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STUDY OF PLANT DIVERSITY IN TAMRALIPTA MAHAVIDYALAYA CAMPUS, TAMLUK, PURBA-MEDINIPUR, WEST BENGAL, INDIA

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Abstract:

Plant community is a dynamic biological system consisting of different plant species. Vegetation at a particular site is the result of interaction of various climatic and bioedaphic factors. During the course of succession, many tree species compete with each other to establish their hold on the vacant niches. Consequently, some tree species occupy the top position and become dominant in the community and others are either contented with their lower phytosociological status or eliminated from the community. The aim of this study was to investigate the plant species diversity of the college campus. In this research, vegetation (tree, shrubs and herbaceous species) study were taken in 10 plots. The plots area were determined by the species area curve method (Oosting – 1958). The study reveals that, there are 15 tree species, 11 shrubby species and 29 herbaceous species in this college campus. The highest IVI found in Tectona grandis L. (IVI- 69.02), Clerodendrum vicosum Vent. (IVI– 87.88), and in Oldenlandia corymbosa L.(IVI- 29.47) respectively among the tree, shrubs and herbs. The abstract plant community of this college campus is Tectona – Clerodendrum – Oldenlandia.

Key Words:- Global warming, IVI, Species diversity, Carbon sequestration.

Introduction:

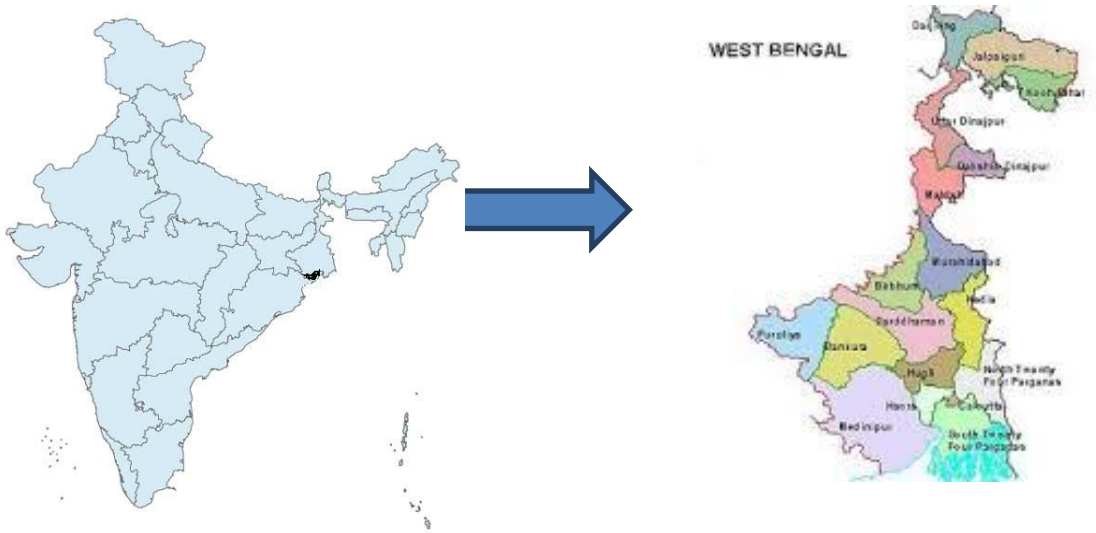
Knowledge of species composition is essential for many ecological studies. Natural communities are mixture of species which are unequally successful. In a given community of one or few species, the dominants, overshadow all others in their mass and biological activity may strongly affect conditions of environment of other species (Whittaker,1965). The proper growth of any plant species is essential for natural status and ecological balance of any plant community. The quality and quantity of proper growth in a plant community depend upon the tree canopy, edaphic factors and other macro-climatic conditions existing under a particular type of ecosystem whether it is natural or manmade.

