CHAPTER-3

PHYTOSOCIOLOGY
CHAPTER-3
PHYTOSOCIOLOGY

3.1 INTRODUCTION

Blanquet (1932) defined Phytosociology or Plant Sociology as, the science of plant communities or the knowledge of vegetation in the widest sense, includes all phenomena which touch upon the life of plants in social units. Phillips (1959) mentioned that the phytosociological study gives us an idea about the correlation of species in an association. It involves the study of structure, nature, organisation and development of plant communities.

The determination or recognition of the associates of a species has important ecological implications. From the phytosociological studies in a vegetation the importance of a species and its likings and dislikings can be understood. All these information will be useful to identify the habitat structure which in turn are essential for the formulation of any strategy for their conservation and/or utilisation (Das & Lahiri, 1997).

The vegetation of an area has a definite structure and composition, developed as a result of long term interaction with various abiotic and biotic factors. Any change in the status of these factors especially biotic, perturbs the vegetation system. Persistent perturbations caused by biotic exploitation triggers such changes in vegetation that finally result in its degradation.

The herbland vegetation of the Sub-Himalayan region creates an outstanding environment for the biological diversity that they provide habitats for numerous species of plants and animals, many of which are endangered in nature. Genetic resources of plants of these herblands are scientifically and economically more important and useful. These vast gene pool can be used to improve crop quality and productivity and increase yield of forage and medicinally important plants, etc. Most of the herblands in this region are subject to uncontrolled (free) grazing with almost no regulation and often beyond their carrying capacity. This has resulted in lose of vegetation cover followed by soil degradation, loss of biodiversity and reduced livestock support.

Sireptocaulon sylvestre Wight is an endangered suffrutescent plant of Asclepiadaceae, endemic to Terai region of Sub-Himalayan Darjeeling in Eastern India, is now known to occur only in two small herblands of about 25000 sq.m. inside the campus of the University of North Bengal. Reasons for such a restricted distribution of this species are unknown. The species might be extinct on any day after any type of modification of its natural habitat within the campus of the
University. And, if it happens, a part of the Earth’s genetic heritage will disappear forever. So proper management of these harblands is essential in order to conserve their biological diversity. But no information is in hand about the basic ecology of these vegetation. Different kinds of such information can be collected through phytosociological studies. So, in the present investigation phytosociological studies were conducted to acquire ecological information on the vegetation of the present (Site-I & II) and past (Site-III & IV as described in Chapter-I) known habitats of Streptocaulon sylvestre. These baseline data will be of much use in framing the strategies for the conservation of the critically endangered species of plant and will give basic ecological information about the Sub-Himalayan herblands.

Phytosociological studies were carried out in accordance with standard quadrat method (Phillips, 1959; Misra, 1968). The quadrat data gathered were analysed for abundance, density, percentage frequency, relative density, relative frequency, relative dominance and importance value index of individual species. Frequency distribution, Simpson’s index (1949), Shannon-Weiner index (1963) Hills diversity numbers N0, N1 and N2 (Hill, 1973), Richness indices R1 and R2 (Margalef, 1958 and Menhinick, 1964), Evenness indices E1 (Pielou, 1977), E2 (Sheldon, 1969), E3 (Heip, 1974), E4 (Hill, 1973) and E5 (Alatalo, 1981), Generic coefficient (Sharma, 1990), Maturity index (Sharma, 1990), Similarity index (Sorenson, 1948), Dissimilarity index and Interspecific Association between Streptocaulon sylvestre and other Associate species were also determined using these field data.

More detailed descriptions of the study area and the methodology of this work has been provided in the Chapter-1 and 2, respectively. Study was conducted during July 1997 to June 1999 for Site-I & II and July 1998 to June 1999 for Site-III & IV. On the basis of annual rainfall and temperature distribution in this area, the year was divided into three main seasons viz. monsoon (mid-June to October), prolonged winter (November to March) and a short summer (April to mid-June). Twenty quadrats of one metre square size were laid out randomly at each site in each season (i.e. a total of 360 quadrats for four sites) to study herbage individuals.

3.2 RESULTS AND DISCUSSION

The vegetational data collected from 360 quadrats in the four different sites recorded a total of 227 species of plants, which include 222 species of angiosperms and 5 species of pteridophytes. This list, of course, did not include all of the species present in these herblands, since some of the species were not found in the quadrats sampled. Plants recorded from four sites of herblands are enumerated in page-108.
along with their proper author citation and protologue references.

All the collected data were analysed and the computed values of abundance, density, percentage frequency, relative density (RD), relative frequency (RF), relative dominance (RDm), importance value index (IVI), Simpson’s index, Shannon-Weiner index, Hill’s diversity numbers, richness and evenness indices, generic coefficient, maturity index, similarity and dissimilarity indices, chi-square test statistics and association indices between *Streptocaulon sylvestre* and associate species are presented in Tables-3.1 to 3.38.

3.2.1 ABDUANCE, DENSITY, FREQUENCY, RELATIVE DENSITY, RELATIVE FREQUENCY, RELATIVE DOMINANCE AND IMPORTANCE VALUE INDEX

3.2.1.1 SITE-I (NORTH BENGAL UNIVERSITY CAMPUS PLOT NO-1)

A total of 129 plant species were recorded from 120 quadrats in site-I during different seasons for two years (1997-1998 and 1998-1999) Out of these, 94 species were recorded in monsoon, 56 species in winter and 76 species in summer.

3.2.1.1.1 SITE-I : MONSOON SEASON

Of the total of 94 species, 72 species were listed in the monsoon of 1997 and 63 species from monsoon of 1998 season. Of these, 41 species were found to occur in both of the year in this season.

3.2.1.1.1.1 SITE-I: MONSOON -'97

Altogether 72 species of plants were recorded in site-I during monsoon 1997 (Table-3.1). The highest number of species recorded in a particular quadrat was 27 and the lowest was 10. A total of 18744 individuals were noted for 20 quadrats. The number of individuals among the quadrats ranged from 261 to 1799, while the average number of species and individuals per quadrat were 17.95 and 937.20, respectively.

Floristic composition, abundance, density, % frequency, relative density (RD), relative frequency (RF), relative dominance (RDm) and IVI of each species of site-I in monsoon '97 are presented in Table-3.1. Amongst the total 72 species, *Borreria alata* accounted for its representation with the highest number of individuals (2664 individuals) contributing to 14.21 % of the relative density. This was followed by *Sporobolus indicus*, *Prunella vulgaris*, *Phyllanthus urinaria*, *Imperata cylindrica*, *Phyllanthus virgatus*, *Mitracarpus verticillatus*, *Saccharum spontaneum* etc. in term of relative density. The maximum abundance was noted for *Chrysopogon aciculatus* (282.50).
Table-3.1 : Floristic composition, Abundance (Ab), Density (D), Frequency (F), Basal Area Cover (BA), Relative Density (RD), Relative Frequency (RF), Relative Dominance (R Dm) and Importance Value Index (IVI) of species of Site-I in Monsoon 1997.

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D</th>
<th>F</th>
<th>BA</th>
<th>RD</th>
<th>RF</th>
<th>R Dm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ageratum conyzoides</td>
<td>91.00</td>
<td>22.75</td>
<td>25</td>
<td>2653</td>
<td>2.43</td>
<td>1.42</td>
<td>2.36</td>
<td>6.21</td>
</tr>
<tr>
<td>2. Ageratum houstonianum</td>
<td>20.00</td>
<td>1.00</td>
<td>5</td>
<td>66</td>
<td>0.11</td>
<td>0.28</td>
<td>0.06</td>
<td>0.45</td>
</tr>
<tr>
<td>3. Amaranthus viridis</td>
<td>27.00</td>
<td>1.35</td>
<td>5</td>
<td>43</td>
<td>0.14</td>
<td>0.28</td>
<td>0.04</td>
<td>0.46</td>
</tr>
<tr>
<td>4. Atylosia scarabaeoides</td>
<td>1.50</td>
<td>0.15</td>
<td>10</td>
<td>29</td>
<td>0.02</td>
<td>0.57</td>
<td>0.02</td>
<td>0.61</td>
</tr>
<tr>
<td>5. Borreria alata</td>
<td>156.70</td>
<td>133.20</td>
<td>85</td>
<td>13473</td>
<td>14.21</td>
<td>4.83</td>
<td>11.99</td>
<td>31.03</td>
</tr>
<tr>
<td>6. Brachiaria reptans</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>18</td>
<td>0.02</td>
<td>0.28</td>
<td>0.02</td>
<td>0.32</td>
</tr>
<tr>
<td>7. Carex indica</td>
<td>14.18</td>
<td>7.80</td>
<td>55</td>
<td>437</td>
<td>0.83</td>
<td>3.12</td>
<td>0.39</td>
<td>4.34</td>
</tr>
<tr>
<td>8. Cassia mimosoides</td>
<td>4.00</td>
<td>0.20</td>
<td>5</td>
<td>35</td>
<td>0.02</td>
<td>0.28</td>
<td>0.03</td>
<td>0.33</td>
</tr>
<tr>
<td>9. Centranthera grandiflora</td>
<td>1.00</td>
<td>0.10</td>
<td>10</td>
<td>17</td>
<td>0.01</td>
<td>0.57</td>
<td>0.01</td>
<td>0.59</td>
</tr>
<tr>
<td>10. Centranthera tranquebarica</td>
<td>4.00</td>
<td>0.20</td>
<td>5</td>
<td>25</td>
<td>0.02</td>
<td>0.28</td>
<td>0.02</td>
<td>0.32</td>
</tr>
<tr>
<td>11. Chromolaena odorata</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>7</td>
<td>0.005</td>
<td>0.28</td>
<td>0.006</td>
<td>0.29</td>
</tr>
<tr>
<td>12. Chrysopogon aciculatus</td>
<td>282.5</td>
<td>28.25</td>
<td>10</td>
<td>2568</td>
<td>3.01</td>
<td>0.57</td>
<td>2.28</td>
<td>5.86</td>
</tr>
<tr>
<td>13. Clerodendrum viscosum</td>
<td>10.00</td>
<td>0.50</td>
<td>5</td>
<td>192</td>
<td>0.05</td>
<td>0.28</td>
<td>0.17</td>
<td>0.50</td>
</tr>
<tr>
<td>14. Costus speciosus</td>
<td>2.00</td>
<td>0.1</td>
<td>5</td>
<td>15</td>
<td>0.01</td>
<td>0.28</td>
<td>0.01</td>
<td>0.30</td>
</tr>
<tr>
<td>15. Crotalaria alata</td>
<td>4.00</td>
<td>0.20</td>
<td>5</td>
<td>25</td>
<td>0.02</td>
<td>0.28</td>
<td>0.02</td>
<td>0.32</td>
</tr>
<tr>
<td>16. Crotalaria ferruginea</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>7</td>
<td>0.005</td>
<td>0.28</td>
<td>0.006</td>
<td>0.29</td>
</tr>
<tr>
<td>17. Crotalaria pallida</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>8</td>
<td>0.005</td>
<td>0.28</td>
<td>0.007</td>
<td>0.29</td>
</tr>
<tr>
<td>18. Crotalaria prostrata</td>
<td>4.07</td>
<td>2.65</td>
<td>65</td>
<td>281</td>
<td>0.28</td>
<td>3.69</td>
<td>0.25</td>
<td>4.22</td>
</tr>
<tr>
<td>19. Cyanotis nudiflora</td>
<td>4.33</td>
<td>1.95</td>
<td>45</td>
<td>367</td>
<td>0.21</td>
<td>2.55</td>
<td>0.32</td>
<td>3.08</td>
</tr>
<tr>
<td>20. Cymbopogon microtheca</td>
<td>21.33</td>
<td>3.20</td>
<td>15</td>
<td>1887</td>
<td>0.34</td>
<td>0.85</td>
<td>1.68</td>
<td>2.87</td>
</tr>
<tr>
<td>22. Cynodon dactylon</td>
<td>25.00</td>
<td>1.25</td>
<td>5</td>
<td>213</td>
<td>0.13</td>
<td>0.28</td>
<td>0.19</td>
<td>0.60</td>
</tr>
<tr>
<td>23. Desmodium heterophyllum</td>
<td>4.00</td>
<td>0.40</td>
<td>10</td>
<td>62</td>
<td>0.04</td>
<td>0.57</td>
<td>0.05</td>
<td>0.66</td>
</tr>
<tr>
<td>24. Desmodium triflorum</td>
<td>15.40</td>
<td>11.55</td>
<td>75</td>
<td>1722</td>
<td>1.23</td>
<td>4.26</td>
<td>1.53</td>
<td>7.02</td>
</tr>
<tr>
<td>25. Digitaria griffithii</td>
<td>17.00</td>
<td>0.85</td>
<td>5</td>
<td>81</td>
<td>0.09</td>
<td>0.28</td>
<td>0.07</td>
<td>0.44</td>
</tr>
<tr>
<td>26. Dysophylla crassicaulis</td>
<td>40.00</td>
<td>2.00</td>
<td>5</td>
<td>449</td>
<td>0.21</td>
<td>0.28</td>
<td>0.40</td>
<td>0.89</td>
</tr>
<tr>
<td>27. Elephantopus scaber</td>
<td>1.00</td>
<td>0.10</td>
<td>10</td>
<td>22</td>
<td>0.01</td>
<td>0.57</td>
<td>0.02</td>
<td>0.60</td>
</tr>
<tr>
<td>28. Eleusine indica</td>
<td>15.00</td>
<td>0.75</td>
<td>5</td>
<td>125</td>
<td>0.08</td>
<td>0.28</td>
<td>0.11</td>
<td>0.47</td>
</tr>
<tr>
<td>29. Emilia sonchifolia</td>
<td>7.33</td>
<td>1.10</td>
<td>15</td>
<td>83</td>
<td>0.11</td>
<td>0.85</td>
<td>0.07</td>
<td>1.03</td>
</tr>
<tr>
<td>30. Eragrostis atrovirens</td>
<td>12.00</td>
<td>0.60</td>
<td>5</td>
<td>97</td>
<td>0.06</td>
<td>0.28</td>
<td>0.08</td>
<td>0.42</td>
</tr>
<tr>
<td>31. Eragrostis unioloides</td>
<td>9.00</td>
<td>1.35</td>
<td>15</td>
<td>227</td>
<td>0.14</td>
<td>0.85</td>
<td>0.20</td>
<td>1.19</td>
</tr>
<tr>
<td>32. Eragrostis viscosa</td>
<td>16.00</td>
<td>0.80</td>
<td>5</td>
<td>126</td>
<td>0.08</td>
<td>0.28</td>
<td>0.11</td>
<td>0.47</td>
</tr>
<tr>
<td>33. Hedyotis corymbosa</td>
<td>3.50</td>
<td>0.35</td>
<td>10</td>
<td>50</td>
<td>0.04</td>
<td>0.57</td>
<td>0.04</td>
<td>0.65</td>
</tr>
</tbody>
</table>

Table Contd.
Contd. Table-3.1

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D</th>
<th>F</th>
<th>BA</th>
<th>RD</th>
<th>RF</th>
<th>RDM</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>34. Hedyotis diffusa</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>7</td>
<td>0.005</td>
<td>0.28</td>
<td>0.006</td>
<td>0.29</td>
</tr>
<tr>
<td>35. Hyptis suaveolens</td>
<td>32.25</td>
<td>6.45</td>
<td>20</td>
<td>1849</td>
<td>0.69</td>
<td>1.13</td>
<td>1.64</td>
<td>3.46</td>
</tr>
<tr>
<td>36. Imperata cylindrica</td>
<td>86.85</td>
<td>60.80</td>
<td>70</td>
<td>7316</td>
<td>6.49</td>
<td>3.97</td>
<td>6.51</td>
<td>16.97</td>
</tr>
<tr>
<td>37. Isachne albens</td>
<td>10.00</td>
<td>0.50</td>
<td>5</td>
<td>57</td>
<td>0.05</td>
<td>0.28</td>
<td>0.05</td>
<td>0.38</td>
</tr>
<tr>
<td>38. Justicia japonica</td>
<td>46.00</td>
<td>4.60</td>
<td>10</td>
<td>645</td>
<td>0.49</td>
<td>0.57</td>
<td>0.57</td>
<td>1.63</td>
</tr>
<tr>
<td>39. Leucas indica</td>
<td>2.00</td>
<td>0.10</td>
<td>5</td>
<td>17</td>
<td>0.01</td>
<td>0.28</td>
<td>0.01</td>
<td>0.30</td>
</tr>
<tr>
<td>40. Lindernia ciliata</td>
<td>3.00</td>
<td>0.30</td>
<td>10</td>
<td>46</td>
<td>0.03</td>
<td>0.57</td>
<td>0.04</td>
<td>0.64</td>
</tr>
<tr>
<td>41. Lindernia crustacea</td>
<td>62.27</td>
<td>34.25</td>
<td>55</td>
<td>2684</td>
<td>3.65</td>
<td>3.12</td>
<td>2.39</td>
<td>9.16</td>
</tr>
<tr>
<td>42. Lindernia hookeri</td>
<td>32.25</td>
<td>6.45</td>
<td>20</td>
<td>595</td>
<td>0.69</td>
<td>1.13</td>
<td>0.53</td>
<td>2.35</td>
</tr>
<tr>
<td>43. Lindernia biflora</td>
<td>46.25</td>
<td>9.25</td>
<td>20</td>
<td>1246</td>
<td>0.98</td>
<td>1.13</td>
<td>1.11</td>
<td>3.22</td>
</tr>
<tr>
<td>44. Merremia hirta</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>26</td>
<td>0.005</td>
<td>0.28</td>
<td>0.02</td>
<td>0.30</td>
</tr>
<tr>
<td>45. Micromeria biflora</td>
<td>27.50</td>
<td>2.75</td>
<td>10</td>
<td>426</td>
<td>0.29</td>
<td>0.57</td>
<td>0.38</td>
<td>1.24</td>
</tr>
<tr>
<td>46. Mimosa pudica</td>
<td>11.50</td>
<td>1.15</td>
<td>10</td>
<td>258</td>
<td>0.12</td>
<td>0.57</td>
<td>0.23</td>
<td>0.92</td>
</tr>
<tr>
<td>47. Mitracarpus verticillatus</td>
<td>126.77</td>
<td>57.05</td>
<td>45</td>
<td>3762</td>
<td>6.09</td>
<td>2.55</td>
<td>3.35</td>
<td>11.99</td>
</tr>
<tr>
<td>48. Mitracarpus pygmaea</td>
<td>16.80</td>
<td>4.20</td>
<td>25</td>
<td>394</td>
<td>0.45</td>
<td>1.42</td>
<td>0.35</td>
<td>2.22</td>
</tr>
<tr>
<td>49. Mnesithea laevis</td>
<td>38.71</td>
<td>13.55</td>
<td>35</td>
<td>2081</td>
<td>1.44</td>
<td>1.99</td>
<td>1.85</td>
<td>5.28</td>
</tr>
<tr>
<td>50. Mukia maderaspata</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>6</td>
<td>0.005</td>
<td>0.28</td>
<td>0.005</td>
<td>0.29</td>
</tr>
<tr>
<td>51. Murdannia vaginata</td>
<td>8.00</td>
<td>0.40</td>
<td>5</td>
<td>44</td>
<td>0.04</td>
<td>0.28</td>
<td>0.04</td>
<td>0.36</td>
</tr>
<tr>
<td>52. Ophioglosum reticulatum</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>20</td>
<td>0.02</td>
<td>0.28</td>
<td>0.02</td>
<td>0.32</td>
</tr>
<tr>
<td>53. Paspalum scrobiculatum</td>
<td>12.20</td>
<td>3.05</td>
<td>25</td>
<td>421</td>
<td>0.32</td>
<td>1.42</td>
<td>0.37</td>
<td>2.11</td>
</tr>
<tr>
<td>54. Phaulopsis imbricata</td>
<td>18.00</td>
<td>0.90</td>
<td>5</td>
<td>131</td>
<td>0.10</td>
<td>0.28</td>
<td>0.12</td>
<td>0.50</td>
</tr>
<tr>
<td>55. Phyllanthus urinaria</td>
<td>114.81</td>
<td>63.15</td>
<td>55</td>
<td>2730</td>
<td>6.74</td>
<td>3.12</td>
<td>2.43</td>
<td>12.29</td>
</tr>
<tr>
<td>56. Phyllanthus virgatus</td>
<td>165.71</td>
<td>58.00</td>
<td>35</td>
<td>5940</td>
<td>6.19</td>
<td>1.99</td>
<td>5.29</td>
<td>13.47</td>
</tr>
<tr>
<td>57. Plectranthus rugosus</td>
<td>13.00</td>
<td>0.65</td>
<td>5</td>
<td>85</td>
<td>0.07</td>
<td>0.28</td>
<td>0.07</td>
<td>0.42</td>
</tr>
<tr>
<td>58. Polygala arvensis</td>
<td>7.00</td>
<td>0.70</td>
<td>10</td>
<td>64</td>
<td>0.07</td>
<td>0.57</td>
<td>0.05</td>
<td>0.69</td>
</tr>
<tr>
<td>59. P. vulgaris</td>
<td>225.00</td>
<td>78.75</td>
<td>35</td>
<td>9460</td>
<td>8.40</td>
<td>1.99</td>
<td>8.42</td>
<td>18.81</td>
</tr>
<tr>
<td>60. Puercaria phaseoloides</td>
<td>3.60</td>
<td>1.80</td>
<td>50</td>
<td>1808</td>
<td>0.19</td>
<td>2.84</td>
<td>1.61</td>
<td>4.64</td>
</tr>
<tr>
<td>61. Rottboellia sp.</td>
<td>82.50</td>
<td>8.25</td>
<td>10</td>
<td>1329</td>
<td>0.88</td>
<td>0.57</td>
<td>1.18</td>
<td>2.63</td>
</tr>
<tr>
<td>62. Rungia pectinata</td>
<td>61.87</td>
<td>49.50</td>
<td>80</td>
<td>4098</td>
<td>5.28</td>
<td>4.54</td>
<td>3.65</td>
<td>13.47</td>
</tr>
<tr>
<td>63. Saccharum spontaneum</td>
<td>54.42</td>
<td>51.70</td>
<td>95</td>
<td>7378</td>
<td>5.51</td>
<td>5.39</td>
<td>6.57</td>
<td>17.47</td>
</tr>
<tr>
<td>64. Salomonia ciliata</td>
<td>16.41</td>
<td>9.85</td>
<td>60</td>
<td>1234</td>
<td>1.05</td>
<td>3.40</td>
<td>1.09</td>
<td>5.54</td>
</tr>
<tr>
<td>65. Schizachyrium brevifolium</td>
<td>12.66</td>
<td>1.90</td>
<td>15</td>
<td>347</td>
<td>0.20</td>
<td>0.85</td>
<td>0.31</td>
<td>1.36</td>
</tr>
<tr>
<td>66. Scleria parvula</td>
<td>50.00</td>
<td>2.50</td>
<td>5</td>
<td>158</td>
<td>0.26</td>
<td>0.28</td>
<td>0.14</td>
<td>0.68</td>
</tr>
<tr>
<td>67. Selaginella sp.</td>
<td>107.50</td>
<td>43.00</td>
<td>40</td>
<td>1754</td>
<td>4.59</td>
<td>2.27</td>
<td>1.56</td>
<td>8.42</td>
</tr>
<tr>
<td>68. Sporobolus indicus</td>
<td>120.35</td>
<td>102.30</td>
<td>85</td>
<td>9036</td>
<td>10.91</td>
<td>4.83</td>
<td>8.04</td>
<td>23.78</td>
</tr>
</tbody>
</table>

Table Contd.
### Contd. Table-3.1

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D</th>
<th>F</th>
<th>BA</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>69. <em>Streptocaulon sylvestre</em></td>
<td>4.11</td>
<td>1.85</td>
<td>45</td>
<td>1289</td>
<td>0.19</td>
<td>2.55</td>
<td>1.15</td>
<td>3.89</td>
</tr>
<tr>
<td>70. <em>Urena lobata</em></td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>7</td>
<td>0.005</td>
<td>0.28</td>
<td>0.006</td>
<td>0.29</td>
</tr>
<tr>
<td>71. <em>Vernonia cinerea</em></td>
<td>6.14</td>
<td>2.15</td>
<td>35</td>
<td>470</td>
<td>0.23</td>
<td>1.99</td>
<td>0.42</td>
<td>2.64</td>
</tr>
<tr>
<td>72. <em>Zornia gibbosa</em></td>
<td>7.46</td>
<td>5.60</td>
<td>75</td>
<td>1072</td>
<td>0.60</td>
<td>4.26</td>
<td>0.95</td>
<td>5.81</td>
</tr>
</tbody>
</table>

Total number of individuals of all species = 18744, Total area covered = 112304 cm²
Total number of quadrats examined = 20, Number of occurrences of all species = 352

In site-I, none of the recorded species showed 100% frequency value during monsoon-'97. The highest percentage frequency (95%) and relative frequency (5.39%) were showed by *Saccharum spontaneum* which was followed by *Borreria alata* (4.83%), *Cymbopogon pendulus* (4.83%), *Sporobolus indicus* (4.83%), *Rungia pectinata* (4.54%), *Desmodium triflorum* (4.26%), *Zornia gibbosa* (4.26%), *Imperata cylindrica* (3.97%) etc. in term of relative frequency. The minimum density (0.05 m⁻²), % frequency (5%) and abundance (1) were recorded for seven species viz, *Chromolaena odorata, Crotalaria ferruginea, Crotalaria pallida, Hedyotis diffusa, Merremia hirta, Mukia maderaspatana* and *Urena lobata*. These species were represented by single individual only. *Streptocaulon sylvestre* showed the relative density and relative frequency values of 0.19% and 2.55%, respectively.

Raunkiaer’s (1934) frequency classes A included 47 species, B 8 species, C 8 species, D 5 species and E 4 species, (Fig-3.1). As per Raunkiaer’s ‘Law of Frequency’ (i.e. A>B>C=<D<E) results indicated that class B was not greater than
class C and also, class E was not larger than class D. So this community was subjected to severe biotic disturbances during monsoon-'97.

*Cymbopogon pendulus* contributed to the highest basal area cover having relative dominance value of 14.78 %. This was followed by *Borreria alata* (11.99 %), *Prunella vulgaris* (8.42 %), *Sporobolus indicus* (8.04 %), *Saccharum spontaneum* (6.57 %), *Imperata cylindrica* (6.51 %), *Phyllanthus virgatus* (5.29 %) etc. The importance value index (IVI) of all species in site-I during monsoon-'97 were in the range of 0.29 - 31.03. On the basis of IVI, *Borreria alata* (31.03) was the most important species in the vegetation followed by *Sporobolus indicus* (23.78 ), *Cymbopogon pendulus* (22.22), *Prunella vulgaris* (18.18), *Saccharum spontaneum* (17.47), *Imperata cylindrica* (16.97), *Phyllanthus virgatus* (13.47), *Rungia pectinata* (13.47), *Phyllanthus urinaria* (12.29), *Mitracarpus verticillatus* (11.99) etc. while *Streptocaulon sylvestre* showed the IVI of 3.89.

On the other hand, six species namely, *Chromolaena odorata*, *Crotalaria ferruginea*, *Crotalaria pallida*, *Hedyotis diffusa*, *Mukia maderaspatana* and *Urena lobata* scored the lowest IVI value of 0.29 in site-I during this season.

### 3.2.1.1.2 SITE-I : MONSOON-'98

Total number of plant species recorded during monsoon-'98 in site-I was 63 (Table-3.2). The number of species recorded in each quadrat ranged between 14 and 26. A total of 15992 individuals were recorded from 20 quadrats. The highest number of individuals recorded in single quadrat was 1331 and lowest was 196. The mean number of species and individuals per quadrat were 19.00 and 799.60, respectively.

Botanical composition, abundance, density % frequency, relative density, relative frequency, relative dominance and IVI of each species of site-I in monsoon-'98 are depicted in Table-3.2. Results indicate that *Sporobolus indicus* had the highest values of density (145.70 m²) and abundance (153.37) among the total of 63 species contributing to 18.22 % of relative density. This was followed by *Borreria alata* (17.01 %), *Rungia pectinata* (14.39 %), *Phyllanthus urinaria* (7.17 %), *Imperata cylindrica* (6.09 %), *Cymbopogon pendulus* (5.33 %) etc. in term of relative density. *Streptocaulon sylvestre* recorded the relative density of 0.23 %.

During this season, two species like *Borreria alata* and *Cymbopogon pendulus* appeared to be the most frequently available species in site-I having maximum % frequency (100 %) and relative frequency (5.23 %). This was followed by *Rungia pectinata* (4.97 %), *Saccharum spontaneum* (4.97 %), *Sporobolus indicus* (4.97 %), *Pueraria phaseoloides* (4.45 %) etc. in term of relative frequency. Seven species
Table 3.2: Phytosociological characters of herbland vegetation of Site-I during Monsoon 1998, (Abbreviation used: Ab=Abundance, D=Density, F=Frequency, BA=Basal Area Cover, RD=Relative Density, RF=Relative Frequency, RDm=Relative Dominance and IVI=Importance Value Index)

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D Pl. m⁻²</th>
<th>F %</th>
<th>BA cm²</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ageratum conyzoides</td>
<td>11.33</td>
<td>3.40</td>
<td>30</td>
<td>724</td>
<td>0.42</td>
<td>1.57</td>
<td>0.65</td>
<td>2.64</td>
</tr>
<tr>
<td>2. Borreria alata</td>
<td>136.05</td>
<td>136.05</td>
<td>100</td>
<td>13745</td>
<td>17.01</td>
<td>5.23</td>
<td>12.46</td>
<td>34.70</td>
</tr>
<tr>
<td>3. Borreria ocyonoides</td>
<td>26.20</td>
<td>6.55</td>
<td>25</td>
<td>670</td>
<td>0.82</td>
<td>1.31</td>
<td>0.61</td>
<td>2.74</td>
</tr>
<tr>
<td>4. Calamagrostis scabrescens</td>
<td>53.50</td>
<td>5.35</td>
<td>10</td>
<td>566</td>
<td>0.67</td>
<td>0.52</td>
<td>0.51</td>
<td>1.70</td>
</tr>
<tr>
<td>5. Cassia mimosoides</td>
<td>1.00</td>
<td>0.15</td>
<td>15</td>
<td>19</td>
<td>0.02</td>
<td>0.78</td>
<td>0.02</td>
<td>1.90</td>
</tr>
<tr>
<td>6. Centranthera indica</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>11</td>
<td>0.006</td>
<td>0.26</td>
<td>0.01</td>
<td>0.27</td>
</tr>
<tr>
<td>7. Chloris delicatula</td>
<td>24.50</td>
<td>4.90</td>
<td>20</td>
<td>535</td>
<td>0.61</td>
<td>1.04</td>
<td>0.48</td>
<td>2.13</td>
</tr>
<tr>
<td>8. Chrysopogon aciculatus</td>
<td>13.66</td>
<td>2.05</td>
<td>15</td>
<td>252</td>
<td>0.25</td>
<td>0.78</td>
<td>0.23</td>
<td>1.26</td>
</tr>
<tr>
<td>9. Clerodendrum viscosum</td>
<td>4.00</td>
<td>0.20</td>
<td>5</td>
<td>70</td>
<td>0.02</td>
<td>0.26</td>
<td>0.06</td>
<td>0.34</td>
</tr>
<tr>
<td>10. Conyza canadensis</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>9</td>
<td>0.006</td>
<td>0.26</td>
<td>0.008</td>
<td>0.27</td>
</tr>
<tr>
<td>11. Crotalaria ferruginea</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>7</td>
<td>0.006</td>
<td>0.26</td>
<td>0.006</td>
<td>0.27</td>
</tr>
<tr>
<td>12. Crotalaria prostrata</td>
<td>1.50</td>
<td>0.45</td>
<td>30</td>
<td>56</td>
<td>0.05</td>
<td>1.57</td>
<td>0.05</td>
<td>1.67</td>
</tr>
<tr>
<td>13. Cymbopogon microtheca</td>
<td>14.50</td>
<td>1.45</td>
<td>10</td>
<td>895</td>
<td>0.18</td>
<td>0.52</td>
<td>0.81</td>
<td>1.51</td>
</tr>
<tr>
<td>14. Cymbopogon pendulus</td>
<td>42.60</td>
<td>42.60</td>
<td>100</td>
<td>27681</td>
<td>5.33</td>
<td>5.23</td>
<td>25.10</td>
<td>35.66</td>
</tr>
<tr>
<td>15. Cyperus juncoides</td>
<td>47.15</td>
<td>30.65</td>
<td>65</td>
<td>1986</td>
<td>3.83</td>
<td>3.40</td>
<td>1.80</td>
<td>9.03</td>
</tr>
<tr>
<td>16. Desmodium heterophyllum</td>
<td>4.33</td>
<td>1.95</td>
<td>45</td>
<td>360</td>
<td>0.24</td>
<td>2.35</td>
<td>0.32</td>
<td>2.91</td>
</tr>
<tr>
<td>17. Desmodium triflorum</td>
<td>16.09</td>
<td>8.85</td>
<td>55</td>
<td>1825</td>
<td>1.10</td>
<td>2.88</td>
<td>1.65</td>
<td>5.63</td>
</tr>
<tr>
<td>18. Drymaria cordata</td>
<td>2.00</td>
<td>0.10</td>
<td>5</td>
<td>9</td>
<td>0.01</td>
<td>0.26</td>
<td>0.008</td>
<td>0.28</td>
</tr>
<tr>
<td>19. Eleusine indica</td>
<td>5.00</td>
<td>0.25</td>
<td>5</td>
<td>46</td>
<td>0.03</td>
<td>0.26</td>
<td>0.04</td>
<td>0.33</td>
</tr>
<tr>
<td>20. Emilia sonchifolia</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>5</td>
<td>0.006</td>
<td>0.26</td>
<td>0.004</td>
<td>0.27</td>
</tr>
<tr>
<td>21. Eragrostis tenella</td>
<td>21.00</td>
<td>5.25</td>
<td>25</td>
<td>675</td>
<td>0.65</td>
<td>1.31</td>
<td>0.61</td>
<td>2.57</td>
</tr>
<tr>
<td>22. Eragrostis unioloides</td>
<td>38.50</td>
<td>3.85</td>
<td>10</td>
<td>450</td>
<td>0.48</td>
<td>0.52</td>
<td>0.41</td>
<td>1.41</td>
</tr>
<tr>
<td>23. Exacum tetragonum</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>6</td>
<td>0.006</td>
<td>0.26</td>
<td>0.005</td>
<td>0.27</td>
</tr>
<tr>
<td>24. Fimbristylis dichotoma</td>
<td>23.50</td>
<td>2.35</td>
<td>10</td>
<td>295</td>
<td>0.29</td>
<td>0.52</td>
<td>0.27</td>
<td>1.08</td>
</tr>
<tr>
<td>25. Hedyotis corymbosa</td>
<td>4.75</td>
<td>0.95</td>
<td>20</td>
<td>117</td>
<td>0.12</td>
<td>1.04</td>
<td>0.10</td>
<td>1.26</td>
</tr>
<tr>
<td>26. Hedyotis diffusa</td>
<td>5.00</td>
<td>0.25</td>
<td>5</td>
<td>25</td>
<td>0.03</td>
<td>0.26</td>
<td>0.02</td>
<td>0.31</td>
</tr>
<tr>
<td>27. Hedyotis herbacea</td>
<td>3.75</td>
<td>0.75</td>
<td>20</td>
<td>95</td>
<td>0.09</td>
<td>1.04</td>
<td>0.08</td>
<td>1.21</td>
</tr>
<tr>
<td>28. Hyptis rhomboidea</td>
<td>1.00</td>
<td>0.10</td>
<td>10</td>
<td>16</td>
<td>0.01</td>
<td>0.52</td>
<td>0.01</td>
<td>0.54</td>
</tr>
<tr>
<td>29. Hyptis suaveoleus</td>
<td>18.00</td>
<td>4.50</td>
<td>25</td>
<td>1180</td>
<td>0.56</td>
<td>1.31</td>
<td>1.07</td>
<td>2.94</td>
</tr>
<tr>
<td>30. Imperata cylindrica</td>
<td>81.16</td>
<td>48.70</td>
<td>60</td>
<td>6185</td>
<td>6.09</td>
<td>3.14</td>
<td>5.61</td>
<td>14.84</td>
</tr>
<tr>
<td>31. Lindernia crustacea</td>
<td>9.42</td>
<td>3.30</td>
<td>35</td>
<td>265</td>
<td>0.41</td>
<td>1.83</td>
<td>0.24</td>
<td>2.48</td>
</tr>
</tbody>
</table>

