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Phyto-sociological attributes of a grassland community in Rangamatia, Mayurbhanj, Odisha.

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Abstract: The frequency, density, abundance, basal cover, relative frequency, relative dominance and important value index of various species of a grassland community located at Rangamatia of Mayurbhanj district, Odisha were studied during December 2006 to December2007. The floristic composition of the grassland community comprised of 36 species (15 were grasses and 21 were non-grasses). Among the species like *Cynodon dactylon, Digitaria abludens*, *Eleusine indica* and *Vetiveria zizanioides* were grasses and *Phyllanthus fraternus* and *Sida cordifolia* were found dominant during this period. All the dominant species exhibited higher percentage of frequency throughout the sampling period. The community represented high density value in the month of September and less in the month of April. The grasses showed highest density values as compared to that of the density of non-grasses. The total basal cover of the experimental site showed minimum during April and maximum in the month of September. The grasses showed higher importance value index than that of the non - grasses.

1. INTRODUCTION

The structural attributes i.e. frequency, density, abundance etc. of the experimental grassland community were determined month wise 1m x 1m size quadrats was used for this study as determined by species area curve. *Cynodon dactylon*, *Digitaria abludens*, *Eleusine indica*, *Vetiveria zizanioides* among the grasses and *Phyllanthus fraternus* and *Sida cordifolia* among the non - grasses exhibited higher percentage of frequency throughout the sampling period. The community represented high density value (3439.8 Ind. $m^{-2)}$ in the month of September. The density value of the community showed gradual decline in trend from December to January, then to February, March and lowest in the month of April. Thereafter the value increased from April to May, June, July, August and then to September. Again a declined trend of density value was observed from September to December. The grasses showed highest density values as compared to that of the density of non-grasses.

The basal area was found to be maximum in the month of October and minimum in the month of April. The value showed a gradual decline in trend from December to January to February then to March and lowest in the month of April. Thereafter, an increasing trend in value was observed from April onwards and attained a peak during October. Again a declined trend of basal area

was noticed till to the end of the sampling period. The total basal cover of the experimental site showed minimum during April and maximum in the month of September. The basal covers gradually decreased from December to April and then it increases till September and onward the value exhibited a decline trend till to the end of the sampling period.

The grasses showed higher importance value index than that of the non - grasses. The grasses contributed lowest IVI in the month of September (154.839) and non-grasses in the month of April (59.396). The IVI for grasses gradually increases from December to April and then it declined up to September and onwards it showed again an increasing trend till to the end of the sampling period. However, the IVI of non - grasses showed an opposite trend i.e. the value decreases from December to April, then an increasing trend of values were marked from April to September. Thereafter it decreases till to the end of the sampling period. The grasses exhibited peak IVI in the month of April (240.591) and non-grasses in the month of September (145.146). The phytogeography and the vegetation of North America and gave a comprehensive account of plant successions [1]. In France established the Zurich-Montpellier school of phytosociology and compiled a book "Plant Sociology" - the study of plant communities [2]. The aboveground phytomass dynamics of a grassland of Argentina [3]. The phytosociology, reproductive capacity, production in relation to a variety of ecological factors especially grazing and seasonal changes of grassland community [4,5,6,7,8] The phytomass dynamics and primary productivity of a humid grassland [9,10].

The present study was aimed at a comparative assessment of phytosociological data of the grassland community. This study helps for clear and better interpretation of the patterns of plant diversity and possible way to restore the biodiversity of grassland communities.

