

## PHYTOSOCIOLOGICAL ANALYSIS OF MEDICINAL PLANTS (*CITRULLUS COLOCYNTHIS* & *CORCHORUS DEPRESSUS*) OF NORTH RAJASTHAN

D. P. GAUCHAN, ABHA DHINGRA and SUDESH DHINGRA

Taxanomy and Eco-physiology Lab.

Botany Department, Maharishi Dayanand (P.G.) College, Sri Ganganagar, Rajasthan, India.

Phytosociological investigation of *Citrullus colocynthis* and *Corchorus depressus* showed that about 88 species were associated with these plants at the site selected for the study. The highest density i.e., 1.540 density/m<sup>2</sup> was of *Tribulus terrestris* so it was distributed frequently. A/F ratio varied from 0.006 to 0.217. Highest IVI (Importance Value Index) was exhibited by *Parthenium hysterophorus* (18.030) and lowest by *Euphorbia chamaesyce* (0.240). Medicinal values and phytochemistry of both the plants are also discussed.

**Keywords :** *Citrullus colocynthis*; *Corchorus depressus*; Medicinal plants; Phytosociological.

### Introduction

*Citrullus colocynthis* and *Corchorus depressus* are wild plants of great medicinal importance. These are very frequent in waste lands of semi arid and arid areas of Northern Rajasthan. *Citrullus colocynthis* is a perennial herb with long trailing branches which remain green throughout the year. It is good sand binder. The fruits and seeds are medicinal. In Sanskrit language it is known as 'Indravaruni' and is used as a medicine which cures stomach abnormalities. In rheumatism, equal part of root and long pepper are used as purgative. The fruit & roots are prescribed in the treatment of snake bite and scorpion sting. The fruit are used as a feed for cattle; goat and camels. The seeds are buried in common salt to wash off their bitter principles, dried, mixed with pearl millet seed and flour and eaten by the rural poor in scarcity periods<sup>1</sup>. Phytochemical studies<sup>2</sup> reveal that fruit of *Citrullus colocynthis* contains eight saturated (59.4%) and unsaturated (41.58%) fatty acids, primary aliphatic alcohols (81.5%), essential oils (15.8%) Mallavarapu and Rao<sup>3</sup> isolated certain chemical constituents from the plant which were recognized as cucurbitacins B, E and I and cucurbitacins-E-2-glucosides.

*Corchorus depressus* is a prostrate undershrub having a woody base, common in hard clayey soils particularly near temporary water resources or gravely soils and waste places. It is known as 'Bedani' in

Sanskrit language. The whole plant has tonic properties. It is given as cooling medicine in fever. The seeds in decoction, with milk and sugar used as a tonic which cure normal as well as sexual weakness. Vohora, Shamsi and Khan<sup>4</sup> isolated trihydroxy- dicarboxy acid from plant which exhibited significant antipyretic and analgesic activities. Phytochemical studies of the plant show the presence of sitosterol glucoside, sitosterol, apigenin, luteonin,  $\alpha$ - amyryn derivatives, cordepressic acid, cordepressenic acid and cordepressin<sup>5</sup>.

Phytosociological analysis of any vegetation forms an important part of ecological studies as it provides a clear picture of the vegetation and help in understanding the community function which is necessary for adequate characterization of the present community. According to Yapp<sup>6</sup> the ecological researches from an area must include the study of a community as a whole and also the study of each individual species, which collectively form that community. The species composition depicts the structure and nature of the community and can be determined by the number of species and their ecological amplitude. Such studies have been carried out by a number of workers<sup>7-11</sup>.

The present investigation was carried out on two communities for *Corchorus depressus* and *Citrullus colocynthis* to understand distribution and dominance of

these particular species.