Table Contd.
### Contd. Table-3.2

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D Pl. m⁻²</th>
<th>F %</th>
<th>BA cm²</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>32. Lindernia hirsuta</td>
<td>15.00</td>
<td>0.75</td>
<td>5</td>
<td>55</td>
<td>0.09</td>
<td>0.26</td>
<td>0.05</td>
<td>0.40</td>
</tr>
<tr>
<td>33. Lindernia hookeri</td>
<td>5.50</td>
<td>1.10</td>
<td>20</td>
<td>113</td>
<td>0.14</td>
<td>1.04</td>
<td>0.10</td>
<td>1.28</td>
</tr>
<tr>
<td>34. Lindernia pyxidaria</td>
<td>7.00</td>
<td>0.35</td>
<td>5</td>
<td>48</td>
<td>0.04</td>
<td>0.26</td>
<td>0.04</td>
<td>0.34</td>
</tr>
<tr>
<td>35. Lindernia sp</td>
<td>1.50</td>
<td>0.15</td>
<td>10</td>
<td>6</td>
<td>0.02</td>
<td>0.52</td>
<td>0.005</td>
<td>0.54</td>
</tr>
<tr>
<td>36. Lobelia alsinoides</td>
<td>16.00</td>
<td>0.80</td>
<td>5</td>
<td>80</td>
<td>0.10</td>
<td>0.26</td>
<td>0.07</td>
<td>0.43</td>
</tr>
<tr>
<td>37. Lygodium flexuosum</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>9</td>
<td>0.006</td>
<td>0.26</td>
<td>0.008</td>
<td>0.27</td>
</tr>
<tr>
<td>38. Melochia corchorifolia</td>
<td>2.66</td>
<td>0.40</td>
<td>15</td>
<td>57</td>
<td>0.05</td>
<td>0.78</td>
<td>0.05</td>
<td>0.88</td>
</tr>
<tr>
<td>39. Merremia hirta</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>44</td>
<td>0.02</td>
<td>0.26</td>
<td>0.04</td>
<td>0.32</td>
</tr>
<tr>
<td>40. Mimosa pudica</td>
<td>6.00</td>
<td>1.80</td>
<td>30</td>
<td>578</td>
<td>0.22</td>
<td>1.57</td>
<td>0.52</td>
<td>2.31</td>
</tr>
<tr>
<td>41. Mitracarpus verticillatus</td>
<td>19.20</td>
<td>14.40</td>
<td>75</td>
<td>1670</td>
<td>1.80</td>
<td>3.92</td>
<td>1.51</td>
<td>7.23</td>
</tr>
<tr>
<td>42. Mitrasacme pygmaea</td>
<td>5.00</td>
<td>0.25</td>
<td>5</td>
<td>26</td>
<td>0.03</td>
<td>0.26</td>
<td>0.02</td>
<td>0.31</td>
</tr>
<tr>
<td>43. Mnesithea laevis</td>
<td>15.66</td>
<td>4.70</td>
<td>30</td>
<td>615</td>
<td>0.59</td>
<td>1.57</td>
<td>0.56</td>
<td>2.72</td>
</tr>
<tr>
<td>44. Murdannia nudiflora</td>
<td>9.25</td>
<td>3.70</td>
<td>40</td>
<td>815</td>
<td>0.46</td>
<td>2.09</td>
<td>0.74</td>
<td>3.29</td>
</tr>
<tr>
<td>45. Paspalum scrobiculatum</td>
<td>12.77</td>
<td>5.75</td>
<td>45</td>
<td>748</td>
<td>0.72</td>
<td>2.35</td>
<td>0.68</td>
<td>3.75</td>
</tr>
<tr>
<td>46. Phyllanthus amarus</td>
<td>9.00</td>
<td>0.45</td>
<td>5</td>
<td>38</td>
<td>0.05</td>
<td>0.26</td>
<td>0.03</td>
<td>0.34</td>
</tr>
<tr>
<td>47. Phyllanthus urinaria</td>
<td>76.46</td>
<td>57.35</td>
<td>75</td>
<td>2985</td>
<td>7.17</td>
<td>3.92</td>
<td>2.70</td>
<td>13.79</td>
</tr>
<tr>
<td>48. Phyllanthus virgatus</td>
<td>26.50</td>
<td>5.30</td>
<td>20</td>
<td>570</td>
<td>0.66</td>
<td>1.04</td>
<td>0.51</td>
<td>2.21</td>
</tr>
<tr>
<td>49. Prunella vulgaris</td>
<td>29.00</td>
<td>14.50</td>
<td>50</td>
<td>1865</td>
<td>1.81</td>
<td>2.62</td>
<td>1.69</td>
<td>6.12</td>
</tr>
<tr>
<td>50. Pueraria phaseoloides</td>
<td>5.82</td>
<td>4.95</td>
<td>85</td>
<td>4183</td>
<td>0.62</td>
<td>4.45</td>
<td>3.79</td>
<td>8.86</td>
</tr>
<tr>
<td>51. Rottboellia sp.</td>
<td>10.00</td>
<td>1.00</td>
<td>10</td>
<td>146</td>
<td>0.12</td>
<td>0.52</td>
<td>0.13</td>
<td>0.77</td>
</tr>
<tr>
<td>52. Rungia pectinata</td>
<td>121.15</td>
<td>115.10</td>
<td>95</td>
<td>9785</td>
<td>14.39</td>
<td>4.97</td>
<td>8.87</td>
<td>28.23</td>
</tr>
<tr>
<td>53. Saccharum spontaneum</td>
<td>40.42</td>
<td>38.40</td>
<td>95</td>
<td>6298</td>
<td>4.80</td>
<td>4.97</td>
<td>5.71</td>
<td>15.48</td>
</tr>
<tr>
<td>54. Salomonia ciliata</td>
<td>2.80</td>
<td>1.40</td>
<td>50</td>
<td>204</td>
<td>0.17</td>
<td>2.62</td>
<td>0.18</td>
<td>2.97</td>
</tr>
<tr>
<td>55. Schizachyrium brevifolium</td>
<td>13.00</td>
<td>3.90</td>
<td>30</td>
<td>1343</td>
<td>0.48</td>
<td>1.57</td>
<td>1.22</td>
<td>3.27</td>
</tr>
<tr>
<td>56. Scleria caricina</td>
<td>22.14</td>
<td>7.75</td>
<td>35</td>
<td>653</td>
<td>0.97</td>
<td>1.83</td>
<td>0.59</td>
<td>3.39</td>
</tr>
<tr>
<td>57. Scleria parvula</td>
<td>55.00</td>
<td>5.50</td>
<td>10</td>
<td>424</td>
<td>0.69</td>
<td>0.52</td>
<td>0.38</td>
<td>1.59</td>
</tr>
<tr>
<td>58. Selaginella sp.</td>
<td>64.69</td>
<td>42.05</td>
<td>65</td>
<td>3280</td>
<td>5.26</td>
<td>3.40</td>
<td>2.97</td>
<td>11.63</td>
</tr>
<tr>
<td>59. Smithia conferta</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>9</td>
<td>0.006</td>
<td>0.26</td>
<td>0.008</td>
<td>0.27</td>
</tr>
<tr>
<td>60. Sporobolus indicus</td>
<td>153.37</td>
<td>145.70</td>
<td>95</td>
<td>12267</td>
<td>18.22</td>
<td>4.97</td>
<td>11.12</td>
<td>34.31</td>
</tr>
<tr>
<td>61. Streptocaulon sylvestre</td>
<td>4.62</td>
<td>1.85</td>
<td>40</td>
<td>1564</td>
<td>0.23</td>
<td>2.09</td>
<td>1.42</td>
<td>3.74</td>
</tr>
<tr>
<td>62. Vernonia cinerea</td>
<td>4.50</td>
<td>0.90</td>
<td>20</td>
<td>217</td>
<td>0.11</td>
<td>1.04</td>
<td>0.19</td>
<td>1.34</td>
</tr>
<tr>
<td>63. Zornia gibbosa</td>
<td>7.80</td>
<td>3.90</td>
<td>50</td>
<td>798</td>
<td>0.480</td>
<td>2.62</td>
<td>0.72</td>
<td>3.82</td>
</tr>
</tbody>
</table>

Total number of individuals of all species = 15992, Total basal area cover = 110273 cm²
Total number of quadrats examined = 20, Number of occurrences of all species = 382
viz. *Centranthera indica*, *Crotalaria ferruginea*, *Emilia sonchifolia*, *Conyza canadensis*, *Exacum tetragonum*, *Lygodium flexuosum* and *Smithia conferta* recorded the minimum values of density (0.05 m$^{-2}$), % frequency (5 %) and abundance (1). *Streptocaulon sylvestre* showed the % frequency and relative frequency values of 40 % and 2.09 %, respectively.

Raunkiaer's frequency classes A included 34 species, B 12 species, C 7 species, D 4 species and E 6 species (Fig- 3.2). According to Raunkiaer's 'Frequency Law' (i.e. A>B>C>=<D<E) this community showed the normal distribution of frequency percentage of the species which indicated the uniformity of the vegetation during this season.

The highest basal area cover was recorded by *Cymbopogon pendulus* having relative dominance value of 25.10 % followed by *Borreria alata* (12.46 %), *Sporobolus indicus* (11.12 %), *Rungia pectinata* (8.87 %), *Saccharum spontaneum* (5.71 %) etc. The IVI of all species in site-1 during monsoon -'98 was within the range of 0.27 -35.66, where the highest IVI (35.66) was noted for *Cymbopogon pendulus*. Amongst the remaining species, five species based on higher IVI values were *Borreria alata* (34.70), *Sporobolus indicus* (34.31), *Rungia pectinata* (28.23), *Saccharum spontaneum* (15.48) and *Imperata cylindrica* (14.84). *Streptocaulon sylvestre* showed the IVI of 3.74. The least IVI (0.27), on the otherhand, was noted for seven species like *Centranthera indica*, *Crotalaria ferruginea*, *Emilia sonchifolia*, *Conyza canadensis*, *Exacum tetragonum*, *Lygodium flexuosum* and *Smithia conferta* insite-1 during monsoon-’98.
3.2.1.1.2 SITE-I : WINTER SEASON

At site-1, a total of 56 species of plants were recorded during winter season of two years (1998 & 1999), 47 of them were in winter-'98 and 32 were in winter-'99. 23 species were common in both the seasons.

3.2.1.1.2.1 SITE-I : WINTER-'98

At site-1, the highest and lowest number of species listed in single quadrat were 19 and 8, respectively. The average number of species per quadrat was 12.50. A total of 7824 individuals were counted from 20 quadrats. The number of individuals among the quadrats ranged from 135 to 801. While the mean number of individuals per quadrat was 391.20.

A perusal of Table-3.3 shows that amongst the total 47 species, *Sporobolus indicus* was the most dominant herb at site-1 during winter-'98 having maximum density (84.90 m^2) and abundance (113.20). This was followed by *Rungia pectinata, Cymbopogon pendulus, Imperata cylindrica, Saccharum spontaneum, Borreria alata, Phyllanthus urinaria* etc. in term of density. Only a single species, *Rungia pectinata* was found most frequently in all the quadrats with % frequency and relative frequency values of 100 % and 8.13 %, respectively. This was followed by *Borreria alata, Cymbopogon pendulus, Saccharum spontaneum, Mitracarpus verticillatus, Sporobolus indicus* etc. Five species viz. *Breynia retusa, Emilia sonchifolia, Mikania micrantha, Osbeckia nepalensis* and *Urena lobata* showed minimum values of density (0.05 m^2), % frequency (5%) and abundance (1). *Streptocaulon sylvestre* showed the % frequency and relative frequency values of 50 % and 4.06 %, respectively.

Raunkiaer’s frequency classes A, B, C, D and E included 31, 3, 6, 4 and 3 species, respectively, (Fig-3.3). As per Raunkiaer’s ‘Law of frequency’ (i.e. A>B>C>=<D<E) observed values indicated that class B was not larger than class C and class E was not greater than class D. So this vegetation was subjected to severe biotic influences during winter-'98.

At site-1, *Sporobolus indicus* recorded the highest value of basal area cover i.e. relative dominance (14.54 %) followed by *Rungia pectinata* (14.18 %), *Cymbopogon pendulus* (12.13 %), *Borreria alata* (9.10 %), *Saccharum spontaneum* (8.13 %), *Imperata cylindrica* (5.14 %) etc. The IVI of all species in site-1 during winter-'98 was in the range of 0.42 - 42.33. On the basis of highest values of IVI (42.33) *Sporobolus indicus* was the most dominant species during winter-'98 followed by *Rungia pectinata* (39.10), *Cymbopogon pendulus* (29.85), *Borreria alata* (23.86),
Table 3.3: Computation of Phytosociological data of different species of Site-I in Winter 1998 season (Abbreviation used: Ab=Abundance, D=Density, F=Frequency, BA=Basal Area Cover, RD=Relative Density, RF=Relative Frequency, RDm=Relative Dominance and IVI=Importance Value Index)

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D</th>
<th>F</th>
<th>BA</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ageratum conyzoides</td>
<td>8.00</td>
<td>0.80</td>
<td>10</td>
<td>425</td>
<td>0.20</td>
<td>0.81</td>
<td>0.54</td>
<td>1.55</td>
</tr>
<tr>
<td>2. Borreria alata</td>
<td>29.00</td>
<td>27.55</td>
<td>95</td>
<td>7122</td>
<td>7.04</td>
<td>7.72</td>
<td>9.10</td>
<td>23.86</td>
</tr>
<tr>
<td>3. Borreria ocymoides</td>
<td>74.00</td>
<td>3.70</td>
<td>5</td>
<td>1158</td>
<td>0.94</td>
<td>0.40</td>
<td>1.48</td>
<td>2.82</td>
</tr>
<tr>
<td>4. Breynia retusa</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>12</td>
<td>0.01</td>
<td>0.40</td>
<td>0.01</td>
<td>0.42</td>
</tr>
<tr>
<td>5. Chrysopogon aciculatus</td>
<td>13.00</td>
<td>0.65</td>
<td>5</td>
<td>273</td>
<td>0.16</td>
<td>0.40</td>
<td>0.35</td>
<td>0.91</td>
</tr>
<tr>
<td>6. Clerodendrum viscosum</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>196</td>
<td>0.04</td>
<td>0.40</td>
<td>0.25</td>
<td>0.69</td>
</tr>
<tr>
<td>7. Crotalaria alata</td>
<td>1.00</td>
<td>0.10</td>
<td>10</td>
<td>14</td>
<td>0.02</td>
<td>0.81</td>
<td>0.02</td>
<td>0.85</td>
</tr>
<tr>
<td>8. Crotalaria prostrata</td>
<td>5.44</td>
<td>2.45</td>
<td>45</td>
<td>306</td>
<td>0.62</td>
<td>3.66</td>
<td>0.39</td>
<td>4.67</td>
</tr>
<tr>
<td>9. Cymbopogon microthea</td>
<td>79.00</td>
<td>11.85</td>
<td>15</td>
<td>2503</td>
<td>3.03</td>
<td>1.22</td>
<td>3.20</td>
<td>7.45</td>
</tr>
<tr>
<td>10. Cymbopogon pendulus</td>
<td>40.47</td>
<td>38.45</td>
<td>95</td>
<td>9621</td>
<td>9.83</td>
<td>7.72</td>
<td>12.30</td>
<td>29.85</td>
</tr>
<tr>
<td>11. Cynodon dactylon</td>
<td>5.00</td>
<td>0.50</td>
<td>10</td>
<td>112</td>
<td>0.13</td>
<td>0.81</td>
<td>0.14</td>
<td>1.08</td>
</tr>
<tr>
<td>12. Desmodium heterophyllum</td>
<td>18.00</td>
<td>2.70</td>
<td>15</td>
<td>337</td>
<td>0.69</td>
<td>1.22</td>
<td>0.43</td>
<td>2.34</td>
</tr>
<tr>
<td>13. Desmodium triflorum</td>
<td>16.77</td>
<td>10.90</td>
<td>65</td>
<td>2446</td>
<td>2.78</td>
<td>5.28</td>
<td>3.13</td>
<td>11.19</td>
</tr>
<tr>
<td>14. Digitaria ciliaris</td>
<td>11.66</td>
<td>1.75</td>
<td>15</td>
<td>228</td>
<td>0.45</td>
<td>1.22</td>
<td>0.29</td>
<td>1.95</td>
</tr>
<tr>
<td>15. Eleusine indica</td>
<td>5.00</td>
<td>0.25</td>
<td>5</td>
<td>43</td>
<td>0.06</td>
<td>0.40</td>
<td>0.05</td>
<td>0.51</td>
</tr>
<tr>
<td>16. Emilia sonchifolia</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>8</td>
<td>0.01</td>
<td>0.40</td>
<td>0.01</td>
<td>0.42</td>
</tr>
<tr>
<td>17. Eragrostis nigraria</td>
<td>11.66</td>
<td>1.75</td>
<td>15</td>
<td>371</td>
<td>0.44</td>
<td>1.22</td>
<td>0.47</td>
<td>2.13</td>
</tr>
<tr>
<td>18. Eragrostis tenella</td>
<td>8.00</td>
<td>0.40</td>
<td>5</td>
<td>73</td>
<td>0.10</td>
<td>0.40</td>
<td>0.09</td>
<td>0.59</td>
</tr>
<tr>
<td>19. Eragrostis unioloides</td>
<td>12.00</td>
<td>0.60</td>
<td>5</td>
<td>107</td>
<td>0.15</td>
<td>0.40</td>
<td>0.13</td>
<td>0.68</td>
</tr>
<tr>
<td>20. Hedyotis corymbosa</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>20</td>
<td>0.04</td>
<td>0.40</td>
<td>0.02</td>
<td>0.46</td>
</tr>
<tr>
<td>21. Hyptis suaveoleus</td>
<td>17.00</td>
<td>2.55</td>
<td>15</td>
<td>997</td>
<td>0.65</td>
<td>1.22</td>
<td>1.27</td>
<td>3.14</td>
</tr>
<tr>
<td>22. Imperata cylindrica</td>
<td>60.33</td>
<td>27.15</td>
<td>45</td>
<td>4020</td>
<td>6.94</td>
<td>3.66</td>
<td>5.14</td>
<td>15.74</td>
</tr>
<tr>
<td>23. Isachne albens</td>
<td>25.00</td>
<td>1.25</td>
<td>5</td>
<td>171</td>
<td>0.32</td>
<td>0.40</td>
<td>0.22</td>
<td>0.94</td>
</tr>
<tr>
<td>24. Lindernia ciliata</td>
<td>5.00</td>
<td>0.25</td>
<td>5</td>
<td>31</td>
<td>0.06</td>
<td>0.40</td>
<td>0.04</td>
<td>0.50</td>
</tr>
<tr>
<td>25. Lindernia crustacea</td>
<td>7.00</td>
<td>0.35</td>
<td>5</td>
<td>45</td>
<td>0.09</td>
<td>0.40</td>
<td>0.05</td>
<td>0.54</td>
</tr>
<tr>
<td>26. Lindernia pyxidaria</td>
<td>9.00</td>
<td>0.45</td>
<td>5</td>
<td>53</td>
<td>0.11</td>
<td>0.40</td>
<td>0.06</td>
<td>0.57</td>
</tr>
<tr>
<td>27. Mikania micrantha</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>9</td>
<td>0.01</td>
<td>0.40</td>
<td>0.01</td>
<td>0.42</td>
</tr>
<tr>
<td>28. Mimosa pudica</td>
<td>1.50</td>
<td>0.15</td>
<td>10</td>
<td>72</td>
<td>0.04</td>
<td>0.81</td>
<td>0.09</td>
<td>0.94</td>
</tr>
<tr>
<td>29. Mitracarpus verticillatus</td>
<td>23.66</td>
<td>17.75</td>
<td>75</td>
<td>3930</td>
<td>4.54</td>
<td>6.09</td>
<td>5.02</td>
<td>15.65</td>
</tr>
<tr>
<td>30. Mnesithea laevis</td>
<td>18.33</td>
<td>2.75</td>
<td>15</td>
<td>856</td>
<td>0.70</td>
<td>1.22</td>
<td>1.09</td>
<td>3.01</td>
</tr>
<tr>
<td>31. Murdannia nudiflora</td>
<td>2.00</td>
<td>0.10</td>
<td>5</td>
<td>23</td>
<td>0.02</td>
<td>0.40</td>
<td>0.03</td>
<td>0.45</td>
</tr>
</tbody>
</table>

*Table Contd.*
Contd. Table-3.3

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D</th>
<th>F</th>
<th>BA</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>32. Osbeckia nepalensis</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>11</td>
<td>0.01</td>
<td>0.40</td>
<td>0.01</td>
<td>0.42</td>
</tr>
<tr>
<td>33. Paspalum scrobiculatum</td>
<td>15.16</td>
<td>4.55</td>
<td>30</td>
<td>907</td>
<td>1.16</td>
<td>2.44</td>
<td>1.15</td>
<td>4.75</td>
</tr>
<tr>
<td>34. Phyllanthus urinaria</td>
<td>46.57</td>
<td>16.30</td>
<td>35</td>
<td>2044</td>
<td>4.16</td>
<td>2.84</td>
<td>2.61</td>
<td>9.61</td>
</tr>
<tr>
<td>35. Phyllanthus virgatus</td>
<td>22.89</td>
<td>10.30</td>
<td>45</td>
<td>805</td>
<td>2.63</td>
<td>3.66</td>
<td>1.03</td>
<td>7.32</td>
</tr>
<tr>
<td>36. Prunella vulgaris</td>
<td>8.14</td>
<td>2.85</td>
<td>35</td>
<td>371</td>
<td>0.73</td>
<td>2.84</td>
<td>0.47</td>
<td>4.04</td>
</tr>
<tr>
<td>37. Pueraria phaseoloides</td>
<td>3.45</td>
<td>1.90</td>
<td>55</td>
<td>1837</td>
<td>0.48</td>
<td>4.47</td>
<td>2.35</td>
<td>7.30</td>
</tr>
<tr>
<td>38. Rungia pectinata</td>
<td>65.70</td>
<td>65.70</td>
<td>100</td>
<td>11090</td>
<td>16.79</td>
<td>8.13</td>
<td>14.18</td>
<td>39.10</td>
</tr>
<tr>
<td>39. Saccharum spontaneum</td>
<td>36.44</td>
<td>29.15</td>
<td>80</td>
<td>6531</td>
<td>7.45</td>
<td>6.50</td>
<td>8.35</td>
<td>22.30</td>
</tr>
<tr>
<td>40. Selaginella sp.</td>
<td>30.75</td>
<td>6.15</td>
<td>20</td>
<td>671</td>
<td>1.57</td>
<td>1.62</td>
<td>0.86</td>
<td>4.05</td>
</tr>
<tr>
<td>41. Sporobolus indicus</td>
<td>113.20</td>
<td>84.90</td>
<td>75</td>
<td>11375</td>
<td>21.70</td>
<td>6.09</td>
<td>14.54</td>
<td>42.33</td>
</tr>
<tr>
<td>42. Streptocaulon sylvestre</td>
<td>4.80</td>
<td>2.40</td>
<td>50</td>
<td>4016</td>
<td>0.61</td>
<td>4.06</td>
<td>5.13</td>
<td>9.80</td>
</tr>
<tr>
<td>43. Triumfetta rhomboidea</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>23</td>
<td>0.04</td>
<td>0.40</td>
<td>0.03</td>
<td>0.47</td>
</tr>
<tr>
<td>44. Urena lobata</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>9</td>
<td>0.01</td>
<td>0.40</td>
<td>0.01</td>
<td>0.42</td>
</tr>
<tr>
<td>45. Vernonia cinerea</td>
<td>14.70</td>
<td>7.35</td>
<td>50</td>
<td>2465</td>
<td>1.88</td>
<td>4.06</td>
<td>3.15</td>
<td>9.09</td>
</tr>
<tr>
<td>46. Vetiveria zizanioides</td>
<td>17.00</td>
<td>1.70</td>
<td>10</td>
<td>443</td>
<td>0.43</td>
<td>0.81</td>
<td>0.56</td>
<td>0.45</td>
</tr>
<tr>
<td>47. Zornia gibbosa</td>
<td>2.00</td>
<td>0.10</td>
<td>5</td>
<td>29</td>
<td>0.02</td>
<td>0.40</td>
<td>0.03</td>
<td>1.80</td>
</tr>
</tbody>
</table>

Total number of individuals of all species = 7824, Total basal area cover = 78209 cm²
Total number of quadrats examined = 20, Number of occurrences of all species = 246

Fig-3.3 Number of species under Raunkiaer’s frequency classes A, B, C, D and E at Site-I during Winter-'98
Phytosociology

Saccharum spontanum (22.30), Imperata cylindrica (15.74), Mitracarpus verticillatus (15.65), Desmodium triflorum (11.19) etc. Besides, the lowest IVI (0.42) was noted for Breynia retusa, Emilia sonchifolia, Mikania micrantha, Osbeckia nepalensis and Urena lobata. Streptocaulon sylvestre possessed the IVI of 9.80 at site-I during winter-'98.

32.1.122. SITE-I : WINTER-'99

Altogether 32 species of plants were recorded at Site-1 during winter-'99 (Table-3.4). The highest number of species recorded in single quadrat was 13 and lowest was 6. The mean number of species per quadrat was 9.10. A total of 4654 individuals were accounted for 20 quadrats, while the number of individuals among the quadrats ranged from 137 to 434. The average number of individuals per quadrat was 232.70.

The floristic composition and community characteristics of site-1 during winter-'99 are presented in Table-3.4. Results indicate that Sporobolus indicus accounted for maximum individualized species in the community during this season contributing to the highest density (54.15 m\(^2\)) and abundance (57) with 23.27 % relative density value. Amongst the remaining species, the first five species based on relative density were Imperata cylindrica (19.31 %), Cymbopogon pendulus (18.80 %), Saccharum spontaneum (14.52 %), Eragrostis unioloides (5.13 %) and Rungia pectinata (4.77 %). Streptocaulon sylvestre showed the relative dominance value of 0.81 %.

At site-1, during winter-'99, none of the recorded 32 species showed 100 % frequency value. Sporobolus indicus had the highest values of % frequency (95 %) and relative frequency (10.55 %) followed by Cymbopogon pendulus, Imperata cylindrica, Pueraria phaseoloides, Rungia pectinata, Desmodium triflorum etc. The % frequency and relative frequency recorded by Streptocaulon sylvestre were 55 % and 6.11 %, respectively. The minimum values of density (0.05 m\(^2\)), % frequency (5 %) and abundance (1) were noted for three species, namely Borreria alata, Centella asiatica and Mukia maderaspatana during winter-'99. Raunkiaer's frequency classes A, B, C, D and E included 20, 3, 2, 4 and 3 species, respectively (Fig-3.4). According to 'Law of frequency' as E was smaller than D, so this community was biotically disturbed during winter-'99.

During winter-'99 Cymbopogon pendulus contributed to the highest basal area cover at site-1 having relative dominance value of 20.15 %. This was followed by Sporobolus indicus (16.77 %), Imperata cylindrica (14.09 %), Saccharum spontaneum (11.75 %), Pueraria phaseoloides (8.63 %) etc. Streptocaulon sylvestre
Table-3.4: Abundance (Ab), Density (D), Frequency (F), Basal Area Cover (BA), Relative Density (RD), Relative Frequency (RF), Relative Dominance (R Dm) and Importance Value Index (IVI) of various species of Site-I in Winter 1999 season.

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D Pl. m⁻²</th>
<th>F %</th>
<th>BA cm²</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ageratum conyzoides</td>
<td>7.00</td>
<td>0.70</td>
<td>10</td>
<td>379</td>
<td>0.30</td>
<td>1.11</td>
<td>0.75</td>
<td>2.16</td>
</tr>
<tr>
<td>2. Axonopus compressus</td>
<td>11.00</td>
<td>0.55</td>
<td>5</td>
<td>90</td>
<td>0.23</td>
<td>0.55</td>
<td>0.18</td>
<td>0.96</td>
</tr>
<tr>
<td>3. Borneria alata</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>17</td>
<td>0.02</td>
<td>0.55</td>
<td>0.03</td>
<td>0.60</td>
</tr>
<tr>
<td>4. Centella asiatica</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>12</td>
<td>0.02</td>
<td>0.55</td>
<td>0.02</td>
<td>0.59</td>
</tr>
<tr>
<td>5. Chloris barbata</td>
<td>10.00</td>
<td>0.50</td>
<td>5</td>
<td>91</td>
<td>0.21</td>
<td>0.55</td>
<td>0.18</td>
<td>0.94</td>
</tr>
<tr>
<td>6. Chtysopogon aciculatus</td>
<td>6.00</td>
<td>0.60</td>
<td>10</td>
<td>280</td>
<td>0.26</td>
<td>1.11</td>
<td>0.55</td>
<td>1.92</td>
</tr>
<tr>
<td>7. Clerodendrum serratum</td>
<td>20.00</td>
<td>1.00</td>
<td>5</td>
<td>982</td>
<td>0.43</td>
<td>0.55</td>
<td>1.94</td>
<td>2.92</td>
</tr>
<tr>
<td>8. Cymbopogon pendulus</td>
<td>48.61</td>
<td>43.75</td>
<td>90</td>
<td>10180</td>
<td>18.80</td>
<td>10.00</td>
<td>20.15</td>
<td>48.95</td>
</tr>
<tr>
<td>9. Desmodium triflorum</td>
<td>5.28</td>
<td>3.70</td>
<td>70</td>
<td>986</td>
<td>1.59</td>
<td>7.78</td>
<td>1.95</td>
<td>11.32</td>
</tr>
<tr>
<td>10. Digitaria ciliaris</td>
<td>14.33</td>
<td>2.15</td>
<td>15</td>
<td>286</td>
<td>0.92</td>
<td>1.66</td>
<td>0.56</td>
<td>3.14</td>
</tr>
<tr>
<td>11. Eleusine indica</td>
<td>4.00</td>
<td>0.20</td>
<td>5</td>
<td>50</td>
<td>0.08</td>
<td>0.55</td>
<td>0.10</td>
<td>0.73</td>
</tr>
<tr>
<td>12. Emmilia sonchifolia</td>
<td>2.00</td>
<td>0.10</td>
<td>5</td>
<td>16</td>
<td>0.04</td>
<td>0.55</td>
<td>0.03</td>
<td>0.62</td>
</tr>
<tr>
<td>13. Eragrostis nigra</td>
<td>2.00</td>
<td>0.10</td>
<td>5</td>
<td>20</td>
<td>0.04</td>
<td>0.55</td>
<td>0.04</td>
<td>0.63</td>
</tr>
<tr>
<td>14. Eragrostis tenella</td>
<td>5.00</td>
<td>0.25</td>
<td>5</td>
<td>41</td>
<td>0.11</td>
<td>0.55</td>
<td>0.08</td>
<td>0.74</td>
</tr>
<tr>
<td>15. Eragrostis unioloides</td>
<td>29.87</td>
<td>11.95</td>
<td>40</td>
<td>1997</td>
<td>5.13</td>
<td>4.44</td>
<td>3.95</td>
<td>13.52</td>
</tr>
<tr>
<td>16. Euphorbia thymifolia</td>
<td>4.00</td>
<td>0.20</td>
<td>5</td>
<td>50</td>
<td>0.08</td>
<td>0.55</td>
<td>0.10</td>
<td>0.73</td>
</tr>
<tr>
<td>17. Hypis suaveoleus</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>67</td>
<td>0.06</td>
<td>0.55</td>
<td>0.13</td>
<td>0.74</td>
</tr>
<tr>
<td>18. Ichnocarpus frutescens</td>
<td>5.00</td>
<td>0.25</td>
<td>5</td>
<td>41</td>
<td>0.11</td>
<td>0.55</td>
<td>0.08</td>
<td>0.74</td>
</tr>
<tr>
<td>19. Imperata cylindrica</td>
<td>52.88</td>
<td>44.95</td>
<td>85</td>
<td>7120</td>
<td>19.31</td>
<td>9.44</td>
<td>14.09</td>
<td>42.84</td>
</tr>
<tr>
<td>20. Mimosa pudica</td>
<td>3.00</td>
<td>0.75</td>
<td>25</td>
<td>385</td>
<td>0.32</td>
<td>2.78</td>
<td>0.76</td>
<td>3.86</td>
</tr>
<tr>
<td>21. Mitracarpus verticillatus</td>
<td>5.00</td>
<td>0.50</td>
<td>10</td>
<td>133</td>
<td>0.21</td>
<td>1.11</td>
<td>0.26</td>
<td>1.58</td>
</tr>
<tr>
<td>22. Mukia maderaspatana</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>9</td>
<td>0.02</td>
<td>0.55</td>
<td>0.02</td>
<td>0.59</td>
</tr>
<tr>
<td>23. Ophiuros exaltatus</td>
<td>23.00</td>
<td>1.15</td>
<td>5</td>
<td>162</td>
<td>0.49</td>
<td>0.55</td>
<td>0.32</td>
<td>1.36</td>
</tr>
<tr>
<td>24. Paspalum scrobiculatum</td>
<td>13.60</td>
<td>3.40</td>
<td>25</td>
<td>827</td>
<td>1.46</td>
<td>2.78</td>
<td>1.64</td>
<td>5.88</td>
</tr>
<tr>
<td>25. Pueraria phaseoloides</td>
<td>5.75</td>
<td>4.60</td>
<td>80</td>
<td>4358</td>
<td>1.98</td>
<td>8.89</td>
<td>8.63</td>
<td>19.50</td>
</tr>
<tr>
<td>26. Rungia pectinata</td>
<td>14.80</td>
<td>11.10</td>
<td>75</td>
<td>2311</td>
<td>4.77</td>
<td>8.33</td>
<td>4.57</td>
<td>17.67</td>
</tr>
<tr>
<td>27. Saccharum spontaneum</td>
<td>56.33</td>
<td>33.80</td>
<td>60</td>
<td>5938</td>
<td>14.52</td>
<td>6.66</td>
<td>11.75</td>
<td>32.93</td>
</tr>
<tr>
<td>28. Sporobolus indicus</td>
<td>57.00</td>
<td>54.15</td>
<td>95</td>
<td>8472</td>
<td>23.27</td>
<td>10.55</td>
<td>16.77</td>
<td>50.59</td>
</tr>
<tr>
<td>29. Streptocaulon sylvestre</td>
<td>3.45</td>
<td>1.90</td>
<td>55</td>
<td>3315</td>
<td>0.81</td>
<td>6.11</td>
<td>6.56</td>
<td>13.48</td>
</tr>
<tr>
<td>30. Tripogon sp.</td>
<td>85.50</td>
<td>8.55</td>
<td>10</td>
<td>1170</td>
<td>3.67</td>
<td>1.11</td>
<td>2.31</td>
<td>7.09</td>
</tr>
<tr>
<td>31. Triumfetta rhomboidea</td>
<td>1.00</td>
<td>0.10</td>
<td>10</td>
<td>21</td>
<td>0.04</td>
<td>1.11</td>
<td>0.04</td>
<td>1.19</td>
</tr>
<tr>
<td>32. Vernonia cinerea</td>
<td>2.23</td>
<td>1.45</td>
<td>65</td>
<td>716</td>
<td>0.62</td>
<td>7.22</td>
<td>1.42</td>
<td>9.26</td>
</tr>
</tbody>
</table>

Total number of individuals of all species = 4654, Total basal area cover = 50522 cm²
Total number of quadrats examined = 20, Number of occurrences of all species = 180
Fig-3.4 Number of species under Raunkiaer's frequency classes A, B, C, D and E at site-I during winter-'99

showed relative dominance of 6.65 %. The IVI of all species in site-1 during winter-'99 were in the range of 0.59 - 50.59 of which Sporobolus indicus (50.59) appeared to be the most important species of that season, followed by Cymbopogon pendulus (48.95), Imperata cylindrica (42.84), Saccharum spontaneum (32.93), Pueraria phaseoloides (19.50), Rungia pectinata (17.67) etc. Streptocaulon sylvestre scored 13.48 as its IVI. Again, two species viz. Centella asiatica and Mukia maderaspatana showed the minimum IVI of 0.59 at site-1 in this season.

3.2.1.3 SITE-1: SUMMER SEASON

Altogether 76 species of plants were recorded in site-1 during the summer seasons of 1998 and 1999. Out of these, 55 species were recorded in summer-'98 and 52 were in summer-'99. 31 species were common in both the years in summer vegetation.

3.2.1.3.1 SITE-1: SUMMER-'98

In the present study in site-1, the highest number of species listed in single quadrat was 18, and 11 was the lowest, while the mean number of species per quadrat was 14.40. The total number of individuals recorded from the 20 quadrats were 17926. While the number of individuals among the quadrats were in the range of 434 - 1697. The average number of individuals per quadrat was 896.30.