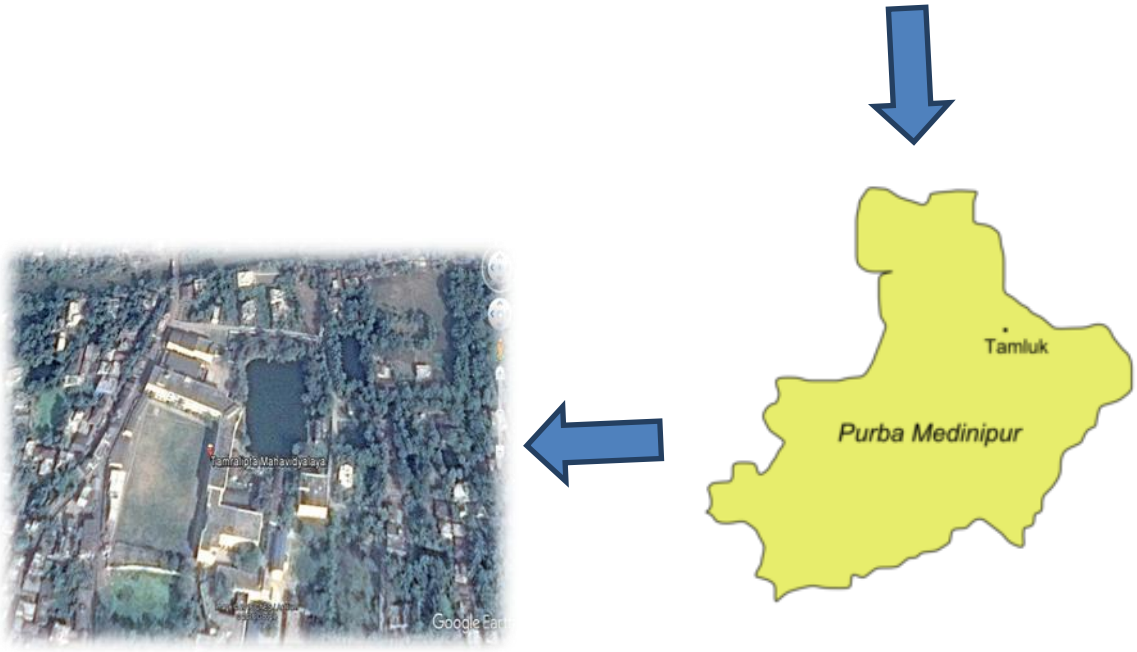
Plant community is a dynamic biological system consisting of different plant species. Vegetation at a particular site is the result of interaction of various climatic and bioedaphic factors. During the course of succession, many tree species compete with each other to establish their hold on the vacant niches. Consequently, some tree species occupy the top position and become dominant in the community and others are either contented with their lower phytosociological status or eliminated from the community. The huge number of plant species inhabiting the earth show great diversity with respect to their habit, habitat, structure, function and life-span. The study was to investigate the plant species diversity of the college campus. In this study it is seen that the tree and shrubs community are lower and gradually becomes delimited, because it is an educational institute area, the building construction, manmade beautification is going on which is necessary for a college. So the natural plant community is gradually transform into manmade community with in this college campus. Lenoir *et. al.* (2010) argued that a down-word shift in species distribution is possibly an indirect response to both climate warming and anthropogenic habitat modification. Vegetation analysis and distribution pattern was taken seasonally with in this college campus for this study.

Study Site:

Tamluk town is a historical place, it has different names, such as – Tamralipta, Tamralipti, Tamolika and Tamoluk town. Today this town is a district head quarters of Purba Medinipur district of West Bengal, India. This town is located at the banks of the Rupnarayan River close to the Bay of Bengal. This town belongs to the geographical limits of 22.3^0 N latitude and 87.92^0 E loegitude. The averge elevation of this town is 7m (23 ft.).

The study was laid down in Tamralipta Mahavidyalaya campus of Tamluk town. This college is located about 2 km distance from 'Maniktala' bus-stand or 2 $^1/_2$ km distance from Sahid Matangini Railway Station.





Materials & Methodology :

Minimum size and minimum no. of Quadrate i.e. plots were determined by the species area curve method (Oosting-1958). Vegetation (tree, shrub and herbaceous species) study were taken in 10 plots. The size of the plots were (20 x 20) m. for tree species, (5x5) m. for shrubs and (1x1)m. for herbaceous species.

- IVI is calculated by the following formula -

IVI=R_{Dom} +R_D+R_F or IVI= R_A+R_D+R_F (Curtis, 1959).

Where, IVI=Important Value Index, R_{DOM}= Relative Dominance, R_D= Relative Density, R_F = Relative Frequency and R_A= Relative Abundance.

