

Phytosociological Study of *Sida cordifolia* L. in District Rewa (M. P.), India

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Abstract- A field survey was conducted at four different sites viz Kothi Compound, Civil Lines, A. G. College and Kuthuliya (Bichhiya) in Rewa district M.P. during years 2005-07. The phytosociological studies made during the course of the present investigation that there were 48 associates of *Sida cordifolia* in the Kothi Compound Campus, 41 associates each in the Civil Lines Area and A. G. College Campus and 42 in Kuthuliya (Bichhiya) Rewa were recorded. The highest Important Value Index (IVI) calculated in case of *Sida cordifolia* was 47.354, 45.857, 45.121 and 42.397 in Kothi Compound, Civil Lines, A. G. College Campus and Kuthuliya (Bichhiya) respectively.

Index Terms- *Sida cordifolia* L., Phytosociological profile, IVI.

I. INTRODUCTION

Sida cordifolia L. belongs to family Malvaceae, commonly known as “Indian ephedra” because of the presence of alkaloid ephedrin. In Hindi it is known as “Vatya” and in English it is known as “Country Mallow”. It is native of tropical and subtropical part of Africa, Australia, China, Nepal, Srilanka, Bhutan and Pakistan. [1]

Sida cordifolia L. is a perennial herb of the family Malvaceae. It is common weed of gardens, cultivated fields and waste lands. The plants grow in open, partial shaded and dense shaded places, both in grazed and ungrazed areas. The species is also reported on disturbed grounds such as cleared areas in forest found in boggy and marshy places. [2]

Sida cordifolia is a small, erect, downy shrub. The leaves of the plant are chordate-oblong or ovate-oblong and fruits with a pair of awns on each carpel. Roots of the plant which constitute a drug are 5-15 cm long with few lateral roots of

smaller size. The tap roots are generally branched at the tip. The outer surface of the root is off to grayish yellow. It is almost odourless with slightly bitter taste. [3]

In the present study qualitative characteristics viz. relative frequency, relative dominance or cover and important value index (IVI) were estimated in the different localities of Rewa Nagarpalica area.

II. MATERIALS AND METHODS

Study sites

The study area is situated between 81°-15' east longitude and 24°-42' north latitude and is situated on Vindhya plateau at the height of 318 meter above m. s. l. The climate is mainly sub tropical and sub humid. The average annual rainfall of the region is 82.953 mm and relative humidity is 79.36 %. Present work was done in the four selected fields of Rewa i.e. Kothi Compound, Civil Lines, A. G. College and Kuthuliya (Bichhiya). Information regarding the distribution of *Sida cordifolia* L. incorporated from various literatures, such as Flora of Madhya Pradesh [4], the wealth of India (vol. VI) and Indian Medicinal Plants (Kirtikar and Basu Vol. I to IV) [5].

Phytosociology

Phytosociological studies were carried out during 2005 to 2007 which covered pre monsoon, monsoon and post monsoon periods. In the present study quantitative characteristics viz. relative frequency, relative dominance or cover, relative density and Important Value Index (IVI) were estimated using standard methodologies [6, 7]. The following are the formulae to derive relative frequency, relative density, relative dominance and IVI:

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

$$\text{Relative Density (R. D.)} = \frac{\text{Total number of one species}}{\text{Total number of plants of all species}} \times 100$$

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

$$\text{Basal area} = \pi r^2$$

Where r = radius of stem

$$\text{Important Value Index (IVI)} = \text{Relative Frequency} + \text{Relative Density} + \text{Relative Dominance}$$

III. RESULTS AND DISCUSSION

Sida corifolia L. is widely distributed along with other species are common throughout the tropical and sub tropical plains all over India and Srilanka up to an altitude of 1050 m., growing wild along the roadside. It grows as wasteland weed. It is also known as the “Bala” in Sanskrit. The plant name Bala is coined on the name of ‘Parvati’ (goddess of strength and beauty). [3]

Quantitative analysis was done for the study of vegetation in the study area covering the pre monsoon, monsoon and post monsoon seasons of the years 2005 to 2007. Relative frequency, relative density, relative dominance and IVI values were computed. The results obtained indicating that the 48 associates of *Sida cordifolia L.* in the Kothi Compound Campus, 41 associates each in Civil Lines area and A. G. College Campus and 42 in Kuthuliya (Bichhiya).