A perusal of Table-3.5 shows that amongst the total 55 species, Borreria
Table 3.5: Phytosociological characters of herbaceous vegetation of Site-I in Summer 1998 season (Abbreviation used : Ab=Abundance, D=Density, F=Frequency, BA=Basal Area Cover, RD=Relative Density, RF=Relative Frequency, RDm=Relative Dominance and IVI=Importance Value Index)

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D</th>
<th>F %</th>
<th>BA</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ageratum conyzoides</td>
<td>23.50</td>
<td>2.35</td>
<td>10</td>
<td>250</td>
<td>0.26</td>
<td>0.70</td>
<td>0.30</td>
<td>1.26</td>
</tr>
<tr>
<td>2. Alloteropsis cimicina</td>
<td>25.00</td>
<td>1.25</td>
<td>5</td>
<td>146</td>
<td>0.14</td>
<td>0.35</td>
<td>0.18</td>
<td>0.67</td>
</tr>
<tr>
<td>3. Andropogon ascinodis</td>
<td>8.00</td>
<td>0.40</td>
<td>5</td>
<td>50</td>
<td>0.04</td>
<td>0.35</td>
<td>0.06</td>
<td>0.45</td>
</tr>
<tr>
<td>4. Atylosia scarabaeoides</td>
<td>1.50</td>
<td>0.15</td>
<td>10</td>
<td>22</td>
<td>0.01</td>
<td>0.70</td>
<td>0.02</td>
<td>0.73</td>
</tr>
<tr>
<td>5. Borreria alata</td>
<td>237.17</td>
<td>201.60</td>
<td>85</td>
<td>11653</td>
<td>22.50</td>
<td>5.94</td>
<td>14.24</td>
<td>42.68</td>
</tr>
<tr>
<td>6. Cassia mimosoides</td>
<td>3.50</td>
<td>0.35</td>
<td>10</td>
<td>50</td>
<td>0.04</td>
<td>0.70</td>
<td>0.06</td>
<td>0.80</td>
</tr>
<tr>
<td>7. Chrysopogon aciculatus</td>
<td>24.00</td>
<td>3.60</td>
<td>15</td>
<td>275</td>
<td>0.40</td>
<td>1.05</td>
<td>0.33</td>
<td>1.78</td>
</tr>
<tr>
<td>8. Clerodendrum viscousum</td>
<td>8.00</td>
<td>0.40</td>
<td>5</td>
<td>137</td>
<td>0.04</td>
<td>0.35</td>
<td>0.17</td>
<td>0.56</td>
</tr>
<tr>
<td>9. Crotalaria alata</td>
<td>5.00</td>
<td>0.25</td>
<td>5</td>
<td>23</td>
<td>0.03</td>
<td>0.35</td>
<td>0.03</td>
<td>0.41</td>
</tr>
<tr>
<td>10. Crotalaria ferruginea</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>5</td>
<td>0.005</td>
<td>0.35</td>
<td>0.006</td>
<td>0.36</td>
</tr>
<tr>
<td>11. Crotalaria pallida</td>
<td>4.00</td>
<td>0.20</td>
<td>5</td>
<td>19</td>
<td>0.02</td>
<td>0.35</td>
<td>0.02</td>
<td>0.39</td>
</tr>
<tr>
<td>12. Crotalaria prostrata</td>
<td>1.43</td>
<td>0.50</td>
<td>35</td>
<td>54</td>
<td>0.05</td>
<td>2.44</td>
<td>0.06</td>
<td>2.55</td>
</tr>
<tr>
<td>13. Cymbopogon pendulus</td>
<td>71.77</td>
<td>64.60</td>
<td>90</td>
<td>22239</td>
<td>7.20</td>
<td>6.29</td>
<td>27.18</td>
<td>40.67</td>
</tr>
<tr>
<td>14. Cynodon dactylon</td>
<td>22.00</td>
<td>1.10</td>
<td>5</td>
<td>179</td>
<td>0.12</td>
<td>0.35</td>
<td>0.22</td>
<td>0.69</td>
</tr>
<tr>
<td>15. Cyperus compressus</td>
<td>6.66</td>
<td>2.00</td>
<td>30</td>
<td>125</td>
<td>0.22</td>
<td>2.10</td>
<td>0.15</td>
<td>2.47</td>
</tr>
<tr>
<td>16. Cyperus laxus</td>
<td>44.50</td>
<td>4.45</td>
<td>10</td>
<td>259</td>
<td>0.49</td>
<td>0.70</td>
<td>0.31</td>
<td>1.50</td>
</tr>
<tr>
<td>17. Desmodium heterophyllum</td>
<td>4.00</td>
<td>0.20</td>
<td>5</td>
<td>41</td>
<td>0.02</td>
<td>0.35</td>
<td>0.05</td>
<td>0.42</td>
</tr>
<tr>
<td>18. Desmodium laxiforum</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>8</td>
<td>0.005</td>
<td>0.35</td>
<td>0.01</td>
<td>0.36</td>
</tr>
<tr>
<td>19. Desmodium triflorum</td>
<td>16.54</td>
<td>10.75</td>
<td>65</td>
<td>1359</td>
<td>1.20</td>
<td>4.54</td>
<td>1.66</td>
<td>7.40</td>
</tr>
<tr>
<td>20. Digitaria ciliaris</td>
<td>9.71</td>
<td>3.40</td>
<td>35</td>
<td>270</td>
<td>0.38</td>
<td>2.44</td>
<td>0.33</td>
<td>3.15</td>
</tr>
<tr>
<td>21. Dysphylia crassicaulis</td>
<td>41.50</td>
<td>4.15</td>
<td>10</td>
<td>665</td>
<td>0.46</td>
<td>0.70</td>
<td>0.81</td>
<td>1.97</td>
</tr>
<tr>
<td>22. Elephantopus scaber</td>
<td>3.00</td>
<td>0.30</td>
<td>10</td>
<td>109</td>
<td>0.03</td>
<td>0.70</td>
<td>0.13</td>
<td>0.86</td>
</tr>
<tr>
<td>23. Eleusine indica</td>
<td>10.00</td>
<td>0.50</td>
<td>5</td>
<td>66</td>
<td>0.05</td>
<td>0.35</td>
<td>0.08</td>
<td>0.48</td>
</tr>
<tr>
<td>24. Emilia sonchifolia</td>
<td>3.80</td>
<td>0.95</td>
<td>25</td>
<td>97</td>
<td>0.10</td>
<td>1.75</td>
<td>0.12</td>
<td>1.97</td>
</tr>
<tr>
<td>25. Eragrostis nigra</td>
<td>8.00</td>
<td>1.20</td>
<td>15</td>
<td>122</td>
<td>0.13</td>
<td>1.05</td>
<td>0.15</td>
<td>1.33</td>
</tr>
<tr>
<td>26. Eragrostis tenella</td>
<td>19.25</td>
<td>7.70</td>
<td>40</td>
<td>712</td>
<td>0.86</td>
<td>2.80</td>
<td>0.87</td>
<td>4.53</td>
</tr>
<tr>
<td>27. Fimbriaria sp.</td>
<td>6.00</td>
<td>0.30</td>
<td>5</td>
<td>37</td>
<td>0.03</td>
<td>0.35</td>
<td>0.04</td>
<td>0.42</td>
</tr>
<tr>
<td>28. Hedyotis corymbosa</td>
<td>2.00</td>
<td>0.10</td>
<td>5</td>
<td>9</td>
<td>0.01</td>
<td>0.35</td>
<td>0.01</td>
<td>0.37</td>
</tr>
<tr>
<td>29. Hedyotis diffusa</td>
<td>4.00</td>
<td>0.20</td>
<td>5</td>
<td>16</td>
<td>0.02</td>
<td>0.35</td>
<td>0.02</td>
<td>0.39</td>
</tr>
<tr>
<td>30. Hypit suaveoleus</td>
<td>176.80</td>
<td>44.20</td>
<td>25</td>
<td>5410</td>
<td>4.93</td>
<td>1.75</td>
<td>6.61</td>
<td>13.29</td>
</tr>
<tr>
<td>31. Imperata cylindrica</td>
<td>68.20</td>
<td>51.15</td>
<td>75</td>
<td>5449</td>
<td>5.70</td>
<td>5.24</td>
<td>6.66</td>
<td>17.60</td>
</tr>
</tbody>
</table>

Table Contd.
<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D</th>
<th>F%</th>
<th>BA</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>32. Isachne albens</td>
<td>17</td>
<td>0.85</td>
<td>5</td>
<td>70</td>
<td>0.09</td>
<td>0.35</td>
<td>0.08</td>
<td>0.52</td>
</tr>
<tr>
<td>33. Leucas indica</td>
<td>70.00</td>
<td>3.50</td>
<td>5</td>
<td>445</td>
<td>0.39</td>
<td>0.35</td>
<td>0.54</td>
<td>1.28</td>
</tr>
<tr>
<td>34. Lindernia pyxidaria</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>4</td>
<td>0.005</td>
<td>0.35</td>
<td>0.005</td>
<td>0.36</td>
</tr>
<tr>
<td>35. Melochia corchorifolia</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>6</td>
<td>0.005</td>
<td>0.35</td>
<td>0.007</td>
<td>0.36</td>
</tr>
<tr>
<td>36. Mikania micrantha</td>
<td>5.00</td>
<td>0.25</td>
<td>5</td>
<td>36</td>
<td>0.03</td>
<td>0.35</td>
<td>0.04</td>
<td>0.42</td>
</tr>
<tr>
<td>37. Mimosa pudica</td>
<td>29.33</td>
<td>4.40</td>
<td>15</td>
<td>838</td>
<td>0.49</td>
<td>1.05</td>
<td>1.02</td>
<td>2.56</td>
</tr>
<tr>
<td>38. Mitracarpus verticillatus</td>
<td>128.53</td>
<td>96.40</td>
<td>75</td>
<td>5037</td>
<td>10.75</td>
<td>5.24</td>
<td>6.16</td>
<td>22.15</td>
</tr>
<tr>
<td>39. Mnesithea laevis</td>
<td>23.36</td>
<td>12.85</td>
<td>55</td>
<td>1123</td>
<td>1.43</td>
<td>3.84</td>
<td>1.37</td>
<td>6.64</td>
</tr>
<tr>
<td>40. Paspalum scrobiculatum</td>
<td>17.91</td>
<td>9.85</td>
<td>55</td>
<td>950</td>
<td>1.10</td>
<td>3.84</td>
<td>1.16</td>
<td>6.10</td>
</tr>
<tr>
<td>41. Phyllanthus virgatus</td>
<td>144.71</td>
<td>101.30</td>
<td>70</td>
<td>4315</td>
<td>11.30</td>
<td>4.89</td>
<td>5.27</td>
<td>21.46</td>
</tr>
<tr>
<td>42. Polygala arvensis</td>
<td>2.00</td>
<td>0.10</td>
<td>5</td>
<td>12</td>
<td>0.01</td>
<td>0.35</td>
<td>0.01</td>
<td>0.37</td>
</tr>
<tr>
<td>43. Pueraria phaseoloides</td>
<td>5.71</td>
<td>4.00</td>
<td>70</td>
<td>740</td>
<td>0.44</td>
<td>4.89</td>
<td>0.90</td>
<td>6.23</td>
</tr>
<tr>
<td>44. Rungia pectinata</td>
<td>39.25</td>
<td>7.85</td>
<td>20</td>
<td>717</td>
<td>0.87</td>
<td>1.40</td>
<td>0.87</td>
<td>3.14</td>
</tr>
<tr>
<td>45. Saccharum spontaneum</td>
<td>52.47</td>
<td>44.60</td>
<td>85</td>
<td>3220</td>
<td>4.97</td>
<td>5.94</td>
<td>3.93</td>
<td>14.84</td>
</tr>
<tr>
<td>46. Salomonia ciliata</td>
<td>7.83</td>
<td>2.36</td>
<td>30</td>
<td>194</td>
<td>0.26</td>
<td>2.10</td>
<td>0.24</td>
<td>2.60</td>
</tr>
<tr>
<td>47. Setaria pumila</td>
<td>10.00</td>
<td>0.50</td>
<td>5</td>
<td>46</td>
<td>0.05</td>
<td>0.35</td>
<td>0.05</td>
<td>0.45</td>
</tr>
<tr>
<td>48. Sida rhombifolia</td>
<td>35.00</td>
<td>1.75</td>
<td>5</td>
<td>257</td>
<td>0.19</td>
<td>0.35</td>
<td>0.31</td>
<td>0.85</td>
</tr>
<tr>
<td>50. Streptocaulon sylvestre</td>
<td>4.90</td>
<td>2.45</td>
<td>50</td>
<td>2059</td>
<td>0.27</td>
<td>3.49</td>
<td>2.51</td>
<td>6.27</td>
</tr>
<tr>
<td>51. Triumfetta rhomboidea</td>
<td>9.00</td>
<td>0.45</td>
<td>5</td>
<td>43</td>
<td>0.05</td>
<td>0.35</td>
<td>0.05</td>
<td>0.45</td>
</tr>
<tr>
<td>52. Urena lobata</td>
<td>1.66</td>
<td>0.25</td>
<td>15</td>
<td>23</td>
<td>0.03</td>
<td>1.05</td>
<td>0.03</td>
<td>1.11</td>
</tr>
<tr>
<td>53. Vernonia cinerea</td>
<td>14.33</td>
<td>6.45</td>
<td>45</td>
<td>800</td>
<td>0.72</td>
<td>3.14</td>
<td>0.98</td>
<td>4.84</td>
</tr>
<tr>
<td>54. Zornia gibbosa</td>
<td>7.43</td>
<td>2.60</td>
<td>35</td>
<td>253</td>
<td>0.29</td>
<td>2.45</td>
<td>0.31</td>
<td>3.05</td>
</tr>
<tr>
<td>55. Gramineae- unidentified</td>
<td>16.00</td>
<td>0.80</td>
<td>5</td>
<td>64</td>
<td>0.09</td>
<td>0.35</td>
<td>0.08</td>
<td>0.52</td>
</tr>
</tbody>
</table>

Total number of individuals of all species = 17926, Total basal area cover = 81799 cm²
Total number of quadrats examined = 20, Number of occurrences of all species = 286

*alata* accounted for highest populated species (4032 individuals) in site-1 during summer-'98, contributing to the maximum density (201.60 m⁻²), abundance (237.17) and relative dominance (22.50 %). This was followed by *Sporobolus indicus* (20.55 %), *Phyllanthus virgatus* (11.30 %), *Mitracarpus verticillatus* (10.75 %), *Cymbopogon pendulus* (7.20 %), *Imperata cylindrica* (5.70 %) etc. in term of relative density.

In site-1 only a single species *Sporobolus indicus* appeared to be the most frequently available species in summer-'98 having maximum % frequency (100 %)
and relative frequency (6.99 %). This was followed by *Cymbopogon pendulus, Borreria alata, Saccharum spontaneum, Imperata cylindrica, Mitracarpus verticillatus* etc. The lowest values of density (0.05 m$^2$), frequency (5 %) and abundance (1) were showed by four species viz. *Crotalaria ferruginea, Desmodium laxiflorum, Lindernia pyxidaria* and *Melochia corchorifolia*. *Streptocaulon sylvestre* recorded the relative frequency value of 3.49 %. Raunkiaer's frequency classes A, B, C, D and E comprised of 34, 8, 4, 5 and 4 species, respectively, (Fig-3.5). As class E was not greater than Class D, so according to 'Frequency Law' the community indicated the sufferings from considerable disturbances during summer-'98.

During summer-'98 *Cymbopogon pendulus* covered the maximum basal area in site-1 having highest relative dominance of 27.18 %, followed by *Borreria alata* (14.24 %), *Sporobolus indicus* (13.07), *Imperata cylindrica* (6.66 %), *Hyptis suaveoleus* (6.61 %), *Mitracarpus verticillatus* (6.16 %) etc. *Streptocaulon sylvestre* showed relative dominance of 2.51 %. The IVI of all species in site-1 during summer-98 ranged between 0.36 and 42.68. The first five dominant species on the basis of IVI were *Borreria alata* (42.68), *Cymbopogon pendulus* (40.67), *Sporobolus indicus* (40.61), *Mitracarpus verticillatus* (22.15) and *Phyllanthus virgatus* (21.46). The lowest IVI (0.36) was noted for *Crotalaria ferruginea, Desmodium laxiflorum,*
Lindernia pyxidaria and Melochia corchorifolia. Streptocaulon sylvestre showed the IVI of 6.27 in site-1 in summer-'98.

3.2.1.3.2 SITE-1 : SUMMER-'99

At site-1, a total of 52 plant species were recorded from quadrats during summer-'99 (Table-3.6). The highest and lowest number of species recorded in single quadrat were 18 and 10, respectively. The mean number of species per quadrat was 14.55. A total of 16579 individuals were recorded from 20 quadrats. The number of individuals among the quadrats ranged from 338 to 1341. While the average number of individuals per quadrat was 828.95.

The results of phytosociological analysis are presented in Table-3.6. Analysis of results showed that out of 52 species, Borreria alata was the most dominant herb in site-1 during summer-'99 recorded highest density (289.10 m⁻²) and abundance (331.22) contributing to 35.96 % of relative density. Amongst the remaining species, the first five species based on relative dominance were Sporobolus indicus (17.92 %), Phyllanthus urinaria (7.46 %), Saccharum spontaneum (6.44 %), Mitracarpus verticillatus (5.79 %) and Cymbopogon pendulus (5.14 %). The relative dominance value of 0.31% was noted for Streptocaulon sylvestre.

Results reveal that Sporobolus indicus was found most frequently in all the quadrats in site-1 during summer-'99 having maximum % frequency (100 %) and relative frequency (6.94 %) values. This was followed by Borreria alata (16.25 %), Cymbopogon pendulus (6.25 %), Saccharum spontaneum (6.25 %), Desmodium triflorum (5.90 %), Phyllanthus urinaria (5.90 %) etc. in term of relative frequency. The minimum density (0.05 m⁻²), % frequency (5 %) and abundance (1) were noted for Crotalaria prostrata, Curculigo orchioides and Euphorbia orbiculata. Streptocaulon sylvestre showed the % frequency and relative frequency values of 55 % and 3.82 %, respectively.

Raunkiaer’s frequency classes A, B, C, D and E included 32, 5, 8, 1 and 6 species, respectively. This can also be represented as A>B<C>D<E. As per Raunkiaer’s ‘Law of frequency’ class B was not larger than class C, so this community was subjected to severe biotic influences during summer-'99. (Fig-3.6).

Cymbopogon pendulus recorded highest basal area cover in site-1 during summer-'99 season with relative dominance of 25.07 % followed by Borreria alata (22.07 %), Sporobolus indicus (12.94 %), Imperata cylindrica (6.07 %) etc. Streptocaulon sylvestre recorded the relative dominance of 3.40 %. The IVI of all
Table-3.6: Floristic composition, Abundance (Ab), Density (D), Frequency (F), Basal Area Cover (BA), Relative Density (RD), Relative Frequency (RF), Relative Dominance (R Dm) and Importance Value Index (IVI) of various species of Site-I during Summer 1999 season.

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D</th>
<th>F</th>
<th>BA</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Borreria alata</td>
<td>331.22</td>
<td>298.10</td>
<td>90</td>
<td>15264</td>
<td>35.96</td>
<td>6.25</td>
<td>22.07</td>
<td>64.28</td>
</tr>
<tr>
<td>2. Brachiaria reptans</td>
<td>5.00</td>
<td>0.25</td>
<td>5</td>
<td>17</td>
<td>0.03</td>
<td>0.35</td>
<td>0.02</td>
<td>0.40</td>
</tr>
<tr>
<td>3. Cassia mimosoides</td>
<td>4.66</td>
<td>1.40</td>
<td>30</td>
<td>170</td>
<td>0.17</td>
<td>2.08</td>
<td>0.24</td>
<td>2.49</td>
</tr>
<tr>
<td>4. Chrysopogon aciculatus</td>
<td>16.22</td>
<td>7.30</td>
<td>45</td>
<td>599</td>
<td>0.88</td>
<td>3.12</td>
<td>0.86</td>
<td>4.86</td>
</tr>
<tr>
<td>5. Clerodendrum viscosum</td>
<td>7.00</td>
<td>0.35</td>
<td>5</td>
<td>73</td>
<td>0.04</td>
<td>0.35</td>
<td>0.10</td>
<td>0.49</td>
</tr>
<tr>
<td>6. Crotalaria pallida</td>
<td>1.00</td>
<td>0.10</td>
<td>10</td>
<td>10</td>
<td>0.01</td>
<td>0.69</td>
<td>0.01</td>
<td>0.71</td>
</tr>
<tr>
<td>7. Crotalaria prostrata</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>5</td>
<td>0.006</td>
<td>0.35</td>
<td>0.007</td>
<td>0.36</td>
</tr>
<tr>
<td>8. Curculigo orchioides</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>4</td>
<td>0.006</td>
<td>0.35</td>
<td>0.006</td>
<td>0.36</td>
</tr>
<tr>
<td>9. Cymbopogon microtheica</td>
<td>21.00</td>
<td>1.05</td>
<td>5</td>
<td>341</td>
<td>0.12</td>
<td>0.35</td>
<td>0.49</td>
<td>0.96</td>
</tr>
<tr>
<td>10. Cymbopogon pendulus</td>
<td>47.33</td>
<td>42.60</td>
<td>90</td>
<td>17342</td>
<td>5.14</td>
<td>6.25</td>
<td>25.07</td>
<td>36.46</td>
</tr>
<tr>
<td>11. Cyperus alalatus</td>
<td>7.50</td>
<td>0.75</td>
<td>10</td>
<td>29</td>
<td>0.09</td>
<td>0.69</td>
<td>0.04</td>
<td>0.82</td>
</tr>
<tr>
<td>12. Cyperus cyperoides</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>6</td>
<td>0.02</td>
<td>0.35</td>
<td>0.008</td>
<td>0.38</td>
</tr>
<tr>
<td>13. Cyperus juncoide</td>
<td>71.50</td>
<td>35.75</td>
<td>50</td>
<td>1359</td>
<td>4.31</td>
<td>3.47</td>
<td>1.96</td>
<td>9.74</td>
</tr>
<tr>
<td>14. Desmodium heterophyllum</td>
<td>3.50</td>
<td>0.35</td>
<td>10</td>
<td>63</td>
<td>0.04</td>
<td>0.69</td>
<td>0.09</td>
<td>0.82</td>
</tr>
<tr>
<td>15. Desmodium triflorum</td>
<td>12.76</td>
<td>10.85</td>
<td>85</td>
<td>1296</td>
<td>1.31</td>
<td>5.90</td>
<td>1.87</td>
<td>9.08</td>
</tr>
<tr>
<td>16. Digitaria bicornis</td>
<td>50.00</td>
<td>2.50</td>
<td>5</td>
<td>163</td>
<td>0.30</td>
<td>0.35</td>
<td>0.23</td>
<td>0.88</td>
</tr>
<tr>
<td>17. Digitaria ciliaris</td>
<td>13.40</td>
<td>3.35</td>
<td>25</td>
<td>269</td>
<td>0.40</td>
<td>1.73</td>
<td>0.39</td>
<td>2.52</td>
</tr>
<tr>
<td>18. Digitaria griffithii</td>
<td>11.00</td>
<td>1.10</td>
<td>10</td>
<td>86</td>
<td>0.13</td>
<td>0.69</td>
<td>0.12</td>
<td>0.94</td>
</tr>
<tr>
<td>19. Elephantopus scaber</td>
<td>9.00</td>
<td>0.90</td>
<td>10</td>
<td>285</td>
<td>0.11</td>
<td>0.69</td>
<td>0.41</td>
<td>1.21</td>
</tr>
<tr>
<td>20. Eleusine indica</td>
<td>15.00</td>
<td>0.75</td>
<td>5</td>
<td>89</td>
<td>0.09</td>
<td>0.35</td>
<td>0.13</td>
<td>0.57</td>
</tr>
<tr>
<td>21. Emilia sonchifolia</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>16</td>
<td>0.02</td>
<td>0.35</td>
<td>0.02</td>
<td>0.39</td>
</tr>
<tr>
<td>22. Eragrostis gangetica</td>
<td>7.00</td>
<td>0.35</td>
<td>5</td>
<td>34</td>
<td>0.04</td>
<td>0.35</td>
<td>0.05</td>
<td>0.44</td>
</tr>
<tr>
<td>23. Eragrostis nigra</td>
<td>12.25</td>
<td>2.45</td>
<td>20</td>
<td>243</td>
<td>0.29</td>
<td>1.39</td>
<td>0.35</td>
<td>2.03</td>
</tr>
<tr>
<td>24. Eragrostis tenella</td>
<td>19.16</td>
<td>5.75</td>
<td>30</td>
<td>522</td>
<td>0.69</td>
<td>2.08</td>
<td>0.75</td>
<td>3.52</td>
</tr>
<tr>
<td>25. Euphorbia orbiculata</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>6</td>
<td>0.006</td>
<td>0.35</td>
<td>0.008</td>
<td>0.36</td>
</tr>
<tr>
<td>27. Imperata cylindrica</td>
<td>54.60</td>
<td>40.95</td>
<td>75</td>
<td>4199</td>
<td>4.94</td>
<td>5.21</td>
<td>6.07</td>
<td>16.22</td>
</tr>
<tr>
<td>28. Imperata latifolia</td>
<td>16.00</td>
<td>0.80</td>
<td>5</td>
<td>87</td>
<td>0.09</td>
<td>0.35</td>
<td>0.12</td>
<td>0.56</td>
</tr>
<tr>
<td>29. Lindernia sp.</td>
<td>20.00</td>
<td>1.00</td>
<td>5</td>
<td>106</td>
<td>0.12</td>
<td>0.35</td>
<td>0.15</td>
<td>0.62</td>
</tr>
<tr>
<td>30. Mariscus cyperinus</td>
<td>1.00</td>
<td>0.10</td>
<td>10</td>
<td>9</td>
<td>0.01</td>
<td>0.69</td>
<td>0.01</td>
<td>0.71</td>
</tr>
<tr>
<td>31. Mimosa pudica</td>
<td>2.00</td>
<td>0.20</td>
<td>10</td>
<td>49</td>
<td>0.02</td>
<td>0.69</td>
<td>0.07</td>
<td>0.78</td>
</tr>
</tbody>
</table>

Table Contd.
Contd. Table-3.6

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D (Pl. m²)</th>
<th>F (%)</th>
<th>BA (cm²)</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>32. Mitracarpus verticillatus</td>
<td>240.00</td>
<td>48.00</td>
<td>20</td>
<td>2894</td>
<td>5.79</td>
<td>1.39</td>
<td>4.18</td>
<td>11.36</td>
</tr>
<tr>
<td>33. Mnesithea laevis</td>
<td>15.30</td>
<td>7.65</td>
<td>50</td>
<td>750</td>
<td>0.92</td>
<td>3.47</td>
<td>1.08</td>
<td>5.47</td>
</tr>
<tr>
<td>34. Mukia maderaspatana</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>12</td>
<td>0.02</td>
<td>0.35</td>
<td>0.02</td>
<td>0.39</td>
</tr>
<tr>
<td>35. Murdannia nudiflora</td>
<td>20.00</td>
<td>1.00</td>
<td>5</td>
<td>65</td>
<td>0.12</td>
<td>0.35</td>
<td>0.09</td>
<td>0.56</td>
</tr>
<tr>
<td>36. Paspalum scrobiculatum</td>
<td>11.11</td>
<td>5.00</td>
<td>45</td>
<td>527</td>
<td>0.60</td>
<td>3.12</td>
<td>0.76</td>
<td>4.48</td>
</tr>
<tr>
<td>37. Pennisetum glaucum</td>
<td>11.50</td>
<td>1.15</td>
<td>10</td>
<td>103</td>
<td>0.14</td>
<td>0.69</td>
<td>0.15</td>
<td>0.98</td>
</tr>
<tr>
<td>38. Phyllanthus urinaria</td>
<td>72.76</td>
<td>61.85</td>
<td>85</td>
<td>2492</td>
<td>7.46</td>
<td>5.90</td>
<td>3.60</td>
<td>16.96</td>
</tr>
<tr>
<td>39. Polygala glomerata</td>
<td>1.33</td>
<td>0.20</td>
<td>15</td>
<td>17</td>
<td>0.02</td>
<td>1.04</td>
<td>0.02</td>
<td>1.08</td>
</tr>
<tr>
<td>40. Pouzolzia zeylanica</td>
<td>18.00</td>
<td>0.90</td>
<td>5</td>
<td>64</td>
<td>0.11</td>
<td>0.35</td>
<td>0.09</td>
<td>0.55</td>
</tr>
<tr>
<td>41. Pueraria phaseoloides</td>
<td>4.58</td>
<td>2.75</td>
<td>60</td>
<td>584</td>
<td>0.33</td>
<td>4.16</td>
<td>0.84</td>
<td>5.33</td>
</tr>
<tr>
<td>42. Rottboellia sp.</td>
<td>52.00</td>
<td>2.60</td>
<td>5</td>
<td>248</td>
<td>0.31</td>
<td>0.35</td>
<td>0.36</td>
<td>1.02</td>
</tr>
<tr>
<td>43. Rungia pectinata</td>
<td>18.00</td>
<td>1.80</td>
<td>10</td>
<td>175</td>
<td>0.22</td>
<td>0.69</td>
<td>0.25</td>
<td>1.16</td>
</tr>
<tr>
<td>44. Saccharum spontaneum</td>
<td>59.33</td>
<td>53.40</td>
<td>90</td>
<td>3652</td>
<td>6.44</td>
<td>6.25</td>
<td>5.28</td>
<td>17.97</td>
</tr>
<tr>
<td>45. Salomonia ciliata</td>
<td>8.25</td>
<td>3.30</td>
<td>40</td>
<td>247</td>
<td>0.40</td>
<td>2.78</td>
<td>0.36</td>
<td>3.54</td>
</tr>
<tr>
<td>46. Sporobolus indicus</td>
<td>148.55</td>
<td>148.55</td>
<td>100</td>
<td>8950</td>
<td>17.92</td>
<td>6.94</td>
<td>12.94</td>
<td>37.80</td>
</tr>
<tr>
<td>47. Streptocaulon sylvestre</td>
<td>4.72</td>
<td>2.60</td>
<td>55</td>
<td>2351</td>
<td>0.31</td>
<td>3.82</td>
<td>3.40</td>
<td>7.53</td>
</tr>
<tr>
<td>48. Tonningia axillaris</td>
<td>16.66</td>
<td>2.50</td>
<td>15</td>
<td>198</td>
<td>0.30</td>
<td>1.04</td>
<td>0.28</td>
<td>1.62</td>
</tr>
<tr>
<td>49. Triumfetta rhomboidea</td>
<td>3.00</td>
<td>0.30</td>
<td>10</td>
<td>29</td>
<td>0.03</td>
<td>0.69</td>
<td>0.04</td>
<td>0.76</td>
</tr>
<tr>
<td>50. Vernonia cinerea</td>
<td>4.66</td>
<td>2.80</td>
<td>60</td>
<td>375</td>
<td>0.34</td>
<td>4.16</td>
<td>0.54</td>
<td>5.04</td>
</tr>
<tr>
<td>51. Vetiveria zizanioides</td>
<td>30.00</td>
<td>3.00</td>
<td>10</td>
<td>319</td>
<td>0.36</td>
<td>0.69</td>
<td>0.46</td>
<td>1.51</td>
</tr>
<tr>
<td>52. Zornia gibbosa</td>
<td>7.55</td>
<td>3.40</td>
<td>45</td>
<td>339</td>
<td>0.41</td>
<td>3.12</td>
<td>0.49</td>
<td>4.02</td>
</tr>
</tbody>
</table>

Total number of individuals of all species = 16579, Total basal area cover = 69160 cm²
Total number of quadrats examined = 20, Number of occurrences of all species = 288

![Fig-3.6 Number of species under Raunkiaer's frequency classes A, B, C, D and E at site-I during summer-'99](image-url)
species were in the wide range of 0.36 - 64.28. Considering the calculated values of IVI, *Borreria alata* was the most important species (64.28) in site-1 during summer-'99. This was followed by *Sporobolus indicus* (37.80), *Cymbopogon pendulus* (36.46), *Saccharum spontaneum* (17.97), *Phyllanthus urinaria* (16.96), *Imperata cylindrica* (16.22), *Mitracarpus verticillatus* (13.36) etc. Besides, *Streptocaulon sylvestre* showed the IVI of 7.53. On the other hand, three species viz. *Crotalaria prostrata*, *Curculigo orchioides* and *Euphorbia orbiculata* recorded the minimum IVI of 0.36 in site-1 during summer-'99.

### 3.2.1.2 SITE-II (NORTH BENGAL UNIVERSITY CAMPUS PLOT-II)

Altogether 123 species were recorded from the 120 quadrats at site-II in different seasons of two years (1997-1999). Out of these, 98 species were recorded in monsoon, 51 species in winter and 77 species in summer seasons.

#### 3.2.1.2.1 SITE-II : MONSOON SEASON

In this season, at site-II, out of total 98 species, 71 species were recorded in monsoon-'97 and 69 species were in monsoon-'98. A common 42 species were found to occur in both the years in this season. The total number of individuals were counted in each 20 quadrats were 26974 and 17921 during monsoon-'97 and '98 seasons, respectively.

#### 3.2.1.2.1.1 SITE-II : MONSOON-'97

During monsoon-'97 season the highest number of species recorded in single quadrat 23 and the lowest was 10. The mean number of species per quadrat was 18.50. The highest number of individuals recorded in single quadrat was 3661 and lowest was 408, while the average number of individuals per quadrat was 1348.70.

The details of primary analysis of monsoon-'97 quadrat data are given in Table-3.7. During this season *Carex indica* was the most dominant species having maximum density (186.90 m⁻²) and abundance (287.54) among the total of 71 recorded species at site-II. Inspite of that another 15 dominant species like *Sporobolus indicus*, *Borreria alata*, *Prunella vulgaris*, *Phyllanthus virgatus*, *Lindernia multiflora*, *Selaginella sp.*, *Phyllanthus urinaria*, *Mitrâcarpus verticillatus*, *Saccharum spontaneum*, *Dysophylla sp.*, *Cyperus compressus*, *Imperata cylindrica*, *Cymbopogon pendulus*, *Lindernia hookeri* and *Salomonia ciliata* showed higher values of density and abundance. Moreover, *Carex indica* showed the highest number
Table-3.7 : List of different species of Site-II during Monsoon 1997 season, with details on Abundance (Ab), Density (D), Frequency (F), Basal Area Cover (BA), Relative Density (RD), Relative Frequency (RF), Relative Dominance (R Dm) and Importance Value Index (IVI).

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D</th>
<th>F</th>
<th>BA</th>
<th>RD</th>
<th>RF</th>
<th>R Dm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ageratum conyzoides</td>
<td>23.50</td>
<td>2.35</td>
<td>10</td>
<td>551</td>
<td>0.17</td>
<td>0.55</td>
<td>0.39</td>
<td>1.11</td>
</tr>
<tr>
<td>2. Apocapis palaeacea</td>
<td>92.00</td>
<td>4.60</td>
<td>5</td>
<td>591</td>
<td>0.34</td>
<td>0.27</td>
<td>0.41</td>
<td>1.02</td>
</tr>
<tr>
<td>3. Atylosia scarabaeoides</td>
<td>11.00</td>
<td>0.55</td>
<td>5</td>
<td>92</td>
<td>0.04</td>
<td>0.27</td>
<td>0.06</td>
<td>0.37</td>
</tr>
<tr>
<td>4. Axonopus compressus</td>
<td>6.00</td>
<td>0.30</td>
<td>5</td>
<td>38</td>
<td>0.02</td>
<td>0.27</td>
<td>0.03</td>
<td>0.32</td>
</tr>
<tr>
<td>5. Borreria alata</td>
<td>120.45</td>
<td>120.45</td>
<td>100</td>
<td>12250</td>
<td>8.93</td>
<td>5.46</td>
<td>8.63</td>
<td>23.02</td>
</tr>
<tr>
<td>6. Carex indica</td>
<td>287.54</td>
<td>186.90</td>
<td>65</td>
<td>10130</td>
<td>13.86</td>
<td>3.55</td>
<td>7.14</td>
<td>24.55</td>
</tr>
<tr>
<td>7. Cassia mimosoides</td>
<td>6.50</td>
<td>0.65</td>
<td>10</td>
<td>95</td>
<td>0.05</td>
<td>0.55</td>
<td>0.06</td>
<td>0.66</td>
</tr>
<tr>
<td>8. Chrysopogon aciculatus</td>
<td>20.55</td>
<td>9.25</td>
<td>45</td>
<td>978</td>
<td>0.68</td>
<td>2.46</td>
<td>0.69</td>
<td>3.83</td>
</tr>
<tr>
<td>9. Crotalaria juncea</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>8</td>
<td>0.003</td>
<td>0.27</td>
<td>0.005</td>
<td>0.28</td>
</tr>
<tr>
<td>10. Crotalaria lenifolia</td>
<td>4.00</td>
<td>0.20</td>
<td>5</td>
<td>25</td>
<td>0.011</td>
<td>0.27</td>
<td>0.02</td>
<td>0.30</td>
</tr>
<tr>
<td>11. Crotalaria pallida</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>9</td>
<td>0.003</td>
<td>0.27</td>
<td>0.006</td>
<td>0.28</td>
</tr>
<tr>
<td>12. Crotalaria prostrata</td>
<td>67.00</td>
<td>23.45</td>
<td>35</td>
<td>2275</td>
<td>1.74</td>
<td>1.91</td>
<td>1.60</td>
<td>5.25</td>
</tr>
<tr>
<td>13. Cyanotis nudiflora</td>
<td>5.83</td>
<td>1.75</td>
<td>30</td>
<td>310</td>
<td>0.13</td>
<td>1.64</td>
<td>0.22</td>
<td>1.99</td>
</tr>
<tr>
<td>14. Cyanotis vaga</td>
<td>2.00</td>
<td>0.10</td>
<td>5</td>
<td>20</td>
<td>0.007</td>
<td>0.27</td>
<td>0.01</td>
<td>0.29</td>
</tr>
<tr>
<td>15. Cymbopogon pendulus</td>
<td>40.60</td>
<td>30.45</td>
<td>75</td>
<td>18390</td>
<td>2.25</td>
<td>4.10</td>
<td>12.96</td>
<td>19.31</td>
</tr>
<tr>
<td>16. Cynodon dactylon</td>
<td>15.20</td>
<td>3.80</td>
<td>25</td>
<td>710</td>
<td>0.28</td>
<td>1.36</td>
<td>0.50</td>
<td>2.14</td>
</tr>
<tr>
<td>17. Cyperus compressus</td>
<td>670.00</td>
<td>33.50</td>
<td>5</td>
<td>2076</td>
<td>2.48</td>
<td>0.27</td>
<td>1.46</td>
<td>4.21</td>
</tr>
<tr>
<td>18. Dactyloctenium aegyptium</td>
<td>8.00</td>
<td>0.40</td>
<td>5</td>
<td>82</td>
<td>0.03</td>
<td>0.27</td>
<td>0.06</td>
<td>0.36</td>
</tr>
<tr>
<td>19. Desmodium heterophyllum</td>
<td>6.00</td>
<td>1.50</td>
<td>25</td>
<td>346</td>
<td>0.11</td>
<td>1.36</td>
<td>0.24</td>
<td>1.71</td>
</tr>
<tr>
<td>20. Desmodium triflorum</td>
<td>28.15</td>
<td>18.30</td>
<td>65</td>
<td>2423</td>
<td>1.35</td>
<td>3.55</td>
<td>1.70</td>
<td>6.60</td>
</tr>
<tr>
<td>21. Digitaria ciliaris</td>
<td>21.00</td>
<td>1.05</td>
<td>5</td>
<td>95</td>
<td>0.08</td>
<td>0.27</td>
<td>0.06</td>
<td>0.41</td>
</tr>
<tr>
<td>22. Drosera burmannii</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>9</td>
<td>0.003</td>
<td>0.27</td>
<td>0.006</td>
<td>0.28</td>
</tr>
<tr>
<td>23. Drym aria cordata</td>
<td>11.00</td>
<td>0.55</td>
<td>5</td>
<td>77</td>
<td>0.04</td>
<td>0.27</td>
<td>0.05</td>
<td>0.36</td>
</tr>
<tr>
<td>24. Dysophylla crassicaulis</td>
<td>157.00</td>
<td>39.25</td>
<td>25</td>
<td>6560</td>
<td>2.91</td>
<td>1.36</td>
<td>4.62</td>
<td>8.89</td>
</tr>
<tr>
<td>25. Echinocloa crusgalli</td>
<td>7.00</td>
<td>0.35</td>
<td>5</td>
<td>51</td>
<td>0.02</td>
<td>0.27</td>
<td>0.03</td>
<td>0.32</td>
</tr>
<tr>
<td>26. Elephas tus scaber</td>
<td>9.50</td>
<td>0.95</td>
<td>10</td>
<td>247</td>
<td>0.07</td>
<td>0.55</td>
<td>0.17</td>
<td>0.79</td>
</tr>
<tr>
<td>27. Ergrostis unioloides</td>
<td>28.00</td>
<td>4.20</td>
<td>15</td>
<td>658</td>
<td>0.31</td>
<td>0.82</td>
<td>0.46</td>
<td>1.59</td>
</tr>
<tr>
<td>28. Fimbristylis dichotoma</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>12</td>
<td>0.01</td>
<td>0.27</td>
<td>0.008</td>
<td>0.29</td>
</tr>
<tr>
<td>29. Fimbristylis umbellaris</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>19</td>
<td>0.01</td>
<td>0.27</td>
<td>0.01</td>
<td>0.29</td>
</tr>
<tr>
<td>30. Hedyotis corymbosa</td>
<td>23.00</td>
<td>4.60</td>
<td>20</td>
<td>485</td>
<td>0.34</td>
<td>1.09</td>
<td>0.34</td>
<td>1.77</td>
</tr>
<tr>
<td>31. Hedyotis diffusa</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>17</td>
<td>0.01</td>
<td>0.27</td>
<td>0.01</td>
<td>0.29</td>
</tr>
</tbody>
</table>