2. MATERIALS AND METHODS

(a) Study site and environment

The experimental site was selected at Rangamatia, situated at a distance of 15 kms away from North Orissa University and 11 kms from Baripada, the District headquarter of Mayurbhanj in the state of Orissa. It is located at 86^0 41' E longitudes and 21^0 56' N latitude. The altitude of the site is above 135.7m.The experimental site was protected from grazing and human interferences for a period of 1 year prior to start of the investigation. The climate of the locality is monsoonal with three distinct seasons viz. rainy (July to October), winter (November to February) and summer (March to June). The total rainfall during this period was 1906.2 mm of which a maximum of 499.8 mm was recorded during July. The minimum and maximum atmospheric temperature during the study period was found to be normal. December showed the lowest temperature (9.93 ^{0}C) whereas May experienced the highest temperature (38.9^{0}C).The wind velocity was maximum (4.31 km h^{-1}) during April and minimum (1.99 km h^{-1}) in the month of November. The soil of the experimental site was found to be moderately acidic (pH = 5.5). The available phosphorus content was high (1.2 ppm) in lower soil and minimum (0.5 ppm) in middle soil profile. The potassium showed gradual reduction from surface (100.3 ppm) to middle (87.6 ppm) and then to lower (81.1 ppm) soil depth. The overall organic carbon (0.61%), nitrogen based on organic carbon content (0.5 to 0.75%), and available potassium (59 to 140 ppm) were found medium where as the available phosphorus content was found to be very low (< 2 ppm) in the soil.

(b) Sample collection and Identification

The plant specimens preferably along with reproductive parts were collected from the experimental site and brought to the laboratory for identification [11]. Identification of all the species were made in consultation with various regional and national flora books i.e. The

Botany of Bihar and Orissa [12]. Supplement to the Botany of Bihar and Orissa [13]. Flora of Madras presidency [14]. Flora of Similipal [15]. Flora of Orissa [16]. Flora of Madhya Pradesh [17,18,19].

(c) Phytosociological study

For determining frequency, density, abundance, basal cover etc., 100 quadrats of 1m x 1m size were laid randomly in each month. Each tiller was counted as an individual plant in case of grasses whereas each forb was considered as an individual. In case of runners each node rooted at the base was considered as an individual. Basing upon these principles the percentage of frequency, density, abundance and such others were calculated following the formulae -

$$\text{(a) Frequency} = \frac{\text{Number of quadrats in which the species occurred}}{\text{Total number of quadrats studied}} \times 100$$

$$\text{(b) Density} = \frac{\text{Number of individuals of a species in all quadrats}}{\text{Total number of quadrats taken}}$$

$$\text{(c) Abundance} = \frac{\text{Total number of individuals of a species in all quadrats}}{\text{Total number of quadrats in which the species occurred.}}$$

Basal area of each species was determined by taking the diameter of the cross-section of the individual species by using ink pad and graph sheet. The stem above the ground was cut transversely and the lower transverse section of the twig was then pressed on an ink pad and finally transferred to the graph sheet. The area was obtained directly by counting the squares covered by the cross section. In this way 10 randomly sampling species were marked during each month and the average area was calculated. This average area of the individual species was multiplied with the respective density value to get the basal cover of the species and was expressed as $cm^2 m^{-2}$.

The relative frequency, relative density and relative dominance were also determined in each month using the value of frequency, density and abundance as follows -

$$\text{Relative Frequency (R.F.)} = \frac{\text{Number of occurrence of the species}}{\text{Number of occurrence of all species}} \times 100$$

$$\text{Relative Density (R.De.)} = \frac{\text{Number of individuals of he species}}{\text{Number of individuals of all species}} \times 100$$

$$\text{Relative Dominance (R.Do.)} = \frac{\text{Basal area of the species}}{\text{Total basal area of all species}} \times 100$$

The Importance Value Index (IVI) for each species was determined by summing up the values of relative frequency, relative density and relative dominance.

$$IVI = R.F + R.De. + R.Do.$$

3. RESULT

The structural attributes i.e. Frequency, density, abundance, basal cover, IVI etc. of the experimental grassland community were determined month wise. It was observed that *Cynodon dactylon*, *Digitaria abludens*, *Eleusine indica*, *Vetiveria zizanioides* among the grasses and *Phyllanthus fraternus* and *Sida cordifolia* among the non - grasses showed higher percentage frequency throughout the sampling period. *Ageratum conyzoides* and *Mecardonia procumbens* exhibited a lower frequency percentage among all the grasses and non- grasses respectively.