- $R_{DOM} = \frac{\text{Total canopy cover of a species}}{\text{Total canopy over of all the species}} \times 100$
- $R_A = \frac{\text{Total no plants of a species in all the quadrate}}{\text{Number of quadrate in which the species is occured}} \times 100$
- $R_D = \frac{\text{Total no plants of a species}}{\text{Total no of plants of all the species}} \times 100$
- $R_F = \frac{\text{No of quadrate in which the species is occured}}{\text{Total no of quadrate examined}} \times 100$
- The coverage percentage of trees and shrubs in each plot were measured regarding to large and small canopy diameter. In herbaceous layer biomass were taken for this study

- Diversity Index (H) = $-\sum\left\{\left(\frac{ni}{N}\right) Log\left(\frac{ni}{N}\right)\right\}$ (Shannon & Wiener,1963)

(ni = IVI of indivisual species and N= IVI of all the species.)

Result & Discussion :

Vegetation survey i.e. species diversity study was conducted during the post monsoon season (Aug. to Nov.) with in the Tamralipta Mahavidyalaya campus. The plant species diversity study was done excluding the ornamental plants and the medicinal plants of the medicinal garden with in the college campus. The IVI and species diversity of tree, shrubs and herbs are shown in table-1, 2 & 3 respectively as below.

List of Plants with their IVI & Diversity Index:

Table -1 : Tree Species

Sl. No.	Name	**Relative Abundance (RA)**	**Relative Density (RD)**	**Relative Frequency (RF)**	IVI	**Diversity Index**
1	*Aegle marmelos* (L.) Correa	4.38	3.69	3.44	11.51	0.054
2	*Alstonia scholaris* (L.) R.Br.	3.65	3.82	3.44	10.91	0.052
3	*Anthocephalous cadamba* (Roxb.) Miq.	1.70	1.72	1.72	5.14	0.030
4	*Albezia lebbeck* (L.) Benth.	8.52	8.13	6.89	23.54	0.086
5	*Borassus flabellifer* L.	3.28	3.69	3.44	10.41	0.050
6	*Casuariana equisitifolia* L.	1.46	1.72	1.72	4.90	0.029
7	*Cocos nucifera* L.	8.03	8.38	5.17	21.58	0.082
8	*Ficus bengalensis* L.	1.70	1.72	1.72	5.14	0.030
9	*Ficus cunea* L.	4.38	3.69	3.44	11.51	0.054
10	*Ficus religiosa* L.Forssk.	4.38	3.69	3.44	11.51	0.054
11	*Mangifera indica* L.	11.69	12.33	12.06	36.08	0.110
12	*Mimusops elongi* L.	4.38	3.69	3.44	11.51	0.054

13	*Psidum guazava* L.	14.12	14.79	13.79	42.70	0.120
14	*Tectona grandis* L.	19.97	19.72	19.31	69.02	0.146
15	*Terminalia catappa* L.	1.46	1.72	1.72	4.90	0.029
	TOTAL				**299.42**	**1.056**