### Materials and Methods

For studying phytosociology of the vegetation, quadrat method was used. Quadrats of 100 x 100 cm were laid randomly in field in accordance with the standard methods<sup>12-13</sup>. The quadrats were laid monthly to determine density, frequency, dominance and finally the Importance Value Index (IVI). The data is presented in Table 1. The study was carried out for one year and the values were computed from the data collected during the year. The importance value index (IVI) for a species is a sum of its relative frequency, relative density and relative dominance. The encountered species at the locality have been arranged in descending order of their IVI values (Table 1).

### Observations

A perusal of data (Table 1) show the plant species associated with *Corchorus depressus* and *Citrullus colocynthis*. Phytosociological analysis shows that *Parthenium hysterophorus* occupies the first position with its highest IVI value (18.030) followed by *Tribulus terrestris* (16.270), *Euphorbia hirta* (14.700), *Erigeron bonariensis* (11.210) and *Heliotropium ellipticum* (9.890). *Parthenium hysterophorus* occupies the first position due to its highest Importance Value Index (IVI) grows at a density of 1.450 individual/m<sup>2</sup> whereas it is 1.540 individual/m<sup>2</sup> for *Tribulus terrestris*, 1.500 individual/m<sup>2</sup> for *Euphorbia hirta*, 1.070 individual/m<sup>2</sup> for *Erigeron bonariensis* and 0.920 individual/m<sup>2</sup> for *Heliotropium ellipticum*.

### Discussion

Flahault<sup>14</sup> had laid emphasis on dominance as the main criteria for describing vegetation units of a community while Brockman Jerosch<sup>15</sup> on value of constant species for characterization. The concept of IVI was developed by Curtis and McIntosh<sup>16</sup> who claimed that it is an excellent indication of

vegetational importance of a species with in a stand. Thus, phytosociology includes the study of each and every species which represents the unit of the community. Several workers<sup>13, 17, 18</sup> have laid emphasis on the determination of Importance Value Index (IVI) and its utility in expressing the dominance and ecological success of species in an area.

The IVI represents the dominance of the species in a community, the higher the IVI, the greater is the dominance. The present study shows that *Parthenium hysterophorus* (IVI- 18.030), *Tribulus terrestris* (IVI- 16.270), *Euphorbia hirta* (IVI-14.700), *Erigeron bonariensis* (IVI-11.210) and *Heliotropium ellipticum* (IVI-9.890) are the dominant species at the selected study site. It was evident that plants which were closely associated with *Parthenium hysterophorus* showed burning appearance. This was clearly noticed in case of *Citrullus colocynthis*. Gradually *Parthenium hysterophorus* dominates the area. It may be due the allelopathic effect.

It may be noted that the presence of certain species in community may not be of much significance because it indicates the potentiality of the species for a wider range of tolerance and therefore, in such situations other criteria may be more meaningful in establishing correlation between the presence of species and environmental factors. The concept of correlation coefficient for grouping and ordering plant species has received a good deal of attention. However, the species correlation data are valid only for the study site i.e., restricted regions particularly with uniform climate and floristic.

A knowledge of the spacing pattern of the species is very important for better understanding of the ecological distribution of the species in any given locality. Different authors have used different indices to find out the pattern of spatial distribution of plant in the community. A/F ratio has been used to find out the pattern distribution.

Table 1. Phytosociological analysis of the common associates of *Corchorus depressus* and *Citrullus colocynthis* at study site stadium.

