumference was changed into basal area using standard conversion table (Cox, 1967).

**Important Value Index (IVI)**

It is the sum of all relative values of density, frequency and canopy coverage (Curtis and Mclontosh, 1950). The communities were named after the leading species having highest IVI. Soil samples were collected from all the sites and chemical analysis were carried out for correlation of the vegetation and soil types (Table 1). Plant specimens were collected, documented, pressed, preserved, and identified with the help of herbarium specimens and available literature (Stewart, 1967 and 1972; Beg and Khan, 1977; Nasir and Ali, 1970-1989; Ali and Nasir, 1989-1991; Nasir and Rafiq, 1995 and Ali and Qaiser, 1993-2007). Plants were arranged alphabetically and mounting of specimens were made on standard Herbarium sheet of size 28.75 cm x 32.50 cm. Voucher specimens were deposited in Herbarium Department of Botany Govt. Post Graduate Jahanzeb College Swat.

## RESULTS

Sampling at seven sites was carried out to record the Ecological attributes of seven different conserved graveyards and to study the diversity of these sites. Seven communities were established represented by 95 species in which 50 herbs, 23 shrubs and 19 were trees (Table 2). At Sherpalam (1000 m) *Olea-Vitex-Cynodon* community with IVI 203, 103 and 85 was observed, consisting of 29 species, out which 14 (48%) herbs, 8 (27%) shrubs and 7 (24%) trees. At Doroshkhela (1200 m) *Olea-Justicia-Cynodon* community with IVI 160, 107 and 70 respectively was observed, consisting of 28 species, 13 (46%) herbs, 8 (28%) shrubs and 7 (25%) trees. At Kotanai (1250 m) *Olea-Daphne-Vetveria* community with IVI 258, 73 and 41 was observed, consisting of 31 species, 17 (55%) herbs, 11 (35%) shrubs and 3 (10%) trees. At Baghdaray (1300 m) *Olea-Rubus-Sporobulus* community with IVI 139, 89 and 45 was observed, consisting of 37 species, 18 (48%) herbs, 14 (38%) shrubs and 5 (13%) trees. At Madyan (1400 m) *Celtis-Leucas-Gymnosporia* community with IVI 77, 73 and 70 was observed, consisting of 22 species, 9 (41%) herbs, 7 (31%) shrubs and 6 (27%) trees. At Venai (1320 m) *Quercus-Berberis-Narcissus* community with IVI 113, 72 and 65 was observed, consisting of 39 species, 19 (49%) herbs 12 (31%) shrubs and 8 (20%) trees. At Miandam (1700 m) *Olea-Hedera-Cynodon* community with IVI 126, 51 and 33 was observed, consisting of 40 species, 18 (45%) herbs, 14 (35%) shrubs and 8 (20%) trees. The details of all the communities are summarized below.

**1. Olea-Vitex-Cynodon community (Sherpalam graveyard 1000 m)**

The soil texture at this site was sandy loam having organic matter 2.61 %, CaCO3 6.6 %, N 0.13 %, P 239.14 ppm and K 140 ppm. The pH was 7 and soil was neutral in nature. This community was represented by 29 species, *Olea ferruginea*, *Vitex negundo* and *Cynodon dactylon* were dominant species with IVI 203, 103 and 85 respectively. *Morus alba*, *Rubus fruticosus* and *Narcissus tazetta* were the co-dominant species and *Melia azedarach*, *Daphne mucronata* and *Oxalis corniculata* were the associated species.

**2. Olea-Justicia-Cynodon community (Doroshkhela graveyard 1200 m)**

The soil texture at this site was silty loam having organic matter 2.40 %, CaCO3 6.3%, N 0.120 %, P 57.71 ppm and K 160 ppm. The pH was 6.4 and the soil was slightly acidic in nature. This community was represented by 28 species, *Olea ferruginea*, *Justicia adhatoda* and *Cynodon dactylon* were dominant species with IVI 160, 107 and 70 respectively. *Eucalyptus lanceolata*, *Vitex negundo* and *Oxalis corniculata* were the co-dominant species and *Ficus carica*, *Daphne mucronata* and *Oenothera rosea* were the associated species.

**3. Olea-Daphne-Vetveria community (Kotanai graveyard 1250 m)**

The soil texture at this site was silty loam having organic matter 1.92 %, CaCO3 5.6%, N 0.096 %, P 52.78 ppm and K 140 ppm. The pH was 6.3 and the soil was slightly acidic in nature. This community was represented by 31 species, *Olea ferruginea*, *Daphne mucronata*, and *Vetiveria zizanioides* were dominant species with IVI 257, 73 and 41 respectively. *Ailanthus altissima*, *Gymnosporia royleana* and *Duchesnea indica* were the co-dominant species and *Ficus carica*, *Rosa moschata* and *Narcissus tazetta* were the associated species.