Table Contd.
Contd. Table-3.7

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D</th>
<th>F%</th>
<th>BA</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>32. Hyptis suaveoleus</td>
<td>10.75</td>
<td>2.15</td>
<td>20</td>
<td>440</td>
<td>0.16</td>
<td>1.09</td>
<td>0.31</td>
<td>1.56</td>
</tr>
<tr>
<td>33. Imperata cylindrica</td>
<td>54.00</td>
<td>32.40</td>
<td>60</td>
<td>4060</td>
<td>2.40</td>
<td>3.28</td>
<td>2.86</td>
<td>8.54</td>
</tr>
<tr>
<td>34. Indigofera globra</td>
<td>3.00</td>
<td>0.45</td>
<td>15</td>
<td>65</td>
<td>0.03</td>
<td>0.82</td>
<td>0.04</td>
<td>0.89</td>
</tr>
<tr>
<td>35. Isachne albens</td>
<td>47.40</td>
<td>11.85</td>
<td>25</td>
<td>1140</td>
<td>0.88</td>
<td>1.36</td>
<td>0.80</td>
<td>3.04</td>
</tr>
<tr>
<td>36. Lindernia ciliata</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>19</td>
<td>0.01</td>
<td>0.27</td>
<td>0.01</td>
<td>0.29</td>
</tr>
<tr>
<td>37. Lindernia crustacea</td>
<td>23.00</td>
<td>4.60</td>
<td>20</td>
<td>377</td>
<td>0.34</td>
<td>1.09</td>
<td>0.26</td>
<td>1.6</td>
</tr>
<tr>
<td>38. Lindernia hookeri</td>
<td>73.25</td>
<td>29.30</td>
<td>40</td>
<td>2579</td>
<td>2.17</td>
<td>2.18</td>
<td>1.82</td>
<td>6.17</td>
</tr>
<tr>
<td>39. Lindernia multiflora</td>
<td>260.66</td>
<td>78.20</td>
<td>30</td>
<td>5990</td>
<td>5.80</td>
<td>1.64</td>
<td>4.22</td>
<td>11.66</td>
</tr>
<tr>
<td>40. Lindernia pyxidaria</td>
<td>11.00</td>
<td>1.00</td>
<td>10</td>
<td>144</td>
<td>0.08</td>
<td>0.55</td>
<td>0.10</td>
<td>0.73</td>
</tr>
<tr>
<td>41. Merremia hirta</td>
<td>26.00</td>
<td>2.60</td>
<td>10</td>
<td>939</td>
<td>0.19</td>
<td>0.55</td>
<td>0.66</td>
<td>1.40</td>
</tr>
<tr>
<td>42. Microseris biflora</td>
<td>35.66</td>
<td>5.35</td>
<td>15</td>
<td>761</td>
<td>0.39</td>
<td>0.82</td>
<td>0.53</td>
<td>1.74</td>
</tr>
<tr>
<td>43. Mimosa pudica</td>
<td>3.0</td>
<td>0.60</td>
<td>20</td>
<td>163</td>
<td>0.04</td>
<td>1.09</td>
<td>0.11</td>
<td>1.24</td>
</tr>
<tr>
<td>44. Mitracarpus verticillatus</td>
<td>158.85</td>
<td>55.60</td>
<td>35</td>
<td>3480</td>
<td>4.12</td>
<td>1.91</td>
<td>2.45</td>
<td>8.48</td>
</tr>
<tr>
<td>45. Mitrasacme pygmaea</td>
<td>120.33</td>
<td>18.05</td>
<td>15</td>
<td>1170</td>
<td>1.34</td>
<td>0.82</td>
<td>0.82</td>
<td>2.98</td>
</tr>
<tr>
<td>46. Mitreola petiolata</td>
<td>20.00</td>
<td>1.00</td>
<td>5</td>
<td>103</td>
<td>0.07</td>
<td>0.27</td>
<td>0.07</td>
<td>0.41</td>
</tr>
<tr>
<td>47. Mnesithia laevis</td>
<td>11.80</td>
<td>2.95</td>
<td>25</td>
<td>499</td>
<td>0.22</td>
<td>1.36</td>
<td>0.35</td>
<td>1.93</td>
</tr>
<tr>
<td>48. Mukia maderaspatana</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>7</td>
<td>0.003</td>
<td>0.27</td>
<td>0.005</td>
<td>0.28</td>
</tr>
<tr>
<td>49. Murdannia spirata</td>
<td>24.00</td>
<td>1.20</td>
<td>5</td>
<td>150</td>
<td>0.09</td>
<td>0.27</td>
<td>0.10</td>
<td>0.46</td>
</tr>
<tr>
<td>50. Paspalum scrobiculatum</td>
<td>14.60</td>
<td>3.65</td>
<td>25</td>
<td>478</td>
<td>0.27</td>
<td>1.36</td>
<td>0.34</td>
<td>1.97</td>
</tr>
<tr>
<td>51. Phaulopsis imbricata</td>
<td>20.50</td>
<td>2.05</td>
<td>10</td>
<td>276</td>
<td>0.15</td>
<td>0.55</td>
<td>0.19</td>
<td>0.89</td>
</tr>
<tr>
<td>52. Phyllanthus uncinus</td>
<td>219.00</td>
<td>65.70</td>
<td>30</td>
<td>2904</td>
<td>4.87</td>
<td>1.64</td>
<td>2.04</td>
<td>8.55</td>
</tr>
<tr>
<td>53. Phyllanthus virgatus</td>
<td>130.23</td>
<td>84.65</td>
<td>65</td>
<td>4673</td>
<td>6.27</td>
<td>3.55</td>
<td>3.29</td>
<td>13.11</td>
</tr>
<tr>
<td>54. Polysacme arvenses</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>25</td>
<td>0.01</td>
<td>0.27</td>
<td>0.02</td>
<td>0.30</td>
</tr>
<tr>
<td>55. Prunella vulgaris</td>
<td>166.83</td>
<td>100.10</td>
<td>60</td>
<td>11712</td>
<td>7.42</td>
<td>3.28</td>
<td>8.25</td>
<td>18.95</td>
</tr>
<tr>
<td>56. Pueraria phaseoloides</td>
<td>12.88</td>
<td>5.80</td>
<td>45</td>
<td>4316</td>
<td>0.43</td>
<td>2.46</td>
<td>3.04</td>
<td>5.93</td>
</tr>
<tr>
<td>57. Pupalia lappacea</td>
<td>16.00</td>
<td>3.20</td>
<td>20</td>
<td>924</td>
<td>0.24</td>
<td>1.09</td>
<td>0.65</td>
<td>1.98</td>
</tr>
<tr>
<td>58. Rotboellia ssp.</td>
<td>7.00</td>
<td>0.35</td>
<td>5</td>
<td>60</td>
<td>0.02</td>
<td>0.27</td>
<td>0.04</td>
<td>0.33</td>
</tr>
<tr>
<td>59. Rungia pectinata</td>
<td>63.57</td>
<td>22.25</td>
<td>35</td>
<td>2278</td>
<td>1.65</td>
<td>1.91</td>
<td>1.60</td>
<td>5.16</td>
</tr>
<tr>
<td>60. Saccharum spontaneum</td>
<td>54.68</td>
<td>51.95</td>
<td>95</td>
<td>7248</td>
<td>3.85</td>
<td>5.19</td>
<td>5.10</td>
<td>14.14</td>
</tr>
<tr>
<td>61. Salomonia ciliata</td>
<td>34.31</td>
<td>27.45</td>
<td>80</td>
<td>2503</td>
<td>2.03</td>
<td>4.37</td>
<td>1.76</td>
<td>8.16</td>
</tr>
<tr>
<td>62. Schizachyrium brevifolium</td>
<td>22.75</td>
<td>4.55</td>
<td>20</td>
<td>660</td>
<td>0.34</td>
<td>1.09</td>
<td>0.46</td>
<td>1.89</td>
</tr>
<tr>
<td>63. Scleria parvula</td>
<td>26.66</td>
<td>4.00</td>
<td>15</td>
<td>497</td>
<td>0.29</td>
<td>0.82</td>
<td>0.35</td>
<td>1.46</td>
</tr>
<tr>
<td>64. Selaginella ssp.</td>
<td>162.11</td>
<td>72.95</td>
<td>45</td>
<td>3545</td>
<td>5.40</td>
<td>2.46</td>
<td>2.50</td>
<td>10.36</td>
</tr>
<tr>
<td>65. Sida rhombifolia</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>12</td>
<td>0.003</td>
<td>0.27</td>
<td>0.008</td>
<td>0.28</td>
</tr>
<tr>
<td>66. Smithia conferta</td>
<td>22.50</td>
<td>2.25</td>
<td>10</td>
<td>456</td>
<td>0.16</td>
<td>0.55</td>
<td>0.32</td>
<td>1.03</td>
</tr>
</tbody>
</table>

Table Contd.
Table-3.7

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D</th>
<th>F</th>
<th>BA</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>67. Sporobolus indicus</td>
<td>135.70</td>
<td>135.70</td>
<td>100</td>
<td>11360</td>
<td>10.06</td>
<td>5.46</td>
<td>8.00</td>
<td>23.52</td>
</tr>
<tr>
<td>68. Streptocaulon sylvestre</td>
<td>9.33</td>
<td>2.80</td>
<td>30</td>
<td>2498</td>
<td>0.21</td>
<td>1.64</td>
<td>1.76</td>
<td>3.61</td>
</tr>
<tr>
<td>69. Vernonia cinerea</td>
<td>16.15</td>
<td>10.50</td>
<td>65</td>
<td>1724</td>
<td>0.78</td>
<td>3.55</td>
<td>1.21</td>
<td>5.54</td>
</tr>
<tr>
<td>70. Vetiveria zizanioides</td>
<td>24.00</td>
<td>3.60</td>
<td>15</td>
<td>666</td>
<td>0.26</td>
<td>0.82</td>
<td>0.47</td>
<td>1.55</td>
</tr>
<tr>
<td>71. Zornia gibbosa</td>
<td>13.36</td>
<td>7.36</td>
<td>55</td>
<td>1338</td>
<td>0.54</td>
<td>3.00</td>
<td>0.94</td>
<td>4.48</td>
</tr>
</tbody>
</table>

Total number of individuals of all species = 26974, Total basal area cover = 141868 cm²
Total number of quadrats examined = 20, Number of occurrences of all species = 366

of individuals (3738). The minimum values of density (0.05 m⁻²), % frequency (5%) and abundance (1) were noted for Crotalaria pallida, Crotalaria juncea, Drosera burmannii, Mukia maderaspatana and Sida rhombifolia.

Two species viz. Borreria alata and Sporobolus indicus appeared to be the most frequently available species at site-II during monsoon-'97 having highest relative frequency (RF) of 5.46 % each. This was followed by Saccharum spontaneum (5.19 %), Salomonia ciliata (4.37 %), Cymbopogon pendulus (4.10 %), Carex indica (3.55 %), Desmodium triflorum (3.55 %), Phyllanthus virgatus (3.55 %), Vernonia cinerea (3.55 %) etc. in term of relative frequency. Streptocaulon sylvestre showed relative frequency value of 1.64 %. Raunkiaer’s frequency classes A included 42 species, B 14 species, C 6 species, D 6 species and E 3 species (Fig-3.7). Two species

![Fig-3.7 Number of species under Raunkiaer's frequency classes A, B, C, D and E at site-II during monsoon-'97](image-url)
viz. Borreria alata and Sporobolus indicus showed 100 % frequency. According to ‘Law of frequency’ as E was smaller than D, so this community was biotically disturbed.

Cymbopogon pendulus recorded the highest value of basal area having maximum value R Dm (12.96 %), followed by Borreria alata (8.63 %), Prunella vulgaris (8.25 %), Sporobolus indicus (8.00 %), Carex indica (7.14 %), Saccharum spontaneum (5.10 %) etc. Streptocaulon sylvestre recorded the R Dm value of 1.76 %.

However in term of IVI, Carex indica was the dominant species at site-II in monsoon-’97 with its highest IVI of 24.55 and was followed by Sporobolus indicus (23.52), Borreria alata (23.02), Cymbopogon pendulus (19.31), Prunella vulgaris (18.95), Saccharum spontaneum (14.14), Phyllanthus virgatus (13.11), Lindernia multiflora (11.66) etc. On the other hand Crotalaria pallida, Crotalaria juncea, Drosera burmannii, Mukia maderaspatana and Sida rhombifolia recorded the lowest IVI of 0.28. Besides, Streptocaulon sylvestre showed IVI of 3.61.

3.2.1.2.1.2 SITE-II : MONSOON-’98

During monsoon-’98, the highest number of species recorded in single quadrat was 28 and the lowest was 13. The average number of species per quadrat was 20.65. The highest number of individuals noted in single quadrat was 1527 and lowest was 553, while the mean number of individuals per quadrat was 896.05.

It is evident from Table-3.8 that in monsoon-’98 season Sporobolus indicus recorded with maximum number of individuals (3911), thereby, having highest relative density value of 21.82 % among the recorded total of 69 species. This was followed by Borreria alata (21.36 %), Phyllanthus urinaria (11.84 %), Imperata cylindrica (6.17 %), Cyperus juncoides (5.62 %), Saccharum spontaneum (3.91 %), Rungia pectinata (3.86 %), Mitracarpus verticillatus (3.37 %), Cymbopogon pendulus (2.95 %) etc. in term of RD values. On the other hand lowest value of RD (0.005 %) was showed by five species viz. Crotalaria alata, Crotalaria ferruginea, Crotalaria pallida, Smithia conferta and Stephania japonica. Streptocaulon sylvestre scored the relative density value of 0.14 %.

Only two species, Saccharum spontaneum and Sporobolus indicus, appeared to be the most frequently available species having maximum % frequency (100 %) and RF (4.89 %) value, followed by Borreria alata, Cymbopogon pendulus, Phyllanthus urinaria, Rungia pectinata, Mitracarpus verticillatus, Pueraria phaseoloides, Desmodium triflorum, Imperata cylindrica etc. Besides, Streptocaulon sylvestre showed % frequency and relative frequency values of 40 % and 1.95 %,
Table 3.8: Phytosociological observations for different species in Site-II during Monsoon 1998 season (Abbreviation used: Ab=Abundance, D=Density, F=Frequency, BA=Basal Area Cover, RD=Relative Density, RF=Relative Frequency, RDm=Relative Dominance and IVI=Importance Value Index)

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D</th>
<th>F</th>
<th>BA</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ageratum conyzoides</td>
<td>8.00</td>
<td>0.40</td>
<td>5</td>
<td>95</td>
<td>0.04</td>
<td>0.24</td>
<td>0.09</td>
<td>0.37</td>
</tr>
<tr>
<td>2. Apocopis paleacea</td>
<td>19.00</td>
<td>1.90</td>
<td>10</td>
<td>278</td>
<td>0.21</td>
<td>0.49</td>
<td>0.26</td>
<td>0.96</td>
</tr>
<tr>
<td>3. Borreria alata</td>
<td>201.52</td>
<td>191.45</td>
<td>95</td>
<td>17260</td>
<td>21.36</td>
<td>4.64</td>
<td>16.22</td>
<td>42.22</td>
</tr>
<tr>
<td>4. Borreria ocyoides</td>
<td>39.66</td>
<td>5.95</td>
<td>15</td>
<td>739</td>
<td>0.66</td>
<td>0.73</td>
<td>0.69</td>
<td>2.08</td>
</tr>
<tr>
<td>5. Bulbostylis densa</td>
<td>8.5</td>
<td>0.85</td>
<td>10</td>
<td>112</td>
<td>0.09</td>
<td>0.49</td>
<td>0.10</td>
<td>0.68</td>
</tr>
<tr>
<td>6. Calamagrostis scabrescens</td>
<td>7.50</td>
<td>0.75</td>
<td>10</td>
<td>85</td>
<td>0.08</td>
<td>0.49</td>
<td>0.08</td>
<td>0.65</td>
</tr>
<tr>
<td>7. Carex indica</td>
<td>112.50</td>
<td>11.25</td>
<td>10</td>
<td>655</td>
<td>1.25</td>
<td>0.49</td>
<td>0.61</td>
<td>2.35</td>
</tr>
<tr>
<td>8. Cassia mimosoides</td>
<td>1.75</td>
<td>0.35</td>
<td>20</td>
<td>65</td>
<td>0.04</td>
<td>0.97</td>
<td>0.06</td>
<td>1.07</td>
</tr>
<tr>
<td>9. Centella asiatica</td>
<td>7.00</td>
<td>0.35</td>
<td>5</td>
<td>85</td>
<td>0.04</td>
<td>0.24</td>
<td>0.08</td>
<td>0.36</td>
</tr>
<tr>
<td>10. Chloris delicatula</td>
<td>16.00</td>
<td>1.60</td>
<td>10</td>
<td>195</td>
<td>0.18</td>
<td>0.49</td>
<td>0.18</td>
<td>0.85</td>
</tr>
<tr>
<td>11. Chrysopogon aciculatus</td>
<td>7.16</td>
<td>2.15</td>
<td>30</td>
<td>230</td>
<td>0.24</td>
<td>1.46</td>
<td>0.21</td>
<td>1.91</td>
</tr>
<tr>
<td>12. Crotalaria alata</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>6</td>
<td>0.005</td>
<td>0.24</td>
<td>0.005</td>
<td>0.25</td>
</tr>
<tr>
<td>13. Crotalaria ferruginea</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>6</td>
<td>0.005</td>
<td>0.24</td>
<td>0.005</td>
<td>0.25</td>
</tr>
<tr>
<td>14. Crotalaria pallida</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>8</td>
<td>0.005</td>
<td>0.24</td>
<td>0.007</td>
<td>0.25</td>
</tr>
<tr>
<td>15. Crotalaria prostrata</td>
<td>1.25</td>
<td>0.25</td>
<td>20</td>
<td>31</td>
<td>0.03</td>
<td>0.97</td>
<td>0.03</td>
<td>1.03</td>
</tr>
<tr>
<td>16. Cymbopogon pendulus</td>
<td>27.84</td>
<td>26.45</td>
<td>95</td>
<td>19078</td>
<td>2.95</td>
<td>4.64</td>
<td>17.93</td>
<td>25.52</td>
</tr>
<tr>
<td>17. Cyperus alatus</td>
<td>10.00</td>
<td>0.50</td>
<td>5</td>
<td>38</td>
<td>0.05</td>
<td>0.24</td>
<td>0.03</td>
<td>0.32</td>
</tr>
<tr>
<td>18. Cyperus cyperoides</td>
<td>125.00</td>
<td>6.25</td>
<td>5</td>
<td>440</td>
<td>0.69</td>
<td>0.24</td>
<td>0.41</td>
<td>1.34</td>
</tr>
<tr>
<td>19. Cyperus juncoide</td>
<td>112.00</td>
<td>50.40</td>
<td>45</td>
<td>3569</td>
<td>5.62</td>
<td>2.20</td>
<td>3.35</td>
<td>11.17</td>
</tr>
<tr>
<td>20. Desmodium heterophyllum</td>
<td>1.50</td>
<td>0.15</td>
<td>10</td>
<td>46</td>
<td>0.01</td>
<td>0.49</td>
<td>0.04</td>
<td>0.54</td>
</tr>
<tr>
<td>21. Desmodium triflorum</td>
<td>19.70</td>
<td>16.75</td>
<td>85</td>
<td>2714</td>
<td>1.86</td>
<td>4.15</td>
<td>2.55</td>
<td>8.56</td>
</tr>
<tr>
<td>22. Digitaria griffithii</td>
<td>11.00</td>
<td>0.55</td>
<td>5</td>
<td>43</td>
<td>0.06</td>
<td>0.24</td>
<td>0.04</td>
<td>0.34</td>
</tr>
<tr>
<td>23. Elephantopus scaber</td>
<td>9.66</td>
<td>2.90</td>
<td>30</td>
<td>1057</td>
<td>0.32</td>
<td>1.46</td>
<td>0.99</td>
<td>2.77</td>
</tr>
<tr>
<td>24. Emilia sonchifolia</td>
<td>1.00</td>
<td>0.10</td>
<td>10</td>
<td>8</td>
<td>0.01</td>
<td>0.49</td>
<td>0.007</td>
<td>0.51</td>
</tr>
<tr>
<td>25. Ergroostis nigra</td>
<td>45.00</td>
<td>2.25</td>
<td>5</td>
<td>293</td>
<td>0.25</td>
<td>0.24</td>
<td>0.27</td>
<td>0.76</td>
</tr>
<tr>
<td>26. Ergroostis tenella</td>
<td>13.33</td>
<td>4.00</td>
<td>30</td>
<td>540</td>
<td>0.44</td>
<td>1.46</td>
<td>0.51</td>
<td>2.41</td>
</tr>
<tr>
<td>27. Ergroostis unioloides</td>
<td>80.00</td>
<td>4.00</td>
<td>5</td>
<td>468</td>
<td>0.44</td>
<td>0.24</td>
<td>0.44</td>
<td>1.12</td>
</tr>
<tr>
<td>28. Eriocaulon cinereum</td>
<td>36.75</td>
<td>7.35</td>
<td>20</td>
<td>968</td>
<td>0.82</td>
<td>0.97</td>
<td>0.91</td>
<td>2.70</td>
</tr>
<tr>
<td>29. Eulalia fastigii</td>
<td>27.33</td>
<td>4.10</td>
<td>15</td>
<td>593</td>
<td>0.46</td>
<td>0.73</td>
<td>0.56</td>
<td>1.75</td>
</tr>
<tr>
<td>30. Hedyotis corymbosa</td>
<td>4.00</td>
<td>0.80</td>
<td>20</td>
<td>94</td>
<td>0.09</td>
<td>0.97</td>
<td>0.09</td>
<td>1.15</td>
</tr>
<tr>
<td>31. Hedyotis diffusa</td>
<td>10.50</td>
<td>1.05</td>
<td>10</td>
<td>128</td>
<td>0.12</td>
<td>0.49</td>
<td>0.12</td>
<td>0.73</td>
</tr>
<tr>
<td>32. Hedyotis herbacea</td>
<td>2.50</td>
<td>0.50</td>
<td>20</td>
<td>65</td>
<td>0.05</td>
<td>0.97</td>
<td>0.06</td>
<td>1.08</td>
</tr>
</tbody>
</table>

Table Contd.
**Phytosociology**

**Contd. Table-3.8**

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D (Pl. m⁻²)</th>
<th>F (%)</th>
<th>BA (cm²)</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>33. Hedyotis pinifolia</td>
<td>14.00</td>
<td>0.70</td>
<td>5</td>
<td>76</td>
<td>0.08</td>
<td>0.24</td>
<td>0.07</td>
<td>0.39</td>
</tr>
<tr>
<td>34. Hypis suaveolens</td>
<td>11.50</td>
<td>3.45</td>
<td>30</td>
<td>1049</td>
<td>0.38</td>
<td>1.46</td>
<td>0.98</td>
<td>2.82</td>
</tr>
<tr>
<td>35. Imperata cylindrica</td>
<td>69.12</td>
<td>55.30</td>
<td>80</td>
<td>6293</td>
<td>6.17</td>
<td>3.91</td>
<td>5.91</td>
<td>15.99</td>
</tr>
<tr>
<td>36. Isachne olbens</td>
<td>30.00</td>
<td>4.50</td>
<td>15</td>
<td>459</td>
<td>0.50</td>
<td>0.73</td>
<td>0.43</td>
<td>1.66</td>
</tr>
<tr>
<td>37. Lagerra aurita</td>
<td>5.00</td>
<td>0.25</td>
<td>5</td>
<td>31</td>
<td>0.03</td>
<td>0.24</td>
<td>0.03</td>
<td>0.30</td>
</tr>
<tr>
<td>38. Lindernia ciliata</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>16</td>
<td>0.01</td>
<td>0.24</td>
<td>0.01</td>
<td>0.26</td>
</tr>
<tr>
<td>39. Lindernia crustacea</td>
<td>7.50</td>
<td>3.00</td>
<td>40</td>
<td>377</td>
<td>0.33</td>
<td>1.95</td>
<td>0.35</td>
<td>2.63</td>
</tr>
<tr>
<td>40. Lindernia hookeri</td>
<td>7.33</td>
<td>1.10</td>
<td>15</td>
<td>123</td>
<td>0.12</td>
<td>0.73</td>
<td>0.11</td>
<td>0.96</td>
</tr>
<tr>
<td>41. Lindernia parviflora</td>
<td>6.00</td>
<td>0.30</td>
<td>5</td>
<td>34</td>
<td>0.03</td>
<td>0.24</td>
<td>0.03</td>
<td>0.30</td>
</tr>
<tr>
<td>42. Lindernia sp.</td>
<td>6.00</td>
<td>0.90</td>
<td>15</td>
<td>77</td>
<td>0.10</td>
<td>0.73</td>
<td>0.07</td>
<td>0.90</td>
</tr>
<tr>
<td>43. Lobelia alsinoides</td>
<td>2.00</td>
<td>0.20</td>
<td>10</td>
<td>25</td>
<td>0.02</td>
<td>0.49</td>
<td>0.02</td>
<td>0.53</td>
</tr>
<tr>
<td>44. Mitracarpus verticillatus</td>
<td>33.55</td>
<td>30.20</td>
<td>90</td>
<td>3696</td>
<td>3.37</td>
<td>4.40</td>
<td>3.47</td>
<td>11.24</td>
</tr>
<tr>
<td>45. Mitrasacme pygmaea</td>
<td>3.25</td>
<td>0.65</td>
<td>20</td>
<td>60</td>
<td>0.07</td>
<td>0.97</td>
<td>0.05</td>
<td>1.09</td>
</tr>
<tr>
<td>46. Mnnesitha laevis</td>
<td>20.00</td>
<td>1.00</td>
<td>5</td>
<td>182</td>
<td>0.11</td>
<td>0.24</td>
<td>0.17</td>
<td>0.52</td>
</tr>
<tr>
<td>47. Murdannia nudiflora</td>
<td>10.66</td>
<td>4.80</td>
<td>45</td>
<td>1393</td>
<td>0.53</td>
<td>2.20</td>
<td>1.31</td>
<td>4.04</td>
</tr>
<tr>
<td>48. Ophioglossum reticulatum</td>
<td>6.00</td>
<td>0.30</td>
<td>5</td>
<td>37</td>
<td>0.03</td>
<td>0.24</td>
<td>0.03</td>
<td>0.30</td>
</tr>
<tr>
<td>49. Paspalum scrobiculatum</td>
<td>12.81</td>
<td>7.05</td>
<td>55</td>
<td>1156</td>
<td>0.78</td>
<td>2.69</td>
<td>1.08</td>
<td>4.55</td>
</tr>
<tr>
<td>50. Phyllanthus urinaria</td>
<td>111.73</td>
<td>106.15</td>
<td>95</td>
<td>4734</td>
<td>11.84</td>
<td>4.64</td>
<td>4.45</td>
<td>20.93</td>
</tr>
<tr>
<td>51. Phyllanthus virgatus</td>
<td>2.00</td>
<td>0.10</td>
<td>5</td>
<td>11</td>
<td>0.01</td>
<td>0.24</td>
<td>0.01</td>
<td>0.26</td>
</tr>
<tr>
<td>52. Prunella vulgaris</td>
<td>16.38</td>
<td>10.65</td>
<td>65</td>
<td>1583</td>
<td>1.19</td>
<td>3.18</td>
<td>1.48</td>
<td>5.85</td>
</tr>
<tr>
<td>53. Pueraria phaseoloides</td>
<td>6.83</td>
<td>6.15</td>
<td>90</td>
<td>5350</td>
<td>0.68</td>
<td>4.40</td>
<td>5.03</td>
<td>10.11</td>
</tr>
<tr>
<td>54. Rungia pectinata</td>
<td>36.47</td>
<td>34.65</td>
<td>95</td>
<td>2987</td>
<td>3.86</td>
<td>4.64</td>
<td>2.81</td>
<td>11.31</td>
</tr>
<tr>
<td>55. Saccharum spontaneum</td>
<td>35.05</td>
<td>35.05</td>
<td>100</td>
<td>5678</td>
<td>3.91</td>
<td>4.89</td>
<td>5.34</td>
<td>14.14</td>
</tr>
<tr>
<td>56. Salomonia ciliata</td>
<td>4.00</td>
<td>1.80</td>
<td>45</td>
<td>188</td>
<td>0.20</td>
<td>2.20</td>
<td>0.17</td>
<td>2.57</td>
</tr>
<tr>
<td>57. Schizachyrium brevifolium</td>
<td>10.55</td>
<td>4.75</td>
<td>45</td>
<td>799</td>
<td>0.53</td>
<td>2.20</td>
<td>0.75</td>
<td>3.48</td>
</tr>
<tr>
<td>58. Scleria caricina</td>
<td>12.33</td>
<td>3.70</td>
<td>30</td>
<td>302</td>
<td>0.41</td>
<td>1.46</td>
<td>0.28</td>
<td>2.15</td>
</tr>
<tr>
<td>59. Scleria parvula</td>
<td>90.00</td>
<td>9.00</td>
<td>10</td>
<td>632</td>
<td>1.00</td>
<td>0.49</td>
<td>0.59</td>
<td>2.08</td>
</tr>
<tr>
<td>60. Selaginella sp.</td>
<td>30.55</td>
<td>13.75</td>
<td>45</td>
<td>1318</td>
<td>1.53</td>
<td>2.20</td>
<td>1.24</td>
<td>4.97</td>
</tr>
<tr>
<td>51. Smithia conferta</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>9</td>
<td>0.005</td>
<td>0.24</td>
<td>0.008</td>
<td>0.25</td>
</tr>
<tr>
<td>63. Stephania japonica</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>8</td>
<td>0.005</td>
<td>0.24</td>
<td>0.007</td>
<td>0.25</td>
</tr>
<tr>
<td>64. Streptocaulon sylvestre</td>
<td>3.25</td>
<td>1.30</td>
<td>40</td>
<td>939</td>
<td>0.14</td>
<td>1.95</td>
<td>0.88</td>
<td>2.97</td>
</tr>
<tr>
<td>65. Triumfetta rhomboidea</td>
<td>1.50</td>
<td>0.15</td>
<td>10</td>
<td>22</td>
<td>0.01</td>
<td>0.49</td>
<td>0.02</td>
<td>0.52</td>
</tr>
<tr>
<td>66. Urena lobata</td>
<td>2.00</td>
<td>0.10</td>
<td>5</td>
<td>12</td>
<td>0.01</td>
<td>0.24</td>
<td>0.01</td>
<td>0.26</td>
</tr>
<tr>
<td>67. Vernonina cinerea</td>
<td>6.77</td>
<td>4.40</td>
<td>65</td>
<td>991</td>
<td>0.49</td>
<td>3.18</td>
<td>0.93</td>
<td>4.60</td>
</tr>
<tr>
<td>68. Vetiveria zizanioides</td>
<td>69.00</td>
<td>3.45</td>
<td>5</td>
<td>435</td>
<td>0.38</td>
<td>0.24</td>
<td>0.41</td>
<td>1.03</td>
</tr>
<tr>
<td>69. Zornia gibbosa</td>
<td>8.43</td>
<td>5.90</td>
<td>70</td>
<td>1197</td>
<td>0.66</td>
<td>3.42</td>
<td>1.12</td>
<td>5.20</td>
</tr>
</tbody>
</table>

Total number of individuals of all species = 17921, Total basal area cover = 106389 cm²
Total number of quadrats examined = 20, Number of occurrences of all species = 409
respectively. Raunkiaer’s frequency classes A included 43 species, B 7 species, C 6 species, D 4 species and E 9 species (Fig-3.8). This indicated that the species with poor dispersion of frequencies were higher in number than the number of species with higher frequency values. It also showed that class E was larger than D. According to ‘Law of frequency’ this tendency showed the normal distribution of frequency percentage which indicate the uniformity of the vegetation, maintained with least biotic disturbance, during this season.

![Graph showing number of species under Raunkiaer's frequency classes A, B, C, D and E at site-II during monsoon- '98](image)

Cymbopogon pendulus recorded the highest value of basal area cover i.e. relative dominance value of 17.93 %. This was followed by Borreria alata (16.22 %), Sporobolus indicus (13.27 %), Imperata cylindrica (5.91 %), Saccharum spontaneum (5.34 %), Pueraria phaseoloides (5.03 %), Phyllanthus urinaria (4.45 %), Mitracarpus verticillatus (3.47 %) etc. in term of relative dominance. Streptocaulon sylvestre recorded the R Dm value of 0.88 %.

However, the dominant species during monsoon-'98 season at site-II based on IVI were Borreria alata (42.22), Sporobolus indicus (39.98), Cymbopogon pendulus (25.52), Phyllanthus urinaria (20.93), Imperata cylindrica (15.99), Saccharum spontaneum (14.14), Rungia pectinata (11.31), Mitracarpus verticillatus (11.24), Cyperus juncoides (11.17) and Pueraria phaseoloides (10.11). The IVI of Streptocaulon sylvestre was calculated to 2.97 only. Besides, based on the lowest determined IVI value (0.25), five very rare species like Crotalaria alata, Crotalaria ferruginea, Crotalaria pallida, Smithia conferta and Stephania japonica were noted at site-II during this season.
3.2.1.2.2 SITE-II : WINTER SEASON

In the present investigation, a total of 51 species of plants were recorded at site-II during winter season through quadrat sampling, 44 of those were in winter-'98 and 34 were in winter-'99. A common 27 species were found to occur in both the winter of both the years. Moreover, altogether 8393 and 4800 number of individuals were recorded from each 20 quadrats in winter-'98 and '99 seasons, respectively.

3.2.1.2.2.1 SITE-II : WINTER-'98

During winter'98 season the highest number of species recorded in single quadrat was 17 and the lowest was 8. The, average number of species per quadrat was 12.75. The highest number of individuals recorded in single quadrat was 954 and lowest was 195, while the average number of individuals per quadrat was 419.65.

Floristic composition and community characteristics for site-II in winter-'98 are given in Table-3.9. Results indicate that *Sporobolus indicus* was the most dominant herb for having maximum density (147.70 m^2), % frequency (100 %) and abundance (147.70) among the total of 44 species at site-II in this season. This was followed by *Saccharum spontaneum, Imperata cylindrica, Mitracarpus verticillatus, Rungia pectinata, Cymbopogon pendulus* etc. in term of density. Besides, minimum values of density (0.05 m^2), % frequency (5 %) and abundance (1) were showed by *Ageratum houstonianum, Centella asiatica, Leucas indica* and *Smithia conferta*.

In winter-'98 only *Sporobolus indicus* was found growing most frequently at site-II with highest RF value of 8.00 %, which was then followed by *Mitracarpus verticillatus* (7.20 %), *Rungia pectinata* (7.20 %), *Saccharum spontaneum* (7.20 %), *Cymbopogon pendulus* (5.60 %), *Vernonia cinerea* (5.60 %), etc. *Streptocaulon sylvestre* showed the % frequency and RF values of 25 % and 2.00 %, respectively. In this season, Raunkiaer’s frequency classes A included 28 species, B 5 species, C 3 species and D & E 4 species each at site-II (Fig-3.9). As class E was not larger than D, so according to ‘Law of frequency’ the community showed the presence of considerable disturbances to its normal growth and development.

The highest basal area cover was noted for *Sporobolus indicus* having maximum relative dominance of 23.40 %. This was followed by *Saccharum spontaneum* (13.57 %), *Cymbopogon pendulus* (8.97 %), *Imperata cylindrica* (8.42 %), *Mitracarpus verticillatus* (7.47 %), *Rungia pectinata* (6.98 %), *Vernonia cinerea* (5.54 %) etc. in term of relative dominance. *Streptocaulon sylvestre* recorded the relative dominance value of 3.79 %.
Table 3.9: Floristic composition, Abundance (Ab), Density (D), Frequency (F), Basal Area Cover (BA), Relative Density (RD), Relative Frequency (RF), Relative Dominance (RDm) and Importance Value Index (IVI) of various species of Site-II in Winter-1998 season.

