# PHYTOSOCIOLOGY OF LOW LAND ECOSYSTEM OF VARANASI

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**ABSTRACT**

In the present study phytosociological analysis of Low land ecosystem require knowledge of standard phytosociological methods and its component species. The standard phytosociological methods were applied to the plant communities of Varansai was carried out one at crop land site namely site I and other at low land site namely site II. The total number of plant species recorded from both the sites is in all 29 species. The total number of species recorded at two sites separately was 20 and 22 respectively. On the basis of IVI and frequency data some species as *Ammania baccifera*, *cynodon dactylon*, *cyperus rotundus*, *Melilotus alba* were found to dominate at site I, whereas that for site II was exhibited by *Ammania baccifera*, *cyperus rotundus, chenopodium album, eclipta alba*.

Study of species composition of both sites reflects that the area occupied by *Ammania baccifera* L. is greater than any other studied species. It exhibit higher value of IVI and frequency than other species shows its high competitive ability presence of different interference mechanism including root system and foliar structure may be accounted for possible reason for dominance of *Ammania baccifera* L. in Low land ecosystem of Varanasi.

**Key words:** *Phytosociology, IVI, frequency, plant communities, Dominance.*

## INTRODUCTION

The comparative assessment of contribution of each species to the total community is done on the basis of frequency, Abundance, Density and Importance value index (IVI). The source of working knowledge of plant community structure and behaviour of component species have primary requisite to detailed knowledge of floristic composition, development of vegetation structure and distribution pattern. Phytosociology is the study of all activity and effects regarding the social life of plants. Beside Low Land

they also grow in crop fields where they compete with crops for water, soil nutrients, light and space and thus reduce crop yields (Handbook of Agriculture, 1992). According to Rice (1984) besides competition species can also have allolopathic interaction with crops. Thus competition and allelopathy togather constitute the interference mechanisms of crops by weeds. Mishra (1946) has observed that "On account of their size, the duration for which they hold water and local biotic and edaphic factors, the low Lands presents a very heterogenous environment which calls for a careful study of response of vegetation towards it".

The impact of seasonal variability also shows wast impact on species diversity, both climatic and edaphic habitat complex, mode of origin, energy efficiency, water utilization are responsible for plant sociability within same area.

In the present investigation Phytosociological analysis of two fields namely one crop field ecosystem represented by site I and waste land represented by site II has been carried out to determine species composition and phytosociological character's of low-lying land of varanasi.

**MATERIAL AND METHODS**

The present study was carried out at varanasi district of Uttar Pradesh (India) a holy city of eastern Uttar Pradesh Situated at $83^0$ $1^1$ 'longitude and $25^0$ $18^1$ north latitude. It is part of Upper Gangetic plane.

The climate of Varanasi according to Dudgeon (1920) is typically mansoonic with high and low temperatures and rainfall within third period of year characterised by three distinct seasons as rainy (July to October), winter (November to February) and summer (March to June). The variation of weather condition are due to high temperature in summer and very low temperature and minimum in winter ranges between (39.6 $\pm$ 5.76 to 9.7 $\pm$ 6.52) the coldest month is January and hottest month is May. The study area falls in the belt of semi-arid to sub-humid climate and has been classified under moist deficit zone four with moisture deficit index of 34.7 to 38.7 percent (Raychaudhuri et al, 1963). The annual precipitation of Varanasi is nearly 998mm of which about $2/3^{rd}$ part is received during June to mid September. Some rains also received during winter. Maximum relative humidity occurs in January and Minimum in May.

The vegetation of study sites was analyzed by quadrat method with quadrat size of $50x50cm^2$. Twenty five quadrat were randomly placed in each field of study and the observation were made twice in

each season. Number of species in each quadrat were recorded. These observation were used to calculate frequency, relative frequency, relative density, relative dominance and importance value index of each species though method given by Curtis (1956), Hauson and Churchill (1961), Michael (1984), the values of frequency and IVI for different species occuring at site I and site II have been represented in Table 1. Site I is agricultural rice field located near Daffi with an approximate area about 4.6 $km^2$ and site II at Kanchanpur area with about 9.8$km^2$ with irregular topography with district soil condition and consists of alluvial and loamy soil texture.