The peak density of the community i.e. 3439.8 Ind. m^{-2} was found in the month of September. The grasses contributed 2568.2 Ind. m^{-2} to the total community whereas non-grasses contributed only 871.6 Ind. m^{-2} . A minimum value density (204.9 Ind. m^{-2}) was observed during April whereas the grasses and non grasses exhibited 199.8 Ind. m^{-2} and 5.1 Ind. m^{-2}

respectively. The density value of the community showed gradual declined in trend from December (1445.3 Ind. m^{-2}) to January (966.5 Ind. m^{-2}), then to February (661.9 Ind. m^{-2}), March (252.4 Ind. m^{-2}) and lowest in the month of April (204.9 Ind. m^{-2}). There after the value increased from April to May (284.2 Ind. m^{-2}), June (1385.4 Ind. m^{-2}), July (2527.9 Ind. m^{-2}), August (3176.1 Ind. m^{-2}) and then to September (3439.8 Ind. m^{-2}). Again a declined trend of density value was observed from September onwards i.e. from September to October (2975.1 Ind. m^{-2}), November (2364.1 Ind. m^{-2}) and December (1496.0 Ind. m^{-2}). Among the dominated species , the grasses i.e. *Cynodon dactylon* , *Digitaria abludens* , *Eleusine indica* and *Vetiveria zizanioides* showed gradual declined in their density values from December/January to February, then to March and exhibited lower value during April/May. The values were then increased onwards and attained peak during September (except *Vetiveria zizanioides* which showed peak value in the month of August). There after again declined trend in density values were marked till to the end of the sampling period. Besides, among the non-grasses, the dominated species i.e. *Phyllanthus fraternus* and *Sida cordifolia* exhibited minimum density value in the month of May and March respectively and maximum in the month of September. However, the total density value of grasses and non-grasses gradually declined from the beginning i.e. from the month of December to January, February, March and April which showed the lowest value. May onwards the value exhibited gradual increase in trend and showed a peak during September. Thereafter, the value again showed a declined trend till to the end of sampling period. The grasses showed highest density values as compared to that of the density of non-grasses (Table-1). In this investigation abundance was expressed as Ind. m^{-2}. The values obtained followed similar trend to that of the density value observed throughout the sampling period.

The basal area (grasses + non grasses) was found to be maximum in the month of October and minimum in the month of April. The value showed a gradual declined in trend from December to January, to February, then to March and lowest in the month of April. Thereafter, an increasing trend in value was observed from April onwards and attained a peak during October. Again a declined trend of basal area was noticed till to the end of the sampling period. The total basal cover of the experimental site showed minimum during April and maximum in the month of September. The basal cover gradually decreases from December to April and then it increases till September and onward the value exhibited a declined trend till to the end of the sampling period.

The Importance value index (IVI) of the community was the sum total value of relative frequency, relative density and the relative dominance. The IVI was found to be near about 300 in each month (Table-2). The grasses showed higher IVI value than that of the non - grasses throughout the sampling period. The grasses contributed lowest IVI in the month of September (154.839) and non-grasses in the month of April (59.396).

The IVI for grasses gradually increases from December to April and then it declined upto September and onwards it showed again an increasing trend till to the end of the sampling period. However, the IVI of non- grasses showed an opposite trend i.e. the value decreases from December to April, then an increasing trend of values were marked from April to September. Thereafter it decreases till to the end of the sampling period. The grasses exhibited peak IVI in the month of April (240.591) and non-grasses in the month of September (145.146).

4. DISCUSSION

The study of frequency, density, abundance, basal cover and IVI of various species in the experimental site were

Table- 1. Density (Ind. m^{-2}) of different species during the study period.