S.N.	Name of Species	Density/m <sup>2</sup>	Frequency (F) (%)	Frequency Class	Abundance	A/F	Relative Density	Relative Dominance	Relative Frequency	IVI
1	<i>Parthenium hysterophorus</i>	1.450	45.830	C	6.120	0.134	6.770	6.120	5.120	18.030
2	<i>Tribulus terrestris</i>	1.540	39.160	B	2.360	0.060	6.230	7.390	4.210	16.270
3	<i>Euphorbia hirta</i>	1.500	35.000	B	3.060	0.087	7.140	3.640	3.910	14.700
4	<i>Eriogon bonariensis</i>	1.070	34.160	B	2.340	0.069	4.670	2.780	3.640	11.210
5	<i>Heliotropium ellipticum</i>	0.920	25.830	B	1.870	0.072	4.630	2.500	2.750	9.890
6	<i>Trianthema portulacastrum</i>	0.700	30.000	B	1.560	0.052	3.010	2.180	3.150	8.350
7	<i>Cynodon dactylon</i>	0.610	29.160	B	1.600	0.055	2.880	2.450	2.960	8.310
8	<i>Cenchrus setigerus</i>	0.350	18.330	A	0.990	0.054	2.320	3.630	2.230	8.230
9	<i>Heliotropium strigosum</i>	0.720	29.160	B	1.700	0.058	3.200	1.760	3.230	8.200
10	<i>Cenchrus ciliaris</i>	0.620	18.330	A	2.010	0.110	2.287	3.490	2.181	7.658
11	<i>Corchorus depressus</i>	0.340	23.330	B	1.240	0.053	1.860	3.090	2.660	7.610
12	<i>Boerhavia diffusa</i>	0.500	26.700	B	1.290	0.048	2.140	2.310	2.760	7.220
13	<i>Solanum surattense</i>	0.350	27.500	B	1.020	0.037	1.910	2.200	3.090	7.050
14	<i>Cenchrus biflorus</i>	0.640	17.500	A	1.530	0.087	2.310	2.490	1.780	6.590
15	<i>Peganum harmala</i>	0.240	19.160	A	1.280	0.067	1.480	2.770	2.190	6.450
16	<i>Launea procumbens</i>	0.300	21.660	B	1.260	0.058	2.040	1.450	2.600	6.100
17	<i>Tribulus pentandrus</i>	0.500	20.000	A	1.310	0.066	2.170	1.630	2.180	5.990
18	<i>Argemone mexicana</i>	0.200	15.830	A	0.880	0.056	1.130	2.310	1.750	5.200
19	<i>Citrullus colocynthis</i>	0.150	13.330	A	0.730	0.055	1.010	2.370	1.690	4.980
20	<i>Digitaria adscendens</i>	0.580	7.500	A	1.630	0.217	2.430	1.590	0.903	4.930
21	<i>Convolvulus microphyllus</i>	0.250	15.830	A	0.910	0.057	1.130	2.080	1.680	4.900
22	<i>Coronopus didymus</i>	0.400	15.000	A	0.860	0.057	2.510	0.910	1.690	4.820
23	<i>Dactyloctenium aegyptium</i>	0.230	11.660	A	0.860	0.074	1.410	1.860	1.420	4.700
24	<i>Convolvulus deserti</i>	0.190	11.660	A	0.900	0.077	0.850	2.100	1.290	4.250
25	<i>Sisymbrium irio</i>	0.208	15.000	A	0.780	0.052	1.584	0.746	1.910	4.240
26	<i>Chenopodium album</i>	0.240	11.660	A	0.720	0.062	1.720	0.480	1.620	4.170
27	<i>Oxalis corniculata</i>	0.390	10.000	A	0.920	0.092	2.260	0.470	1.300	4.040
28	<i>Trigonella polycerata</i>	0.216	11.600	A	1.041	0.090	1.840	0.490	1.560	3.890
29	<i>Pulicaria crispata</i>	0.130	11.660	A	0.875	0.075	0.880	1.170	1.560	3.860

Table 1. Contd...