The tables 1,2,3 and 4 shows that the relative frequency of *Sida cordifolia L.* was 6.184 on Kothi Compound, 6.405 on Civil

Lines, 6.235 on A. G. College and 5.830 on Kuthuliya (Bichhiya). The relative density of *Sida cordifolia L.* was 10.354 on Kothi Compound, 8.972 on Civil Lines, 8.041 on A. G. College and 7.633 on Kuthuliya (Bichhiya). The relative cover of *Sida cordifolia L.* was 30.816 on Kothi Compound, 30.480 on Civil Lines, 30.845 on A. G. College and 28.934 on Kuthuliya (Bichhiya).

The species having the highest IVI were considered as the leading dominants of the plant community in the study area. The highest IVI calculated in case of *Sida cordifolia L.* was 47.354, 45.857, 45.121 and 42.397 in Kothi Compound, Civil Lines, A. G. College and Kuthuliya (Bichhiya) respectively.

Anushree *et al.*, 2014 [8] observed that plant diversity and distribution of weeds in winter season crops of agro-ecosystems in Bilaspur district, Chhatisgarh. Seshagiri *et al.*, 2013 [9] surveyed the phytosociology, soil conservation and socio-economic aspects in red sand dunes near Bhimili of Visakhapatnam.

Table 1- Important value Index (IVI) of the species found in Kothi Compound Campus, Rewa as associates of *Sida cordifolia L.*

S. No.	Name of the species	Relative Frequency	Relative Density	Relative Cover	I. V. I.
1	<i>Abutilon indicum</i>	0.837	1.339	2.886	5.062
2	<i>Achyranthes aspera</i>	3.347	4.284	8.948	16.579
3	<i>Amaranthus gangeticus</i>	0.837	1.071	2.294	4.202
4	<i>Alysicarpus monilifer</i>	3.766	3.079	0.323	7.168
5	<i>Alysicarpus longifolius</i>	2.510	1.606	0.324	4.440
6	<i>Aurea lanata</i>	0.837	1.803	0.054	2.694
7	<i>Ageratum conyzoides</i>	1.674	1.606	4.722	8.052
8	<i>Biophytum sensitivum</i>	3.347	2.409	0.061	5.817
9	<i>Boerhaavia diffusa</i>	2.929	2.008	0.476	5.413
10	<i>Bothriochloa pertusa</i>	1.674	1.473	4.964	8.111
11	<i>Caesulia oxilaris</i>	0.837	0.535	0.127	1.499
12	<i>Cassia obtusifolia</i>	2.510	2.945	0.448	5.903
13	<i>Corchorus capusularis</i>	1.255	0.937	0.098	2.290
14	<i>Cyperus rotundus</i>	2.184	3.024	0.917	6.125
15	<i>Cynodon dactylon</i>	4.184	4.355	0.018	8.557
16	<i>Desmostachya bipinnata</i>	0.837	0.535	5.223	6.595
17	<i>Desmodium triflorum</i>	3.347	4.016	0.334	7.707
18	<i>Dicanthium annulatum</i>	4.184	4.622	1.523	10.329
19	<i>Dicliptera micranthes</i>	1.674	1.473	0.099	3.246
20	<i>Eclipta prostrata</i>	1.255	1.339	0.203	2.797
21	<i>Eragrostis tenella</i>	0.837	0.535	14.169	15.541
22	<i>Euphorbia microphylla</i>	0.837	0.937	0.639	2.413
23	<i>Euphorbia hirta</i>	2.510	3.481	0.132	6.123
24	<i>Evolvulus alsinoides</i>	2.510	2.141	0.145	4.796
25	<i>Gomphrena celosiodes</i>	3.347	3.614	0.060	7.021
26	<i>Heliotropium supinum</i>	1.255	1.071	4.641	6.967
27	<i>Indigofera cordifolia</i>	2.092	1.339	0.035	3.466
28	<i>Indigofera linifolia</i>	0.837	0.803	0.102	1.742
29	<i>Launea nudicaulis</i>	3.347	2.945	6.982	13.274
30	<i>Malvestrum tricuspidatum</i>	2.510	2.811	0.297	5.618
31	<i>Martinia diandra</i>	0.837	0.535	0.172	1.544
32	<i>Melilotus parviflora</i>	2.094	1.606	0.042	3.740
33	<i>Melilotus alba</i>	1.674	1.339	0.444	3.457