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D</th>
<th>F</th>
<th>BA</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ageratum conyzoides</td>
<td>2.00</td>
<td>0.10</td>
<td>5</td>
<td>49</td>
<td>0.02</td>
<td>0.40</td>
<td>0.06</td>
<td>0.48</td>
</tr>
<tr>
<td>Ageratum houstonianum</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>17</td>
<td>0.01</td>
<td>0.40</td>
<td>0.02</td>
<td>0.43</td>
</tr>
<tr>
<td>Apocopis paleacea</td>
<td>62.00</td>
<td>3.10</td>
<td>5</td>
<td>574</td>
<td>0.74</td>
<td>0.40</td>
<td>0.73</td>
<td>1.87</td>
</tr>
<tr>
<td>Borreria alata</td>
<td>15.92</td>
<td>10.35</td>
<td>65</td>
<td>3171</td>
<td>2.46</td>
<td>5.20</td>
<td>4.05</td>
<td>11.71</td>
</tr>
<tr>
<td>Centella asiatica</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>11</td>
<td>0.01</td>
<td>0.40</td>
<td>0.01</td>
<td>0.42</td>
</tr>
<tr>
<td>Chrysopogon aciculatus</td>
<td>5.50</td>
<td>1.10</td>
<td>20</td>
<td>381</td>
<td>0.26</td>
<td>1.60</td>
<td>0.48</td>
<td>2.34</td>
</tr>
<tr>
<td>Crotalaria prostrata</td>
<td>1.60</td>
<td>0.40</td>
<td>25</td>
<td>58</td>
<td>0.09</td>
<td>2.00</td>
<td>0.07</td>
<td>2.16</td>
</tr>
<tr>
<td>Cynoglossum lanceolatum</td>
<td>14.00</td>
<td>0.70</td>
<td>5</td>
<td>91</td>
<td>0.16</td>
<td>0.40</td>
<td>0.11</td>
<td>0.67</td>
</tr>
<tr>
<td>Cynofoglossum lanceolatum</td>
<td>37.42</td>
<td>26.20</td>
<td>70</td>
<td>7027</td>
<td>6.24</td>
<td>5.60</td>
<td>8.97</td>
<td>20.81</td>
</tr>
<tr>
<td>Cynodon dactylon</td>
<td>25.66</td>
<td>3.85</td>
<td>15</td>
<td>737</td>
<td>0.92</td>
<td>1.20</td>
<td>0.94</td>
<td>3.06</td>
</tr>
<tr>
<td>Desmodium heterophyllum</td>
<td>4.25</td>
<td>0.85</td>
<td>20</td>
<td>130</td>
<td>0.20</td>
<td>1.60</td>
<td>0.16</td>
<td>1.96</td>
</tr>
<tr>
<td>Desmodium triflorum</td>
<td>13.00</td>
<td>6.50</td>
<td>50</td>
<td>1600</td>
<td>1.55</td>
<td>4.00</td>
<td>2.04</td>
<td>7.59</td>
</tr>
<tr>
<td>Digitaria ciliaris</td>
<td>6.00</td>
<td>0.30</td>
<td>5</td>
<td>43</td>
<td>0.07</td>
<td>0.40</td>
<td>0.05</td>
<td>0.52</td>
</tr>
<tr>
<td>Drosera burmannii</td>
<td>15.00</td>
<td>0.75</td>
<td>10</td>
<td>205</td>
<td>0.36</td>
<td>0.80</td>
<td>0.26</td>
<td>1.42</td>
</tr>
<tr>
<td>Elephantopus scaber</td>
<td>4.50</td>
<td>0.45</td>
<td>10</td>
<td>127</td>
<td>0.11</td>
<td>0.80</td>
<td>0.16</td>
<td>1.07</td>
</tr>
<tr>
<td>Eleusine indica</td>
<td>8.5</td>
<td>1.70</td>
<td>20</td>
<td>353</td>
<td>0.40</td>
<td>1.60</td>
<td>0.45</td>
<td>2.45</td>
</tr>
<tr>
<td>Emilia sonchifolia</td>
<td>4.75</td>
<td>0.95</td>
<td>20</td>
<td>122</td>
<td>0.22</td>
<td>1.60</td>
<td>0.15</td>
<td>1.97</td>
</tr>
<tr>
<td>Eragrostis nigra</td>
<td>25.00</td>
<td>3.75</td>
<td>15</td>
<td>624</td>
<td>0.89</td>
<td>1.20</td>
<td>0.79</td>
<td>2.88</td>
</tr>
<tr>
<td>Eragrostis unioloides</td>
<td>18.33</td>
<td>2.75</td>
<td>15</td>
<td>523</td>
<td>0.65</td>
<td>1.20</td>
<td>0.67</td>
<td>2.52</td>
</tr>
<tr>
<td>Eriocaulon quinquangulare</td>
<td>13.00</td>
<td>1.30</td>
<td>10</td>
<td>196</td>
<td>0.31</td>
<td>0.80</td>
<td>0.25</td>
<td>1.36</td>
</tr>
<tr>
<td>Hedystis corymbosa</td>
<td>4.33</td>
<td>0.65</td>
<td>15</td>
<td>82</td>
<td>0.15</td>
<td>1.20</td>
<td>0.10</td>
<td>1.45</td>
</tr>
<tr>
<td>Hedystis diffusa</td>
<td>1.50</td>
<td>0.30</td>
<td>20</td>
<td>56</td>
<td>0.07</td>
<td>1.60</td>
<td>0.07</td>
<td>1.74</td>
</tr>
<tr>
<td>Hymospora suaveoleus</td>
<td>4.33</td>
<td>0.65</td>
<td>15</td>
<td>223</td>
<td>0.15</td>
<td>1.20</td>
<td>0.28</td>
<td>1.63</td>
</tr>
<tr>
<td>Imperata cylindrica</td>
<td>65.00</td>
<td>42.25</td>
<td>65</td>
<td>6593</td>
<td>10.07</td>
<td>5.20</td>
<td>8.42</td>
<td>23.69</td>
</tr>
<tr>
<td>Leucas indica</td>
<td>1.00</td>
<td>1.00</td>
<td>5</td>
<td>9</td>
<td>0.01</td>
<td>0.40</td>
<td>0.01</td>
<td>0.42</td>
</tr>
<tr>
<td>Mimosa pudica</td>
<td>6.16</td>
<td>1.85</td>
<td>30</td>
<td>778</td>
<td>0.44</td>
<td>2.40</td>
<td>0.99</td>
<td>3.83</td>
</tr>
<tr>
<td>Mitracarpus verticillatus</td>
<td>31.55</td>
<td>28.40</td>
<td>90</td>
<td>5851</td>
<td>6.77</td>
<td>7.20</td>
<td>7.47</td>
<td>21.44</td>
</tr>
<tr>
<td>Mnesitheca laevis</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>67</td>
<td>0.03</td>
<td>0.40</td>
<td>0.08</td>
<td>0.51</td>
</tr>
<tr>
<td>Opilisemenos compositus</td>
<td>6.00</td>
<td>6.00</td>
<td>5</td>
<td>49</td>
<td>0.07</td>
<td>0.40</td>
<td>0.06</td>
<td>0.53</td>
</tr>
<tr>
<td>Paspalum scrobiculatum</td>
<td>15.45</td>
<td>8.50</td>
<td>55</td>
<td>1753</td>
<td>2.02</td>
<td>4.40</td>
<td>2.24</td>
<td>8.66</td>
</tr>
<tr>
<td>Phyllanthus urinaria</td>
<td>21.66</td>
<td>3.25</td>
<td>15</td>
<td>307</td>
<td>0.77</td>
<td>1.20</td>
<td>0.39</td>
<td>2.36</td>
</tr>
<tr>
<td>Phyllanthus virgatus</td>
<td>25.36</td>
<td>13.95</td>
<td>55</td>
<td>1174</td>
<td>3.32</td>
<td>4.40</td>
<td>1.50</td>
<td>9.22</td>
</tr>
</tbody>
</table>

*Table Contd.*
<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D</th>
<th>F</th>
<th>BA</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>33. Prunella vulgaris</td>
<td>8.67</td>
<td>1.30</td>
<td>15</td>
<td>193</td>
<td>0.31</td>
<td>1.20</td>
<td>0.24</td>
<td>1.75</td>
</tr>
<tr>
<td>34. Pueraria phaseoloides</td>
<td>4.87</td>
<td>1.95</td>
<td>40</td>
<td>2004</td>
<td>0.46</td>
<td>3.20</td>
<td>2.56</td>
<td>6.22</td>
</tr>
<tr>
<td>35. Rungia pectinata</td>
<td>30.05</td>
<td>27.05</td>
<td>90</td>
<td>5463</td>
<td>6.44</td>
<td>7.20</td>
<td>6.98</td>
<td>20.62</td>
</tr>
<tr>
<td>36. Saccharum spontaneum</td>
<td>56.17</td>
<td>50.55</td>
<td>90</td>
<td>10628</td>
<td>12.04</td>
<td>7.20</td>
<td>13.57</td>
<td>32.81</td>
</tr>
<tr>
<td>37. Schizachyrium brevifolium</td>
<td>34.00</td>
<td>3.40</td>
<td>10</td>
<td>709</td>
<td>0.81</td>
<td>0.80</td>
<td>0.90</td>
<td>2.51</td>
</tr>
<tr>
<td>38. Selaginella</td>
<td>23.00</td>
<td>5.75</td>
<td>25</td>
<td>577</td>
<td>1.37</td>
<td>2.00</td>
<td>0.73</td>
<td>4.10</td>
</tr>
<tr>
<td>39. Smithia conferta</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>8</td>
<td>0.01</td>
<td>0.40</td>
<td>0.01</td>
<td>0.42</td>
</tr>
<tr>
<td>40. Sporobolus indicus</td>
<td>147.70</td>
<td>147.70</td>
<td>100</td>
<td>18319</td>
<td>35.19</td>
<td>8.00</td>
<td>23.40</td>
<td>66.59</td>
</tr>
<tr>
<td>41. Streptocaulon sylvestre</td>
<td>6.80</td>
<td>1.70</td>
<td>25</td>
<td>2969</td>
<td>0.40</td>
<td>2.00</td>
<td>3.79</td>
<td>6.19</td>
</tr>
<tr>
<td>42. Urena lobata</td>
<td>2.00</td>
<td>0.1</td>
<td>5</td>
<td>16</td>
<td>0.02</td>
<td>0.40</td>
<td>0.02</td>
<td>0.44</td>
</tr>
<tr>
<td>43. Vernonia cinerea</td>
<td>19.35</td>
<td>13.55</td>
<td>70</td>
<td>4338</td>
<td>3.23</td>
<td>5.60</td>
<td>5.54</td>
<td>14.37</td>
</tr>
<tr>
<td>44. Zornia gibbosa</td>
<td>6.00</td>
<td>0.30</td>
<td>5</td>
<td>80</td>
<td>0.07</td>
<td>0.40</td>
<td>0.10</td>
<td>0.57</td>
</tr>
</tbody>
</table>

Total number of individuals of all species = 8393, Total basal area cover = 78285 cm²
Total number of quadrats examined =20, Number of occurrences of all species = 250

Based on IV I, Sporobolus indicus was the most dominant species at site-II in winter-'98 with calculated highest value of IVI of 66.59, and was followed fare behind by Saccharum spontaneum (32.81), Imperata cylindrica (23.69), Mitracarpus verticillatus (21.44), Cymbopogon pendulus (20.81), Rungia pectinata (20.62), Vernonia cinerea (14.37) etc. Besides, Streptocaulon sylvestre showed the IVI of 6.19. Inspite of that, Centella asiatica, Leucas indica and Smithia conferta recorded the lowest IVI of 0.42.

**Fig-3.9** Number of species under Raunkiaer's frequency classes A, B, C, D and E at site-II during winter-'98
3.2.1.2.2 SITE-II : WINTER-'99

During winter-'99 season the highest and lowest number of species found in single quadrat were 13 and 7, respectively. The mean number of species per quadrat was 9.7. The highest number of individuals in single quadrat was 461 and lowest was 132. While the average individuals per quadrat was 240.

A perusal of Table-3.10 shows that in winter-'99, *Sporobolus indicus* was the dominant species having highest density (88.75 m\(^2\)), % frequency (100 %) and abundance (88.75) among the recorded total of 34 species. This was followed by *Imperata cylindrica, Saccharum spontaneum, Cymbopogon pendulus, Rungia pectinata, Paspalum scrobiculatum* etc. in term of density and abundance. The minimum density (0.05 m\(^2\)), % frequency (5 %) and abundance (1) were noted for eight speices viz. *Ageratum conyzoides, Ageratum houstonianum, Centella asiatica, Desmodium heterophyllum, Emilia sonchifolia, Merremia hirta (L), Phyllanthus virgatus and Triumfetta rhomboidea.*

Table 3.10: Computation of Phytosociological observations of various species of Site-II in Winter 1999 season (Abbreviation used : Ab=Abundance, D=Density, F=Frequency, BA=Basal Area Cover, RD=Relative Density, RF=Relative Frequency, RDm=Relative Dominance and IVI=Importance Value Index).

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D</th>
<th>F %</th>
<th>BA</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <em>Ageratum conyzoides</em></td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>34</td>
<td>0.02</td>
<td>0.52</td>
<td>0.07</td>
<td>0.61</td>
</tr>
<tr>
<td>2. <em>Ageratum houstonianum</em></td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>24</td>
<td>0.02</td>
<td>0.52</td>
<td>0.05</td>
<td>0.59</td>
</tr>
<tr>
<td>3. <em>Borreria alata</em></td>
<td>5.66</td>
<td>0.85</td>
<td>15</td>
<td>260</td>
<td>0.35</td>
<td>1.55</td>
<td>0.52</td>
<td>2.42</td>
</tr>
<tr>
<td>4. <em>Brachiaria reptans</em></td>
<td>30.00</td>
<td>3.00</td>
<td>10</td>
<td>876</td>
<td>1.25</td>
<td>1.03</td>
<td>1.75</td>
<td>4.03</td>
</tr>
<tr>
<td>5. <em>Centella asiatica</em></td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>12</td>
<td>0.02</td>
<td>0.52</td>
<td>0.02</td>
<td>0.56</td>
</tr>
<tr>
<td>6. <em>Cymbopogon pendulus</em></td>
<td>25.47</td>
<td>24.20</td>
<td>95</td>
<td>7268</td>
<td>10.08</td>
<td>9.84</td>
<td>14.57</td>
<td>34.49</td>
</tr>
<tr>
<td>7. <em>Cynodon dactylon</em></td>
<td>13.00</td>
<td>1.30</td>
<td>10</td>
<td>274</td>
<td>0.54</td>
<td>1.03</td>
<td>0.55</td>
<td>2.12</td>
</tr>
<tr>
<td>8. <em>Desmodium heterophyllum</em></td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>12</td>
<td>0.02</td>
<td>0.52</td>
<td>0.02</td>
<td>0.56</td>
</tr>
<tr>
<td>9. <em>Desmodium triflorum</em></td>
<td>8.10</td>
<td>4.05</td>
<td>50</td>
<td>1056</td>
<td>1.68</td>
<td>5.18</td>
<td>2.12</td>
<td>8.98</td>
</tr>
<tr>
<td>10. <em>Digitaria ciliaris</em></td>
<td>17.00</td>
<td>4.25</td>
<td>25</td>
<td>513</td>
<td>1.77</td>
<td>2.59</td>
<td>1.03</td>
<td>5.39</td>
</tr>
<tr>
<td>11. <em>Digitaria griffithii</em></td>
<td>5.00</td>
<td>0.25</td>
<td>5</td>
<td>38</td>
<td>0.10</td>
<td>0.52</td>
<td>0.07</td>
<td>0.69</td>
</tr>
<tr>
<td>12. <em>Drosera burmannii</em></td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>22</td>
<td>0.06</td>
<td>0.52</td>
<td>0.04</td>
<td>0.62</td>
</tr>
<tr>
<td>13. <em>Elephantopus scaber</em></td>
<td>10.60</td>
<td>2.65</td>
<td>25</td>
<td>625</td>
<td>1.10</td>
<td>2.59</td>
<td>1.25</td>
<td>4.94</td>
</tr>
<tr>
<td>14. <em>Emilia sonchifolia</em></td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>8</td>
<td>0.02</td>
<td>0.52</td>
<td>0.01</td>
<td>0.55</td>
</tr>
<tr>
<td>15. <em>Eragrostis tenella</em></td>
<td>29.50</td>
<td>2.95</td>
<td>10</td>
<td>450</td>
<td>1.23</td>
<td>1.03</td>
<td>0.90</td>
<td>3.16</td>
</tr>
</tbody>
</table>

*Table Contd.*
Contd. Table-3.10

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D Pl. m⁻²</th>
<th>F %</th>
<th>BA cm²</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>16. Eragrostis unioloides</td>
<td>6.25</td>
<td>1.25</td>
<td>20</td>
<td>308.00</td>
<td>0.52</td>
<td>2.07</td>
<td>0.62</td>
<td>3.21</td>
</tr>
<tr>
<td>17. Hyptis suaveoleus</td>
<td>5.00</td>
<td>0.25</td>
<td>5</td>
<td>79.00</td>
<td>0.10</td>
<td>0.52</td>
<td>0.16</td>
<td>0.78</td>
</tr>
<tr>
<td>18. Imperata cylindrica</td>
<td>42.80</td>
<td>32.10</td>
<td>75</td>
<td>5528.00</td>
<td>13.37</td>
<td>7.77</td>
<td>11.08</td>
<td>32.22</td>
</tr>
<tr>
<td>19. Isachne albens</td>
<td>125.00</td>
<td>6.25</td>
<td>5</td>
<td>724.00</td>
<td>2.60</td>
<td>0.52</td>
<td>1.45</td>
<td>4.57</td>
</tr>
<tr>
<td>20. Merremia hirta</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>35.00</td>
<td>0.02</td>
<td>0.52</td>
<td>0.07</td>
<td>0.61</td>
</tr>
<tr>
<td>21. Mimosa pudica</td>
<td>6.50</td>
<td>0.65</td>
<td>10</td>
<td>251.00</td>
<td>0.27</td>
<td>1.03</td>
<td>0.50</td>
<td>1.80</td>
</tr>
<tr>
<td>22. Mitracarpus verticillatus</td>
<td>5.50</td>
<td>2.75</td>
<td>50</td>
<td>783.00</td>
<td>1.14</td>
<td>5.18</td>
<td>1.57</td>
<td>7.89</td>
</tr>
<tr>
<td>23. Paspalum scrobiculatum</td>
<td>19.63</td>
<td>10.80</td>
<td>55</td>
<td>2251.00</td>
<td>4.50</td>
<td>5.70</td>
<td>4.51</td>
<td>14.71</td>
</tr>
<tr>
<td>24. Phyllanthus urinaria</td>
<td>2.00</td>
<td>0.10</td>
<td>10</td>
<td>11.00</td>
<td>0.04</td>
<td>1.03</td>
<td>0.02</td>
<td>1.09</td>
</tr>
<tr>
<td>25. Phyllanthus virgatus</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>6.00</td>
<td>0.02</td>
<td>0.52</td>
<td>0.01</td>
<td>0.55</td>
</tr>
<tr>
<td>26. Pueraria phaseoloides</td>
<td>3.30</td>
<td>1.65</td>
<td>50</td>
<td>1691.00</td>
<td>0.68</td>
<td>5.18</td>
<td>3.39</td>
<td>9.25</td>
</tr>
<tr>
<td>27. Rungia pectinata</td>
<td>13.61</td>
<td>12.25</td>
<td>90</td>
<td>2703.00</td>
<td>5.10</td>
<td>9.32</td>
<td>5.42</td>
<td>19.84</td>
</tr>
<tr>
<td>28. Saccharum spontaneum</td>
<td>40.06</td>
<td>30.05</td>
<td>75</td>
<td>6383.00</td>
<td>12.52</td>
<td>7.77</td>
<td>12.80</td>
<td>33.09</td>
</tr>
<tr>
<td>29. Sporobolus indicus</td>
<td>88.75</td>
<td>88.75</td>
<td>100</td>
<td>12868.00</td>
<td>36.98</td>
<td>10.36</td>
<td>25.80</td>
<td>73.14</td>
</tr>
<tr>
<td>30. Streptocaulon sylvestre</td>
<td>3.20</td>
<td>1.60</td>
<td>50</td>
<td>2565.00</td>
<td>0.66</td>
<td>5.18</td>
<td>5.14</td>
<td>10.98</td>
</tr>
<tr>
<td>31. Triumfetta rhomboidea</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>10.00</td>
<td>0.02</td>
<td>0.52</td>
<td>0.02</td>
<td>0.56</td>
</tr>
<tr>
<td>32. Urena lobata</td>
<td>2.33</td>
<td>0.35</td>
<td>15</td>
<td>51.00</td>
<td>0.14</td>
<td>1.55</td>
<td>0.10</td>
<td>1.79</td>
</tr>
<tr>
<td>33. Vernonia cinerea</td>
<td>6.50</td>
<td>3.25</td>
<td>50</td>
<td>1317.00</td>
<td>1.35</td>
<td>5.18</td>
<td>2.64</td>
<td>9.17</td>
</tr>
<tr>
<td>34. Vetiveria zizanioides</td>
<td>26.00</td>
<td>3.90</td>
<td>15</td>
<td>831.00</td>
<td>1.62</td>
<td>1.55</td>
<td>1.66</td>
<td>4.83</td>
</tr>
</tbody>
</table>

Total number of individuals of all species = 4800, Total basal area cover = 49867 cm²  
Total number of quadrats examined = 20, Number of occurrences of all species = 193

Furthermore, *Sporobolus indicus* appeared to be the most frequently available species with highest relative frequency value of 10.36 % and was followed by *Cymbopogon pendulus* (9.84 %), *Rungia pectinata* (9.32 %), *Imperata cylindrica* (7.77 %), *Saccharum spontaneum* (7.77 %), *Paspalum scrobiculatum* (5.70 %) etc. Raunkiaer’s frequency classes A comprised 21 species, B 2 species, C 6 species, D 2 species and E 3 species (Fig-3.10). According to ‘Law of frequency’ as C was greater than B, so this vegetation was subjected to severe biotic influences during this season.

*Sporobolus indicus* also recorded the highest value of basal area cover having relative dominance of 25.80 %. This was followed by *Cymbopogon pendulus, Saccharum spontaneum, Imperata cylindrica, Rungia pectinata* etc. in term of relative dominance. However the determined IVI revealed that *Sporobolus indicus* was the most important species of the vegetation with highest IVI of 73.14 during winter-'99, which was, followed far behind by *Cymbopogon pendulus* (34.49),
Number of species under Raunkiaer's frequency classes A, B, C, D and E at site-II during winter-'99

Saccharum spontaneum (33.09), Imperata cylindrica (32.22), Rungia pectinata (19.84), Paspalum scrobiculatum (14.71) etc. On the other hand, Emilia sonchifolia and Phyllanthus virgatus both recorded the minimum IVI of 0.55. The IVI of Streptocaulon sylvestre was calculated to 10.98.

3.2.1.2.3 SITE-II : SUMMER SEASON

At site-II, a total of 77 species of plants were recorded during summer season of two years through quadrat samplings, 54 of which were in summer-'98 and 61 were in summer-'99 seasons. Of these, 38 species were found to occur there during the summer of both the years. The total of 21901 and 19395 individuals were counted in each 20 quadrats during summer-'98 and '99 seasons, respectively.

3.2.1.2.3.1 SITE-II : SUMMER-'98

During summer-'98, at site-II, the highest number of species recorded in single quadrat was 23 and the lowest was 11. The mean number of species per quadrat was 15.95. The highest and lowest number of individuals recorded in single quadrat were 1624 and 595, respectively. Moreover, the average number of individuals per quadrat was 1095.05.

From the perusal of Table-3.11 it is seen that during summer-'98, the most dominant species recorded from site-11 was Sporobolus indicus having highest density (274.35 m⁻²), % frequency (100 %) and abundance (274.35) values among the recorded 54 species of plants. Other dominant species in this season were Borreria alata, Phyllanthus virgatus, Saccharum spontaneum, Imperata cylindrica and
Table-3.11: Abundance (Ab), Density (D), Frequency (F), Basal Area Cover (BA), Relative Density (RD), Relative Frequency (RF), Relative Dominance (RDm) and Importance Value Index (IVI) of different species of Site-II during Summer 1998.

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D</th>
<th>F</th>
<th>BA</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ageratum conyzoides</td>
<td>5.00</td>
<td>0.25</td>
<td>5</td>
<td>24</td>
<td>0.02</td>
<td>0.32</td>
<td>0.03</td>
<td>0.37</td>
</tr>
<tr>
<td>2. Ageratum houstonianum</td>
<td>2.00</td>
<td>0.10</td>
<td>5</td>
<td>10</td>
<td>0.009</td>
<td>0.32</td>
<td>0.01</td>
<td>0.34</td>
</tr>
<tr>
<td>3. Andropogon ascinodis</td>
<td>11.66</td>
<td>1.75</td>
<td>15</td>
<td>204</td>
<td>0.17</td>
<td>0.95</td>
<td>0.24</td>
<td>1.36</td>
</tr>
<tr>
<td>4. Apocopis paleacea</td>
<td>35.00</td>
<td>1.75</td>
<td>5</td>
<td>151</td>
<td>0.17</td>
<td>0.32</td>
<td>0.18</td>
<td>0.67</td>
</tr>
<tr>
<td>5. Borreria alata</td>
<td>257.25</td>
<td>257.25</td>
<td>100</td>
<td>14168</td>
<td>23.49</td>
<td>6.35</td>
<td>16.96</td>
<td>46.80</td>
</tr>
<tr>
<td>6. Carex indica</td>
<td>105.00</td>
<td>10.50</td>
<td>10</td>
<td>405</td>
<td>0.96</td>
<td>0.63</td>
<td>0.48</td>
<td>2.07</td>
</tr>
<tr>
<td>7. Cassia mimosoides</td>
<td>2.50</td>
<td>0.25</td>
<td>10</td>
<td>33</td>
<td>0.02</td>
<td>0.63</td>
<td>0.04</td>
<td>0.69</td>
</tr>
<tr>
<td>8. Chrysopogon aciculatus</td>
<td>20.77</td>
<td>9.35</td>
<td>45</td>
<td>733</td>
<td>0.85</td>
<td>2.86</td>
<td>0.88</td>
<td>4.59</td>
</tr>
<tr>
<td>9. Crotalaria alata</td>
<td>2.00</td>
<td>0.10</td>
<td>5</td>
<td>10</td>
<td>0.009</td>
<td>0.32</td>
<td>0.01</td>
<td>0.34</td>
</tr>
<tr>
<td>10. Crotalaria ferruginea</td>
<td>1.00</td>
<td>0.20</td>
<td>20</td>
<td>21</td>
<td>0.02</td>
<td>1.27</td>
<td>0.02</td>
<td>1.31</td>
</tr>
<tr>
<td>11. Crotalaria prostrata</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>4</td>
<td>0.004</td>
<td>0.32</td>
<td>0.005</td>
<td>0.33</td>
</tr>
<tr>
<td>12. Cyanotis nudiflora</td>
<td>4.00</td>
<td>0.20</td>
<td>5</td>
<td>21</td>
<td>0.02</td>
<td>0.32</td>
<td>0.02</td>
<td>0.36</td>
</tr>
<tr>
<td>13. Cymbopogon microtheca</td>
<td>168.00</td>
<td>8.40</td>
<td>5</td>
<td>2574</td>
<td>0.77</td>
<td>0.32</td>
<td>3.08</td>
<td>4.17</td>
</tr>
<tr>
<td>14. Cymbopogon pendulus</td>
<td>35.25</td>
<td>28.20</td>
<td>80</td>
<td>12213</td>
<td>2.57</td>
<td>5.08</td>
<td>14.62</td>
<td>22.27</td>
</tr>
<tr>
<td>15. Cyperus alalatus</td>
<td>10.00</td>
<td>0.50</td>
<td>5</td>
<td>20</td>
<td>0.04</td>
<td>0.32</td>
<td>0.02</td>
<td>0.38</td>
</tr>
<tr>
<td>16. Cyperus compressus</td>
<td>49.00</td>
<td>4.90</td>
<td>10</td>
<td>197</td>
<td>0.45</td>
<td>0.63</td>
<td>0.23</td>
<td>1.31</td>
</tr>
<tr>
<td>17. Cyperus cyperoides</td>
<td>45.50</td>
<td>18.20</td>
<td>40</td>
<td>712</td>
<td>1.66</td>
<td>2.54</td>
<td>0.85</td>
<td>5.05</td>
</tr>
<tr>
<td>18. Desmodium heterophyllum</td>
<td>2.66</td>
<td>0.40</td>
<td>15</td>
<td>65</td>
<td>0.03</td>
<td>0.95</td>
<td>0.08</td>
<td>1.06</td>
</tr>
<tr>
<td>19. Desmodium triflorum</td>
<td>18.50</td>
<td>11.10</td>
<td>60</td>
<td>1488</td>
<td>1.01</td>
<td>3.81</td>
<td>1.78</td>
<td>6.60</td>
</tr>
<tr>
<td>20. Digitaria ciliaris</td>
<td>23.80</td>
<td>5.95</td>
<td>25</td>
<td>452</td>
<td>0.54</td>
<td>1.59</td>
<td>0.54</td>
<td>2.67</td>
</tr>
<tr>
<td>21. Elephantopus scaber</td>
<td>7.50</td>
<td>0.75</td>
<td>10</td>
<td>185</td>
<td>0.07</td>
<td>0.63</td>
<td>0.22</td>
<td>0.92</td>
</tr>
<tr>
<td>22. Emilia sonchifolia</td>
<td>6.50</td>
<td>1.30</td>
<td>20</td>
<td>132</td>
<td>0.12</td>
<td>1.27</td>
<td>0.16</td>
<td>1.55</td>
</tr>
<tr>
<td>23. Eragrostis nigra</td>
<td>34.00</td>
<td>1.70</td>
<td>5</td>
<td>154</td>
<td>0.15</td>
<td>0.32</td>
<td>0.18</td>
<td>0.65</td>
</tr>
<tr>
<td>24. Eragrostis tenella</td>
<td>20.50</td>
<td>8.20</td>
<td>40</td>
<td>791</td>
<td>0.75</td>
<td>2.54</td>
<td>0.94</td>
<td>4.23</td>
</tr>
<tr>
<td>25. Eragrostis uniöloides</td>
<td>11.00</td>
<td>0.55</td>
<td>5</td>
<td>58</td>
<td>0.05</td>
<td>0.32</td>
<td>0.07</td>
<td>0.44</td>
</tr>
<tr>
<td>26. Hedyotis corymbosa</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>16</td>
<td>0.01</td>
<td>0.32</td>
<td>0.02</td>
<td>0.35</td>
</tr>
<tr>
<td>27. Hedyotis diffusa</td>
<td>4.00</td>
<td>0.20</td>
<td>5</td>
<td>15</td>
<td>0.02</td>
<td>0.32</td>
<td>0.02</td>
<td>0.36</td>
</tr>
<tr>
<td>28. Hypis suaveoleus</td>
<td>11.50</td>
<td>2.30</td>
<td>20</td>
<td>295</td>
<td>0.21</td>
<td>1.27</td>
<td>0.35</td>
<td>1.83</td>
</tr>
<tr>
<td>29. Imperata cylindrica</td>
<td>37.33</td>
<td>33.60</td>
<td>90</td>
<td>3756</td>
<td>3.07</td>
<td>5.71</td>
<td>4.49</td>
<td>13.27</td>
</tr>
<tr>
<td>30. Leucas indica</td>
<td>16.50</td>
<td>1.65</td>
<td>10</td>
<td>219</td>
<td>0.15</td>
<td>0.63</td>
<td>0.26</td>
<td>1.04</td>
</tr>
<tr>
<td>31. Leucaena leucocephala</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>6</td>
<td>0.004</td>
<td>0.32</td>
<td>0.007</td>
<td>0.33</td>
</tr>
<tr>
<td>32. Lindernia cordifolia</td>
<td>5.00</td>
<td>0.25</td>
<td>5</td>
<td>18</td>
<td>0.02</td>
<td>0.32</td>
<td>0.02</td>
<td>0.36</td>
</tr>
</tbody>
</table>

*Table Contd.*
Contd. Table-3.11

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D Pl m²</th>
<th>F %</th>
<th>BA cm²</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>33. Lindernia crustacea</td>
<td>7.50</td>
<td>2.25</td>
<td>30</td>
<td>191</td>
<td>0.20</td>
<td>1.90</td>
<td>0.23</td>
<td>2.33</td>
</tr>
<tr>
<td>34. Mimosa pudica</td>
<td>21.00</td>
<td>3.15</td>
<td>15</td>
<td>650</td>
<td>0.29</td>
<td>0.95</td>
<td>0.78</td>
<td>2.02</td>
</tr>
<tr>
<td>35. Mitracarpus verticillatus</td>
<td>24.71</td>
<td>17.30</td>
<td>70</td>
<td>1118</td>
<td>1.58</td>
<td>4.44</td>
<td>1.34</td>
<td>7.36</td>
</tr>
<tr>
<td>36. Mnesithea laevis</td>
<td>12.55</td>
<td>5.65</td>
<td>45</td>
<td>498</td>
<td>0.51</td>
<td>2.86</td>
<td>0.59</td>
<td>3.96</td>
</tr>
<tr>
<td>37. Paspalum scrobiculatum</td>
<td>19.00</td>
<td>10.45</td>
<td>55</td>
<td>1048</td>
<td>0.95</td>
<td>3.49</td>
<td>1.25</td>
<td>5.69</td>
</tr>
<tr>
<td>38. Phyllanthus virgatus</td>
<td>262.77</td>
<td>236.50</td>
<td>90</td>
<td>10423</td>
<td>21.60</td>
<td>5.71</td>
<td>12.48</td>
<td>39.79</td>
</tr>
<tr>
<td>39. Prunella vulgaris</td>
<td>40.00</td>
<td>4.00</td>
<td>10</td>
<td>232</td>
<td>0.36</td>
<td>0.63</td>
<td>0.28</td>
<td>1.27</td>
</tr>
<tr>
<td>40. Pueraria phaseoloides</td>
<td>8.72</td>
<td>4.80</td>
<td>55</td>
<td>926</td>
<td>0.44</td>
<td>3.49</td>
<td>1.11</td>
<td>5.04</td>
</tr>
<tr>
<td>41. Rottboellia sp.</td>
<td>11.00</td>
<td>0.55</td>
<td>5</td>
<td>50</td>
<td>0.05</td>
<td>0.32</td>
<td>0.06</td>
<td>0.43</td>
</tr>
<tr>
<td>42. Rungia pectinata</td>
<td>31.00</td>
<td>4.65</td>
<td>15</td>
<td>428</td>
<td>0.42</td>
<td>0.95</td>
<td>0.51</td>
<td>1.88</td>
</tr>
<tr>
<td>43. Saccharum spontaneum</td>
<td>65.20</td>
<td>65.20</td>
<td>100</td>
<td>4577</td>
<td>5.95</td>
<td>6.35</td>
<td>5.48</td>
<td>17.78</td>
</tr>
<tr>
<td>44. Salomonia ciliata</td>
<td>5.30</td>
<td>2.65</td>
<td>50</td>
<td>191</td>
<td>0.24</td>
<td>3.17</td>
<td>0.23</td>
<td>3.64</td>
</tr>
<tr>
<td>45. Schizachyrium brevifolium</td>
<td>63.62</td>
<td>25.45</td>
<td>40</td>
<td>3065</td>
<td>2.32</td>
<td>2.54</td>
<td>3.67</td>
<td>8.53</td>
</tr>
<tr>
<td>46. Setaria pumila</td>
<td>90.00</td>
<td>4.50</td>
<td>5</td>
<td>387</td>
<td>0.41</td>
<td>0.32</td>
<td>0.46</td>
<td>1.19</td>
</tr>
<tr>
<td>47. Sporobolus indicus</td>
<td>274.35</td>
<td>274.35</td>
<td>100</td>
<td>16468</td>
<td>25.05</td>
<td>6.35</td>
<td>19.71</td>
<td>51.11</td>
</tr>
<tr>
<td>48. Streptiocalon sylvestre</td>
<td>82.00</td>
<td>2.05</td>
<td>25</td>
<td>1362</td>
<td>0.19</td>
<td>1.59</td>
<td>1.63</td>
<td>3.41</td>
</tr>
<tr>
<td>49. Triumfetta pilosa</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>16</td>
<td>0.01</td>
<td>0.32</td>
<td>0.02</td>
<td>0.35</td>
</tr>
<tr>
<td>50. Triumfetta rhomboidea</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>16</td>
<td>0.01</td>
<td>0.32</td>
<td>0.02</td>
<td>0.35</td>
</tr>
<tr>
<td>51. Urena lobata</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>4</td>
<td>0.004</td>
<td>0.32</td>
<td>0.005</td>
<td>0.33</td>
</tr>
<tr>
<td>52. Vernonia cinerea</td>
<td>15.12</td>
<td>12.10</td>
<td>80</td>
<td>1746</td>
<td>1.10</td>
<td>5.08</td>
<td>2.09</td>
<td>8.27</td>
</tr>
<tr>
<td>53. Vetiveria zizanioides</td>
<td>25.75</td>
<td>5.15</td>
<td>20</td>
<td>591</td>
<td>0.47</td>
<td>1.27</td>
<td>0.70</td>
<td>2.44</td>
</tr>
<tr>
<td>54. Zornia gibbosa</td>
<td>6.41</td>
<td>3.85</td>
<td>60</td>
<td>394</td>
<td>0.35</td>
<td>3.81</td>
<td>0.47</td>
<td>4.63</td>
</tr>
</tbody>
</table>

Total number of individuals of all species = 21901, Total basal area cover = 83531 cm²
Total number of quadrats examined = 20, Number of occurrences of all species = 315

**Cymbopogon pendulus** based on density and abundance. **Sporobolus indicus** had the highest number of individuals of 5487. The lowest values of density (0.05 m²), % frequency (5 %) and abundance (1) were noted for three species like *Crotalaria prostrata*, *Leucaena leucocephala* and *Urena lobata*.

At site-II, three species of herbs like *Borreria alata*, *Saccharum spontaneum* and *Sporobolus indicus* were found growing most frequently during summer-'98 with maximum % frequency (100 %) and relative frequency (6.35 %). These were followed by *Imperata cylindrica*, *Phyllanthus virgatus*, *Cymbopogon pendulus*, *Vernonia cinerea*, *Mitracarpus verticillatus*, *Desmodium triflorum*, *Zornia gibbosa*.
etc. in term of relative frequency. *Streptocaulon sylvestre* showed the % frequency and RF values of 25 % and 1.59 %, respectively. Raunkiaer’s frequency classes A composed 33 species, B 6 species, C 7 species, D 3 species and E 5 species (Fig-3.11). Class B was smaller than class C. As per the ‘Law of frequency’ this community was biotically disturbed during this season.

![Fig-3.11 Number of species under Raunkiaer’s frequency classes A, B, C, D and E at site-II during summer-'98](image)

The highest basal area cover was recorded for *Sporobolus indicus* having relative dominance of 19.71 % followed by *Borreria alata* (16.96 %), *Cymbopogon pendulus* (14.62 %), *Phyllanthus virgatus* (12.48 %), *Saccharum spontaneum* (5.48 %) etc. *Streptocaulon sylvestre* showed relative dominance of 1.63 %. Based on IVI the dominant species at site-II during summer-'98 were *Sporobolus indicus* (51.11), *Borreria alata* (46.80), *Phyllanthus virgatus* (39.79), *Cymbopogon pendulus* (22.27), *Saccharum spontaneum* (17.78) and *Imperata cylindrica* (13.27). In addition, based on the minimum IVI of 0.33 three species like *Crotalaria prostrata*, *Leuceana leucocephala* (seedlings) and *Urena lobata* were identified as very rare species at site-II during summer-'98 season.

### 3.2.1.2.3.2 SITE-II : SUMMER-'99

At site-II, during summer-'99 season the lowest and highest number of species recorded in single quadrat were 11 and 19, respectively. Moreover the mean number of species per quadrat was 14.45. The lowest and highest number of individuals recorded in single quadrat were 503 and 1926, respectively, while the average
individuals per quadrat was 969.75.

The details of floristic composition and community characteristics for site-II in summer-’99 are presented in Table-3.12. Results indicate that during summer-’99 *Borreria alata* was the most dominant herb having maximum density (441.35 m$^2$) and maximum abundance (490.39) values among the recorded 61 species at site-II.