**Table 1 : Phytosociology of Different species from Site I & Site II, Low Land of Varanasi.**

| S.No. | Plant Species. | Frequency | | Rel. Frequency | | Rel. Density | | Rel. Abundance | | IVI | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Site I | Site II | Site I | Site II | Site I | Site II | Site I | Site II | Site I | Site II |
| 1. | *Achyranthes aspera* L. | 24 | 48 | 2.43 | 4.72 | 2.93 | 4.45 | 0.32 | 0.33 | 5.58 | 9.49 |
| 2. | *Ageratum conyzoides* L. | 16 | - | 3.12 | - | 0.97 | - | 1.68 | - | 5.77 | - |
| 3. | *Amaranthus spinosus* L. | - | 30 | - | 1.56 | - | 0.42 | - | 4.42 | - | 6.40 |
| 4. | *Ammania baccifera* L. | 86 | 91 | 7.70 | 14.71 | 4.39 | 9.61 | 8.59 | 7.60 | 20.68 | 31.93 |
| 5. | *Blumea lacera* Dc. | 25 | 15 | 1.57 | 1.24 | 1.94 | 0.58 | 1.87 | 2.43 | 5.38 | 4.25 |
| 6. | *Boerhaavia diffusa* L. | 60 | - | 5.90 | - | 5.81 | - | 0.81 | - | 12.52 | - |
| 7. | *Chenopodium album* L. | - | 40 | - | 3.92 | - | 1.17 | - | 2.80 | - | 7.89 |
| 8. | *Croton sparsiflorus* Morung | 28 | 56 | 2.75 | 4.00 | 1.48 | 3.00 | 0.16 | 0.20 | 4.39 | 7.20 |
| 9. | *Cynodon dactylon* pers. | 52 | 36 | 5.90 | 5.92 | 1.52 | 2.33 | 13.50 | 3.91 | 20.92 | 12.16 |
| 10. | *Cyyperus rotundus* L. | 60 | 39 | 5.12 | 4.48 | 2.52 | 4.89 | 3.69 | 1.30 | 11.33 | 10.67 |
| 11. | *Dichanthium annulatum* stapf. | 30 | 40 | 3.65 | 3.35 | 2.18 | 1.78 | 1.56 | 1.58 | 5.49 | 6.61 |
| 12. | *Eclipta alba* Haask. | 30 | 40 | 1.58 | 5.22 | 0.65 | 0.75 | 1.39 | 0.97 | 3.62 | 6.94 |
| 13. | *Ergrostis tenella* Benth. | 24 | - | 2.43 | - | 0.47 | - | 0.90 | - | 4.74 | - |
| 14. | *Gnaphalium leuto-album* L. | 16 | - | 1.22 | - | 0.61 | - | 1.25 | - | 3.08 | - |
| 15. | *Indigofera linifolia* Retz. | - | 10 | - | 1.43 | - | 0.87 | - | 0.55 | - | 2.85 |
| 16. | *Justicia simplex* Don. | - | 10 | - | 1.82 | - | 2.04 | - | 2.73 | - | 6.59 |
| 17. | *Ladwigia perennis* L. | - | 28 | - | 5.46 | - | 1.70 | - | 1.12 | - | 8.28 |
| 18. | *Melitotus alba* Medic. | 48 | 44 | 4.72 | 3.36 | 2.83 | 2.21 | 2.76 | 2.69 | 10.31 | 8.26 |
| 19. | *Oldenlandia corymbosa* L. | 36 | - | 2.75 | - | 2.67 | - | 0.53 | - | 5.95 | - |
| 20. | *Oryza sativa* L. | 100 | 10 | 16.38 | 1.46 | 6.72 | 0.64 | 8.74 | 2.93 | 31.84 | 5.03 |
| 21. | *Phyllanthus niruri* L. | 20 | - | 2.00 | - | 0.46 | - | 3.90 | - | 6.36 | - |
| 22. | *Rumex dentatus* L. | 15 | 20 | 2.63 | 5.73 | 1.95 | 3.25 | 1.79 | 3.94 | 8.47 | 12.72 |
| 23. | *Solanum Xanthocarpum* L. | - | 10 | - | 1.82 | - | 2.04 | - | 2.73 | - | 6.59 |
| 24. | *Sphaeranthus indicus* pers. | 32 | 20 | 2.20 | 1.52 | 0.69 | 0.53 | 2.40 | 1.25 | 5.29 | 3.30 |
| 25. | *Tephrosia purpurea* pers. | 30 | 40 | 3.65 | 3.35 | 2.18 | 1.78 | 1.56 | 1.58 | 5.49 | 6.61 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 26. | *Tridex Precumbens* L. | - | 36 | - | 2.75 | - | 2.67 | - | 0.53 | - | 5.95 |
| 27. | *Veronica cinerea* Less. | - | 10 | - | 1.31 | - | 0.27 | - | 0.65 | - | 2.23 |
| 28. | *Vicia hirsuta* (L.*)* S.F. Gray. | 30 | - | 1.56 | - | 0.42 | - | 4.42 | - | 6.40 | - |
| 29. | *Xanhium Strumarium* L. | - | 20 | - | 2.03 | - | 0.47 | - | 6.34 | - | 8.84 |

***Value based on observation of quadrat size 50x50cm$^2$ placed randomly at studied sites.**

## RESULT AND DISCUSSION

Knowledge of component species is necessary for the study of community structure and its organization, composition of species is one of the major anatomical characters of plant community.

As shown in table 1 total number of species occurring at site I and site II was 20 and 22 respectively. Amongst them 13 species were common to both the sites. Seasonal variation in number also recorded in each season and the number of species decreased from rainy season to winter season. The decrease in number of species are may be due to different stresses to which low lying lands gets exposed after rainy season. It may also attribute to Allelopathy also on seedling growth. Ameena and George (2002) fond inhibition of germination and seedling growth by aqous extracts of nutsedge dry plant part. The community as a whole due high relative humidity and soil moisture favours seed germination and growth of number of species. The decrease in winter attributed due to reduced moisture content of soil. Most of the species which were recorded are mostly annuals which are best suited to exploit resources with high potential growth rates (Grime and Hunt, 1975).

Frequency is usually denoted in terms of parentage occurence of individual species in an area and thus expresses the dispersion of various species density denoted by the total number of a species in community. Frequency and density combindly reflects distribution pattern of species. Basal cover signifies the area occupied by above ground parts of plant at region of emergence. The Importance value index (IVI) expresses the dominance and ecological success of species by single value (Phillips, 1959). It is additive value of relative frequency, relative density and relative dominance.

It was shown from Table 1 that *Ammania baccifera* exhibit more than 85 present frequency at both studied sites followed by *cynodon dactylon*, *cyperus rotundus, Rumex dentatus, sphaeranthus indicus*.

On the basis of values of IVI *Ammania baccifera* exhibit most successful establishment at site I & site II than any other species due to greater competitive ability. Some anatomical features such as expansive root system, foliar morphology reflects successful establishment to others as possible reason. Allelopathic intervention may also be attributed to further study and possible reason to its better competitive ability.

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