

**ASSESSMENT OF DIVERSIFIED VEGETATION COMMUNITY
IN ISLAMABAD VICINITY, PAKISTAN**

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ABSTRACT

*Islamabad is rich in diversified flora. This study was conducted to assess the vegetation communities of Islamabad vicinity. In present study seven different sites were selected in the vicinity i.e. CDA Nursery, F9 Park, Faisal Mosque, Jasmine Garden, near Prime Minister House, near Quaid-e-Azam University and Rawal Lake. A total of 62 major plant species were found in the study area. The dominance of plant species was estimated on basis of importance value. Most dominating species was *Broussonetia papyrifera* with highest importance value (71.4±35.82). These selected sites were categorized on the basis of species richness indices and Shanon's diversity indices. Jinnah Garden was rich in plant species on basis of species richness.*

KEY WORDS

*Species; Dominant species; *Broussonetia papyrifera*; *Nerium oleander*; Flora; *Jasminum*; *Dalbergia sissoo*.*

Plant properties deliver ingredients for survival of animals, medicinal, forage values, possess, and preserve cultural heritages, biological information and real knowledge about the vicinity (Hameed et al., 2011). Vegetation environment relationships disclose diverse fundamental processes that result in appearance of different vegetation patterns existing in urban ecosystems (Zeleny, 2008). In the recent Years, dumping of sewage wastes and garbage material has pronounced effects on the flora and fauna of the major reservoir. Due to accelerated urbanization and developmental activities in the recent Years, sewage wastes are being continuously discharged and dumped having adverse effect on soil environment (Chen et al., 2005). Distribution of species richness is likely to be regulated by two or more environmental gradients (Pausas and Austin, 2001). Species richness of urban ecosystem is determined mainly by environmental conditions and the species pool (Leps, 2004) which is usually less considered by decision makers and planners due to little knowledge of advantages provided by natural vegetation. Environmental variables can be classified into direct, indirect and resource gradients (Austin and Smith, 1989). Direct variables include

factors such as soil characteristics that have a direct effect on vegetation (Tayler, 2003).

The *Dalbergia sissoo*, *Acacia nilotica*, *Morus alba* and *Morus nigra* were dominant tree species of the area 1960s which were eradicated as a result of human activities and introduction of some new plant species. The *Broussonetia papyrifera* invasion has been recognized as one of the major factors that has transformed the vegetation composition of the area from native to a mixture of introduced and native species. C.D.A has attempted to eradicate the plant by replacing it with some plant species of innate origin like *Bauhinia variegata* and *Cassia fistula* that are not only productive for wildlife but also does not harm the existing vegetation. Further, these are fast growing species (Imran, 2004).

The Murree area is quite rich in species diversity; with over 700 plant species were recorded many of them announced as endangered species (Ahmad and Javed, 2007). In Pakistan (Islamabad) there are three major types of forest existing regions are: i) subtropical pine forest at higher elevations, ii) Himalayan moist temperate forest at very limited area, and iii) deciduous broad-leaved forest at lower hills (Chaghtai et al., 1978).

MATERIALS AND METHODS

The data on vegetation of the area was recorded with the help of square quadrats of 1x1 m dimension taken at a distance of 10 m between the two quadrats along transect line 100 m in length; 20 such transects laid at each study site with a distance at least 15 m between the two neighboring transect lines. For the vegetation with a height above 2 m, larger quadrates (10 m x 10 m) were laid with a distance of 10 m between

the two neighboring quadrats to record the data, same transect used for two types of quadrats. The information recorded from each quadrat was plant species present, number of plants belonging to each species and percent covered. These data was used to estimate percent composition, density and frequency for each plant species percent composition, density and frequency of each plant species. Various vegetation attributes were calculated according to the following formulae (Shabbir and Bajwa, 2006).

$$\text{Relative Density (\%)} = \frac{\text{Number of quadrates in which a species occurs}}{\text{Area samples (total number of quadrates)}} \times 100$$

$$\text{Relative Frequency (\%)} = \frac{\text{Number of quadrates in which a species occurs}}{\text{Total number of quadrates sampled}} \times 100$$

$$\text{Relative Cover (\%)} = \frac{\text{Area covered by a species in a quadrat}}{\text{Total area covered by all the species in a quadrat}} \times 100$$

$$\text{Importance Value (IV)} = \text{Relative Frequency} + \text{Relative Density}$$