No.	Species name	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
	GRASSES													
1	*Alloteropsis cimicina* (L.) Stapf	0.80	-	-	-	-	-	7.50	12.40	13.30	12.80	12.00	3.20	1.20
2	*Cynodon dactylon* (L.)Pers.	105.00	121.00	110.80	61.20	51.10	71.90	139.90	176.00	182.10	188.60	141.30	138.20	108.70
3	*Cyperus castaneus* Willd.	58.50	3.10	-	-	-	-	31.20	116.00	114.20	104.00	86.00	79.60	56.00
4	*Digitaria abludens*(Roem.& Schult.)Veldk.	81.50	72.00	58.20	46.90	40.20	41.10	63.70	103.40	128.60	141.50	134.70	126.30	80.50
5	*Digitaria longiflora* (Retz.) Pers.	412.00	329.60	250.00	-	-	-	265.00	512.90	559.30	819.20	789.20	629.70	460.10
6	*Eleusine indica* (L.) Gaertn.	79.60	74.10	70.20	68.40	67.60	69.00	118.60	154.20	203.70	225.00	189.60	110.30	80.80
7	*Eragrostis tenella* (L.)P.Beauv.ex Roem.& Schult.	11.50	8.20	1.10	-	-	-	45.70	99.20	100.70	81.50	71.60	51.60	11.20
8	*Eragrostis unioloides*(Retz.)Nees ex Steud.	41.00	31.00	21.10	10.60	3.60	-	68.70	127.50	167.60	166.40	115.50	90.80	40.60
9	*Fimbristylis dichotoma* (L.) Vahl	44.50	22.00	11.10	1.60	-	-	36.70	103.20	114.50	81.20	72.00	71.00	45.00
10	*Fimbristylis ovata* (Burm.f.)Kern	11.50	-	-	-	-	-	76.40	191.60	198.40	156.00	107.20	42.90	11.20
11	*Lipocarpha sphacelata* (Vahl) Kunth	-	-	-	-	-	-	15.60	32.70	35.10	23.60	14.40	8.30	-
12	*Paspalum scrobiculatum* L.	31.50	2.20	-	-	-	22.80	61.10	130.70	191.50	188.50	136.00	85.50	31.20
13	*Scleria lithosperma* (L.) Sw.	63.00	45.00	2.50	-	-	-	45.00	66.10	139.40	147.60	132.70	110.80	61.60
14	*Setaria intermedia* Roem & Schult.	19.00	-	-	-	-	-	8.60	40.50	109.70	88.90	76.10	57.00	19.20
15	*Vetiveria zizanioides* (L.) Nash ex Small	97.70	82.00	56.00	48.00	37.30	34.70	116.20	133.20	174.30	143.40	132.20	112.00	98.80
	Grasses total	**1057.10**	**790.20**	**581.00**	**236.70**	**199.80**	**239.50**	**1099.90**	**1999.60**	**2432.40**	**2568.20**	**2210.50**	**1717.20**	**1106.10**
	NON GRASSES													
1	*Aclisia secundiflora* (Bl.)Bakh.f.	1.90	-	-	-	-	-	3.40	57.50	90.10	96.10	40.10	22.60	2.40
2	*Ageratum conyzoides* L.	0.40	-	-	-	-	-	0.30	1.70	1.50	2.70	1.70	0.90	0.30
3	*Alysicarpus vaginalis* (L.) DC.	9.60	6.40	2.40	-	-	-	11.90	35.40	47.30	47.40	33.50	26.80	10.30
4	*Centranthera indica* (L.) Gamble	6.80	2.80	-	-	-	-	9.40	20.00	20.80	21.50	16.10	13.60	6.20
5	*Desmodium triflorum* (L.) DC.	34.10	20.60	8.60	-	-	11.60	37.60	54.10	64.20	51.10	51.10	47.10	32.90
6	*Elephantopus scaber* L.	33.80	23.30	17.30	-	-	-	29.10	23.40	39.30	51.40	53.40	54.00	33.20
7	*Emilia sonchifolia* (L.) DC.	5.10	1.70	0.80	2.60	-	1.50	7.70	14.80	24.60	27.50	14.90	12.20	4.80
8	*Evolvulus nummularius* (L.) L.	29.80	21.20	10.10	-	-	18.00	56.70	65.20	60.70	65.90	78.00	50.60	31.00
9	*Hedyotis herbacea* L.	13.10	5.50	-	-	-	-	14.90	26.60	35.00	42.30	45.60	30.50	14.40
10	*Lindernia anagallis* (Burm.f.)Pennell	2.20	1.30	-	-	-	-	3.30	6.20	5.60	7.70	4.70	5.50	2.60
11	*Lindernia crustacea* (L.) F.v. Muell.	11.00	5.60	1.60	-	-	-	6.00	16.00	12.00	19.80	19.60	17.20	9.50
12	*Ludwigia hyssopifolia* (G.Don)Excell	1.30	-	-	-	-	-	-	3.10	13.30	15.50	13.60	5.60	1.40
13	*Mecardonia procumbens* (Mill.)Small	0.20	-	-	-	-	-	0.40	1.50	1.40	2.50	2.90	1.30	0.30
14	*Melochia corchorifolia* L.	3.30	2.60	2.00	2.20	-	-	1.10	3.80	4.90	4.40	4.10	3.90	3.00
15	*Murdannia nudiflora* (L.) Brenan	-	-	-	-	-	-	-	2.70	12.60	15.30	10.40	8.00	-
16	*Oxalis corniculata* L.	8.80	6.60	3.20	-	-	-	8.40	17.80	18.90	21.60	15.70	16.10	8.10
17	*Phyllanthus fraternus* Webster	33.90	19.00	9.50	2.70	2.80	1.30	43.10	54.80	81.60	88.60	64.90	52.70	35.10
18	*Rungia pectinata* (L.)Nees	166.00	48.00	23.00	6.60	-	2.80	25.10	85.40	153.50	217.80	220.00	222.40	167.10
19	*Sida cordifolia* L.	2.00	2.40	2.40	1.60	2.30	1.10	2.70	2.50	2.20	3.60	2.90	2.50	2.00
20	*Spermacoce ramanii* Sivar. & Nair	5.10	1.60	-	-	-	8.40	15.80	17.00	18.10	17.50	11.80	11.10	4.90
21	*Zornia gibbosa* Spanoghe	19.80	7.70	-	-	-	-	8.60	18.80	36.10	51.40	59.60	42.30	20.40
	Non-grasses total	**388.20**	**176.30**	**80.90**	**15.70**	**5.10**	**44.70**	**285.50**	**528.30**	**743.70**	**871.60**	**764.60**	**646.90**	**389.90**
	Total	**1445.30**	**966.50**	**661.90**	**252.40**	**204.90**	**284.20**	**1385.40**	**2527.90**	**3176.10**	**3439.80**	**2975.10**	**2364.10**	**1496.00**