**4. Olea-Rubus-Sporobulus community (Baghdaray graveyard 1300 m)**

The soil texture at this site was silty loam having organic matter 1.58 %, CaCO3 5.8%, N 0.079 %, P 45.43 ppm and K 60 ppm. The pH was 6.5 and organic matter nitrogen, phosphorus and potassium. The soil was slightly acidic in nature. This community was represented by 37 species, *Olea ferruginea*, *Rubus fruticosus* and *Sporobolus diander* were dominant species with IVI 139, 89 and 45 respectively. *Oxalis corniculata*, *Elaeagnus umbellata* and *Melia azedarach* were the co-dominant species and *Ficus carica*, *Gymnosporia royleana* and *Cynodon dactylon* were the associated species.

**5. Celtis-Gymnosporia-Leucas community (Madyan graveyard 1400 m)**

The soil in this community was silty loam having organic matter 3.09 %, CaCO3 6%, N 0.154 %, P 35.87 ppm and K 200 ppm. The pH was 6.4 and the soil was slightly acidic in nature. This community was represented by 22 species, *Celtis australis*, *Geranium rotundifolium* and *Leucas mollissima* were dominant species with IVI 77, 70 and 73 respectively. *Quercus baloot*, *Randia tetrasperma* and *Vetiveria zizanioides* were the co-dominant species and *Olea ferruginea*, *Daphne mucronata* and *Sporobolus diander* were the associated species.

**6. Quercus-Berberis-Narcissus community (Venai graveyard 1320 m)**

The soil texture at this site was sandy loam having organic matter 4.19 %, CaCO3 5.6%, N 0.209 %, P 24.59 ppm and K 170 ppm. The pH was 5.4 and the soil was slightly acidic in nature. This community was represented by 39 species, *Quercus incana*, *Berberis lycium* and *Narcissus tazetta* were dominant species with IVI 113, 72 and 65 respectively. *Olea ferruginea*, *Indigofera heterantha* and *Sonchus asper* were the co-dominant species and *Morus nigra*, *Zanthoxylum armatum* and *Cannabis sativa* were the associated species.

**7. Olea-Hedera-Cynodon community (Miandam graveyard 1700 m)**

The soil texture at this site was silty loam having organic matter 6.66 %, CaCO3 8.3%, N 0.333 %, P 2.03 ppm and K 140 ppm. The pH was 7.4 and the soil was slightly basic in nature. This community was represented by 40 species, *Olea ferruginea*, *Hedera nepalensis* and *Cynodon dactylon* were dominant species with IVI 126, 51 and 33 respectively. *Quercus baloot*, *Berberis lycium* and *Tagetes minuta* were the co-dominant species and *Pinus wallichiana*, *Isodon rugosus* and *Galium aparine* were the associated species.

## DISCUSSION

It is evident from the findings that some of the species i.e. *Artemisia scoparia, Asparagus gracilis, Berberis lycium, Celtis australis, Clematis grata, Cotoneaster nummularia, Daphne mucronata, Elaeagnus umbellate, Ficus carica, Gymnosporia royleana, Hedera nepalensis, Indigofera heterantha, Isodon rugosus, Jasminum humile, Justicia adhatoda, Myrsine africana, Olea ferruginea, Pinus roxburghii, Pinus wallichiana, Quercus baloot, Quercus incana, Rosa moschata, Rubus fruticosus, Sarcococca saligna, Ulmus wallichiana, Vitex negundo, Zanthoxylum armatum* and *Ziziphus sativa* could be used as indicator species for the rehabilitation of the surrounding areas of these selected graveyards. The continuously increasing human pressure is destabilizing the biodiversity status especially species survival, habitat, and ecosystem which is resulting into the erosion of plant genetic resources and unsustainable ecosystem. Therefore, certain species that are ecologically successful must be adopted as graveyards indicator species which will play great role in the conservation of the plant species of the area. Further in-situ conservation of the graveyards indicator species for long term results and socio-economic uplift is recommended as an outcome of this analysis.