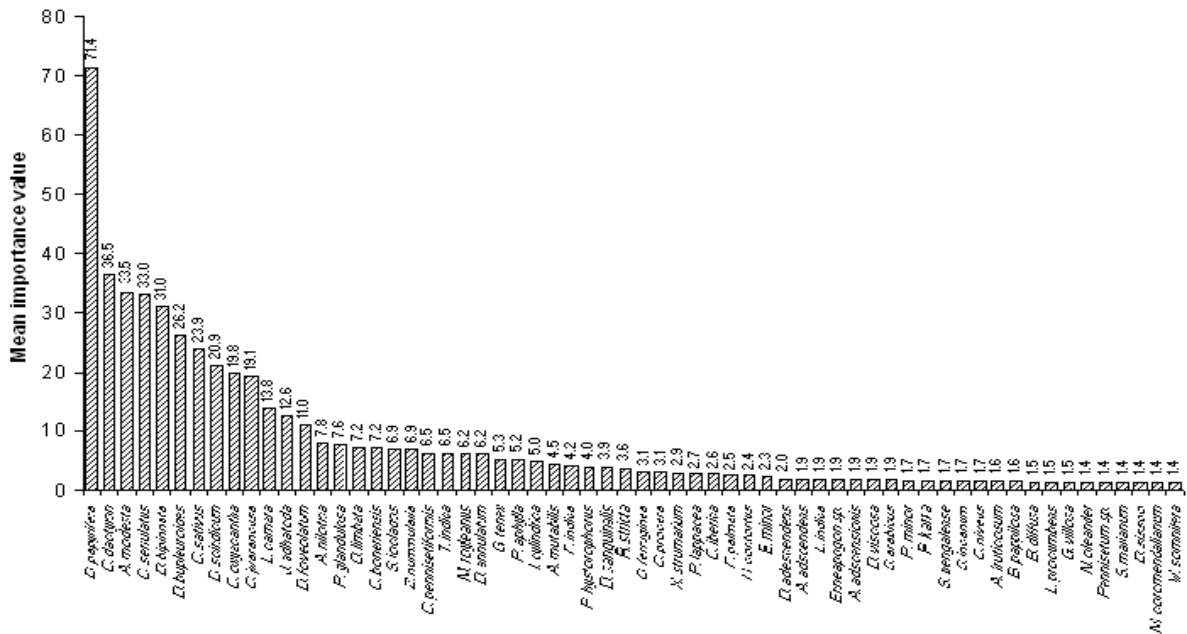
The plant communities were identified on the basis of dominant plant species i.e. species with the highest importance value.

RESULTS AND DISCUSSION

The human activity always has profound effect on the plant community of an area. Housing schemes and urbanization cause ecological changes in the flora. The increase in human population put heavy demand of land for infrastructure and result in the destruction and degradation of existing vegetation and inadequate planting sites (Jim, 2000). Rapid expansion of the cities engulf chunks of agriculture land and result in shrinkage of green spaces. The Green spaces are eventually distributed in the built-up areas if the areas are not planted and reserved primarily with the ecological aspect. (Feng et al., 2005).

Importance Indices. *Brossonnetia papyrifera* (71.4) is dominating species on the basis of overall mean Importance Value of all seven study sites, Figure 1 followed by *Cynodon dactylon* (36.4), *Chrysopogon serrulatus* (33.0), *Acacia modesta* (33.5), *Desmostachya bipinnata* (31.0), *Diclyptera bupleuroides* (26.1), *Cannabis sativus* (23.9), *Dactyloctenium scindicum* (20.9), *Carthamus oxyacantha* (19.8), *Cymbopogon jwarancusa* (19.1), *Lantana camara* (13.8), *Justicia adhatoda* (12.6), *Dichanthium foveolatum* (10.9),