Table- 2 : Importance Value Index (IVI) of different species during the study period.

No.	Species name	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
	GRASSES	3.439	-	-	-	-	-	5.967	3.719	3.202	3.627	4.420	4.258	3.462
1	*Alloteropsis cimicina* (L.) Stapf	12.200	18.339	25.203	39.154	47.445	39.845	15.278	11.930	10.523	10.069	9.251	10.482	12.311
2	*Cynodon dactylon* (L.)Pers.	8.304	4.546	-	-	-	-	6.937	9.202	7.920	7.313	7.247	7.711	8.464
3	*Cyperus castaneus* Willd.	13.762	17.373	22.962	44.167	55.258	39.007	11.252	11.186	11.470	11.362	11.915	12.903	13.673
4	*Digitaria abludens*(Roem.& Schult.)Veldk.	34.280	40.570	47.134	-	-	-	24.554	25.435	22.708	28.697	31.749	32.004	36.612
5	*Digitaria longiflora* (Retz.) Pers.	13.462	17.374	24.474	51.561	67.907	47.713	17.181	13.196	13.525	13.494	13.471	11.934	13.368
6	*Eleusine indica* (L.) Gaertn.	6.402	7.316	5.894	-	-	-	8.724	8.892	8.269	7.251	7.485	7.404	6.443
7	*Eragrostis tenella* (L.)P.Beauv.ex Roem.& Schult.	8.946	10.539	13.753	23.043	26.039	-	10.385	10.898	11.150	10.459	9.682	9.647	9.058
8	*Eragrostis unioloides*(Retz.)Nees ex Steud.	8.517	8.096	9.539	8.651	-	-	7.483	9.405	8.859	7.538	7.643	8.225	8.865
9	*Fimbristylis dichotoma* (L.) Vahl	5.563	-	-	-	-	-	10.594	12.193	10.881	9.121	8.249	6.424	5.956
10	*Fimbristylis ovata* (Burm.f.)Kern	-	-	-	-	-	-	6.206	5.303	5.740	5.420	4.501	4.791	-
11	*Lipocarpha sphacelata* (Vahl) Kunth	9.463	7.305	-	-	-	22.568	11.556	12.798	13.450	12.581	11.670	10.737	9.728
12	*Paspalum scrobiculatum* L.	10.468	11.772	9.725	-	-	-	10.148	8.682	10.417	10.208	10.404	10.932	10.947
13	*Scleria lithosperma* (L.) Sw.	6.920	-	-	-	-	-	6.784	6.286	8.553	7.466	7.492	7.632	6.978
14	*Setaria intermedia* Roem & Schult.	13.205	16.248	19.626	38.985	43.942	31.196	14.550	11.301	11.825	10.234	10.821	11.275	13.273
15	*Vetiveria zizanioides* (L.) Nash ex Small	**154.930**	**159.478**	**178.309**	**205.562**	**240.591**	**180.328**	**167.600**	**160.425**	**158.492**	**154.839**	**155.999**	**156.359**	**159.139**
	Grasses total													
	NON GRASSES													
1	*Aclisia secundiflora* (Bl.)Bakh.f.	5.032	-	-	-	-	-	3.540	8.022	9.020	9.155	7.419	7.029	4.124
2	*Ageratum conyzoides* L.	5.753	-	-	-	-	-	6.019	5.990	6.234	5.404	6.200	5.523	5.445