Table -2 : Shrubs

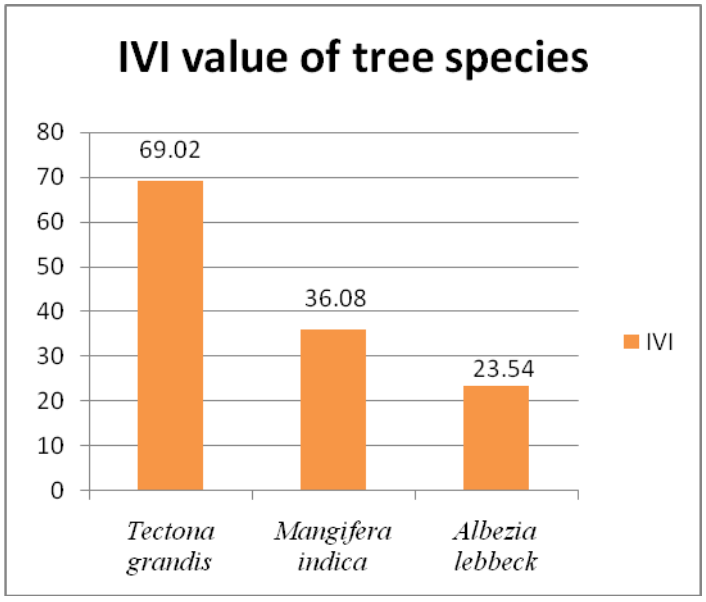
Sl. No.	Name	**Relative Abundance (RA)**	**Relative Density (RD)**	**Relative Frequency (RF)**	IVI	**Diversity Index**
1	*Adhatoda vasica* L.	9.50	9.95	6.65	26.1	0.092
2	*Barleria lupulina* Lindl	13.30	13.57	8.75	35.62	0.109
3	*Calotropis procera* (Aiton) T. Aiton	5.70	5.73	4.37	15.8	0.067
4	*Citrus reticulata* Blanco	5.54	6.03	4.72	16.29	0.068
5	*Datura metel* L	2.02	2.11	1.75	5.88	0.033
6	*Clerodendrum vicosum* Vent	26.92	24.13	36.83	87.88	0.156
7	*Lantana camara* L.	14.25	15.08	15.13	44.46	0.122
8	*Morus indica* L.	1.26	1.35	1.05	3.66	0.023
9	*Murraya paniculata* (L.) Jack	2.02	2.11	1.75	5.88	0.033
10	*Nerium oleander* L.	1.71	1.80	1.40	4.91	0.029
11	*Xanthium strumarium* L.	17.73	18.09	17.57	53.39	0.133
	TOTAL				**299.8**	**0.865**

Table -3 : Herbs

Sl. No.	Name	**Relative Abundance (RA)**	**Relative Density (RD)**	**Relative Frequency (RF)**	IVI	**Diversity Index**
1	*Acalypha indica* L.	3.87	3.58	3.70	11.15	0.05
2	*Aerva aspera* L.	3.65	3.54	3.70	10.89	0.05
3	*Aloe* vera (L.) Burm.f.	0.96	0.93	0.92	2.81	0.01
4	*Alternanthera sessilis*(L.) R.Br. ex DC.	4.55	4.63	4.62	13.8	0.06
5	*Andrographis paniculata* (Burm.f.) Wall. ex Nees	2.83	2.72	2.77	8.32	0.04
6	*Argemone maxicana* L	2.79	2.69	2.77	8.25	0.04
7	*Boerhaavia diffusa* L. nom. Cons	4.47	4.52	4.62	13.61	0.06
8	*Cassia tora*(L.) Roxb	0.93	0.88	0.92	2.73	0.01
9	*Catharanthus roseus*(L.) G. Don	3.80	3.73	3.70	11.23	0.05
10	*Cleome viscosa* L.	1.93	1.94	1.85	5.72	0.03
11	*Commelina benghalensis* L.	1.64	1.87	1.85	5.36	0.03
12	*Croton bonplandianum* L.	5.44	5.68	5.55	16.67	0.07
13	*Cynodon dactylon* (L.) Pers.	7.31	7.36	7.40	22.07	0.08
14	Desmodium triflorum (L.) DC.	1.79	1.57	1.85	5.1	0.03
15	*Duranta repens* L.	4.47	4.56	4.62	13.65	0.06
16	*Eclipta prostrata* (L.) L.	0.96	1.08	0.92	2.96	0.01
17	*Euphorbia hirta* L.	1.93	2.01	1.85	5.79	0.03
18	*Evolvulus nummularis* L.	2.68	2.48	2.77	7.93	0.04
19	*Heliotropium indicum* L.	2.72	2.80	2.77	8.29	0.04
20	*Lippia nodiflora* (L.) Greene.	2.64	2.61	2.77	8.02	0.04
21	*Mimosa pudica* L.	1.79	1.90	1.85	5.54	0.03

22	*Musa paradisiacal* L.	4.77	4.71	4.62	14.1	0.06
23	*Ocimum sanctum* L	3.80	3.58	3.70	11.08	0.05
24	*Oldenlandia corymbosa* L.	11.45	11.54	11.48	29.47	0.09
25	*Scoparia dulcis* L.	4.69	4.78	4.62	14.09	0.06
26	*Sida cordifolia* L.	2.01	1.86	1.85	5.72	0.03
27	*Tridax procumbens* L.	5.66	5.68	5.55	16.89	0.07
28	*Vernonia cinerea* (L.) DC. ex Wight	3.87	3.73	3.70	11.3	0.05
	TOTAL				**299.17**	**1.32**