Acacia nilotica (7.83), *Prosopis glandulosa* (7.61), *Otostegia limbata* (7.20), *Conyza bonariensis* (7.18), *Sporobolus ioclados* (6.93), *Ziziphus nummularia* (6.86), *Cenchrus pennisetiformis* (6.52), *Trichodesma indica* (6.51), *Maytenus royleanus* (6.24), *Dichanthium annulatum* (6.22), *Grewia tenex* (5.28), *Periploca aphylla* (5.22), *Imperata cylindrical* (4.97), *Aristida mutabilis* (4.52), *Fagonia indica* (4.23), *Parthenium hysterophorus* (4.03), *Digitaria sanguinalis* (3.87), *Rhazia stricta* (3.58), *Calotropis procera* (3.10), *Olea ferruginea* (3.12), *Xanthium strumarium* (2.95), *Pupalia lappacea* (2.71), *Centaurea iberica* (2.63), *Ficus palmate* (2.48), *Heteropogon contortus* (2.39), *Eragrostis minor* (2.28), *Digitaria adscendens* (2.00), *Asparagus adscendens* (1.89), *Dodonaea viscosa* (1.86), *Enneapogon sp.* (1.88), *Lantana indica* (1.88), *Sporobolus arabicus*, *Aristida adscensionis* (1.86), *Phalaris minor*, *Phragmites karka*, *Saccharum bengalense* (1.74), *Solanum incanum* (1.73), *Abutilon fruticosum*, *Cyperus niveus* (1.65), *Buxus pappilosa* (1.64), *Boerhaavia diffusa* (1.54), *Launaea procumbens* (1.53), *Grewia villosa* (1.46), *Malvestrum coromendalianum*, *Nerium oleander*, *Pennisetum sp.* (*Cenchrus* like), *Dalbergia sissoo*, *Withania somnifera* and *Silybum marianum* (1.44). The results of study under the process matches with that reported by Malik and Husain, (2007).



The plant species *Broussonetia papyrifera* has been recognized as one of the worst plants invaders highly impact species in Pakistan which flourishes along streams and drains due to presence of high moisture content that favors the vigorous growth. These species have the potential to less diversity and richness of woody as well as herbaceous species Khatoon and Ali, (1999). Although there are many factors which define the growth of vegetation, but generally vegetation dominance associated with greater water availability in areas (Malik and Husain, 2006). During February, up to April, proximity to *Broussonetia papyrifera* contributes to severe pollen allergy in Islamabad area which indicates that *Broussonetia* species are the most dominating specie (Birsal, 2007).

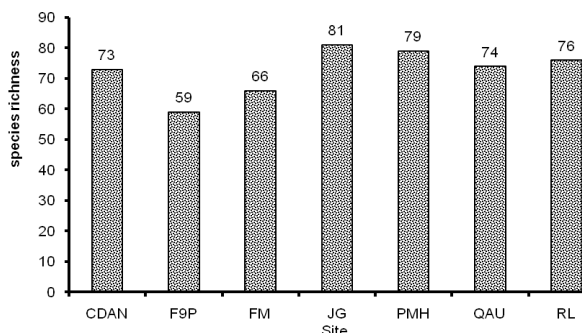


Figure 2 – Plant Richness at seven different study sites

The plant species richness at seven different sites is presented in Figure 2. The indices show that Jsmmine Garden was the richest specie site

(81) in among the seven study sites followed by the PMH (79), RL (76), QAU (74) and C.D.A-N (73) while Faisal Mosque (66) and F-9 Park was the poorer site (59) among the seven study sites.

Comparison of Plant Species Diversity on the basis Shannon's diversity indices. The plant abundance data among the seven sites was collected from 1x1 m² sizes of 10 sub-quadrates for herbs and 10 sub-quadrates of 5x5 m² for tress for each study site. A uniform distance, with-in each study site was used to calculate the diversity indices, frequency and density indices.

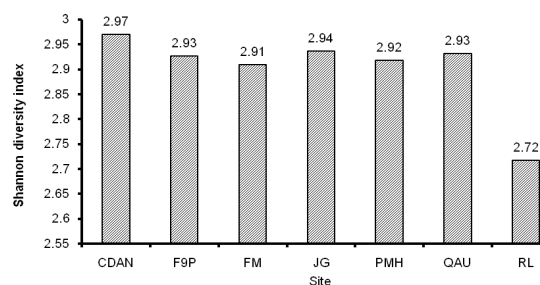


Figure 3 – Comparison of plant species diversity at seven different study sites by Shannon's diversity indices estimated by computer software Estimates 8.0

The Comparison of the Shannon's Diversity Indices for plant communities at seven different study sites, (C.D.A-N) C.D.A-Nursery, (F-9P) F-9 Park, (FM) Faisal Mosque, (JG) Jasmine Garden, (PMH) Prime Minister House, (QAU) Quad-e-Azam University and (RL) Rawal Lake is presented in Figure 3. The order of diversity at

study sites was as follows C.D.A-N (2.97), JG (2.94), F-9P and (QAU) (2.93), PMH (2.92), FM (2.91) and RL (2.72). However, this Indies was similar for whereas with respect diversity indices, F-9 park and Quid-e-Azam University sites. Several diversity ideas exist in the ecological litera-

ture. The Shannon index is based on percentage composition by species (Shannon and Weaver 1949). The other most commonly applied ideas are Combines Species Richness, Number with Equitability, and Evenness, with which individuals are distributed among species.

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