**Table-3.12 : Floristic composition, Abundance (Ab), Density (D), Frequency (F), Basal Area Cover (BA), Relative Density (RD), Relative Frequency (RF), Relative Dominance (RDm) and Importance Value Index (IVI) of different species of Site-II in Summer-1999 season.**

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D Pl. m$^{-2}$</th>
<th>F %</th>
<th>BA cm$^2$</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <em>Acacia auriculiformis</em></td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>9</td>
<td>0.005</td>
<td>0.35</td>
<td>0.01</td>
<td>0.36</td>
</tr>
<tr>
<td>2. <em>Atylosia scarabaeoides</em></td>
<td>2.00</td>
<td>0.20</td>
<td>10</td>
<td>27</td>
<td>0.02</td>
<td>0.70</td>
<td>0.03</td>
<td>0.75</td>
</tr>
<tr>
<td>3. <em>Borreria alata</em></td>
<td>490.39</td>
<td>441.35</td>
<td>90</td>
<td>23225</td>
<td>45.51</td>
<td>6.34</td>
<td>29.98</td>
<td>81.83</td>
</tr>
<tr>
<td>4. <em>Brachiaria reptans</em></td>
<td>9.00</td>
<td>0.90</td>
<td>10</td>
<td>58</td>
<td>0.09</td>
<td>0.70</td>
<td>0.07</td>
<td>0.86</td>
</tr>
<tr>
<td>5. <em>Cassia mimosoides</em></td>
<td>3.31</td>
<td>2.15</td>
<td>65</td>
<td>278</td>
<td>0.22</td>
<td>4.58</td>
<td>0.36</td>
<td>5.16</td>
</tr>
<tr>
<td>6. <em>Centranthera nepalensis</em></td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>6</td>
<td>0.005</td>
<td>0.35</td>
<td>0.008</td>
<td>0.36</td>
</tr>
<tr>
<td>7. <em>Chrysopogon aciculatus</em></td>
<td>9.16</td>
<td>2.75</td>
<td>30</td>
<td>282</td>
<td>0.28</td>
<td>2.11</td>
<td>0.36</td>
<td>2.75</td>
</tr>
<tr>
<td>8. <em>Crotalaria ferruginea</em></td>
<td>1.66</td>
<td>0.25</td>
<td>15</td>
<td>19</td>
<td>0.02</td>
<td>1.05</td>
<td>0.02</td>
<td>1.09</td>
</tr>
<tr>
<td>9. <em>Crotalaria pallida</em></td>
<td>4.33</td>
<td>0.65</td>
<td>15</td>
<td>60</td>
<td>0.07</td>
<td>1.05</td>
<td>0.08</td>
<td>1.20</td>
</tr>
<tr>
<td>10. <em>Cymbopogon pendulus</em></td>
<td>48.33</td>
<td>43.50</td>
<td>90</td>
<td>17073</td>
<td>4.48</td>
<td>6.34</td>
<td>22.04</td>
<td>32.86</td>
</tr>
<tr>
<td>11. <em>Cyperus alulatus</em></td>
<td>10.00</td>
<td>1.00</td>
<td>10</td>
<td>45</td>
<td>0.10</td>
<td>0.70</td>
<td>0.06</td>
<td>0.86</td>
</tr>
<tr>
<td>12. <em>Cyperus compressus</em></td>
<td>20.00</td>
<td>3.00</td>
<td>15</td>
<td>133</td>
<td>0.31</td>
<td>1.05</td>
<td>0.17</td>
<td>1.53</td>
</tr>
<tr>
<td>13. <em>Cyperus cyperoides</em></td>
<td>16.00</td>
<td>0.80</td>
<td>5</td>
<td>40</td>
<td>0.08</td>
<td>0.35</td>
<td>0.05</td>
<td>0.48</td>
</tr>
<tr>
<td>14. <em>Cyperus juncoides</em></td>
<td>53.09</td>
<td>29.20</td>
<td>55</td>
<td>1176</td>
<td>3.01</td>
<td>3.87</td>
<td>1.52</td>
<td>8.40</td>
</tr>
<tr>
<td>15. <em>Cyperus kyllingia</em></td>
<td>7.50</td>
<td>0.75</td>
<td>10</td>
<td>33</td>
<td>0.08</td>
<td>0.70</td>
<td>0.04</td>
<td>0.82</td>
</tr>
<tr>
<td>16. <em>Cyperus rotundus</em></td>
<td>23.00</td>
<td>1.15</td>
<td>5</td>
<td>39</td>
<td>0.12</td>
<td>0.35</td>
<td>0.05</td>
<td>0.52</td>
</tr>
<tr>
<td>17. <em>Desmodium heterophyllum</em></td>
<td>1.00</td>
<td>0.10</td>
<td>10</td>
<td>22</td>
<td>0.01</td>
<td>0.70</td>
<td>0.03</td>
<td>0.74</td>
</tr>
<tr>
<td>18. <em>Desmodium triflorum</em></td>
<td>8.66</td>
<td>6.50</td>
<td>75</td>
<td>941</td>
<td>0.67</td>
<td>5.28</td>
<td>1.21</td>
<td>7.16</td>
</tr>
<tr>
<td>19. <em>Digitaria bicornis</em></td>
<td>4.86</td>
<td>1.70</td>
<td>35</td>
<td>126</td>
<td>0.17</td>
<td>2.46</td>
<td>0.16</td>
<td>2.79</td>
</tr>
<tr>
<td>20. <em>Digitaria ciliaris</em></td>
<td>8.50</td>
<td>0.85</td>
<td>10</td>
<td>70</td>
<td>0.09</td>
<td>0.70</td>
<td>0.09</td>
<td>0.88</td>
</tr>
<tr>
<td>21. <em>Elephantopus scaber</em></td>
<td>7.43</td>
<td>2.60</td>
<td>35</td>
<td>849</td>
<td>0.27</td>
<td>2.46</td>
<td>1.09</td>
<td>3.82</td>
</tr>
<tr>
<td>22. <em>Eleusine indica</em></td>
<td>18.25</td>
<td>3.65</td>
<td>20</td>
<td>412</td>
<td>0.37</td>
<td>1.41</td>
<td>0.53</td>
<td>2.31</td>
</tr>
<tr>
<td>23. <em>Emilia sonchifolia</em></td>
<td>4.00</td>
<td>0.20</td>
<td>5</td>
<td>17</td>
<td>0.02</td>
<td>0.35</td>
<td>0.02</td>
<td>0.39</td>
</tr>
<tr>
<td>24. <em>Eragrostis gangetica</em></td>
<td>30.00</td>
<td>1.50</td>
<td>5</td>
<td>132</td>
<td>0.15</td>
<td>0.35</td>
<td>0.17</td>
<td>0.67</td>
</tr>
<tr>
<td>25. <em>Eragrostis nigra</em></td>
<td>18.00</td>
<td>1.80</td>
<td>10</td>
<td>173</td>
<td>0.18</td>
<td>0.70</td>
<td>0.22</td>
<td>1.10</td>
</tr>
<tr>
<td>26. <em>Eragrostis tenella</em></td>
<td>20.50</td>
<td>2.05</td>
<td>10</td>
<td>217</td>
<td>0.21</td>
<td>0.70</td>
<td>0.28</td>
<td>1.19</td>
</tr>
</tbody>
</table>

Table Contd.
Contd. Table-3.12

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D Fl. m²</th>
<th>F %</th>
<th>BA cm²</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>27. Eragrostis unioloides</td>
<td>12.00</td>
<td>0.60</td>
<td>5</td>
<td>68</td>
<td>0.06</td>
<td>0.35</td>
<td>0.09</td>
<td>0.50</td>
</tr>
<tr>
<td>28. Euphorbia orbiculata</td>
<td>2.00</td>
<td>0.10</td>
<td>5</td>
<td>10</td>
<td>0.01</td>
<td>0.35</td>
<td>0.01</td>
<td>0.37</td>
</tr>
<tr>
<td>29. Fimбриaria sp.</td>
<td>17.00</td>
<td>0.85</td>
<td>5</td>
<td>94</td>
<td>0.09</td>
<td>0.35</td>
<td>0.12</td>
<td>0.56</td>
</tr>
<tr>
<td>30. Fimbristylis dichotoma</td>
<td>8.00</td>
<td>0.40</td>
<td>5</td>
<td>40</td>
<td>0.04</td>
<td>0.35</td>
<td>0.05</td>
<td>0.44</td>
</tr>
<tr>
<td>31. Hedyotis corymbosa</td>
<td>18.00</td>
<td>0.90</td>
<td>5</td>
<td>88</td>
<td>0.09</td>
<td>0.35</td>
<td>0.11</td>
<td>0.55</td>
</tr>
<tr>
<td>32. Hyptis suaveoleus</td>
<td>19.80</td>
<td>4.95</td>
<td>25</td>
<td>573</td>
<td>0.51</td>
<td>1.76</td>
<td>0.74</td>
<td>3.01</td>
</tr>
<tr>
<td>33. Imperata cylindrica</td>
<td>69.82</td>
<td>38.40</td>
<td>55</td>
<td>3766</td>
<td>3.96</td>
<td>3.87</td>
<td>4.86</td>
<td>12.69</td>
</tr>
<tr>
<td>34. Leucas indica</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>7</td>
<td>0.005</td>
<td>0.35</td>
<td>0.009</td>
<td>0.36</td>
</tr>
<tr>
<td>35. Lindernia ciliata</td>
<td>10.00</td>
<td>0.50</td>
<td>5</td>
<td>46</td>
<td>0.05</td>
<td>0.35</td>
<td>0.06</td>
<td>0.46</td>
</tr>
<tr>
<td>36. Lindernia sp.</td>
<td>40.00</td>
<td>2.00</td>
<td>5</td>
<td>205</td>
<td>0.20</td>
<td>0.35</td>
<td>0.26</td>
<td>0.81</td>
</tr>
<tr>
<td>37. Mimosa pudica</td>
<td>16.00</td>
<td>1.60</td>
<td>10</td>
<td>363</td>
<td>0.16</td>
<td>0.70</td>
<td>0.47</td>
<td>1.33</td>
</tr>
<tr>
<td>38. Mitracarpus verticillatus</td>
<td>164.00</td>
<td>32.80</td>
<td>20</td>
<td>2310</td>
<td>3.38</td>
<td>1.41</td>
<td>2.98</td>
<td>7.77</td>
</tr>
<tr>
<td>39. Mnesithea laevis</td>
<td>14.75</td>
<td>2.95</td>
<td>20</td>
<td>275</td>
<td>0.30</td>
<td>1.41</td>
<td>0.35</td>
<td>2.06</td>
</tr>
<tr>
<td>40. Mukia maderaspatana</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>5</td>
<td>0.005</td>
<td>0.35</td>
<td>0.006</td>
<td>0.36</td>
</tr>
<tr>
<td>41. Ophioglossum reticulatum</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>13</td>
<td>0.01</td>
<td>0.35</td>
<td>0.01</td>
<td>0.37</td>
</tr>
<tr>
<td>42. Paspalum scrobiculatum</td>
<td>20.50</td>
<td>6.15</td>
<td>30</td>
<td>609</td>
<td>0.63</td>
<td>2.11</td>
<td>0.78</td>
<td>3.52</td>
</tr>
<tr>
<td>43. Pennisetum glaucum</td>
<td>38.50</td>
<td>3.85</td>
<td>10</td>
<td>307</td>
<td>0.40</td>
<td>0.35</td>
<td>0.39</td>
<td>1.14</td>
</tr>
<tr>
<td>44. Phyllanthus urinaria</td>
<td>64.18</td>
<td>35.30</td>
<td>55</td>
<td>1435</td>
<td>3.64</td>
<td>3.87</td>
<td>1.85</td>
<td>9.36</td>
</tr>
<tr>
<td>45. Polygala linearifolia</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>6</td>
<td>0.005</td>
<td>0.35</td>
<td>0.008</td>
<td>0.36</td>
</tr>
<tr>
<td>46. Pueraria phaseoloides</td>
<td>7.37</td>
<td>7.00</td>
<td>95</td>
<td>1732</td>
<td>0.72</td>
<td>6.69</td>
<td>2.23</td>
<td>9.64</td>
</tr>
<tr>
<td>47. Rottboellia sp.</td>
<td>5.00</td>
<td>0.25</td>
<td>5</td>
<td>26</td>
<td>0.02</td>
<td>0.35</td>
<td>0.03</td>
<td>0.40</td>
</tr>
<tr>
<td>48. Rungia pectinata</td>
<td>5.50</td>
<td>0.55</td>
<td>10</td>
<td>56</td>
<td>0.05</td>
<td>0.70</td>
<td>0.07</td>
<td>0.82</td>
</tr>
<tr>
<td>49. Saccharum spontaneum</td>
<td>73.15</td>
<td>73.15</td>
<td>100</td>
<td>4690</td>
<td>7.54</td>
<td>7.04</td>
<td>6.05</td>
<td>20.63</td>
</tr>
<tr>
<td>50. Salomonia ciliata</td>
<td>7.00</td>
<td>0.35</td>
<td>5</td>
<td>27</td>
<td>0.03</td>
<td>0.35</td>
<td>0.03</td>
<td>0.41</td>
</tr>
<tr>
<td>51. Schizachyrium brevifolium</td>
<td>44.33</td>
<td>6.65</td>
<td>15</td>
<td>780</td>
<td>0.68</td>
<td>1.05</td>
<td>1.00</td>
<td>2.73</td>
</tr>
<tr>
<td>52. Setaria pumila</td>
<td>50.50</td>
<td>5.05</td>
<td>10</td>
<td>390</td>
<td>0.52</td>
<td>0.35</td>
<td>0.50</td>
<td>1.37</td>
</tr>
<tr>
<td>53. Sida rhombifolia</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>7</td>
<td>0.005</td>
<td>0.35</td>
<td>0.009</td>
<td>0.36</td>
</tr>
<tr>
<td>54. Sporobolus indicus</td>
<td>196.10</td>
<td>186.30</td>
<td>95</td>
<td>11406</td>
<td>19.21</td>
<td>6.69</td>
<td>14.72</td>
<td>40.62</td>
</tr>
<tr>
<td>55. Streptocaulon sylvestre</td>
<td>4.78</td>
<td>2.15</td>
<td>45</td>
<td>1722</td>
<td>0.22</td>
<td>3.17</td>
<td>2.22</td>
<td>5.61</td>
</tr>
<tr>
<td>56. Trinumfetta rhomboidea</td>
<td>1.50</td>
<td>0.15</td>
<td>10</td>
<td>14</td>
<td>0.01</td>
<td>0.70</td>
<td>0.02</td>
<td>0.73</td>
</tr>
<tr>
<td>57. Urena lobata</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>13</td>
<td>0.01</td>
<td>0.35</td>
<td>0.01</td>
<td>0.37</td>
</tr>
<tr>
<td>58. Vernonia cinerea</td>
<td>6.86</td>
<td>2.40</td>
<td>35</td>
<td>335</td>
<td>0.25</td>
<td>2.46</td>
<td>0.43</td>
<td>3.14</td>
</tr>
<tr>
<td>59. Vetiveria zizanioides</td>
<td>9.66</td>
<td>1.45</td>
<td>15</td>
<td>186</td>
<td>0.15</td>
<td>1.05</td>
<td>0.24</td>
<td>1.44</td>
</tr>
<tr>
<td>60. Youngia japonica</td>
<td>2.00</td>
<td>0.10</td>
<td>5</td>
<td>9</td>
<td>0.01</td>
<td>0.36</td>
<td>0.01</td>
<td>0.37</td>
</tr>
<tr>
<td>61. Zornia gibbosa</td>
<td>10.43</td>
<td>3.65</td>
<td>35</td>
<td>396</td>
<td>0.37</td>
<td>2.46</td>
<td>0.51</td>
<td>3.34</td>
</tr>
</tbody>
</table>

Total number of individuals of all species = 19395, Total basal area cover = 77471 cm²
Total number of quadrats examined = 20, Number of occurrences of all species = 284
This was followed by *Sporobolus indicus*, *Saccharum spontaneum*, *Cymbopogon pendulus*, *Imperata cylindrica*, *Phyllanthus urinaria*, *Mitracarpus verticillatus* etc. in terms of density. Further, *Borreria alata* had the highest number of 8824 individuals, which was found highest among the four study sites for a single species. The minimum values of density (0.05 m²), abundance (1) and % frequency (5 %) were showed by six species viz. *Acacia auriculiformis*, *Centranthera nepalensis*, *Leucas indica*, *Mukia maderaspatana*, *Polygala linarifolia* and *Sida rhombifolia*.

However, only *Saccharum spontaneum* appeared to be the most frequently available species having highest values of % frequency (100 %) and relative frequency (7.04 %) in this season followed by *Pueraria phaseoloides*, *Sporobolus indicus*, *Borreria alata*, *Cymbopogon pendulus*, *Desmodium triflorum* etc. *Streptocaulon sylvestre* showed % frequency and relative frequency values of 45 % and 3.17 %, respectively.

The frequency classes of the community in the present investigation can be compared with the normal frequency diagram of Raunkiaer (1934). In this investigation Raunkiaer’s frequency classes A included 43 species, B 7 species, C 4 species, D 2 species and E 5 species (Fig-3.12). As per Raunkiaer’s ‘Frequency Law’ the plant community at site-II showed the normal distribution of frequency percentage which indicated the uniformity of the vegetation during this season.

Maximum basal area cover was occupied by *Borreria alata* i.e. it had the highest relative dominance value of 29.98 %, and was then followed by
Cymbopogon pendulus (22.04 %), Sporobolus indicus (14.72 %), Saccharum spontaneum (6.05 %) etc. However, in term of IVI, Borreria alata was the most dominant species at site-II in summer-'99 with IVI of 81.83. This was followed far behind by Sporobolus indicus (40.62), Cymbopogon pendulus (32.86), Saccharum spontaneum (20.63), Imperata cylindrica (12.69) etc. Streptocaulon sylvestre recorded the IVI of 5.61. On the other hand, six species like Acacia auriculiformis (seedling), Centranthera nepalensis, Leucas indica, Mukia maderaspatana, Polygala linarifolia and Sida rhomhifolia had the minimum IVI of 0.36, those were classified as very rare species at site-II, in this season.

3.2.1.3 SITE-III (SANYASIKATA)

In the present investigation total of 98 plant species were listed at site-III in different seasons during the year 1998-1999 (one year). Out of these, 63 species were recorded in monsoon-'98, whereas 46 and 55 species were recorded during winter-99 and summer-'99 seasons, respectively.

3.2.1.3.1 SITE-III : MONSOON SEASON

At site-III, during monsoon-'98 season a total of 12913 individuals were counted from the 20 quadrats. The number of highest and lowest species occurring in single quadrat were 21 and 10, respectively. The mean number of species per quadrat was 14.75. The highest and lowest number of individuals recorded in single quadrat were 1258 and 296, respectively, whereas the average individuals per quadrat was 645.95.

The floristic composition and phytosociological characteristics for site-III of monsoon-'98 are given in Table-3.13. From the perusal of data it is observed that at site-III Borreria alata was the dominant species during monsoon-'98 season having highest number of individuals (2192) and density (109.60 m$^{-2}$) among the recorded 63 species. This was followed by Cyperus alulatus, Phyllanthus virgatus, Rungia pectinata, Imperata cylindrica, Panicum sp., Ageratum conyzoides etc. in term of density. The maximum value of abundance was noted for Cyperus alulatus. Besides, the minimum density (0.05 m$^{-2}$), % frequency (5 %) and abundance (1) were showed by Cassia occidentalis, Hedyotis diffusa and Merremia hirta.

Only Borreria alata was found most frequently in all the quadrats having maximum % frequency (100 %) and relative frequency (6.75 %) values, followed
Table-3.13 : List of various species of Site-III in Monsoon 1998 season with details on Abundance (Ab), Density (D), Frequency (F), Basal Area Cover (BA), Relative Density (RD), Relative Frequency (RF), Relative Dominance (RDm) and Importance Value Index (IVI).

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D</th>
<th>F</th>
<th>BA</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ageratum conyzoides</td>
<td>32.84</td>
<td>31.20</td>
<td>95</td>
<td>3122</td>
<td>4.83</td>
<td>6.42</td>
<td>4.96</td>
<td>16.21</td>
</tr>
<tr>
<td>2. Ageratum houstonianum</td>
<td>45.00</td>
<td>4.50</td>
<td>10</td>
<td>458</td>
<td>0.69</td>
<td>0.67</td>
<td>0.73</td>
<td>2.09</td>
</tr>
<tr>
<td>3. Alloteropsis cimicina</td>
<td>80.00</td>
<td>4.00</td>
<td>5</td>
<td>482</td>
<td>0.62</td>
<td>0.34</td>
<td>0.76</td>
<td>1.72</td>
</tr>
<tr>
<td>4. Ammannia cordata</td>
<td>11.00</td>
<td>0.55</td>
<td>5</td>
<td>64</td>
<td>0.08</td>
<td>0.34</td>
<td>0.10</td>
<td>0.52</td>
</tr>
<tr>
<td>5. Axonopus compressus</td>
<td>12.60</td>
<td>6.30</td>
<td>50</td>
<td>845</td>
<td>0.97</td>
<td>3.38</td>
<td>1.34</td>
<td>5.69</td>
</tr>
<tr>
<td>6. Borussia alata</td>
<td>109.60</td>
<td>109.60</td>
<td>100</td>
<td>10171</td>
<td>1696</td>
<td>6.75</td>
<td>16.16</td>
<td>39.87</td>
</tr>
<tr>
<td>7. Brachiaria reptans</td>
<td>52.72</td>
<td>29.00</td>
<td>55</td>
<td>3254</td>
<td>4.49</td>
<td>3.71</td>
<td>5.17</td>
<td>13.37</td>
</tr>
<tr>
<td>8. Cassia occidentalis</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>10</td>
<td>0.007</td>
<td>0.34</td>
<td>0.01</td>
<td>0.36</td>
</tr>
<tr>
<td>9. Cleome rutidosperma</td>
<td>4.25</td>
<td>0.85</td>
<td>20</td>
<td>122</td>
<td>0.13</td>
<td>1.36</td>
<td>0.19</td>
<td>1.68</td>
</tr>
<tr>
<td>10. Commelina diffusa</td>
<td>5.71</td>
<td>2.00</td>
<td>35</td>
<td>251</td>
<td>0.31</td>
<td>2.36</td>
<td>0.39</td>
<td>3.06</td>
</tr>
<tr>
<td>11. Cynodon dactylon</td>
<td>46.60</td>
<td>11.65</td>
<td>25</td>
<td>1673</td>
<td>1.80</td>
<td>1.69</td>
<td>2.66</td>
<td>6.15</td>
</tr>
<tr>
<td>12. Cyperus alatus</td>
<td>170.00</td>
<td>76.50</td>
<td>45</td>
<td>4774</td>
<td>11.84</td>
<td>3.04</td>
<td>7.58</td>
<td>22.46</td>
</tr>
<tr>
<td>13. Cyperus castaneus</td>
<td>37.20</td>
<td>18.60</td>
<td>50</td>
<td>1399</td>
<td>2.88</td>
<td>3.38</td>
<td>2.22</td>
<td>8.48</td>
</tr>
<tr>
<td>14. Cyperus pseudokyllingioides</td>
<td>34.75</td>
<td>6.95</td>
<td>20</td>
<td>508</td>
<td>1.07</td>
<td>1.36</td>
<td>0.81</td>
<td>3.24</td>
</tr>
<tr>
<td>15. Cyperus rotundus</td>
<td>17.16</td>
<td>5.15</td>
<td>30</td>
<td>434</td>
<td>0.80</td>
<td>2.03</td>
<td>0.69</td>
<td>3.52</td>
</tr>
<tr>
<td>16. Desmodium heterophyllum</td>
<td>4.50</td>
<td>0.45</td>
<td>10</td>
<td>118</td>
<td>0.07</td>
<td>0.67</td>
<td>0.19</td>
<td>0.93</td>
</tr>
<tr>
<td>17. Desmodium triflorum</td>
<td>18.66</td>
<td>11.20</td>
<td>60</td>
<td>1521</td>
<td>1.73</td>
<td>4.05</td>
<td>2.42</td>
<td>8.20</td>
</tr>
<tr>
<td>18. Digitaria ciliaris</td>
<td>51.40</td>
<td>-25.70</td>
<td>50</td>
<td>2138</td>
<td>3.98</td>
<td>3.38</td>
<td>3.39</td>
<td>10.75</td>
</tr>
<tr>
<td>19. Dysphyll acrassicaulis</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>28</td>
<td>0.02</td>
<td>0.34</td>
<td>0.04</td>
<td>0.40</td>
</tr>
<tr>
<td>20. Echinocloa crusgalli</td>
<td>23.25</td>
<td>9.30</td>
<td>40</td>
<td>1397</td>
<td>1.44</td>
<td>2.70</td>
<td>2.22</td>
<td>6.36</td>
</tr>
<tr>
<td>21. Eleusine indica</td>
<td>11.00</td>
<td>2.75</td>
<td>25</td>
<td>469</td>
<td>0.42</td>
<td>1.69</td>
<td>0.74</td>
<td>2.85</td>
</tr>
<tr>
<td>22. Eragrostis gangetica</td>
<td>12.50</td>
<td>1.25</td>
<td>10</td>
<td>201</td>
<td>0.19</td>
<td>0.67</td>
<td>0.32</td>
<td>1.18</td>
</tr>
<tr>
<td>23. Eragrostis nigra</td>
<td>10.00</td>
<td>0.50</td>
<td>5</td>
<td>73</td>
<td>0.07</td>
<td>0.34</td>
<td>0.11</td>
<td>0.52</td>
</tr>
<tr>
<td>24. Fimbristylis dichotoma</td>
<td>19.00</td>
<td>1.90</td>
<td>10</td>
<td>233</td>
<td>0.29</td>
<td>0.67</td>
<td>0.37</td>
<td>1.33</td>
</tr>
<tr>
<td>25. Fimbristylis griffithii</td>
<td>100.00</td>
<td>20.00</td>
<td>20</td>
<td>2360</td>
<td>3.09</td>
<td>1.36</td>
<td>3.75</td>
<td>8.20</td>
</tr>
<tr>
<td>26. Fimbristylis ovata</td>
<td>20.00</td>
<td>1.00</td>
<td>5</td>
<td>126</td>
<td>0.15</td>
<td>0.34</td>
<td>0.20</td>
<td>0.69</td>
</tr>
<tr>
<td>27. Hedystis corymbosa</td>
<td>4.66</td>
<td>0.70</td>
<td>15</td>
<td>86</td>
<td>0.11</td>
<td>1.01</td>
<td>0.13</td>
<td>1.25</td>
</tr>
<tr>
<td>28. Hedystis diffusa</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>8</td>
<td>0.007</td>
<td>0.34</td>
<td>0.01</td>
<td>0.36</td>
</tr>
<tr>
<td>29. Imperata cylindrica</td>
<td>155.00</td>
<td>38.75</td>
<td>25</td>
<td>4487</td>
<td>5.99</td>
<td>1.69</td>
<td>7.13</td>
<td>14.81</td>
</tr>
<tr>
<td>30. Isachne albens</td>
<td>3.50</td>
<td>0.35</td>
<td>10</td>
<td>39</td>
<td>0.05</td>
<td>0.67</td>
<td>0.06</td>
<td>0.78</td>
</tr>
<tr>
<td>31. Leucas indica</td>
<td>2.66</td>
<td>0.80</td>
<td>30</td>
<td>122</td>
<td>0.12</td>
<td>2.03</td>
<td>0.19</td>
<td>2.34</td>
</tr>
<tr>
<td>32. Limnophila aromatica</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>16</td>
<td>0.02</td>
<td>0.34</td>
<td>0.02</td>
<td>0.38</td>
</tr>
</tbody>
</table>

Table Contd.
Contd. Table-3.13

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D Pl. m²</th>
<th>F %</th>
<th>BA cm²</th>
<th>RD</th>
<th>RF</th>
<th>RDM</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>33. Lindernia ciliata</td>
<td>2.33</td>
<td>0.35</td>
<td>15</td>
<td>50</td>
<td>0.05</td>
<td>1.01</td>
<td>0.08</td>
<td>1.14</td>
</tr>
<tr>
<td>34. Lindernia crustacea</td>
<td>5.77</td>
<td>3.75</td>
<td>65</td>
<td>428</td>
<td>0.58</td>
<td>4.39</td>
<td>0.68</td>
<td>5.65</td>
</tr>
<tr>
<td>35. Lindernia hookeri</td>
<td>1.83</td>
<td>0.55</td>
<td>30</td>
<td>59</td>
<td>0.08</td>
<td>2.03</td>
<td>0.09</td>
<td>2.20</td>
</tr>
<tr>
<td>36. Lindernia pyxidaria</td>
<td>4.50</td>
<td>0.45</td>
<td>10</td>
<td>64</td>
<td>0.07</td>
<td>0.67</td>
<td>0.10</td>
<td>0.84</td>
</tr>
<tr>
<td>37. Ludwigia perennis</td>
<td>6.00</td>
<td>1.20</td>
<td>20</td>
<td>265</td>
<td>0.18</td>
<td>1.36</td>
<td>0.42</td>
<td>1.96</td>
</tr>
<tr>
<td>38. Melastoma malabathricum</td>
<td>1.50</td>
<td>0.15</td>
<td>10</td>
<td>28</td>
<td>0.02</td>
<td>0.67</td>
<td>0.04</td>
<td>0.73</td>
</tr>
<tr>
<td>39. Merremia hirta</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>26</td>
<td>0.007</td>
<td>0.34</td>
<td>0.04</td>
<td>0.39</td>
</tr>
<tr>
<td>40. Mikania micrantha</td>
<td>3.30</td>
<td>0.50</td>
<td>15</td>
<td>84</td>
<td>0.07</td>
<td>1.01</td>
<td>0.13</td>
<td>1.21</td>
</tr>
<tr>
<td>41. Mimosa pudica</td>
<td>1.00</td>
<td>0.10</td>
<td>10</td>
<td>33</td>
<td>0.01</td>
<td>0.67</td>
<td>0.05</td>
<td>0.73</td>
</tr>
<tr>
<td>42. Mitracarpus verticillatus</td>
<td>40.50</td>
<td>4.05</td>
<td>10</td>
<td>583</td>
<td>0.62</td>
<td>0.67</td>
<td>0.92</td>
<td>2.21</td>
</tr>
<tr>
<td>43. Murdannia nudiflora</td>
<td>25.46</td>
<td>16.55</td>
<td>65</td>
<td>2943</td>
<td>2.56</td>
<td>4.39</td>
<td>4.67</td>
<td>11.62</td>
</tr>
<tr>
<td>44. Murdannia spirata</td>
<td>8.00</td>
<td>0.40</td>
<td>5</td>
<td>99</td>
<td>0.06</td>
<td>0.34</td>
<td>0.16</td>
<td>0.56</td>
</tr>
<tr>
<td>45. Oplismenus burmannii</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>16</td>
<td>0.02</td>
<td>0.34</td>
<td>0.02</td>
<td>0.38</td>
</tr>
<tr>
<td>46. Oplismenus compositus</td>
<td>32.50</td>
<td>3.25</td>
<td>10</td>
<td>543</td>
<td>0.50</td>
<td>0.67</td>
<td>0.86</td>
<td>2.03</td>
</tr>
<tr>
<td>47. Panicum sp.</td>
<td>126.50</td>
<td>37.95</td>
<td>30</td>
<td>3279</td>
<td>5.87</td>
<td>2.03</td>
<td>5.21</td>
<td>13.11</td>
</tr>
<tr>
<td>48. Paspalidium flavidum.</td>
<td>12.00</td>
<td>1.20</td>
<td>10</td>
<td>170</td>
<td>0.18</td>
<td>0.67</td>
<td>0.27</td>
<td>1.12</td>
</tr>
<tr>
<td>49. Paspalum conjugatum</td>
<td>10.00</td>
<td>0.50</td>
<td>5</td>
<td>83</td>
<td>0.07</td>
<td>0.37</td>
<td>0.13</td>
<td>0.54</td>
</tr>
<tr>
<td>50. Paspalum scrobiculatum</td>
<td>40.00</td>
<td>6.00</td>
<td>15</td>
<td>797</td>
<td>0.93</td>
<td>1.01</td>
<td>1.26</td>
<td>3.20</td>
</tr>
<tr>
<td>51. Phyllanthus virgatus</td>
<td>153.00</td>
<td>61.20</td>
<td>40</td>
<td>4602</td>
<td>9.47</td>
<td>2.70</td>
<td>7.31</td>
<td>19.48</td>
</tr>
<tr>
<td>52. Pouzolzia zeylanica</td>
<td>3.00</td>
<td>0.45</td>
<td>15</td>
<td>61</td>
<td>0.07</td>
<td>1.01</td>
<td>0.09</td>
<td>1.17</td>
</tr>
<tr>
<td>53. Rungia pectinata</td>
<td>140.14</td>
<td>49.05</td>
<td>35</td>
<td>3777</td>
<td>7.59</td>
<td>2.36</td>
<td>6.00</td>
<td>15.95</td>
</tr>
<tr>
<td>54. Saccharum spontaneum</td>
<td>31.84</td>
<td>20.70</td>
<td>65</td>
<td>2157</td>
<td>3.20</td>
<td>4.39</td>
<td>3.43</td>
<td>11.02</td>
</tr>
<tr>
<td>55. Sacciolepis myosuroides</td>
<td>10.50</td>
<td>1.05</td>
<td>10</td>
<td>131</td>
<td>0.16</td>
<td>0.67</td>
<td>0.21</td>
<td>1.04</td>
</tr>
<tr>
<td>56. Selaginella sp.</td>
<td>10.33</td>
<td>1.55</td>
<td>15</td>
<td>118</td>
<td>0.24</td>
<td>1.01</td>
<td>0.18</td>
<td>1.43</td>
</tr>
<tr>
<td>57. Setaria geniculata</td>
<td>6.75</td>
<td>1.35</td>
<td>20</td>
<td>168</td>
<td>0.21</td>
<td>1.36</td>
<td>0.26</td>
<td>1.83</td>
</tr>
<tr>
<td>58. Sida acuta</td>
<td>9.40</td>
<td>2.35</td>
<td>25</td>
<td>347</td>
<td>0.36</td>
<td>1.69</td>
<td>0.55</td>
<td>2.66</td>
</tr>
<tr>
<td>59. Sporobolus diander</td>
<td>8.00</td>
<td>0.40</td>
<td>5</td>
<td>57</td>
<td>0.06</td>
<td>0.34</td>
<td>0.09</td>
<td>0.49</td>
</tr>
<tr>
<td>60. Sporobolus indicus</td>
<td>74.50</td>
<td>7.45</td>
<td>10</td>
<td>648</td>
<td>1.15</td>
<td>0.67</td>
<td>1.03</td>
<td>2.85</td>
</tr>
<tr>
<td>61. Tonningia axillaris</td>
<td>1.50</td>
<td>0.15</td>
<td>10</td>
<td>28</td>
<td>0.02</td>
<td>0.67</td>
<td>0.04</td>
<td>0.73</td>
</tr>
<tr>
<td>62. Urena lobata</td>
<td>1.00</td>
<td>0.10</td>
<td>10</td>
<td>15</td>
<td>0.01</td>
<td>0.67</td>
<td>0.02</td>
<td>0.70</td>
</tr>
<tr>
<td>63. Vetiveria zizanioides</td>
<td>22.00</td>
<td>1.10</td>
<td>5</td>
<td>272</td>
<td>0.17</td>
<td>0.34</td>
<td>0.43</td>
<td>0.94</td>
</tr>
</tbody>
</table>

Total number of individuals of all species = 12919, Total basal area cover = 62920 cm²
Total number of quadrats examined = 20, Number of occurrences of all species = 296
by *Ageratum conyzoides*, *Lindernia crustacea*, *Murdannia nudiflora*, *Saccharum spontaneum*, *Desmodium triflorum* etc. Raunkiaer's frequency classes A included 40 species, B 12 species, C 6 species D 3 species and E 2 species (Fig-3.13). According to Raunkiaer’s ‘Frequency Law’ as E was smaller than D, so this community was subjected to severe biotic disturbances during monsoon -'98.

![Fig-3.13 Number of species under Raunkiaer’s frequency classes A, B, C, D and E at site-III during monsoon-'98](image)

Highest basal area cover was showed by *Borreria alata* with relative dominance value of 16.16 %. However, the first ten dominant species on the basis of IVI were *Borreria alata* (39.87), *Cyperus alulatus* (22.46), *Phyllanthus virgatus* (19.48), *Ageratum conyzoides* (16.21), *Rungia pectinata* (15.95), *Imperata cylindrica* (14.81), *Brachiaria reptans* (13.37), *Panicum sp.* (13.11), *Murdannia nudiflora* (11.62) and *Digitaria ciliaris* (10.75). In addition, based on the lowest IVI (0.36) two species like *Cassia occidentalis* and *Hedyotis diffusa* were noted as very rare species at site-III during this season.

### 3.2.1.3.2 SITE-III : WINTER SEASON

The total number of plant species was 46 in site-III during winter-'99 season. The highest and lowest number of species recorded in single quadrat were 15 and 8, respectively. The average number of species per quadrat was 11.10. Total 6731 individuals were counted from 20 quadrats. The highest number of individuals recorded in single quadrat was 453 and lowest was 169. The mean number of individuals per quadrat was 336.55.
A perusal of Table-3.14 shows that *Saccharum spontaneum* was the most dominant species at site-III during winter-99 having highest number of individuals (1532), density (76.60 m\(^{-2}\)) and abundance (102.13). Other top five dominant species on the basis of number of individuals and density were *Ageratum houstonianum*, *Echinochloa crusgalli*, *Imperata cylindrica*, *Paspalum scrobiculatum* and *Fimbristylis umbellaris*. Results reveal that *Leucas indica* was found most frequently in the vegetation of site-III having maximum % frequency (100 %) and relative frequency (9.17 %). This was followed by *Saccharum spontaneum*, *Echinochloa crusgalli*, *Ageratum houstonianum*, *Ageratum conyzoides*, *Pouzolzia zeylanica* etc.