34	<i>Oldenlandia corymbosa</i>	0.837	0.535	0.001	1.373
35	<i>Oxalis corniculata</i>	2.092	2.677	0.070	4.839
36	<i>Phyllanthus niruri</i>	2.929	3.078	0.159	6.166
37	<i>Peristrophe bicalyculata</i>	3.347	3.212	0.870	7.429
38	<i>Phasiolus trilobus</i>	2.929	2.409	0.652	5.990
39	<i>Parrthenium hystrophorus</i>	2.929	2.543	0.387	5.859
40	<i>Ruellia tuberosa</i>	1.355	1.070	0.072	2.397
41	<i>Rungia elegans</i>	1.674	1.606	0.015	3.295
42	<i>Sida cordifolia</i>	6.184	10.354	30.816	47.354
43	<i>Striga euphrasioides</i>	0.837	0.535	0.056	1.428
44	<i>Sopubia delphenifolia</i>	0.418	0.267	0.028	0.713
45	<i>Solanum surattense</i>	0.837	0.669	1.631	3.138
46	<i>Tridax procumbens</i>	2.929	2.945	2.730	8.604
47	<i>Vandellia crustacean</i>	0.418	0.133	0.580	1.131
48	<i>Vernonia cinerea</i>	0.803	0.339	0.339	1.979

Table 2- Important value Index (IVI) of the species found in the locality of Civil Lines, Rewa as associates of *Sida cordifolia* L.

S. No.	Name of the species	Relative Frequency	Relative Density	Relative Cover	I. V. I.
1	<i>Abutilon indicum</i>	1.081	1.870	2.916	5.867
2	<i>Achyranthes aspera</i>	2.162	1.870	6.375	10.407
3	<i>Amaranthus gangeticus</i>	1.081	1.020	2.011	4.112
4	<i>Ageratum conyzoides</i>	1.621	2.040	3.951	7.612
5	<i>Alysicarpus monilifer</i>	4.324	3.401	0.488	8.213
6	<i>Aurea lanata</i>	1.081	1.020	0.252	2.353
7	<i>Biophytum sensitivum</i>	3.783	2.552	0.077	6.411
8	<i>Boerhaavia diffusa</i>	4.324	2.891	0.531	7.746
9	<i>Bothriochloa pertusa</i>	4.405	4.972	1.637	11.014
10	<i>Caesulia tora</i>	2.162	2.40	9.592	13.794
11	<i>Cassia obtusifolia</i>	3.243	3.571	0.675	7.489
12	<i>Corchorus capusularis</i>	1.081	1.020	0.114	2.215
13	<i>Cyperus rotundus</i>	2.162	1.870	5.426	9.458
14	<i>Cynodon dactylon</i>	5.405	6.632	1.892	13.929
15	<i>Desmostachya bipinnata</i>	1.081	0.680	4.630	6.391
16	<i>Desmodium triflorum</i>	3.783	4.591	0.408	8.782
17	<i>Eclipta prostrata</i>	1.081	1.090	0.206	2.477
18	<i>Euphorbia hirta</i>	4.324	5.102	0.284	9.710
19	<i>Eragrostis tenella</i>	1.621	1.360	6.804	9.785
20	<i>Gomphrena celosiodes</i>	4.324	4.081	0.106	8.511
21	<i>Heliotropium supinum</i>	1.081	1.020	4.032	6.133
22	<i>Indigofera linifolia</i>	2.702	3.061	0.383	6.146
23	<i>Justicia simplex</i>	1.081	1.020	4.133	6.234
24	<i>Launea nudicaulis</i>	0.540	0.170	0.005	0.715
25	<i>Malvestrum tricuspidatum</i>	2.162	2.721	0.378	5.261
26	<i>Martinia diandra</i>	1.081	0.680	0.222	1.983
27	<i>Melilotus parviflora</i>	2.702	2.721	0.088	5.511
28	<i>Merrimia emarginata</i>	1.621	1.700	0.220	6.762
29	<i>Oxalis corniculata</i>	3.243	3.401	0.118	7.192
30	<i>Phyllanthus niruri</i>	3.243	3.741	0.208	7.192
31	<i>Peristrophe bicalyculata</i>	3.783	3.061	0.425	7.269
32	<i>Parthenium hystrophorus</i>	3.243	3.061	0.038	6.342
33	<i>Ruellia tuberosa</i>	1.081	1.020	0.252	2.353
34	<i>Rungia parviflora</i>	2.162	1.530	0.147	3.839
35	<i>Rungia elegans</i>	1.081	1.870	0.259	3.21
36	<i>Sida cordifolia</i>	6.405	8.972	30.480	45.857
37	<i>Sida acuta</i>	1.081	0.680	0.430	2.191