3	*Alysicarpus vaginalis* (L.) DC.	7.944	9.290	9.093	-	-	-	7.167	8.319	8.132	8.035	7.792	7.817	8.006
4	*Centranthera indica* (L.) Gamble	8.761	9.438	-	-	-	-	8.070	8.419	7.767	7.726	7.478	7.818	6.908
5	*Desmodium triflorum* (L.) DC.	6.791	7.303	8.861	-	-	16.960	7.894	6.753	6.346	5.775	6.072	6.336	6.920
6	*Elephantopus scaber* L.	13.314	16.002	21.888	-	-	-	14.897	11.425	11.445	11.406	11.635	12.184	13.109
7	*Emilia sonchifolia* (L.) DC.	8.131	9.883	10.653	16.585	-	16.689	10.404	8.390	8.195	8.191	7.888	7.930	8.092
8	*Evolvulus nummularius* (L.) L.	8.339	9.525	12.391	-	-	18.198	9.764	8.607	7.629	7.389	8.277	7.947	8.416
9	*Hedyotis herbacea* L.	6.009	6.389	-	-	-	-	5.664	5.666	5.427	5.668	6.178	6.070	5.812
10	*Lindernia anagallis* (Burm.f.)Pennell	3.542	6.170	-	-	-	-	4.280	3.296	4.812	4.662	4.480	3.721	4.110
11	*Lindernia crustacea* (L.) F.v. Muell.	5.528	6.183	5.374	-	-	-	4.675	5.246	4.855	4.866	4.871	5.072	4.639
12	*Ludwigia hyssopifolia* (G.Don)Excell	6.165	-	-	-	-	-	-	5.196	5.368	7.551	7.556	6.089	5.748
13	*Mecardonia procumbens* (Mill.)Small	2.712	-	-	-	-	-	3.033	3.607	3.136	3.028	3.647	3.054	2.327
14	*Melochia corchorifolia* L.	5.827	7.165	9.055	15.467	-	-	3.771	5.473	5.406	5.155	5.793	5.190	4.948
15	*Murdannia nudiflora* (L.) Brenan	-	-	-	-	-	-	-	2.978	5.029	5.179	4.366	4.144	-
16	*Oxalis corniculata* L.	4.523	6.071	4.710	-	-	-	4.849	4.821	4.920	4.770	3.658	4.536	4.183
17	*Phyllanthus fraternus* Webster	8.790	9.730	12.601	18.954	26.379	14.393	8.537	7.488	8.442	8.493	8.126	8.182	9.010
18	*Rungia pectinata* (L.)Nees	16.924	11.434	12.839	18.647	-	10.379	5.161	8.698	9.774	11.213	12.329	14.483	16.702
19	*Sida cordifolia* L.	7.050	9.654	14.216	24.780	33.017	19.981	8.857	7.797	6.562	7.797	7.000	6.518	8.196
20	*Spermacoce ramanii* Sivar. & Nair	7.284	9.225	-	-	-	23.057	10.252	8.477	7.064	7.457	6.433	7.128	7.253
21	*Zornia gibbosa* Spanoghe	6.640	7.048	-	-	-	-	5.555	4.895	5.924	6.228	6.793	6.864	6.896
	Non- grasses total	**145.058**	**140.510**	**121.681**	**94.431**	**59.396**	**119.657**	**132.389**	**139.562**	**141.487**	**145.146**	**143.991**	**143.634**	**140.844**
	Total	**299.988**	**299.989**	**299.990**	**299.993**	**299.987**	**299.986**	**299.989**	**299.987**	**299.980**	**299.985**	**299.989**	**299.993**	**299.983**