Table-3.14: Phytosociological characters of herbold vegetation of Site-III during Winter 1999 season. (Abbreviation used: Ab=Abundance, D=Density, F=Frequency, BA=Basal Area Cover, RD=Relative Density, RF=Relative Frequency, RDm=Relative Dominance and IVI=Importance Value Index)

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D</th>
<th>F</th>
<th>BA</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ageratum conyzoides</td>
<td>14.80</td>
<td>7.40</td>
<td>50</td>
<td>2083</td>
<td>2.20</td>
<td>4.58</td>
<td>3.82</td>
<td>10.60</td>
</tr>
<tr>
<td>2. Ageratum houstonianum</td>
<td>69.82</td>
<td>38.40</td>
<td>55</td>
<td>9071</td>
<td>11.41</td>
<td>5.04</td>
<td>16.63</td>
<td>33.08</td>
</tr>
<tr>
<td>3. Alloteropsis cimicina</td>
<td>13.00</td>
<td>0.65</td>
<td>5</td>
<td>160</td>
<td>0.19</td>
<td>0.46</td>
<td>0.29</td>
<td>0.94</td>
</tr>
<tr>
<td>4. Axonopus compressus</td>
<td>9.00</td>
<td>2.70</td>
<td>30</td>
<td>460</td>
<td>0.80</td>
<td>2.75</td>
<td>0.84</td>
<td>4.39</td>
</tr>
<tr>
<td>5. Borrichia alata</td>
<td>6.71</td>
<td>2.35</td>
<td>35</td>
<td>680</td>
<td>0.70</td>
<td>3.21</td>
<td>1.24</td>
<td>5.15</td>
</tr>
<tr>
<td>6. Brachiaria reptans</td>
<td>82.66</td>
<td>12.40</td>
<td>15</td>
<td>2119</td>
<td>3.68</td>
<td>1.37</td>
<td>3.88</td>
<td>8.93</td>
</tr>
<tr>
<td>7. Chrysopogon aciculatus</td>
<td>3.50</td>
<td>0.35</td>
<td>10</td>
<td>183</td>
<td>0.10</td>
<td>0.91</td>
<td>0.33</td>
<td>1.34</td>
</tr>
<tr>
<td>8. Clerodendrum viscosum</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>183</td>
<td>0.04</td>
<td>0.46</td>
<td>0.33</td>
<td>0.83</td>
</tr>
<tr>
<td>9. Commelina diffusa</td>
<td>11.00</td>
<td>1.10</td>
<td>10</td>
<td>185</td>
<td>0.33</td>
<td>0.91</td>
<td>0.34</td>
<td>1.58</td>
</tr>
<tr>
<td>11. Cyperus alutatus</td>
<td>12.66</td>
<td>1.90</td>
<td>15</td>
<td>202</td>
<td>0.56</td>
<td>1.37</td>
<td>0.37</td>
<td>2.30</td>
</tr>
<tr>
<td>12. Cyperus rotundus</td>
<td>66.00</td>
<td>6.60</td>
<td>10</td>
<td>621</td>
<td>1.96</td>
<td>0.91</td>
<td>1.14</td>
<td>4.01</td>
</tr>
<tr>
<td>13. Cyperus iria</td>
<td>23.50</td>
<td>4.70</td>
<td>20</td>
<td>466</td>
<td>1.39</td>
<td>1.83</td>
<td>0.85</td>
<td>4.07</td>
</tr>
<tr>
<td>14. Desmodium heterophyllum</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>25</td>
<td>0.04</td>
<td>0.46</td>
<td>0.04</td>
<td>0.54</td>
</tr>
<tr>
<td>15. Desmodium triflorum</td>
<td>1.50</td>
<td>0.15</td>
<td>10</td>
<td>31</td>
<td>0.04</td>
<td>0.91</td>
<td>0.05</td>
<td>1.00</td>
</tr>
<tr>
<td>16. Digitaria bicornis</td>
<td>70.00</td>
<td>3.50</td>
<td>5</td>
<td>456</td>
<td>1.04</td>
<td>0.46</td>
<td>0.83</td>
<td>2.33</td>
</tr>
<tr>
<td>17. Digitaria ciliaris</td>
<td>10.00</td>
<td>2.00</td>
<td>20</td>
<td>293</td>
<td>0.59</td>
<td>1.83</td>
<td>0.54</td>
<td>2.96</td>
</tr>
<tr>
<td>18. Drosera burmannii</td>
<td>2.50</td>
<td>0.25</td>
<td>10</td>
<td>37</td>
<td>0.07</td>
<td>0.91</td>
<td>0.07</td>
<td>1.05</td>
</tr>
<tr>
<td>19. Echinochloa crusgalli</td>
<td>54.77</td>
<td>35.60</td>
<td>65</td>
<td>5913</td>
<td>10.57</td>
<td>5.96</td>
<td>10.84</td>
<td>27.37</td>
</tr>
<tr>
<td>20. Eleocharis retroflexa</td>
<td>80.00</td>
<td>4.00</td>
<td>5</td>
<td>387</td>
<td>1.19</td>
<td>0.46</td>
<td>0.71</td>
<td>2.36</td>
</tr>
</tbody>
</table>

*Table Contd.*
<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D</th>
<th>F</th>
<th>BA</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>21. <em>Eragrostis gangetica</em></td>
<td>29.16</td>
<td>8.75</td>
<td>30</td>
<td>1397</td>
<td>2.60</td>
<td>2.75</td>
<td>2.56</td>
<td>7.91</td>
</tr>
<tr>
<td>22. <em>Fimbriaria sp.</em></td>
<td>41.82</td>
<td>16.65</td>
<td>40</td>
<td>1765</td>
<td>4.94</td>
<td>3.67</td>
<td>3.23</td>
<td>11.84</td>
</tr>
<tr>
<td>23. <em>Fimbristylis umbellaris</em></td>
<td>71.40</td>
<td>17.85</td>
<td>25</td>
<td>1862</td>
<td>5.30</td>
<td>2.29</td>
<td>3.41</td>
<td>11.00</td>
</tr>
<tr>
<td>24. <em>Glinus lotoides</em></td>
<td>16.16</td>
<td>4.85</td>
<td>30</td>
<td>955</td>
<td>1.44</td>
<td>2.75</td>
<td>1.75</td>
<td>5.94</td>
</tr>
<tr>
<td>25. <em>Imperata cylindrica</em></td>
<td>77.14</td>
<td>27.00</td>
<td>35</td>
<td>3774</td>
<td>8.02</td>
<td>3.21</td>
<td>6.92</td>
<td>18.15</td>
</tr>
<tr>
<td>27. <em>Lindernia crustacea</em></td>
<td>5.00</td>
<td>1.50</td>
<td>30</td>
<td>170</td>
<td>0.44</td>
<td>2.75</td>
<td>0.31</td>
<td>3.50</td>
</tr>
<tr>
<td>28. <em>Lindernia parviflora</em></td>
<td>5.00</td>
<td>0.25</td>
<td>5</td>
<td>36</td>
<td>0.07</td>
<td>0.46</td>
<td>0.06</td>
<td>0.59</td>
</tr>
<tr>
<td>29. <em>Lobelia alsinoides</em></td>
<td>26.00</td>
<td>2.60</td>
<td>10</td>
<td>350</td>
<td>0.77</td>
<td>0.91</td>
<td>0.64</td>
<td>2.32</td>
</tr>
<tr>
<td>30. <em>Ludwigia perennis</em></td>
<td>1.25</td>
<td>0.25</td>
<td>20</td>
<td>82</td>
<td>0.07</td>
<td>1.83</td>
<td>0.15</td>
<td>2.05</td>
</tr>
<tr>
<td>31. <em>Melastoma malabathricum</em></td>
<td>2.28</td>
<td>0.80</td>
<td>35</td>
<td>169</td>
<td>0.24</td>
<td>3.21</td>
<td>0.31</td>
<td>3.76</td>
</tr>
<tr>
<td>32. <em>Mikania micrantha</em></td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>11</td>
<td>0.01</td>
<td>0.46</td>
<td>0.02</td>
<td>0.49</td>
</tr>
<tr>
<td>33. <em>Mimosa pudica</em></td>
<td>5.00</td>
<td>0.25</td>
<td>5</td>
<td>109</td>
<td>0.07</td>
<td>0.46</td>
<td>0.20</td>
<td>0.73</td>
</tr>
<tr>
<td>34. <em>Paspalum scrobiculatum</em></td>
<td>40.11</td>
<td>18.05</td>
<td>45</td>
<td>2806</td>
<td>5.36</td>
<td>4.13</td>
<td>5.14</td>
<td>14.63</td>
</tr>
<tr>
<td>35. <em>Phyllanthus fraternus</em></td>
<td>1.50</td>
<td>0.15</td>
<td>10</td>
<td>15</td>
<td>0.04</td>
<td>0.91</td>
<td>0.03</td>
<td>1.34</td>
</tr>
<tr>
<td>36. <em>Pouzolzia zeylanica</em></td>
<td>11.30</td>
<td>5.65</td>
<td>50</td>
<td>814</td>
<td>1.68</td>
<td>4.58</td>
<td>1.49</td>
<td>7.75</td>
</tr>
<tr>
<td>37. <em>Pueraria phaseoloides</em></td>
<td>3.00</td>
<td>0.30</td>
<td>10</td>
<td>251</td>
<td>0.09</td>
<td>0.91</td>
<td>0.46</td>
<td>1.46</td>
</tr>
<tr>
<td>38. <em>Rungia pectinata</em></td>
<td>28.20</td>
<td>7.05</td>
<td>25</td>
<td>1319</td>
<td>2.09</td>
<td>2.29</td>
<td>2.42</td>
<td>6.80</td>
</tr>
<tr>
<td>39. <em>Sacciolepis myosuroides</em></td>
<td>29.00</td>
<td>5.80</td>
<td>20</td>
<td>1053</td>
<td>1.72</td>
<td>1.83</td>
<td>1.93</td>
<td>5.48</td>
</tr>
<tr>
<td>40. <em>Saccharum spontaneum</em></td>
<td>102.13</td>
<td>76.60</td>
<td>75</td>
<td>10481</td>
<td>22.76</td>
<td>6.88</td>
<td>19.22</td>
<td>48.86</td>
</tr>
<tr>
<td>41. <em>Scoparia dulcis</em></td>
<td>4.40</td>
<td>1.10</td>
<td>25</td>
<td>149</td>
<td>0.32</td>
<td>2.29</td>
<td>0.27</td>
<td>2.88</td>
</tr>
<tr>
<td>42. <em>Sporobolus indicus</em></td>
<td>24.00</td>
<td>2.40</td>
<td>10</td>
<td>389</td>
<td>0.71</td>
<td>0.91</td>
<td>0.71</td>
<td>2.33</td>
</tr>
<tr>
<td>43. <em>Stellaria media</em></td>
<td>25.00</td>
<td>1.25</td>
<td>5</td>
<td>172</td>
<td>0.37</td>
<td>0.46</td>
<td>0.31</td>
<td>1.14</td>
</tr>
<tr>
<td>44. <em>Tonningia axillaris</em></td>
<td>5.33</td>
<td>0.80</td>
<td>15</td>
<td>170</td>
<td>0.24</td>
<td>1.37</td>
<td>0.31</td>
<td>1.92</td>
</tr>
<tr>
<td>45. <em>Vernonia cinerea</em></td>
<td>2.00</td>
<td>0.10</td>
<td>5</td>
<td>41</td>
<td>0.03</td>
<td>0.46</td>
<td>0.07</td>
<td>0.56</td>
</tr>
<tr>
<td>46. <em>Xanthium indicum</em></td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>12</td>
<td>0.01</td>
<td>0.46</td>
<td>0.02</td>
<td>0.49</td>
</tr>
</tbody>
</table>

Total number of individuals of all species = 6731, Total basal area cover = 54528 cm²
Total number of quadrats examined = 20, Number of occurrences of all species = 218

The lowest values of density (0.05 m²), % frequency (5 %) and abundance (1) were contributed by *Mikania micrantha* and *Xanthium indicum*. Raunkiaer’s frequency classes A composed of 27 species, B 12 species, C 4 species, D 2 species and E only 1 species (Fig-3.14). E was smaller than D. So, according to Raunkiaer’s ‘Frequency Law’ this vegetation was biotically disturbed during winter-99.
Saccharum spontaneum also recorded the highest value of basal area cover in winter season having relative dominance of 19.22% which was followed by Ageratum houstonianum (16.63%), Echinochloa crusgalli (10.84%), Imperata cylindrica (6.92%), Paspalum scrobiculatum (5.14%) etc. The IVI of all species in site-III was in wide range of 0.49 - 48.86. Saccharum spontaneum contributed to the maximum IVI of 48.86. This was followed by Ageratum houstonianum (33.08), Echinochloa crusgalli (27.37), Imperata cylindrica (18.15), Leucas indica (14.79), Paspalum scrobiculatum (14.63) etc. Whereas, two species viz. Mikania micrantha and Xanthium indicum had the least IVI of 0.49.

3.2.1.3.3. SITE-III : SUMMER SEASON

At site-III, total 55 plant species were recorded during summer-'99. The highest number of species recorded in single quadrat was 20 and lowest was 10. The mean number of species per quadrat was 13.70. The number of individuals among the quadrats ranged from 310 to 1629 and a total 18062 individuals were counted from 20 quadrats. While the average number of individuals per quadrat was 903.10.

The floristic composition and community characteristics for site-III of summer-99 are presented in Table-3.15. Amongst the total 55 species Borreria alata accounted for maximum individualized species (6436 individuals) contributing to 35.63% of the relative density. Moreover, another five species which dominated the community based on the number of inidividuals and relative density were
Table-3.15 : Floristic composition, Abundance (Ab), Density (D), Frequency (F), Basal Area Cover (BA), Relative Density (RD), Relative Frequency (RF), Relative Dominance (RDm) and Importance Value Index (IVI) of different species in Site-III during Summer-1999 season.

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D</th>
<th>F %</th>
<th>BA</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ageratum conyzoides</td>
<td>33.57</td>
<td>23.50</td>
<td>70</td>
<td>2316</td>
<td>2.60</td>
<td>5.15</td>
<td>3.76</td>
<td>11.51</td>
</tr>
<tr>
<td>2. Axonopus compressus</td>
<td>15.43</td>
<td>5.40</td>
<td>35</td>
<td>575</td>
<td>0.60</td>
<td>2.57</td>
<td>0.93</td>
<td>4.10</td>
</tr>
<tr>
<td>3. Borreria alata</td>
<td>357.55</td>
<td>321.80</td>
<td>90</td>
<td>16490</td>
<td>35.63</td>
<td>6.62</td>
<td>26.77</td>
<td>69.02</td>
</tr>
<tr>
<td>4. Brachiaria reptans</td>
<td>42.66</td>
<td>12.80</td>
<td>30</td>
<td>758</td>
<td>1.42</td>
<td>2.20</td>
<td>1.23</td>
<td>4.85</td>
</tr>
<tr>
<td>5. Bulbostylis barbata</td>
<td>8.00</td>
<td>0.40</td>
<td>5</td>
<td>33</td>
<td>0.04</td>
<td>0.37</td>
<td>0.05</td>
<td>0.46</td>
</tr>
<tr>
<td>6. Cassia sophera</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>26</td>
<td>0.01</td>
<td>0.37</td>
<td>0.04</td>
<td>0.42</td>
</tr>
<tr>
<td>7. Chrysopogon aciculatus</td>
<td>18.00</td>
<td>3.60</td>
<td>20</td>
<td>303</td>
<td>0.40</td>
<td>1.47</td>
<td>0.49</td>
<td>2.36</td>
</tr>
<tr>
<td>8. Cleome rutidosperma</td>
<td>8.80</td>
<td>2.20</td>
<td>25</td>
<td>199</td>
<td>0.24</td>
<td>1.84</td>
<td>0.32</td>
<td>2.40</td>
</tr>
<tr>
<td>9. Clerodendrum viscosum</td>
<td>17.50</td>
<td>1.75</td>
<td>10</td>
<td>274</td>
<td>0.19</td>
<td>0.73</td>
<td>0.44</td>
<td>1.36</td>
</tr>
<tr>
<td>10. Commelina diffusa</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>16</td>
<td>0.01</td>
<td>0.37</td>
<td>0.02</td>
<td>0.40</td>
</tr>
<tr>
<td>11. Crotalaria pallida</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>4</td>
<td>0.005</td>
<td>0.37</td>
<td>0.006</td>
<td>0.38</td>
</tr>
<tr>
<td>12. Cynodon dactylon</td>
<td>70.00</td>
<td>35.00</td>
<td>50</td>
<td>5799</td>
<td>3.87</td>
<td>3.67</td>
<td>9.41</td>
<td>16.95</td>
</tr>
<tr>
<td>13. Cyperus aludatus</td>
<td>7.00</td>
<td>1.40</td>
<td>20</td>
<td>48</td>
<td>0.15</td>
<td>1.47</td>
<td>0.08</td>
<td>1.70</td>
</tr>
<tr>
<td>14. Cyperus compressus</td>
<td>13.50</td>
<td>1.35</td>
<td>10</td>
<td>57</td>
<td>0.15</td>
<td>0.73</td>
<td>0.09</td>
<td>0.97</td>
</tr>
<tr>
<td>15. Cyperus diffusus</td>
<td>6.66</td>
<td>1.00</td>
<td>15</td>
<td>46</td>
<td>0.11</td>
<td>1.10</td>
<td>0.07</td>
<td>1.28</td>
</tr>
<tr>
<td>16. Cyperus kyllingia</td>
<td>6.00</td>
<td>0.30</td>
<td>5</td>
<td>12</td>
<td>0.03</td>
<td>0.37</td>
<td>0.02</td>
<td>0.42</td>
</tr>
<tr>
<td>17. Cyperus pseudokyllingioides</td>
<td>32.73</td>
<td>18.00</td>
<td>55</td>
<td>591</td>
<td>1.99</td>
<td>4.04</td>
<td>0.96</td>
<td>6.99</td>
</tr>
<tr>
<td>18. Desmodium triflorum</td>
<td>17.33</td>
<td>7.80</td>
<td>45</td>
<td>864</td>
<td>0.86</td>
<td>3.31</td>
<td>1.40</td>
<td>5.57</td>
</tr>
<tr>
<td>19. Digitaria bicornis</td>
<td>13.50</td>
<td>1.35</td>
<td>10</td>
<td>82</td>
<td>0.15</td>
<td>0.73</td>
<td>0.13</td>
<td>1.01</td>
</tr>
<tr>
<td>20. Digitaria ciliaris</td>
<td>32.50</td>
<td>3.25</td>
<td>10</td>
<td>233</td>
<td>0.36</td>
<td>0.73</td>
<td>0.38</td>
<td>1.47</td>
</tr>
<tr>
<td>21. Echinochloa crusgalli</td>
<td>162.81</td>
<td>130.25</td>
<td>80</td>
<td>8469</td>
<td>14.42</td>
<td>5.88</td>
<td>13.75</td>
<td>34.05</td>
</tr>
<tr>
<td>22. Eleusine indica</td>
<td>11.33</td>
<td>3.40</td>
<td>30</td>
<td>366</td>
<td>0.37</td>
<td>2.20</td>
<td>0.59</td>
<td>3.16</td>
</tr>
<tr>
<td>23. Emilia sonchifolia</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>5</td>
<td>0.005</td>
<td>0.37</td>
<td>0.008</td>
<td>0.38</td>
</tr>
<tr>
<td>24. Eragrostis gangetica</td>
<td>55.50</td>
<td>11.10</td>
<td>20</td>
<td>894</td>
<td>1.23</td>
<td>1.47</td>
<td>1.45</td>
<td>4.15</td>
</tr>
<tr>
<td>25. Eragrostis nigra</td>
<td>8.33</td>
<td>2.50</td>
<td>30</td>
<td>232</td>
<td>0.27</td>
<td>2.20</td>
<td>0.37</td>
<td>2.84</td>
</tr>
<tr>
<td>26. Eragrostis tenella</td>
<td>12.50</td>
<td>1.25</td>
<td>10</td>
<td>121</td>
<td>0.14</td>
<td>0.73</td>
<td>0.19</td>
<td>1.06</td>
</tr>
<tr>
<td>27. Fimbristylis acuminata</td>
<td>78.00</td>
<td>46.80</td>
<td>60</td>
<td>3203</td>
<td>5.18</td>
<td>4.41</td>
<td>5.20</td>
<td>14.79</td>
</tr>
<tr>
<td>28. Fimbristylis tetragona</td>
<td>30.66</td>
<td>4.60</td>
<td>15</td>
<td>367</td>
<td>0.51</td>
<td>1.10</td>
<td>0.59</td>
<td>2.20</td>
</tr>
<tr>
<td>29. Hedyotis diffusa</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>4</td>
<td>0.005</td>
<td>0.37</td>
<td>0.006</td>
<td>0.38</td>
</tr>
<tr>
<td>30. Hoppea dichotoma</td>
<td>4.40</td>
<td>1.10</td>
<td>25</td>
<td>77</td>
<td>0.12</td>
<td>1.84</td>
<td>0.12</td>
<td>2.08</td>
</tr>
</tbody>
</table>

*Table Contd.*
Contd. Table-3.15

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D Pl. m²</th>
<th>F %</th>
<th>BA cm²</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>31. Hygrophila salicifolia</td>
<td>391.00</td>
<td>39.10</td>
<td>10</td>
<td>1760</td>
<td>4.33</td>
<td>0.73</td>
<td>2.86</td>
<td>7.92</td>
</tr>
<tr>
<td>32. Imperata cylindrica</td>
<td>189.00</td>
<td>56.70</td>
<td>30</td>
<td>5445</td>
<td>6.28</td>
<td>2.20</td>
<td>8.84</td>
<td>17.32</td>
</tr>
<tr>
<td>33. Leucas indica</td>
<td>8.80</td>
<td>6.60</td>
<td>75</td>
<td>614</td>
<td>0.73</td>
<td>5.51</td>
<td>0.99</td>
<td>7.23</td>
</tr>
<tr>
<td>34. Lindernia crustacea</td>
<td>2.50</td>
<td>0.50</td>
<td>20</td>
<td>42</td>
<td>0.05</td>
<td>1.47</td>
<td>0.07</td>
<td>1.59</td>
</tr>
<tr>
<td>35. Lindernia diffusa</td>
<td>8.00</td>
<td>0.40</td>
<td>5</td>
<td>30</td>
<td>0.04</td>
<td>0.37</td>
<td>0.05</td>
<td>0.46</td>
</tr>
<tr>
<td>36. Lindernia multiflora</td>
<td>26.00</td>
<td>9.10</td>
<td>35</td>
<td>1117</td>
<td>1.01</td>
<td>2.57</td>
<td>1.81</td>
<td>5.39</td>
</tr>
<tr>
<td>37. Lindernia sp.</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>4</td>
<td>0.005</td>
<td>0.37</td>
<td>0.06</td>
<td>0.38</td>
</tr>
<tr>
<td>38. Melastoma malabathricum</td>
<td>2.66</td>
<td>0.40</td>
<td>15</td>
<td>37</td>
<td>0.04</td>
<td>1.10</td>
<td>0.06</td>
<td>1.20</td>
</tr>
<tr>
<td>39. Melochia corchorifolia</td>
<td>3.00</td>
<td>0.90</td>
<td>30</td>
<td>88</td>
<td>0.10</td>
<td>2.20</td>
<td>0.14</td>
<td>2.44</td>
</tr>
<tr>
<td>40. Mariscus cyperinus</td>
<td>53.57</td>
<td>18.75</td>
<td>35</td>
<td>878</td>
<td>2.07</td>
<td>2.57</td>
<td>1.42</td>
<td>6.06</td>
</tr>
<tr>
<td>41. Mimosa pudica</td>
<td>1.00</td>
<td>0.10</td>
<td>10</td>
<td>25</td>
<td>0.01</td>
<td>0.73</td>
<td>0.04</td>
<td>0.78</td>
</tr>
<tr>
<td>42. Mitracarpus verticillatus</td>
<td>41.00</td>
<td>6.15</td>
<td>15</td>
<td>438</td>
<td>0.68</td>
<td>1.10</td>
<td>0.71</td>
<td>2.49</td>
</tr>
<tr>
<td>43. Murdannia nudi flora</td>
<td>95.00</td>
<td>9.50</td>
<td>10</td>
<td>519</td>
<td>1.05</td>
<td>0.73</td>
<td>0.84</td>
<td>2.62</td>
</tr>
<tr>
<td>44. Paspalum scrobiculatum</td>
<td>34.70</td>
<td>17.35</td>
<td>50</td>
<td>1435</td>
<td>1.92</td>
<td>3.67</td>
<td>2.33</td>
<td>7.92</td>
</tr>
<tr>
<td>45. Pouzolzia zeylanica</td>
<td>2.00</td>
<td>0.70</td>
<td>35</td>
<td>63</td>
<td>0.08</td>
<td>2.57</td>
<td>0.10</td>
<td>2.75</td>
</tr>
<tr>
<td>46. Richardia scabra</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>10</td>
<td>0.01</td>
<td>0.37</td>
<td>0.01</td>
<td>0.39</td>
</tr>
<tr>
<td>47. Saccharum spontaneum</td>
<td>97.28</td>
<td>68.10</td>
<td>70</td>
<td>4741</td>
<td>7.54</td>
<td>5.15</td>
<td>7.70</td>
<td>20.39</td>
</tr>
<tr>
<td>48. Sacciolepis myosuroides</td>
<td>32.20</td>
<td>8.05</td>
<td>30</td>
<td>487</td>
<td>0.89</td>
<td>1.84</td>
<td>0.79</td>
<td>3.52</td>
</tr>
<tr>
<td>49. Scoparia dulcis</td>
<td>3.80</td>
<td>0.95</td>
<td>25</td>
<td>83</td>
<td>0.10</td>
<td>1.84</td>
<td>0.13</td>
<td>2.07</td>
</tr>
<tr>
<td>50. Sida acuta</td>
<td>19.33</td>
<td>2.90</td>
<td>15</td>
<td>291</td>
<td>0.32</td>
<td>1.10</td>
<td>0.47</td>
<td>1.89</td>
</tr>
<tr>
<td>51. Sporobolus indicus</td>
<td>115.00</td>
<td>11.50</td>
<td>10</td>
<td>810</td>
<td>1.27</td>
<td>0.73</td>
<td>1.31</td>
<td>3.31</td>
</tr>
<tr>
<td>52. Tonningia axillaris</td>
<td>21.50</td>
<td>2.15</td>
<td>10</td>
<td>159</td>
<td>0.24</td>
<td>0.73</td>
<td>0.26</td>
<td>1.23</td>
</tr>
<tr>
<td>53. Urena lobata</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>4</td>
<td>0.005</td>
<td>0.37</td>
<td>0.006</td>
<td>0.38</td>
</tr>
<tr>
<td>54. Vernonnia cinerea</td>
<td>1.00</td>
<td>0.10</td>
<td>10</td>
<td>15</td>
<td>0.01</td>
<td>0.73</td>
<td>0.02</td>
<td>0.76</td>
</tr>
<tr>
<td>55. Vetiveria zizanioides</td>
<td>10.00</td>
<td>0.50</td>
<td>5</td>
<td>40</td>
<td>0.05</td>
<td>0.37</td>
<td>0.06</td>
<td>0.48</td>
</tr>
</tbody>
</table>

Total number of individuals of all species = 18062, Total basal area cover = 61599 cm²
Total number of quadrats examined = 20, Number of occurrences of all species = 272

Echinochloa crusgalli, Saccharum spontaneum, Imperata cylindrica, Fimbristylis acuminata and Hygrophila salicifolia. Further, Hygrophila salicifolia recorded the highest value of abundance (391.00).

At site-III, during summer-99 season none of the species showed 100 % frequency value. The highest % frequency (90 %) and relative frequency (6.62 %) were noted for Borreria alata. The species showed % frequency values of 45 and
more were *Echinochloa crusgalli* (80 %), *Leucas indica* (75 %), *Ageratum conyzoides* (70 %), *Saccharum spontaneum* (70 %), *Fimbristylis acuminata* (60 %), *Cyperus pseudokyllingioides* (55 %), *Cynodon dactylon* (50 %), *Paspalum scrobiculatum* (50 %) and *Desmodium triflorum* (45 %). The minimum density (0.05 m$^{-2}$), % frequency (5 %) and abundance (1) were showed by five species viz. *Crotalaria pallida, Emilia sonchifolia, Hedyotis diffusa, Lindernia sp.* and *Urena lobata*. Raunkiaer's frequency classes A composed of 32 species, B 13 species, C 5 species, D 4 species and E only 1 species (Fig-3.15). This showed that frequency class E was smaller than class D. So, as per Raunkiaer's 'Frequency Law' this community was subjected to severe biotic influences during summer-'99.

During summer-'99, *Borreria alata* also contributed to the highest basal area cover having highest relative dominance of 26.77 % followed by *Echinochloa crusgalli* (13.75 %), *Cynodon dactylon* (9.41 %), *Imperata cylindrica* (8.84 %), *Saccharum spontaneum* (7.70 %) etc.

The IVI of all species in site-III during summer-'99 was in wide range of 0.38 - 69.02. The highest IVI (69.02) value was contributed by *Borreria alata*. This was followed far behind by *Echinochloa crusgalli* (34.05), *Saccharum spontaneum* (20.39), *Imperata cylindrica* (17.32), *Cynodon dactylon* (16.95), *Fimbristylis acuminata* (14.79) etc. On the other hand, five species viz. *Crotalaria pallida, Emilia sonchifolia, Hedyotis diffusa, Lindernia sp.* and *Urena lobata* recorded the minimum IVI of 0.38.
3.2.1.4 SITE-IV (KHARIBARI)

A total of 99 species of plants were recorded at site-IV during different seasons of the year (1998-1999). Out of these, 72 species were recorded during monsoon-98 whereas 39 and 44 species were recorded during winter-'99 and summer-'99 seasons, respectively.

3.2.1.4.1 SITE-IV : MONSOON SEASON

At site-IV, during monsoon-'98, the number of highest and lowest species occurring in single quadrat were 25 and 13, respectively, while the average number of species per quadrat was 19.05. A total of 7765 individuals were counted from 20 quadrats. The number of individuals among the quadrats ranged from 204 to 668. The mean number of individuals per quadrat was 388.25.

The floristic composition and phytosociological characteristics of site-IV during monsoon-'98 are given in Table-3.16. Results reveal that at site-IV the first ten dominant species on the basis of number of individuals were *Cynodon dactylon* (683), *Cyperus rotundus* (470), *Saccharum spontaneum* (440), *Cyperus iria* (396), *Murdannia nudiflora* (394), *Paspalum scrobiculatum* (389), *Chloris dolichostachya* (385), *Rungia pectinata* (270), *Sporobolus indicus* (263) and *Imperata cylindrica* (262). *Cyperus rotundus* also recorded the maximum abundance of 235.00.

Not a single species in this site showed 100 % frequency value during this season. The highest percentage frequency (85 %) and relative frequency (4.52 %) were recorded for *Murdannia nudiflora*. This was followed by *Desmodium triflorum* (65 %), *Cyperus iria* (60 %), *Ludwigia perennis* (55 %), *Selaginella sp.* (55 %), *Cyperus alulatus* (50 %), *Lindernia parviflora* (50 %), *Lindernia pyxidaria* (50 %), *Phyllanthus urinaria* (50 %) etc. in term of % frequency. Five species viz. *Cyperus compressus*, *Echinochloa crusgalli*, *Merremia hirta*, *Mirasacme indica* and *Scoparia dulcis* had the minimum density (0.05 m²), % frequency (5 %) and abundance (1) values.

In this investigation at site-IV, Raunkiaer's frequency classes A included 37 species, B 20 species, C 13 species and D & E each included only 1 species. Class E was not larger than class D (Fig-3.16). So as per Raunkiaer’s ‘Frequency Law’ it is indicated that the community was biotically disturbed during monsoon-98.

*Cynodon dactylon* contributed to the highest basal area cover and had recorded maximum relative dominance value of 8.73 %. The IVI of all species in site-IV during monsoon-'98 was in the narrow range of 0.28 - 19.91. *Cynodon dactylon*
Table-3.16: Abundance (Ab), Density (D), Frequency (F), Basal Area Cover (BA), Relative Density (RD), Relative Frequency (RF), Relative Dominance (RDm) and Importance Value Index (IVI) of various species of Site-IV in Monsoon 1998 season.

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D</th>
<th>F</th>
<th>BA</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Achyranthes porphyristachya</td>
<td>5.00</td>
<td>0.50</td>
<td>10</td>
<td>71</td>
<td>0.13</td>
<td>0.53</td>
<td>0.15</td>
<td>0.81</td>
</tr>
<tr>
<td>2. Ageratum conyzoides</td>
<td>6.00</td>
<td>1.50</td>
<td>25</td>
<td>278</td>
<td>0.38</td>
<td>1.33</td>
<td>0.58</td>
<td>2.29</td>
</tr>
<tr>
<td>3. Alternanthera sessilis</td>
<td>4.70</td>
<td>1.65</td>
<td>35</td>
<td>332</td>
<td>0.42</td>
<td>1.86</td>
<td>0.69</td>
<td>2.97</td>
</tr>
<tr>
<td>4. Ammannia cordata</td>
<td>6.66</td>
<td>1.00</td>
<td>15</td>
<td>132</td>
<td>0.26</td>
<td>0.79</td>
<td>0.27</td>
<td>1.32</td>
</tr>
<tr>
<td>5. Blumea lacera</td>
<td>8.50</td>
<td>1.70</td>
<td>20</td>
<td>198</td>
<td>0.44</td>
<td>1.06</td>
<td>0.41</td>
<td>1.91</td>
</tr>
<tr>
<td>6. Borreria alata</td>
<td>49.50</td>
<td>4.95</td>
<td>10</td>
<td>609</td>
<td>1.27</td>
<td>0.53</td>
<td>1.27</td>
<td>3.07</td>
</tr>
<tr>
<td>7. Brachiaria reptans</td>
<td>9.75</td>
<td>3.90</td>
<td>40</td>
<td>1140</td>
<td>1.00</td>
<td>2.13</td>
<td>2.38</td>
<td>5.51</td>
</tr>
<tr>
<td>8. Centella asiatica</td>
<td>15.16</td>
<td>4.55</td>
<td>30</td>
<td>1020</td>
<td>1.17</td>
<td>1.59</td>
<td>2.13</td>
<td>4.89</td>
</tr>
<tr>
<td>9. Cenatoperis thalictroides</td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>17</td>
<td>0.04</td>
<td>0.26</td>
<td>0.03</td>
<td>0.33</td>
</tr>
<tr>
<td>11. Chrysopogon aciculatus</td>
<td>15.77</td>
<td>7.10</td>
<td>45</td>
<td>754</td>
<td>1.83</td>
<td>2.39</td>
<td>1.57</td>
<td>5.79</td>
</tr>
<tr>
<td>12. Cynodon dactylon</td>
<td>75.88</td>
<td>34.15</td>
<td>45</td>
<td>4173</td>
<td>8.79</td>
<td>2.39</td>
<td>8.73</td>
<td>19.91</td>
</tr>
<tr>
<td>13. Cyperus alulatus</td>
<td>14.90</td>
<td>7.45</td>
<td>50</td>
<td>1209</td>
<td>1.92</td>
<td>2.66</td>
<td>2.53</td>
<td>7.11</td>
</tr>
<tr>
<td>14. Cyperus compressus</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>9</td>
<td>0.01</td>
<td>0.26</td>
<td>0.02</td>
<td>0.29</td>
</tr>
<tr>
<td>15. Cyperus pseudokyllingioides</td>
<td>10.00</td>
<td>3.00</td>
<td>30</td>
<td>304</td>
<td>0.77</td>
<td>1.59</td>
<td>0.63</td>
<td>2.99</td>
</tr>
<tr>
<td>16. Cyperus rotundus</td>
<td>235.00</td>
<td>23.50</td>
<td>10</td>
<td>1359</td>
<td>6.05</td>
<td>0.53</td>
<td>2.84</td>
<td>9.42</td>
</tr>
<tr>
<td>17. Cyperus iria</td>
<td>33.00</td>
<td>19.80</td>
<td>60</td>
<td>1830</td>
<td>5.09</td>
<td>3.19</td>
<td>3.83</td>
<td>12.11</td>
</tr>
<tr>
<td>18. Dentella serpyllifolia</td>
<td>20.00</td>
<td>1.00</td>
<td>5</td>
<td>128</td>
<td>0.26</td>
<td>0.26</td>
<td>0.27</td>
<td>0.79</td>
</tr>
<tr>
<td>19. Desmodium triflorum</td>
<td>18.54</td>
<td>12.05</td>
<td>65</td>
<td>1502</td>
<td>3.10</td>
<td>3.45</td>
<td>3.14</td>
<td>9.69</td>
</tr>
<tr>
<td>20. Digitaria ciliaris</td>
<td>10.00</td>
<td>2.00</td>
<td>20</td>
<td>178</td>
<td>0.51</td>
<td>1.06</td>
<td>0.37</td>
<td>1.94</td>
</tr>
<tr>
<td>21. Digitaria sanguinalis</td>
<td>16.50</td>
<td>1.65</td>
<td>10</td>
<td>136</td>
<td>0.42</td>
<td>0.53</td>
<td>0.28</td>
<td>1.23</td>
</tr>
<tr>
<td>22. Dryopteris flax-mas</td>
<td>13.00</td>
<td>3.25</td>
<td>25</td>
<td>463</td>
<td>0.84</td>
<td>1.33</td>
<td>0.97</td>
<td>3.14</td>
</tr>
<tr>
<td>23. Echiocloa crusgalli</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>9</td>
<td>0.01</td>
<td>0.26</td>
<td>0.02</td>
<td>0.29</td>
</tr>
<tr>
<td>24. Eleusine indica</td>
<td>17.33</td>
<td>2.60</td>
<td>15</td>
<td>449</td>
<td>0.67</td>
<td>0.79</td>
<td>0.94</td>
<td>2.40</td>
</tr>
<tr>
<td>25. Eragrostis gangetica</td>
<td>15.00</td>
<td>3.75</td>
<td>25</td>
<td>609</td>
<td>0.96</td>
<td>1.33</td>
<td>1.27</td>
<td>3.56</td>
</tr>
<tr>
<td>26. Eragrostis unioloides</td>
<td>5.66</td>
<td>1.70</td>
<td>30</td>
<td>282</td>
<td>0.44</td>
<td>1.59</td>
<td>0.59</td>
<td>2.62</td>
</tr>
<tr>
<td>27. Eriocaulon quinquangularare</td>
<td>68.50</td>
<td>6.85</td>
<td>10</td>
<td>851</td>
<td>1.76</td>
<td>0.53</td>
<td>1.78</td>
<td>4.07</td>
</tr>
<tr>
<td>28. Fimbristylis aestivalis</td>
<td>24.33</td>
<td>3.65</td>
<td>15</td>
<td>898</td>
<td>0.94</td>
<td>0.79</td>
<td>1.88</td>
<td>3.61</td>
</tr>
<tr>
<td>29. Fimbristylis dichotoma</td>
<td>16.71</td>
<td>5.85</td>
<td>35</td>
<td>838</td>
<td>1.50</td>
<td>1.86</td>
<td>1.75</td>
<td>5.11</td>
</tr>
<tr>
<td>30. Fimbristylis griffithii</td>
<td>8.00</td>
<td>1.20</td>
<td>15</td>
<td>301</td>
<td>0.31</td>
<td>0.79</td>
<td>0.63</td>
<td>1.73</td>
</tr>
</tbody>
</table>

Table Contd.
<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D Pl. m²</th>
<th>F %</th>
<th>BA cm²</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>31. Fimbristylis umbellaris</td>
<td>13.50</td>
<td>2.70</td>
<td>20</td>
<td>418</td>
<td>0.69</td>
<td>1.06</td>
<td>0.87</td>
<td>2.62</td>
</tr>
<tr>
<td>32. Hedyotis corymbosa</td>
<td>6.50</td>
<td>1.30</td>
<td>20</td>
<td>176</td>
<td>0.33</td>
<td>1.06</td>
<td>0.37</td>
<td>1.76</td>
</tr>
<tr>
<td>33. Hedyotis diffusa</td>
<td>9.12</td>
<td>3.65</td>
<td>40</td>
<td>410</td>
<td>0.94</td>
<td>2.13</td>
<td>0.86</td>
<td>3.93</td>
</tr>
<tr>
<td>34. Hedyotis herbacea</td>
<td>12.14</td>
<td>4.25</td>
<td>35</td>
<td>540</td>
<td>1.09</td>
<td>1.86</td>
<td>1.13</td>
<td>4.08</td>
</tr>
<tr>
<td>35. Hydrocotyle sibthorpioides</td>
<td>5.50</td>
<td>1.65</td>
<td>30</td>
<td>300</td>
<td>0.42</td>
<td>1.59</td>
<td>0.63</td>
<td>2.64</td>
</tr>
<tr>
<td>36. Hygrophiella polysperma</td>
<td>13.00</td>
<td>1.95</td>
<td>15</td>
<td>196</td>
<td>0.50</td>
<td>0.79</td>
<td>0.41</td>
<td>1.70</td>
</tr>
<tr>
<td>37. Hypericum japonicum</td>
<td>11.80</td>
<td>2.95</td>
<td>25</td>
<td>372</td>
<td>0.76</td>
<td>1.33</td>
<td>0.78</td>
<td>2.87</td>
</tr>
<tr>
<td>38. Imperata cylindrica</td>
<td>32.75</td>
<td>13.10</td>
<td>40</td>
<td>1482</td>
<td>3.37</td>
<td>2.13</td>
<td>3.09</td>
<td>8.59</td>
</tr>
<tr>
<td>39. Isolepis setacea</td>
<td>17.50</td>
<td>1.75</td>
<td>10</td>
<td>147</td>
<td>0.45</td>
<td>0.53</td>
<td>0.31</td>
<td>1.29</td>
</tr>
<tr>
<td>40. Limnophila aquatica</td>
<td>22.77</td>
<td>10.25</td>
<td>45</td>
<td>927</td>
<td>2.64</td>
<td>2.39</td>
<td>1.94</td>
<td>6.97</td>
</tr>
<tr>
<td>41. Limnophila heterophylla</td>
<td>13.00</td>
<td>2.60</td>
<td>20</td>
<td>263</td>
<td>0.67</td>
<td>1.06</td>
<td>0.55</td>
<td>2.28</td>
</tr>
<tr>
<td>42. Limnophila micrantha</td>
<td>4.00</td>
<td>0.20</td>
<td>5</td>
<td>21</td>
<td>0.05</td>
<td>0.26</td>
<td>0.04</td>
<td>0.35</td>
</tr>
<tr>
<td>43. Lindernia ciliata</td>
<td>5.00</td>
<td>0.75</td>
<td>15</td>
<td>49</td>
<td>0.19</td>
<td>0.79</td>
<td>0.10</td>
<td>1.08</td>
</tr>
<tr>
<td>44. Lindernia crustacea</td>
<td>4.33</td>
<td>0.65</td>
<td>15</td>
<td>54</td>
<td>0.16</td>
<td>0.79</td>
<td>0.11</td>
<td>1.06</td>
</tr>
<tr>
<td>45. Lindernia hookeri</td>
<td>19.00</td>
<td>3.80</td>
<td>20</td>
<td>285</td>
<td>0.98</td>
<td>1.06</td>
<td>0.59</td>
<td>2.63</td>
</tr>
<tr>
<td>46. Lindernia parviflora</td>
<td>15.40</td>
<td>7.70</td>
<td>50</td>
<td>568</td>
<td>1.98</td>
<td>2.66</td>
<td>1.19</td>
<td>5.83</td>
</tr>
<tr>
<td>47. Lindernia pyxidaria</td>
<td>10.00</td>
<td>5.00</td>
<td>50</td>
<td>404</td>
<td>1.28</td>
<td>2.66</td>
<td>0.84</td>
<td>4.78</td>
</tr>
<tr>
<td>48. Lobelia alsinoides</td>
<td>5.88</td>
<td>2.65</td>
<td>45</td>
<td>277</td>
<td>0.68</td>
<td>2.39</td>
<td>0.58</td>
<td>3.65</td>
</tr>
<tr>
<td>49. Lobelia heyneana</td>
<td>24.10</td>
<td>12.05</td>
<td>50</td>
<td>1114</td>
<td>3.10</td>
<td>2.66</td>
<td>2.33</td>
<td>8.09</td>
</tr>
<tr>
<td>50. Ludwigia perennis</td>
<td>5.36</td>
<td>2.95</td>
<td>55</td>
<td>915</td>
<td>0.76</td>
<td>2.92</td>
<td>1.91</td>
<td>5.59</td>
</tr>
<tr>
<td>51. Merremia hirta</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>23</td>
<td>0.01</td>
<td>0.26</td>
<td>0.05</td>
<td>0.32</td>
</tr>
<tr>
<td>52. Microcarpaea minima</td>
<td>15.00</td>
<td>0.75</td>
<td>5</td>
<td>124</td>
<td>0.19</td>
<td>0.26</td>
<td>0.26</td>
<td>0.71</td>
</tr>
<tr>
<td>53. Mitrasacme indica</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>6</td>
<td>0.01</td>
<td>0.26</td>
<td>0.01</td>
<td>0.28</td>
</tr>
<tr>
<td>54. Murdannia nudiflora</td>
<td>23.17</td>
<td>19.70</td>
<td>85</td>
<td>3950</td>
<td>5.07</td>
<td>4.52</td>
<td>8.26</td>
<td>17.85</td>
</tr>
<tr>
<td>55. Murdannia spirata</td>
<td>8.50</td>
<td>3.40</td>
<td>40</td>
<td>702</td>
<td>0.87</td>
<td>2.13</td>
<td>1.47</td>
<td>4.47</td>
</tr>
<tr>
<td>56. Murdannia japonica</td>
<td>8.40</td>
<td>2.10</td>
<td>25</td>
<td>551</td>
<td>0.54</td>
<td>1.33</td>
<td>1.15</td>
<td>3.02</td>
</tr>
<tr>
<td>57. Ophioglossum reticulatum</td>
<td>4.50</td>
<td>0.45</td>
<td>10</td>
<td>47</td>
<td>0.11</td>
<td>0.53</td>
<td>0.10</td>
<td>0.74</td>
</tr>
<tr>
<td>58. Opilsimenus compositus</td>
<td>5.00</td>
<td>0.25</td>
<td>5</td>
<td>31</td>
<td>0.06</td>
<td>0.26</td>
<td>0.06</td>
<td>0.38</td>
</tr>
<tr>
<td>59. Oxalis corniculata</td>
<td>10.00</td>
<td>1.50</td>
<td>15</td>
<td>211</td>
<td>0.38</td>
<td>0.79</td>
<td>0.44</td>
<td>1.61</td>
</tr>
<tr>
<td>60. Paspalum scrobiculatum</td>
<td>43.22</td>
<td>19.45</td>
<td>45</td>
<td>2274</td>
<td>5.00</td>
<td>2.39</td>
<td>4.75</td>
<td>12.14</td>
</tr>
<tr>
<td>61. Peperomia pellucida</td>
<td>10.00</td>
<td>0.50</td>
<td>5</td>
<td>64</td>
<td>0.13</td>
<td>0.26</td>
<td>0.13</td>
<td>0.52</td>
</tr>
<tr>
<td>62. Phyllanthus urinaria</td>
<td>6.00</td>
<td>3.00</td>
<td>50</td>
<td>319</td>
<td>0.77</td>
<td>2.66</td>
<td>0.67</td>
<td>4.10</td>
</tr>
<tr>
<td>63. Phyllanthus virgatus</td>
<td>5.66</td>
<td>1.70</td>
<td>30</td>
<td>187</td>
<td>0.44</td>
<td>1.59</td>
<td>0.39</td>
<td>2.42</td>
</tr>
<tr>
<td>64. Rotala rotundifolia</td>
<td>11.50</td>
<td>2.30</td>
<td>20</td>
<td>380</td>
<td>0.59</td>
<td>1.06</td>
<td>0.79</td>
<td>2.44</td>
</tr>
</tbody>
</table>