38	<i>Striga euphrasioides</i>	1.081	1.190	0.372	2.643
39	<i>Sopubia delphenifolia</i>	0.540	0.340	0.887	1.767
40	<i>Solanum surattense</i>	1.081	0.680	1.774	3.535
41	<i>Tridex procumbens</i>	4.864	3.571	3.059	11.494

Table 3- Important value Index (IVI) of the species found in A. G. College Campus, Rewa as associates of *Sida cordifolia* L.

S. No.	Name of the species	Relative Frequency	Relative Density	Relative Cover	I. V. I.
1	<i>Abutilon indicum</i>	3.141	3.497	0.473	7.111
2	<i>Achyranthes aspera</i>	4.188	4.133	7.825	16.146
3	<i>Alysicarpus monilifer</i>	2.617	3.179	0.389	6.185
4	<i>Amaranthus gangeticus</i>	1.047	0.953	1.758	3.758
5	<i>Ageratum conyzoides</i>	1.570	1.589	0.275	3.434
6	<i>Boerhaavia diffusa</i>	2.617	2.861	0.540	6.018
7	<i>Bothriochloa pertusa</i>	4.235	4.359	1.102	9.696
8	<i>Cassia obtusifolia</i>	3.141	2.384	3.277	8.802
9	<i>Commelina benghalensis</i>	1.047	0.635	0.057	1.739
10	<i>Corchorus capusularis</i>	1.047	0.635	0.057	1.739
11	<i>Cyperus rotundus</i>	1.570	1.271	9.801	12.643
12	<i>Cynodon dactylon</i>	5.235	5.087	1.467	11.789
13	<i>Desmostachya bipinnata</i>	2.094	2.225	8.591	12.910
14	<i>Desmodium triflorum</i>	4.712	4.451	0.389	9.552
15	<i>Dicanthium annulatum</i>	5.235	6.041	1.338	12.614
16	<i>Eclipta prostrata</i>	1.047	1.127	0.220	2.538
17	<i>Eragrostis tenella</i>	0.523	0.317	10.007	10.847
18	<i>Euphorbia hirta</i>	4.712	4.769	0.212	9.693
19	<i>Evolvulus alsinoides</i>	1.570	1.589	0.177	3.276
20	<i>Gomphrena celosiodes</i>	2.094	1.907	0.054	4.055
21	<i>Indigofera linifolia</i>	1.570	1.907	0.241	3.718
22	<i>Indigofera linifolia</i>	1.047	1.271	0.106	2.424
23	<i>Justicia simplex</i>	1.047	1.112	4.685	6.844
24	<i>Launea nudicaulis</i>	1.570	2.066	2.007	5.643
25	<i>Malvestrum tricuspidatum</i>	4.188	4.133	0.455	8.776
26	<i>Martinia diandra</i>	0.523	0.317	1.000	1.840
27	<i>Melilotus parviflora</i>	2.617	2.543	0.040	5.200
28	<i>Merrimia emarginata</i>	1.570	1.907	0.173	3.650
29	<i>Oldenlandia corymbosa</i>	1.047	0.953	0.500	2.500
30	<i>Oxalis corniculata</i>	3.664	3.497	0.107	7.268
31	<i>Phyllanthus niruri</i>	4.188	3.338	0.124	7.650
32	<i>Peristrophe bicalyculata</i>	3.141	2.861	0.510	6.512
33	<i>Phasiolus trilobus</i>	1.047	1.112	5.252	7.411
34	<i>Parthenium hystrophorus</i>	3.141	2.702	0.014	4.857
35	<i>Ruellia tuberosa</i>	1.570	1.589	0.222	3.381
36	<i>Rungia elegans</i>	2.094	1.907	0.180	4.181
37	<i>Sida cordifolia</i>	6.235	8.041	30.845	45.121
38	<i>Sopubia delphenifolia</i>	0.523	0.158	0.391	1.072
39	<i>Solanum surattense</i>	1.047	0.635	1.345	3.027
40	<i>Tridex procumbens</i>	3.664	3.656	2.838	10.158
41	<i>Vernonia cinerea</i>	1.047	0.476	1.361	2.884

Table 4- Important value Index (IVI) of the species found in the locality of Kuthuliya (Bichhiya), Rewa as associates of *Sida cordifolia* L.