determined. It was observed that the *Cynodon dactylon, Digitaria abludens, Eleusine indica* and *Vetiveria zizanioides* showed high frequency percentage throughout the sampling period. Whereas *Ageratum conyzoides* and *Mecardonia procumbens* exhibited lower percentage of frequency among all the grasses and non-grasses.

The density of all species in the community was found to high in the month of September (The grasses contributed 74.7% to the total community where as non-grasses contributed only 25.3%) and less during April (Grasses 97.5% and non-grasses 2.5%). The density value of the community showed gradual declined in trend from December to January, February, March and then to April. There after the value started increasing from April to September. Again a declined trend of density value was observed from September onwards till to the end of sampling period (December).

The dominated species of grasses i.e. *Cynodon dactylon, Digitaria abludens, Eleusine indica and Vetiveria zizanioides* in the community showed decline in their density values from December / January to February, then to March and exhibited lower value during April / May. The values were then increased and attained peak during September expect *Vetiveria zizanioides* which showed peak value during August.

Again a declined trend in density values was marked till to the end of the sampling period. Besides, among the non-grasses the dominated species i.e. *Phyllanthus fraternus* and *Sida cordifolia* exhibited minimum density value in the month of May and March respectively and maximum in the month of September. The total density value of grasses and non-grasses on the other hand gradually declined from the beginning i.e. from the month of December to January, February, March and April which showed the lowest value. May onwards the value exhibited gradual increased in trend and attained peak during September. Then the value showed a declined trend till to the end of the sampling period.

The abundance of various species followed similar trend to that observed in density value of concerned species throughout the sampling period. The total basal area of all species was found to be maximum in the month of October and minimum in the month of April. The value exhibited gradual decline in trend from December to January, February, March and lowest in the month of April. Then an increasing trend in value was observed from April onwards and attained peak during October. The basal area later on showed a decline trend till to the end of the sampling period. The total basal cover of the species on the other hand exhibited minimum during April and maximum in the month of September. The basal cover gradually decreases from December to April and then it increased till September and onwards the value showed a declined trend till to the end of the sampling period (December).

The calculated Importance Value Index (IVI) of grasses was found to be high than that of the non-grasses in each month. The grasses contributed lowest IVI in the month of September and non-grasses in the month of April. The IVI of grasses gradually increases from December to April and then it declined till September. Onwards the value showed an increasing tends till to the end of the sampling period. However the IVI of non-grasses revealed an opposite trend i.e., the value decreases from December to April, then an increasing trend of value was marked from April to September. Thereafter it decreases till to the end of the sampling period. The grasses showed peak IVI in the month of April and non-grasses in the month of September. So I concluded that the irregularities of species distribution due to depends upon the environmental climatic conditions. The increasing and decreasing trend of result in frequency, density, abundance, basal cover as well as in IVI of various grasses and non-grasses attributed to be due to variation in species composition, inter and intra specific

competition among the species, micro and macro climatic fluctuation, physicochemical characteristic of the soil as well as the photosynthetic efficiency of the species concerned. Similar findings were also reported by [20,21,22,23,24,25].

5. CONCLUSION

The structural aspects of the investigation is usually connected with the physical, chemical and biological characteristics of the vegetation during different periods of its life history including phytosociological characters, biomass, leaf area, pigmentation and also the nutrient levels of the habitat. This study helps in identification of physiology, vegetational development, cycling of nutrients, energy flow, production and growth form the functional aspects of the ecosystems. The task of recovery of the natural ecosystems to the earlier balanced state and its preservation has now posed a formidable challenge to all sections of the ecologist and environmentalist all over the world due to heavy damage of natural ecosystem by human beings.

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