**Table 1.** Soil analysis recorded from seven communities at different graveyards of Swat Northern Pakistan ranging from 1000–1700 m.

| S # | Site | Physical analysis | | | Chemical analysis of the sample | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Silt | Clay | Sand | Class | pH | OM% | CaCO3% | N% | Pppm | Kppm |
| 1. | Sherpalam | 42.8 | 2.4 | 54.8 | Sandy loam | 7.0 | 2.61 | 6.6 | 0.130 | 239.14 | 140 |
| 2. | Doroshkhela | 70.8 | 2.0 | 27.2 | Silty loam | 6.4 | 2.40 | 6.3 | 0.120 | 57.71 | 160 |
| 3. | Kotanai | 60.8 | 8.8 | 30.4 | Silty loam | 6.3 | 1.92 | 5.6 | 0.096 | 52.78 | 140 |
| 4. | Baghdaray | 52.8 | 2.0 | 45.2 | Silty loam | 6.5 | 1.58 | 5.8 | 0.079 | 45.43 | 60 |
| 5. | Madyan | 54.8 | 6.8 | 38.4 | Silty loam | 6.4 | 3.09 | 6.0 | 0.154 | 35.87 | 200 |
| 6. | Venai | 42.8 | 2.4 | 54.8 | Sandy loam | 5.4 | 4.19 | 5.6 | 0.209 | 24.59 | 170 |
| 7. | Miandam | 59.2 | 1.2 | 39.6 | Silty loam | 7.4 | 6.66 | 8.3 | 0.333 | 2.03 | 140 |

**Table 2.** Diverse information regarding families, botanical names, habit and important value index (IVI) of seven communities at different conserved graveyards in Upper Swat Northern Pakistan ranging from 980-1500 m.