S.N.	Name of Species	Density/m <sup>2</sup>	Frequency (F) (%)	Frequency Class	Abundance	A/F	Relative Density	Relative Dominance	Relative Frequency	IVI
30	<i>Crotalaria juncea</i>	0.130	9.160	A	0.560	0.061	1.050	1.560	1.110	3.730
31	<i>Calotropis procera</i>	0.120	10.830	A	0.690	0.064	0.892	1.200	1.300	3.400
32	<i>Tricholepis radicans</i>	0.150	12.500	A	0.875	0.070	0.706	1.260	1.350	3.320
33	<i>Asphodelus tenuifolius</i>	0.200	10.000	A	0.810	0.081	1.200	0.920	1.150	3.280
34	<i>Stellaria media</i>	0.440	7.500	A	0.840	0.112	2.030	0.230	0.960	3.230
35	<i>Phyllanthus fraternus</i>	0.200	9.160	A	0.550	0.060	1.620	0.264	1.320	3.210
36	<i>Fagonia cretica</i>	0.170	13.330	A	0.860	0.065	0.912	0.810	1.435	3.160
37	<i>Euphorbia dracunculoides</i>	0.140	8.330	A	0.580	0.070	0.850	0.750	1.020	2.630
38	<i>Peristrophe bicalycula</i>	0.100	7.500	A	0.610	0.081	0.720	0.928	0.961	2.610
39	<i>Launaea fallax</i>	0.125	10.000	A	0.483	0.048	0.823	0.607	1.110	2.540
40	<i>Abutilon pannosum</i>	0.130	12.500	A	0.520	0.042	0.748	0.470	1.250	2.470
41	<i>Commelina benghalensis</i>	0.110	7.500	A	0.541	0.072	0.943	0.449	1.080	2.470
42	<i>Cirsium wallichii</i>	0.080	7.500	A	0.290	0.039	0.700	0.760	0.950	2.410
43	<i>Euphorbia clarkeana</i>	0.200	10.830	A	0.770	0.071	0.899	0.360	1.010	2.270
44	<i>Cyperus rotundus</i>	0.110	7.500	A	0.380	0.051	0.982	0.340	0.930	2.260
45	<i>Indigofera hochstetteri</i>	0.040	4.160	A	0.330	0.079	0.340	1.320	0.573	2.230
46	<i>Withania somnifera</i>	0.060	5.830	A	0.500	0.086	0.480	0.990	0.730	2.200
47	<i>Spergula arvensis</i>	0.180	9.160	A	0.560	0.061	0.910	0.280	0.910	2.110
48	<i>Xanthium strumarium</i>	0.058	5.000	A	0.360	0.072	0.477	0.905	0.713	2.090
49	<i>Achyranthes aspera</i>	0.060	5.000	A	0.410	0.082	0.490	0.920	0.660	2.070
50	<i>Chrozophora oblongifolia</i>	0.100	8.330	A	0.480	0.058	0.400	0.720	0.824	1.950
51	<i>Aerva pseudotomentosa</i>	0.070	6.660	A	0.270	0.041	0.537	0.520	0.859	1.920
52	<i>Nonnea pulla</i>	0.090	6.660	A	0.360	0.054	0.585	0.640	0.670	1.890
53	<i>Rumex dentatus</i>	0.100	5.800	A	0.290	0.050	0.720	0.300	0.810	1.850
54	<i>Veronica agrestis</i>	0.220	5.000	A	0.850	0.170	1.150	0.110	0.550	1.830
55	<i>Boerhavia chinensis</i>	0.070	5.830	A	0.310	0.053	0.489	0.490	0.750	1.740
56	<i>Chenopodium ambrosioides</i>	0.070	5.000	A	0.330	0.066	0.570	0.350	0.730	1.670
57	<i>Portulaca oleracea</i>	0.120	9.160	A	0.210	0.023	0.458	0.350	0.852	1.660
58	<i>Chenopodium murale</i>	0.100	5.830	A	0.300	0.051	0.600	0.300	0.720	1.630
59	<i>Nicotiana plumbaginifolia</i>	0.060	6.660	A	0.250	0.038	0.350	0.570	0.680	1.610
60	<i>Launaea resedifolia</i>	0.108	5.000	A	0.516	0.103	0.668	0.356	0.578	1.602

Table 1. Contd...