S. No.	Name of the species	Relative Frequency	Relative Density	Relative Cover	I. V. I.
1	<i>Abutilon indicum</i>	1.932	1.990	3.441	7.363

2	<i>Achyranthes aspera</i>	1.932	1.990	0.280	4.202
3	<i>Amaranthus gangeticus</i>	0.966	1.326	2.634	4.926
4	<i>Alysicarpus monilifer</i>	3.381	3.482	0.418	7.281
5	<i>Aurea lanata</i>	1.449	1.160	0.065	3.674
6	<i>Ageratum conyzoides</i>	1.932	2.321	3.885	8.138
7	<i>Biophytum sensitivum</i>	2.415	2.653	1.069	5.137
8	<i>Boerhaavia diffusa</i>	3.830	5.965	1.456	11.281
9	<i>Bothriochloa pertusa</i>	3.830	5.965	1.486	11.281
10	<i>Cassia obtusifolia</i>	1.932	1.658	0.043	3.633
11	<i>Caesulia tora</i>	3.564	3.482	0.490	7.836
12	<i>Caesulia oxilaris</i>	0.966	0.497	0.108	1.571
13	<i>Corchorus capusularis</i>	0.966	0.829	0.439	2.234
14	<i>Cyperus rotundus</i>	2.898	2.653	4.020	9.571
15	<i>Cynodon dactylon</i>	4.830	5.970	1.577	12.377
16	<i>Commelina benghalensis</i>	1.449	1.160	0.576	3.185
17	<i>Desmostachya bipinnata</i>	2.898	2.155	3.171	8.224
18	<i>Desmodium triflorum</i>	3.864	4.145	0.124	8.133
19	<i>Dicanthium annulatum</i>	4.830	6.633	1.346	12.809
20	<i>Digitaria biformis</i>	1.449	1.658	2.388	5.495
21	<i>Eclipta prostrata</i>	0.996	0.995	0.135	2.096
22	<i>Eragrostis tenella</i>	0.483	0.165	10.004	10.652
23	<i>Euphorbia hirta</i>	3.864	4.643	2.947	11.456
24	<i>Evolvulus alsinoides</i>	1.449	0.995	0.688	3.132
25	<i>Gomphrena celosiodes</i>	2.415	1.824	0.097	4.336
26	<i>Heliotropium supinum</i>	0.966	0.829	3.030	4.825
27	<i>Indigofera linifolia</i>	1.966	1.995	1.140	5.101
28	<i>Launea nudicaulis</i>	1.932	1.990	6.840	10.762
29	<i>Malvestrum tricuspidatum</i>	4.347	3.648	0.368	8.363
30	<i>Martinia diandra</i>	0.966	0.497	0.140	1.603
31	<i>Melilotus parviflora</i>	3.864	2.985	0.083	6.932
32	<i>Oxalis corniculata</i>	3.864	2.985	0.083	6.932
33	<i>Phyllanthus niruri</i>	3.864	3.316	0.159	7.336
34	<i>Peristrophe bicalyculata</i>	3.810	2.653	0.318	6.352
35	<i>Phaseolus trilobus</i>	1.966	1.663	1.108	4.737
36	<i>Parthenium hysterophorus</i>	2.415	2.487	0.298	5.200
37	<i>Ruellia tuberosa</i>	2.449	1.326	1.078	4.853
38	<i>Rungia elegans</i>	1.483	1.165	1.267	3.915
39	<i>Sida cordifolia</i>	5.830	7.633	28.934	42.397
40	<i>Striga euphrasioides</i>	1.483	1.331	1.070	3.884
41	<i>Solanum surattense</i>	0.966	0.995	0.707	2.668
42	<i>Tridax procumbens</i>	3.864	3.482	2.579	9.925

IV. CONCLUSION

Sida cordifolia L. is a perennial branched herb of the family malvaceae. There is appreciable variation in the phytosociological studies. It shows a vast number of common associates in all the four study sites. The various data on frequency, density, cover and IVI were obtained from the associates found in different localities. On the basis of Important value index the community of different localities were recognized.

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