Comparison between the IVI value of Plant Species



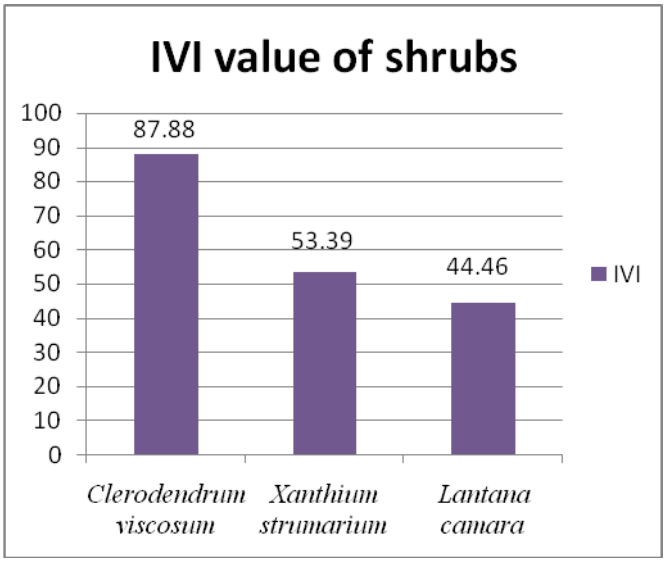


Fig. -- A **Fig. -- B**

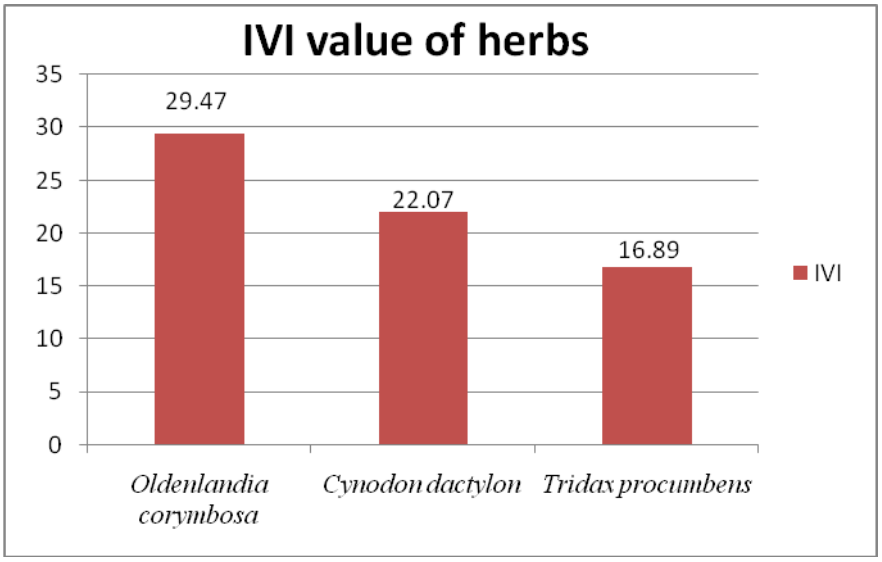


Fig. -- C

The nature of the plant community at a place is determined by the species that grow and develop in such an environment. In this study it is seen that the total number of trees, shrub and herbaceous species were 15, 11 and 29 respectively. Among the tree species highest IVI found in *Tectona grandis* L. (IVI – 69.02) then *Mangifera indica* (IVI – 36.08) and *Albezia lebbeck* (L.) Bent. (IVI – 23.54), which are shown in fig–A, where as in shrubby species the highest IVI found in *Clerodendrum vicosum* Vent. (IVI– 87.88), then *Xanthium strumarium* L. (IVI– 53.39) and *Lantana camara* L. (IVI – 44.46) show in fig–B. *Lantana camara* L. is an exotic species in this region, which shows more gregarious and better establishment than other native plants. Similar observation was found by Mishra *et. al.(*1997) . Among the herbaceous species highest IVI found *in Oldenlandia corymbosa* L. (IVI – 29.47), then *Cynodon dactylon* (L.) Pers. (IVI – 22.07) and *Tridax procumbens* L.(IVI – 16.89) shown in fig – C.