S.N.	Name of Species	Density/m <sup>2</sup>	Frequency (F) (%)	Frequency Class	Abundance	A/F	Relative Density	Relative Dominance	Relative Frequency	IVI
61	<i>Salsola baryosna</i>	0.050	4.160	A	0.270	0.065	0.465	0.530	0.513	1.510
62	<i>Oligomeris linifolia</i>	0.060	4.160	A	0.450	0.108	0.589	0.340	0.560	1.490
63	<i>Heliotropium bacciferum</i>	0.050	5.830	A	0.330	0.057	0.477	0.490	0.690	1.460
64	<i>Euphorbia geniculata</i>	0.080	7.500	A	0.291	0.039	0.440	0.215	0.765	1.420
65	<i>Heliotropium curassavicum</i>	0.040	4.160	A	0.330	0.079	0.223	0.754	0.407	1.380
66	<i>Croton bonplandianum</i>	0.050	5.830	A	0.410	0.070	0.321	0.340	0.611	1.280
67	<i>Carthamus oxyacantha</i>	0.050	5.000	A	0.180	0.036	0.478	0.240	0.548	1.270
68	<i>Indigofera linifolia</i>	0.040	4.160	A	0.250	0.060	0.290	0.360	0.569	1.220
69	<i>Farsetia hamiltonii</i>	0.150	4.160	A	0.500	0.120	0.547	0.240	0.378	1.170
70	<i>Solanum nigrum</i>	0.050	4.160	A	0.290	0.070	0.250	0.350	0.500	1.120
71	<i>Zaleya govindia</i>	0.040	2.500	A	0.290	0.116	0.350	0.435	0.318	1.100
72	<i>Convolvulus arvensis</i>	0.040	4.160	A	0.250	0.060	0.398	0.170	0.537	1.100
73	<i>Sonchus brachyotus</i>	0.040	2.500	A	0.250	0.100	0.200	0.490	0.320	1.020
74	<i>Euphorbia serpens</i>	0.060	4.160	A	0.270	0.065	0.419	0.100	0.503	1.020
75	<i>Dactyloctenium scindicum</i>	0.016	1.660	A	0.080	0.048	0.133	0.639	0.235	1.007
76	<i>Medicago polymorpha</i>	0.110	5.000	A	0.190	0.038	0.400	0.140	0.450	1.000
77	<i>Mukia maderaspatana</i>	0.060	5.830	A	0.410	0.070	0.298	0.140	0.550	1.000
78	<i>Polygonum barbatum</i>	0.040	3.330	A	0.190	0.057	0.200	0.370	0.390	0.980
79	<i>Derris innoxia</i>	0.020	2.500	A	0.250	0.100	0.061	0.530	0.289	0.945
80	<i>Verbesina encelioides</i>	0.020	2.500	A	0.160	0.064	0.244	0.310	0.340	0.897
81	<i>Anagallis arvensis</i>	0.030	3.330	A	0.166	0.050	0.290	0.138	0.476	0.882
82	<i>Malvastrum coromandelianum</i>	0.250	2.500	A	0.160	0.064	0.150	0.380	0.320	0.850
83	<i>Abutilon indicum</i>	0.030	3.330	A	0.330	0.099	0.205	0.440	0.330	0.810
84	<i>Eragrostis ciliaris</i>	0.050	5.000	A	0.290	0.058	0.191	0.130	0.470	0.790
85	<i>Melilotus indica</i>	0.090	3.330	A	0.220	0.066	0.316	0.112	0.305	0.734
86	<i>Sida cordifolia</i>	0.010	1.660	A	0.160	0.096	0.172	0.260	0.238	0.678
87	<i>Kochia indica</i>	0.008	0.830	A	0.080	0.096	0.100	0.200	0.135	0.438
88	<i>Digera muricata</i>	0.030	2.500	A	0.110	0.044	0.096	0.060	0.200	0.365
89	<i>Psammodon canescens</i>	0.300	20.000	A	0.125	0.006	0.131	0.200	0.145	0.290
90	<i>Euphorbia chamaesyce</i>	0.008	0.830	A	0.080	0.096	0.071	0.070	0.100	0.240

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