| S # | Family | Botanical name | IVI of different communities | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Habit | OVCy | OJCy | ODVe | ORS | CGL | QBN | HCy |
| 1. | Acanthaceae | *Dicliptera roxburghiana* Nees | Herb | - | 20 | 18 | - | 21 | 7 | - |
| | | *Justicia adhatoda* L. | Shrub | - | 107 | - | - | - | - | - |
| 2. | Amaranthaceae | *Achyranthes aspera* L. | Herb | 16 | - | 6 | - | 16 | - | 11 |
| | | *Alternanthera pungens* Kunth. | Herb | 7 | - | - | - | - | - | - |
| | | *Amaranthus caudatus* L. | Herb | 12 | - | - | - | - | - | 9 |
| | | *Amaranthus spinosus* L. | Herb | - | - | - | - | - | - | 15 |
| 3. | Amaryllidaceae | *Narcissus tazetta* L. | Herb | 40 | - | 20 | - | 17 | 65 | 21 |
| 4. | Anacardiaceae | *Pistacia integerrima* J. L. Stew. ex Brandis | Tree | - | - | - | - | 76 | - | - |
| 5. | Apiaceae | *Bupleurum falcatum* L. | Herb | - | - | - | - | - | - | 11 |
| | | *Scandix pecten-veneris* L. | Herb | - | - | - | - | - | - | 16 |
| 6. | Araliaceae | *Hedera nepalensis* K. Koch | Shrub | - | - | - | - | - | - | 51 |
| 7. | Asteraceae | *Artemisia scoparia* Waldst. & Kit. | Herb | - | - | - | 17 | - | - | - |
| | | *Calendula arvensis* L. | Herb | - | - | - | - | - | 5 | - |
| | | *Conyza canadensis* (L.) Cronquist | Herb | - | 12 | 9 | 4 | - | 20 | - |
| | | *Sonchus asper* (L.) Hill | Herb | - | - | - | - | - | 27 | - |
| | | *Tagetes minuta* L. | Herb | 16 | - | - | - | - | 5 | 31 |
| 8. | Berberidaceae | *Berberis lycium* Royle | Shrub | 26 | - | - | 7 | 13 | 72 | 27 |
| 9. | Boraginaceae | *Heliotropium undulatum* Vahl. | Herb | - | 13 | - | 4 | - | - | - |
| | | *Myosotis caespitosa* Clarke | Herb | - | 12 | - | - | - | 4 | - |
| 10. | Brassicaceae | *Alliaria petiolata* (M.B.) Cav. & Grande Boll. | Herb | - | 11 | 12 | - | - | - | - |
| | | *Lepidium ruderale* HK. Anders. | Herb | - | 11 | - | - | - | - | - |
| 11. | Buxaceae | *Sarcococca saligna* (D. Don) Muell. Arg | Shrub | - | - | - | - | - | 11 | 17 |
| 12. | Caesalpiniaceae | *Caesalpinia decapetala* (Roth) Alston | Shrub | 23 | - | 2521 | - | - | - | - |
| 13. | Cannabinaceae | *Cannabis sativa* L. | Herb | - | 24 | - | - | - | 24 | - |
| 14. | Caryophyllaceae | *Stellaria media* (L.) Cyr. | Herb | - | - | 7 | - | - | - | - |
| 15. | Celastraceae | *Gymnosporia royleana* (Wall.) Lawson | Shrub | 24 | 31 | 53 | 17 | 70 | - | - |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 16. | Chenopodiaceae | *Chenopodium album* L. | Herb | 13 | - | - | - | - | 7 | - |
| | | *Chenopodium ambrosioides* L. | Herb | 22 | - | 9 | 14 | - | 20 | 17 |
| 17. | Convolvulaceae | *Ipomoea purpurea* (L.) Roth | Herb | - | - | - | - | - | 6 | - |
| 18. | Cucurbitaceae | *Melothria heterophylla* Cogn. | Herb | - | - | - | 3 | - | - | - |
| 19. | Cuscutaceae | *Cuscuta reflexa* Roxb. | Herb | - | - | - | - | - | - | 11 |
| 20. | Ebenaceae | *Diospyros lotus* L. | Tree | - | - | - | - | - | - | 14 |
| 21. | Elaeagnaceae | *Elaeagnus umbellata* Thunb. | Shrub | - | - | - | 43 | - | 8 | 13 |
| 22. | Euphorbiaceae | *Andrachne cordifolia* (Dcne.) Muell. | Shrub | - | - | - | 8 | - | 10 | - |
| 21 | | *Euphorbia helioscopia* L. | Herb | 7 | - | - | - | - | - | - |
| 23. | Fagaceae | *Quercus baloot* Griffth | Tree | - | - | - | - | 47 | - | 77 |
| | | *Quercus diltata L.* | Tree | - | - | - | - | - | 04 | - |
| | | *Quercus incana* Roxb. | Tree | - | - | - | - | - | 113 | - |
| 24. | Geraniaceae | *Geranium rotundifolium* L. | Herb | - | - | 19 | 7 | - | 7 | - |
| 25. | Iridaceae | *Iris germanica* L. | Herb | - | - | 9 | - | - | - | - |
| 26. | Labiatae | *Calamintha umbrosa* (M. Bieb.). Fish. & Mey | Herb | - | - | - | 11 | - | - | - |
| | | *Leucas mollissima* Wall.ex Bth. | Herb | - | - | - | - | 73 | - | - |
| | | *Origanum vulgare* L. | Herb | - | 11 | 11 | 11 | - | - | - |
| | | *Isodon rugosus* (Wall. ex Benth) Codd | Shrub | - | 13 | 25 | 9 | 34 | 12 | 25 |
| 27. | Liliaceae | *Asparagus gracilis* Royle | Shrub | - | 10 | 9 | - | - | - | - |
| 28. | Malvaceae | *Malvastrum coromandelianum* (L.) Garcke | Herb | 13 | - | - | - | - | - | - |
| 29. | Meliaceae | *Melia azedarach* L. | Tree | 23 | 20 | - | 38 | - | 12 | - |
| 30. | Moraceae | *Ficus carica* L. | Tree | 20 | 28 | 16 | 31 | - | 24 | 9 |