Diversity Index is proportionally related with the IVI of a plant community. This index indicate the community composition of a area. The highest species diversity index found in herbaceous species (1.32), lowest species diversity index found in shrubby species(0.86) and moderate species diversity found in tree species(1.05). In this study it is seen that the tree and shrubs community are lower and gradually becomes delimited, because it is an educational institute area, the building construction, manmade beautification is going on which is necessary for a college. So the natural plant community is gradually transform into manmade community with in this college campus. Lenoir *et. al.* (2010) argued that a down-word shift in species distribution is possibly an indirect response to both climate warming and anthropogenic habitat modification.

TABLE- 4:

Establishment of Abstract Plant Community in the College Campus

Name	Highest **IVI** values of plant species			COMMUNITY
	TREE	SHRUBS	HERBS	
***Tectona grandis* L f.**	**69.02**			
Mangifera indica L	36.08			
Albezia lebbeck. (L.) Bent	23.54			
***Clerodendrum viscosum* Vent.**		**87.88**		
Xanthium strumarium L.		53.39		***Tectona--Clerodendrum--Oldenlandia***
Lantana camara L.		44.46		
***Oldenlandia corymbosa* L.**			**29.47**	
Cynodon dactylon (L.) Pers.			22.07	
Tridax procumbens L.			16.89	

The Abstract Plant Community is "*Tectona --- Clerodendrum—Oldenlandia*"

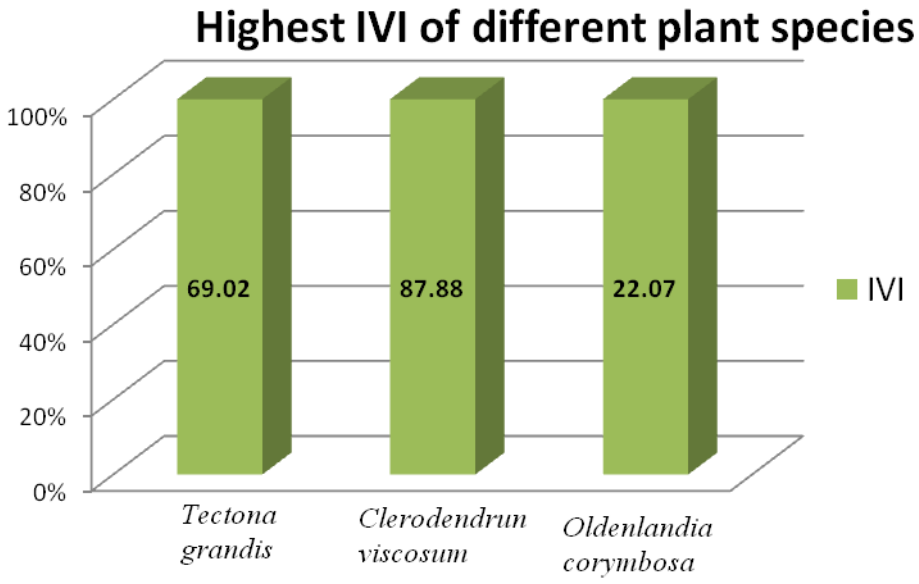


Fig-- D

In this study it is seen that the highest IVI among the tree species found in *Tectona grandis* (IVI – 69.02), among the shrubby species found in *Clerodendrum vicosum* Vent. (IVI = 87.88) and highest IVI among the herbaceous species found in *Oldenlandia corymbosa* (IVI = 29.47). These are shown in Table-4. So, the abstract plant community of the Tamralipta Mahavidyalaya campus is *Tectona* – *Clerodendrum* – *Oldenlandia* (Fig. –D).

Conclusion :

The study reveals that in this college campus the plant species richness is not so high. Among the different plant species higher diversity found in herbaceous species, lowest diversity found in shrubby species and moderate diversity found in tree species. This study also reveals that the abstract plant community of this college campus is *Tectona* – *Clerodendrum* – *Oldenlandia.* But it is remarkably seen that *Lantana camara* L. which is an exotic species is gregariously found in this college campus.

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