| | | *Morus alba* L. | Tree | - | - | - | - | - | - | 17 |
| | | *Morus nigra* L. | Tree | 31 | 20 | - | - | 10 | 31 | - |
| 31. | Myrsinaceae | *Myrsine africana* L. | Shrub | - | - | 14 | 20 | - | 12 | 16 |
| 32. | Myrtaceae | *Eucalyptus lanceolata* L. | Tree | - | 38 | - | - | - | - | - |
| | | *Myrtis Comunis L.* | Shrub | - | - | - | - | 34 | - | - |
| 33. | Nyctaginaceae | *Mirabilis jalapa* L. | Herb | - | - | - | - | - | 6 | - |
| 34. | Oleaceae | *Jasminum humile* L. | Shrub | - | - | - | - | 17 | 23 | 18 |
| | | *Jasminum Officinale L.* | Shrub | - | - | - | 20 | - | - | - |
| | | *Olea ferruginea* Royle | Tree | 203 | 160 | 257 | 139 | 56 | 81 | 126 |
| 35. | Onagraceae | *Oenothera rosea* Soland. | Herb | - | 25 | - | 13 | - | - | - |
| 36. | Oxalidaceae | *Oxalis corniculata* L. | Herb | 32 | 36 | - | 38 | - | 11 | - |
| 37. | Papilionaceae | *Indigofera heterantha* Wall.ex Brandis | Shrub | - | - | - | 28 | - | 47 | 9 |
| | | *Lespedeza juncea* (L. f.) Persoon | Herb | - | - | - | 16 | - | - | - |
| | | *Medicago minima* (L.) Grufb. | Herb | - | - | 12 | - | - | - | - |
| | | *Robinia pseudoacacia* L. | Tree | 9 | - | - | 15 | - | - | - |
| 38. | Plantaginaceae | *Plantago lanceolata* L. | Herb | 4 | - | 17 | 14 | - | - | 20 |
| 39. | Pinaceae | *Pinus roxburghii* Sargent | Tree | - | - | - | - | 34 | - | - |
| | | *Pinus wallichiana* A. B. Jackson | Tree | - | - | - | - | - | - | 34 |
| 40. | Poaceae | *Cynodon dactylon* (L.) Pers. | Herb | 85 | 70 | - | 37 | 34 | 17 | 33 |
| | | *Heteropogon contortus* (L.) P. Beauv. ex Roem. & Schult. | Herb | - | - | - | - | - | - | 17 |
| | | *Sporobolus diander* (Retz.) P. Beauv. | Herb | - | - | - | 45 | 51 | - | - |
| | | *Vetiveria zizanioides* (L.) Nash | Herb | - | - | 41 | 22 | 69 | - | - |
| 41. | Polygonaceae | *Bistorta amplexicaulis* (D. Don) Green | Herb | - | - | - | - | - | 14 | - |
| | | *Rumex dentatus* L. | Herb | 24 | - | 11 | - | - | 23 | - |
| | | *Rumex hastatus* D. Don | Herb | 9 | - | - | - | - | - | 22 |
| 42. | Ranunculaceae | *Clematis grata* Wall. | Shrub | - | - | 15 | 8 | - | - | - |
| 43. | Rhamnaceae | *Ziziphus sativa* Gaertn. | Tree | - | - | - | - | - | 10 | - |
| 44. | Rosaceae | *Agrimonia eupatoria* L. | Herb | - | - | 13 | 8 | - | - | - |
| | | *Cotoneaster nummularia* Fisch. & Mey. | Shrub | - | - | - | - | - | 18 | 16 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Duchesnea indica* (Andr.) Focke | Herb | - | 21 | 31 | - | - | - | 19 |
| | | *Pyrus pashia* Ham. ex D. Don | Tree | - | - | - | - | - | - | 14 |
| | | *Rosa moschata* non J. Herrm. | Shrub | 25 | - | 36 | - | - | - | - |
| | | *Rosa canina* L. | Shrub | - | - | - | 6 | - | 21 | 9 |
| | | *Rubus fruticosus* Hk. f. non L. | Shrub | 43 | 32 | 22 | 89 | - | 14 | 20 |
| 45. | Rubiaceae | *Galium aparine* L. | Herb | - | - | - | - | - | - | 28 |
| | | *Randia tetrasperma* (Roxb.) Bth. & HK. f. | Shrub | - | - | - | - | 62 | - | - |
| | | *Rubia cordifolia* L. | Herb | - | 18 | 6 | 11 | 13 | 8 | 11 |
| 46. | Rutaceae | *Zanthoxylum armatum* DC. | Shrub | 26 | 24 | 20 | 27 | 47 | 24 | 21 |
| 47. | Salicaceae | *Populus nigra* L. | Tree | 5 | - | - | - | - | - | - |
| 48. | Scrophulariaceae | *Verbascum thapsus* L. | Herb | - | -- | - | 9 | - | - | 15 |
| 49. | Simaroubaceae | *Ailanthus altissima* (Mill.) Swingle | Tree | - | 10 | 26 | 28 | - | 10 | - |
| 50. | Smilacaceae | *Smilax glaucophylla* Klotzsch | Shrub | - | - | - | - | - | - | 9 |
| 51. | Solanaceae | *Solanum pseudocapsicum* L. | Herb | - | - | - | - | 6 | 5 | 13 |
| 52. | Thymeleaceae | *Daphne mucronata* Royle | Shrub | 31 | 46 | 73 | 7 | 55 | - | - |
| 53. | Ulmaceae | *Celtis australis* L. | Tree | 10 | 19 | - | - | 77 | 11 | - |
| | | *Ulmus wallichiana* Planch. | Tree | - | - | - | - | - | - | 9 |
| 54. | Verbenaceae | *Vitex negundo* L. | Shrub | 103 | 50 | 32 | 26 | - | - | - |

**Index of abbreviations:**
B = *Berberis;* C = *Celtis;* Cy = *Cynodon;* D = *Daphne;* H = *Hedera; G = Gymnosporia;* L = *Leucas;*
J = *Justicia,* N = *Narcissus;* O = *Olea;* Q = *Quercus;* R = *Rubus;* S = *Sporobolus;* Ve = *Vetiveria* and V = *Vitex*

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