Table Contd.
Contd. Table-3.16

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D</th>
<th>F</th>
<th>BA</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>65. <em>Rungia pectinata</em></td>
<td>33.75</td>
<td>13.50</td>
<td>40</td>
<td>1256</td>
<td>3.47</td>
<td>2.13</td>
<td>2.62</td>
<td>8.22</td>
</tr>
<tr>
<td>66. <em>Saccharum spontaneum</em></td>
<td>73.33</td>
<td>22.00</td>
<td>30</td>
<td>3316</td>
<td>5.66</td>
<td>1.59</td>
<td>6.93</td>
<td>14.18</td>
</tr>
<tr>
<td>67. <em>Sacciolepis myosuroides</em></td>
<td>18.00</td>
<td>2.70</td>
<td>15</td>
<td>325</td>
<td>0.69</td>
<td>0.79</td>
<td>0.68</td>
<td>2.16</td>
</tr>
<tr>
<td>68. <em>Scoparia dulcis</em></td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>8</td>
<td>0.01</td>
<td>0.26</td>
<td>0.01</td>
<td>0.28</td>
</tr>
<tr>
<td>69. <em>Selaginella sp.</em></td>
<td>21.18</td>
<td>11.65</td>
<td>55</td>
<td>841</td>
<td>3.00</td>
<td>2.92</td>
<td>1.76</td>
<td>7.68</td>
</tr>
<tr>
<td>70. <em>Sida rhombifolia</em></td>
<td>2.00</td>
<td>0.20</td>
<td>10</td>
<td>33</td>
<td>0.05</td>
<td>0.53</td>
<td>0.07</td>
<td>0.65</td>
</tr>
<tr>
<td>71. <em>Sporobolus indicus</em></td>
<td>37.57</td>
<td>13.15</td>
<td>35</td>
<td>1371</td>
<td>3.38</td>
<td>1.86</td>
<td>2.86</td>
<td>8.10</td>
</tr>
<tr>
<td>72. <em>Xyris indica</em></td>
<td>54.00</td>
<td>8.10</td>
<td>15</td>
<td>788</td>
<td>2.08</td>
<td>0.79</td>
<td>1.65</td>
<td>4.52</td>
</tr>
</tbody>
</table>

Total number of individuals of all species = 7765, Total basal area cover = 47810 cm²
Total number of quadrats examined = 20, Number of occurrences of all species = 376

![Graph](image)

**Fig-3.16 Number of species under Raunkiaer’s frequency classes A, B, C, D and E at site-IV during Monsoon-’98**

recorded the highest value of IVI (19.91), followed by *Murdannia nudiflora* (17.85), *Saccharum spontaneum* (14.18), *Paspalum scrobiculatum* (12.14), *Cyperus iria* (12.11), *Chloris dolichostachya* (9.94), *Desmodium triflorum* (9.69), *Cyperus rotundus* (9.42) etc. Only two species viz. *Mirasacme indica* and *Scoparia dulcis* scored the lowest IVI of 0.28 at site-IV during this season.
3.2.1.4.2 SITE-IV : WINTER SEASON

At site-IV, a total of 39 plant species were listed during winter-'99. The highest and lowest number of species recorded in single quadrat were 17 and 7, respectively. The average number of species per quadrat was 11.10. A total of 5985 individuals were recorded from 20 quadrats. The number of individuals among the quadrats ranged from 67 to 461. While the average number of individuals per quadrat was 299.25.

A perusal of Table-3.17 shows that, amongst the total 39 species, *Imperata cylindrica* was the most dominant species at site-IV during winter-'99 with the record of highest density (105.75 m\(^{-2}\)) and maximum number of individuals (2115) contributing to 35.34 % of relative density. Amongst the remaining species, the first five species based on the number of individuals were *Sporobolus indicus* (637), *Saccharum spontaneum* (390), *Eleusine indica* (385), *Gnaphalium pensylvanicum* (371) and *Hydrocotyle sibthorpioides* (278). The maximum abundance was noted for *Saccharum spontaneum* (195.00).

Table-3.17 : Floristic composition, Abundance (Ab), Density (D), Frequency (F), Basal Area Cover (BA), Relative Density (RD), Relative Frequency (RF), Relative Dominance (R Dm) and Importance Value Index (IVI) of different species in Site-IV during Winter-1999 season.

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D Pl m(^2)</th>
<th>F %</th>
<th>BA cm(^2)</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Alternanthera sessilis</td>
<td>4.66</td>
<td>0.70</td>
<td>15</td>
<td>246</td>
<td>0.23</td>
<td>1.35</td>
<td>0.59</td>
<td>2.17</td>
</tr>
<tr>
<td>2. Axonopus compressus</td>
<td>4.00</td>
<td>0.80</td>
<td>20</td>
<td>155</td>
<td>0.26</td>
<td>1.81</td>
<td>0.37</td>
<td>2.44</td>
</tr>
<tr>
<td>3. Blumea lacera</td>
<td>3.40</td>
<td>0.85</td>
<td>25</td>
<td>130</td>
<td>0.28</td>
<td>2.26</td>
<td>0.31</td>
<td>2.85</td>
</tr>
<tr>
<td>4. Centella asiatica</td>
<td>11.00</td>
<td>4.40</td>
<td>40</td>
<td>858</td>
<td>1.47</td>
<td>3.62</td>
<td>2.08</td>
<td>7.17</td>
</tr>
<tr>
<td>5. Cynodon dactylon</td>
<td>3.71</td>
<td>1.30</td>
<td>35</td>
<td>260</td>
<td>0.43</td>
<td>3.16</td>
<td>0.63</td>
<td>4.22</td>
</tr>
<tr>
<td>6. Cyperus edulatus</td>
<td>10.00</td>
<td>0.50</td>
<td>5</td>
<td>56</td>
<td>0.16</td>
<td>0.45</td>
<td>0.13</td>
<td>0.74</td>
</tr>
<tr>
<td>7. Cyperus rotundus</td>
<td>30.00</td>
<td>3.00</td>
<td>10</td>
<td>293</td>
<td>1.00</td>
<td>0.90</td>
<td>0.71</td>
<td>2.61</td>
</tr>
<tr>
<td>8. Desmodium triflorum</td>
<td>17.07</td>
<td>11.95</td>
<td>70</td>
<td>1408</td>
<td>3.99</td>
<td>6.33</td>
<td>3.41</td>
<td>13.73</td>
</tr>
<tr>
<td>9. Digitaria ciliaris</td>
<td>17.10</td>
<td>8.55</td>
<td>50</td>
<td>1218</td>
<td>2.86</td>
<td>4.52</td>
<td>2.95</td>
<td>10.33</td>
</tr>
<tr>
<td>10. Digitaria sibthorpioides</td>
<td>13.43</td>
<td>4.70</td>
<td>35</td>
<td>638</td>
<td>1.57</td>
<td>3.16</td>
<td>1.54</td>
<td>6.27</td>
</tr>
<tr>
<td>11. Echinochloa crusgalli</td>
<td>8.75</td>
<td>1.75</td>
<td>20</td>
<td>238</td>
<td>0.58</td>
<td>1.81</td>
<td>0.57</td>
<td>2.96</td>
</tr>
</tbody>
</table>

Table Contd.
Contd. Table-3.17

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D  Pl. m⁻¹</th>
<th>F %</th>
<th>BA cm⁻³</th>
<th>RD</th>
<th>RF</th>
<th>RDM</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. <em>Fimbriaria sp.</em></td>
<td>5.00</td>
<td>0.25</td>
<td>5</td>
<td>48</td>
<td>0.08</td>
<td>0.45</td>
<td>0.11</td>
<td>0.64</td>
</tr>
<tr>
<td>15. <em>Fimbristylis ovata</em></td>
<td>5.00</td>
<td>0.25</td>
<td>5</td>
<td>46</td>
<td>0.08</td>
<td>0.45</td>
<td>0.11</td>
<td>0.64</td>
</tr>
<tr>
<td>16. <em>Fimbristylis umbellaris</em></td>
<td>7.33</td>
<td>1.10</td>
<td>15</td>
<td>191</td>
<td>0.37</td>
<td>1.35</td>
<td>0.46</td>
<td>2.18</td>
</tr>
<tr>
<td>17. <em>Gnaphalium pensylvanicum</em></td>
<td>61.83</td>
<td>18.55</td>
<td>30</td>
<td>2141</td>
<td>6.20</td>
<td>2.71</td>
<td>5.18</td>
<td>14.09</td>
</tr>
<tr>
<td>18. <em>Grangea maderaspatana</em></td>
<td>21.00</td>
<td>3.15</td>
<td>15</td>
<td>406</td>
<td>1.05</td>
<td>1.35</td>
<td>0.98</td>
<td>3.38</td>
</tr>
<tr>
<td>19. <em>Hydrocotyle sibthorpioides</em></td>
<td>17.37</td>
<td>13.90</td>
<td>80</td>
<td>2647</td>
<td>4.64</td>
<td>7.24</td>
<td>6.41</td>
<td>18.29</td>
</tr>
<tr>
<td>20. <em>Hypericum japonicum</em></td>
<td>6.08</td>
<td>3.65</td>
<td>60</td>
<td>672</td>
<td>1.22</td>
<td>5.43</td>
<td>1.63</td>
<td>8.28</td>
</tr>
<tr>
<td>21. <em>Hyptis suaveolens</em></td>
<td>36.00</td>
<td>3.60</td>
<td>10</td>
<td>972</td>
<td>1.20</td>
<td>0.90</td>
<td>2.35</td>
<td>4.45</td>
</tr>
<tr>
<td>22. <em>Imperata cylindrica</em></td>
<td>124.41</td>
<td>105.75</td>
<td>85</td>
<td>11530</td>
<td>35.34</td>
<td>7.69</td>
<td>27.92</td>
<td>70.95</td>
</tr>
<tr>
<td>23. <em>Ixeris polycephala</em></td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>8</td>
<td>0.01</td>
<td>0.45</td>
<td>0.02</td>
<td>0.48</td>
</tr>
<tr>
<td>24. <em>Lindernia crustacea</em></td>
<td>2.00</td>
<td>0.30</td>
<td>15</td>
<td>37</td>
<td>0.10</td>
<td>1.35</td>
<td>0.08</td>
<td>1.53</td>
</tr>
<tr>
<td>25. <em>Lindernia parviflora</em></td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>20</td>
<td>0.05</td>
<td>0.45</td>
<td>0.05</td>
<td>0.55</td>
</tr>
<tr>
<td>26. <em>Ludwigia perennis</em></td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>14</td>
<td>0.01</td>
<td>0.45</td>
<td>0.03</td>
<td>0.49</td>
</tr>
<tr>
<td>27. <em>Mazus pumilus</em></td>
<td>3.00</td>
<td>0.90</td>
<td>30</td>
<td>130</td>
<td>0.30</td>
<td>2.71</td>
<td>0.31</td>
<td>3.32</td>
</tr>
<tr>
<td>28. <em>Mikania micrantha</em></td>
<td>10.66</td>
<td>1.60</td>
<td>15</td>
<td>276</td>
<td>0.53</td>
<td>1.35</td>
<td>0.67</td>
<td>2.55</td>
</tr>
<tr>
<td>29. <em>Mukia maderaspatana</em></td>
<td>5.00</td>
<td>0.25</td>
<td>5</td>
<td>51</td>
<td>0.08</td>
<td>0.45</td>
<td>0.12</td>
<td>0.65</td>
</tr>
<tr>
<td>30. <em>Oxalis corniculata</em></td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>9</td>
<td>0.01</td>
<td>0.45</td>
<td>0.02</td>
<td>0.48</td>
</tr>
<tr>
<td>32. <em>Polygonum plebejum</em></td>
<td>11.07</td>
<td>7.20</td>
<td>65</td>
<td>925</td>
<td>2.40</td>
<td>5.88</td>
<td>2.24</td>
<td>10.52</td>
</tr>
<tr>
<td>33. <em>Pseudognaphalium luteo-album</em></td>
<td>13.66</td>
<td>4.10</td>
<td>30</td>
<td>599</td>
<td>1.37</td>
<td>2.71</td>
<td>1.45</td>
<td>5.53</td>
</tr>
<tr>
<td>34. <em>Rungia pectinata</em></td>
<td>12.10</td>
<td>6.05</td>
<td>50</td>
<td>988</td>
<td>2.02</td>
<td>4.52</td>
<td>2.39</td>
<td>8.93</td>
</tr>
<tr>
<td>35. <em>Saccharum spontaneum</em></td>
<td>195.00</td>
<td>19.50</td>
<td>10</td>
<td>3594</td>
<td>6.51</td>
<td>0.90</td>
<td>8.70</td>
<td>16.11</td>
</tr>
<tr>
<td>36. <em>Solanum nigrum</em></td>
<td>1.80</td>
<td>0.45</td>
<td>25</td>
<td>154</td>
<td>0.15</td>
<td>2.26</td>
<td>0.37</td>
<td>2.78</td>
</tr>
<tr>
<td>37. <em>Sporobolus indicus</em></td>
<td>42.46</td>
<td>31.85</td>
<td>75</td>
<td>4640</td>
<td>10.64</td>
<td>6.78</td>
<td>11.24</td>
<td>28.66</td>
</tr>
<tr>
<td>38. <em>Vernonia cinerea</em></td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>19</td>
<td>0.01</td>
<td>0.45</td>
<td>0.04</td>
<td>0.50</td>
</tr>
<tr>
<td>39. <em>Youngia japonica</em></td>
<td>3.00</td>
<td>0.75</td>
<td>25</td>
<td>156</td>
<td>0.25</td>
<td>2.26</td>
<td>0.38</td>
<td>2.89</td>
</tr>
</tbody>
</table>

Total number of individuals of all species = 5985, Total basal area cover = 41287 cm²
Total number of quadrats examined = 20, Number of occurrences of all species = 221

At site-IV, during winter-99 none of the species showed 100 % frequency value. The highest percentage frequency (85 %) and relative frequency (7.69 %) were showed by *Imperata cylindrica*. This was followed by *Hydrocotyle sibthorpioides* (80%), *Sporobolus indicus* (75%), *Desmodium triflorum* (70%).
Polygonum plebejum (65 %) Hypericum japonicum (60 %) etc. Four species viz. Ixeris polycephala, Ludwigia perennis, Oxalis corniculata and Vernonia cinerea scored the minimum density (0.05 m\(^2\)), % frequency (5 %) and abundance (1) values.

Raunkiaer’s frequency classes A, B, C, D and E included 20, 10, 4, 4 and 1 species, respectively (Fig-3.17). This may be represented as A>B>C=D>E. As per Raunkiaer’s ‘Law of frequency’ (A>B>C>=<D<E) E was not larger than D. So it is indicated that this community was biotically disturbed during winter-’99.

During winter-’99 Imperata cylindrica recorded highest basal area cover with relative dominance of 27.92. The IVI of all species in site-IV during winter-’99 was in the wide range of 0.48 - 70.93. Accordingly, Imperata cylindrica was detected as the most important species of the site with its IVI of 70.93. This was followed far behind by Sporobolus indicus (28.66), Hydrocotyle sibthorpioides (18.29), Eleusine indica (16.12), Saccharum spontaneum (16.11), Gnaphaliumpensylvanicum (14.09), Desmodium triflorum (13.73) etc. The lowest IVI (0.48) was noted for Ixeris polycephala and Oxalis corniculata at site-IV during winter-’99.
3.2.1.4.3. SITE-IV : SUMMER SEASON

In this investigation altogether 44 species were recorded at site-IV during summer-'99 season. The highest number of species recorded in single quadrat was 20 and lowest was 10. While the mean number of species per quadrat was 13.35. A total of 13588 individuals were recorded from 20 quadrats. The highest and lowest number of individuals recorded in single quadrat were 1274 and 338, respectively, whereas the average number of individuals recorded per quadrat was 679.40.

The floristic composition and community characteristics of site-IV during summer-'99 are shown in Table-3.18. Results indicate that *Imperata cylindrica* accounted for the maximum individualized species in this community during summer-'99 contributing to the maximum density (165.00 m\(^2\)) and abundance (253.84) with 24.28 % relative density value. Moreover, other four species viz. *Echinochloa crusgalli* (13.65 %), *Tonningia axillaris* (10.85 %), *Cynodon dactylon* (7.44 %) and *Desmodium triflorum* (5.55 %) also codominated the community in terms of relative density values.

**Table-3.18 : List of Plant species of Site-IV in Summer 1999 season, with details on Abundance (Ab), Density (D), Frequency (F), Basal Area Cover (BA), Relative Density (RD), Relative Frequency (RF), Relative Dominance (R Dm) and Importance Value Index (IVI).**

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D</th>
<th>F</th>
<th>BA</th>
<th>RD</th>
<th>RF</th>
<th>R Dm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Alternanthera sessilis</td>
<td>15.10</td>
<td>7.55</td>
<td>50</td>
<td>952</td>
<td>1.11</td>
<td>3.74</td>
<td>1.80</td>
<td>6.65</td>
</tr>
<tr>
<td>2. Axonopus compressus</td>
<td>11.20</td>
<td>2.80</td>
<td>25</td>
<td>315</td>
<td>0.42</td>
<td>1.87</td>
<td>0.59</td>
<td>2.88</td>
</tr>
<tr>
<td>3 Borreria alata</td>
<td>26.00</td>
<td>10.40</td>
<td>40</td>
<td>941</td>
<td>1.53</td>
<td>2.99</td>
<td>1.78</td>
<td>6.30</td>
</tr>
<tr>
<td>4 Brachiaria reptans</td>
<td>15.83</td>
<td>4.75</td>
<td>30</td>
<td>354</td>
<td>0.70</td>
<td>2.25</td>
<td>0.67</td>
<td>3.62</td>
</tr>
<tr>
<td>5 Centella asiatica</td>
<td>17.44</td>
<td>7.85</td>
<td>45</td>
<td>665</td>
<td>1.15</td>
<td>3.37</td>
<td>1.26</td>
<td>5.78</td>
</tr>
<tr>
<td>6 Chrysopogon aciculatus</td>
<td>15.00</td>
<td>2.25</td>
<td>15</td>
<td>203</td>
<td>0.33</td>
<td>1.12</td>
<td>0.38</td>
<td>1.83</td>
</tr>
<tr>
<td>7 Commelina diffusa</td>
<td>1.00</td>
<td>0.10</td>
<td>10</td>
<td>10</td>
<td>0.01</td>
<td>0.75</td>
<td>0.02</td>
<td>0.78</td>
</tr>
<tr>
<td>8. Crassocephalum crepidioides</td>
<td>2.00</td>
<td>0.10</td>
<td>5</td>
<td>10</td>
<td>0.01</td>
<td>0.37</td>
<td>0.02</td>
<td>0.40</td>
</tr>
<tr>
<td>9 Cynoglossum lanceolatum</td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>4</td>
<td>0.007</td>
<td>0.37</td>
<td>0.007</td>
<td>0.38</td>
</tr>
<tr>
<td>10 Cynodon dactylon</td>
<td>144.43</td>
<td>50.55</td>
<td>35</td>
<td>8393</td>
<td>7.44</td>
<td>2.62</td>
<td>15.88</td>
<td>25.94</td>
</tr>
<tr>
<td>11 Cypres alutus</td>
<td>18.50</td>
<td>7.40</td>
<td>40</td>
<td>276</td>
<td>1.09</td>
<td>2.99</td>
<td>0.52</td>
<td>4.60</td>
</tr>
<tr>
<td>12 Cypres compressus</td>
<td>25.00</td>
<td>5.00</td>
<td>20</td>
<td>195</td>
<td>0.73</td>
<td>1.50</td>
<td>0.37</td>
<td>2.60</td>
</tr>
<tr>
<td>13 Cypres juncoide</td>
<td>11.50</td>
<td>1.15</td>
<td>10</td>
<td>58</td>
<td>0.17</td>
<td>1.75</td>
<td>0.11</td>
<td>1.03</td>
</tr>
</tbody>
</table>

*Table Contd.*
Contd. Table-3.18

<table>
<thead>
<tr>
<th>Name of species</th>
<th>Ab</th>
<th>D (Pl. m²)</th>
<th>F (%)</th>
<th>BA (cm²)</th>
<th>RD</th>
<th>RF</th>
<th>RDm</th>
<th>IVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. <em>Cyperus pseudokyllingioides</em></td>
<td>12.40</td>
<td>6.20</td>
<td>50</td>
<td>243</td>
<td>0.91</td>
<td>3.74</td>
<td>0.46</td>
<td>5.11</td>
</tr>
<tr>
<td>15. <em>Cyperus rotundus</em></td>
<td>20.00</td>
<td>1.00</td>
<td>5</td>
<td>37</td>
<td>0.15</td>
<td>0.37</td>
<td>0.07</td>
<td>0.59</td>
</tr>
<tr>
<td>16. <em>Desmodium triflorum</em></td>
<td>39.73</td>
<td>37.75</td>
<td>95</td>
<td>3247</td>
<td>5.55</td>
<td>7.11</td>
<td>6.14</td>
<td>18.80</td>
</tr>
<tr>
<td>17. <em>Digitaria ciliaris</em></td>
<td>20.00</td>
<td>3.00</td>
<td>15</td>
<td>256</td>
<td>0.44</td>
<td>1.12</td>
<td>0.48</td>
<td>2.04</td>
</tr>
<tr>
<td>19. <em>Eragrostis nigra</em></td>
<td>41.78</td>
<td>29.25</td>
<td>70</td>
<td>2259</td>
<td>4.30</td>
<td>5.24</td>
<td>4.27</td>
<td>13.81</td>
</tr>
<tr>
<td>20. <em>Fimbristylis acuminata</em></td>
<td>8.86</td>
<td>3.10</td>
<td>35</td>
<td>263</td>
<td>0.45</td>
<td>2.62</td>
<td>0.50</td>
<td>3.57</td>
</tr>
<tr>
<td>21. <em>Fimbristylis tetragona</em></td>
<td>6.00</td>
<td>0.30</td>
<td>5</td>
<td>27</td>
<td>0.04</td>
<td>0.37</td>
<td>0.05</td>
<td>0.46</td>
</tr>
<tr>
<td>22. <em>Hedyotis diffusa</em></td>
<td>24.40</td>
<td>18.30</td>
<td>75</td>
<td>1358</td>
<td>2.69</td>
<td>5.62</td>
<td>2.57</td>
<td>10.88</td>
</tr>
<tr>
<td>23. <em>Hydrocotyle sibthorpioides</em></td>
<td>10.63</td>
<td>5.85</td>
<td>55</td>
<td>386</td>
<td>0.86</td>
<td>4.12</td>
<td>0.73</td>
<td>5.71</td>
</tr>
<tr>
<td>24. <em>Hypericum japonicum</em></td>
<td>16.00</td>
<td>1.60</td>
<td>10</td>
<td>133</td>
<td>0.23</td>
<td>0.75</td>
<td>0.25</td>
<td>1.23</td>
</tr>
<tr>
<td>25. <em>Imperata cylindrica</em></td>
<td>253.84</td>
<td>165.00</td>
<td>65</td>
<td>9771</td>
<td>24.28</td>
<td>4.87</td>
<td>18.49</td>
<td>47.64</td>
</tr>
<tr>
<td>26. <em>Lindernia crustacea</em></td>
<td>150.00</td>
<td>15.00</td>
<td>10</td>
<td>1152</td>
<td>2.21</td>
<td>0.75</td>
<td>2.18</td>
<td>5.14</td>
</tr>
<tr>
<td>27. <em>Lindernia multiflora</em></td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>15</td>
<td>0.02</td>
<td>0.37</td>
<td>0.03</td>
<td>0.42</td>
</tr>
<tr>
<td>28. <em>Ludwigia perennis</em></td>
<td>12.00</td>
<td>1.20</td>
<td>10</td>
<td>217</td>
<td>0.17</td>
<td>0.75</td>
<td>0.41</td>
<td>1.33</td>
</tr>
<tr>
<td>29. <em>Mariscus cyperinus</em></td>
<td>31.94</td>
<td>25.55</td>
<td>80</td>
<td>1334</td>
<td>3.76</td>
<td>5.99</td>
<td>2.52</td>
<td>12.27</td>
</tr>
<tr>
<td>30. <em>Mikania micrantha</em></td>
<td>3.00</td>
<td>0.15</td>
<td>5</td>
<td>11</td>
<td>0.02</td>
<td>0.37</td>
<td>0.02</td>
<td>0.41</td>
</tr>
<tr>
<td>31. <em>Ophioglossum reticulatum</em></td>
<td>5.50</td>
<td>0.55</td>
<td>10</td>
<td>53</td>
<td>0.08</td>
<td>0.75</td>
<td>0.10</td>
<td>0.93</td>
</tr>
<tr>
<td>32. <em>Oxalis corniculata</em></td>
<td>13.00</td>
<td>1.30</td>
<td>10</td>
<td>169</td>
<td>0.19</td>
<td>0.75</td>
<td>0.32</td>
<td>1.26</td>
</tr>
<tr>
<td>33. <em>Paspalum scrobiculatum</em></td>
<td>37.50</td>
<td>22.50</td>
<td>60</td>
<td>1735</td>
<td>3.31</td>
<td>4.49</td>
<td>3.28</td>
<td>11.08</td>
</tr>
<tr>
<td>34. <em>Peperomia pellucida</em></td>
<td>13.00</td>
<td>0.65</td>
<td>5</td>
<td>69</td>
<td>0.09</td>
<td>0.37</td>
<td>0.13</td>
<td>0.59</td>
</tr>
<tr>
<td>35. <em>Phealopsis imbricata</em></td>
<td>1.00</td>
<td>0.05</td>
<td>5</td>
<td>4</td>
<td>0.007</td>
<td>0.37</td>
<td>0.007</td>
<td>0.38</td>
</tr>
<tr>
<td>36. <em>Phyllanthus urinaria</em></td>
<td>16.10</td>
<td>8.05</td>
<td>50</td>
<td>420</td>
<td>1.18</td>
<td>3.74</td>
<td>0.79</td>
<td>5.71</td>
</tr>
<tr>
<td>37. <em>Phyllanthus virgatus</em></td>
<td>1.50</td>
<td>0.15</td>
<td>10</td>
<td>13</td>
<td>0.02</td>
<td>0.75</td>
<td>0.02</td>
<td>0.79</td>
</tr>
<tr>
<td>38. <em>Rungia pectinata</em></td>
<td>102.00</td>
<td>25.50</td>
<td>25</td>
<td>2150</td>
<td>3.75</td>
<td>1.87</td>
<td>4.07</td>
<td>9.69</td>
</tr>
<tr>
<td>39. <em>Saccharum spontanum</em></td>
<td>35.13</td>
<td>26.35</td>
<td>75</td>
<td>2120</td>
<td>3.88</td>
<td>5.62</td>
<td>4.01</td>
<td>13.51</td>
</tr>
<tr>
<td>40. <em>Sacciolepis myosuroides</em></td>
<td>75.00</td>
<td>7.50</td>
<td>10</td>
<td>431</td>
<td>1.10</td>
<td>0.75</td>
<td>0.81</td>
<td>2.66</td>
</tr>
<tr>
<td>41. <em>Sida rhombifolia</em></td>
<td>16.33</td>
<td>2.45</td>
<td>15</td>
<td>260</td>
<td>0.36</td>
<td>1.12</td>
<td>0.49</td>
<td>1.97</td>
</tr>
<tr>
<td>42. <em>Sporobolus indicus</em></td>
<td>27.50</td>
<td>2.75</td>
<td>10</td>
<td>222</td>
<td>0.40</td>
<td>0.75</td>
<td>0.42</td>
<td>1.57</td>
</tr>
<tr>
<td>43. <em>Tonningia axillaris</em></td>
<td>105.36</td>
<td>73.75</td>
<td>70</td>
<td>4307</td>
<td>10.85</td>
<td>5.24</td>
<td>8.15</td>
<td>24.24</td>
</tr>
<tr>
<td>44. <em>Vernonia cinerea</em></td>
<td>35.00</td>
<td>1.75</td>
<td>5</td>
<td>189</td>
<td>0.26</td>
<td>0.37</td>
<td>0.36</td>
<td>0.99</td>
</tr>
</tbody>
</table>

Total number of individuals of all species = 13588, Total basal area cover = 52837 cm²
Total number of quadrats examined = 20, Number of occurrences of all species = 267
None of the species showed 100% frequency value at site-IV during summer-’99. *Desmodium triflorum* had the highest % frequency (95%) and relative frequency (7.11%) followed by *Mariscus cyperinus*, *Hedyotis diffusa*, *Saccharum spontaneum*, *Tonningia axillaris*, *Eragrostis nigra*, *Imperata cylindrica* etc. The minimum density (0.05 m²), % frequency (5%) and abundance (1) values were recorded for *Cynoglossum lanceolatum* and *Phaulopsis imbricata*. Raunkiaer’s frequency classes A, B, C, D and E included 23, 7, 7, 6 and 1 species, respectively (Fig-3.18). This can also be written as A>B=C>D>E. As per Raunkiaer’s ‘Law of frequency’ (i.e. A>B>C>=<D<E) this indicated that class B was not greater than class C and class E was not larger than class D. So this community was subjected to severe biotic disturbances during summer-’99.

![Figure 3.18](image)

**Fig-3.18 Number of species under Raunkiaer’s frequency classes A, B, C, D and E at site-II during summer-’99**

At site-IV, *Imperata cylindrica* contributed to the highest basal area cover during summer-’99 having relative dominance value of 18.49%. This was followed by *Cynodon dactylon* (15.88%), *Echinochloa crusgalli* (14.40%), *Tonningia axillaris* (8.15%), *Desmodium triflorum* (6.14%) etc. The IVI of all species of site-IV during summer-’99 was in the range of 0.38 - 47.64. The first five dominant species based on IVI were *Imperata cylindrica* (47.64), *Echinochloa crusgalli* (32.17), *Cynodon dactylon* (25.94), *Tonningia axillaris* (24.24) and *Desmodium triflorum* (18.80). Again, based on the least IVI (0.38), only two species viz. *Cynoglossum lanceolatum* and *Phaulopsis imbricata* were recognised as rare species at site-IV during summer-’99.
3.2.2. SIMPSON'S INDEX, SHANNON-WEINER INDEX, HILL'S DIVERSITY NUMBERS, RICHNESS AND EVENNESS INDICES, GENERIC COEFFICIENT AND MATURITY INDEX OF FOUR DIFFERENT HERBLANDS.

3.2.2.1. SITE-I

The results of Simpson's index, Shannon-Weiner index, Hills diversity numbers, Richness and Evenness indices, Generic coefficient and Maturity index of Site-I are presented in Table-3.19.

Simpson's index \( (\lambda) \) indicates concentration of dominance. Lower the value of \( \lambda \), better is the sharing of dominance by many species. The Simpson’s index \( (\lambda) \) for the site-I were 0.0678 and 0.1025 in monsoon- '97 and '98, 0.1075 and 0.1551 in winter-'98 and '99, 0.1313 and 0.1823 in summer-'98 and '99 seasons, respectively. The value of \( \lambda \) was lower in monsoon than that of winter and summer, which indicates the presence of a large number of co-dominating species in the vegetation in monsoon. It, also, shows that in monsoon, herbage dominance was shared by many species in site-I.

The Shannon-Weiner index or index of diversity \( (H') \) of herbage of site-I during monsoon-'97 and '98 seasons were more (3.008 and 2.7604, respectively) than winter-'98 and '99 (2.6330 and 2.1660, respectively) and summer-'98 and '99 (2.4117 and 2.2546, respectively) seasons. The higher value of diversity index in monsoon indicates that herbaceous community in this season was more stable than winter and summer at site-I.

Hill's diversity number \( N_0 \) indicates the number of all species, \( N_1 \) the number of abundant species and \( N_2 \) the number of very abundant species (i.e. \( N_1 \) is always be intermediate between \( N_0 \) and \( N_2 \)). Both \( N_1 \) and \( N_2 \) for site-I were more in monsoon ('97 and '98) than in winter ('98 and '99) and summer ('98 and '99) indicating more species becoming abundantly dominant during monsoon. This was also supported by Simpson's index \( (\lambda) \).

Species richness refers to as the number of species in the community. In site-I a total of 129 plant species were recorded. Season wise species richness were 72 and 63 in monsoon- '97 & '98; 47 and 32 in winter-'98 & '99 and 55 and 52 in summer-'98 & '99 seasons, respectively. Richness indices \( R_1 \) and \( R_2 \) ranged from 3.6706 to 7.2164 and 0.4038 to 0.5313, respectively. Species richness and \( R_1 \) were higher in monsoon than winter and summer seasons, suggesting that monsoon season supports the growth of more species.
Table-3.19 : Simpson’s Index, Shannon-Weiner Index, Hill's diversity numbers, Richness and Evenness Indices, Generic Coefficient and Maturity Index of Site-I.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Monsoon</th>
<th>Winter</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simpson’s Index</td>
<td>0.0678</td>
<td>0.1025</td>
<td>0.1075</td>
</tr>
<tr>
<td>Shannon-Wiener Index</td>
<td>3.0085</td>
<td>2.7604</td>
<td>2.6330</td>
</tr>
<tr>
<td>Hill’s diversity number-N0</td>
<td>72</td>
<td>63</td>
<td>47</td>
</tr>
<tr>
<td>Hill’s diversity number-N1</td>
<td>20.2468</td>
<td>15.8061</td>
<td>13.9154</td>
</tr>
<tr>
<td>Species richness</td>
<td>72</td>
<td>63</td>
<td>47</td>
</tr>
<tr>
<td>Richness Index-R1 (Margalef’s Index)</td>
<td>7.2164</td>
<td>6.4050</td>
<td>5.1310</td>
</tr>
<tr>
<td>Richness Index-R2 (Menhinick’s Index)</td>
<td>0.5258</td>
<td>0.4981</td>
<td>0.5313</td>
</tr>
<tr>
<td>Evenness Index-E1 (Pielou’s)</td>
<td>0.7033</td>
<td>0.6662</td>
<td>0.6838</td>
</tr>
<tr>
<td>Evenness Index-E2 (Sheldon’s)</td>
<td>0.2812</td>
<td>0.2508</td>
<td>0.2960</td>
</tr>
<tr>
<td>Evenness Index-E3 (Heip’s)</td>
<td>0.2710</td>
<td>0.2388</td>
<td>0.2807</td>
</tr>
<tr>
<td>Evenness Index-E4 (Hill’s)</td>
<td>0.7284</td>
<td>0.6172</td>
<td>0.6684</td>
</tr>
<tr>
<td>Evenness Index-E5 (Alatalo’s Modified Hill’s ratio)</td>
<td>0.7143</td>
<td>0.5913</td>
<td>0.6428</td>
</tr>
<tr>
<td>Generic Coefficient (%)</td>
<td>80.55</td>
<td>76.19</td>
<td>80.85</td>
</tr>
<tr>
<td>Maturity Index</td>
<td>24.44</td>
<td>30.31</td>
<td>26.17</td>
</tr>
</tbody>
</table>

Species evenness or equitability refers to how the ‘species abundances’ are distributed among different species in the vegetation. If all species in a community accounted equal number of individuals, evenness would be considered maximum. In this investigation higher values of evenness indices E1 was in monsoon- '97 (0.7033), E2 in winter-'98 (0.2960), E3 in winter-'98 (0.2807), E4 in winter-'99 (0.7391) and E5 in monsoon-'97 (0.7143) for site-I.
Phytosociology

Generic coefficient for site-I was above 80% in almost all seasons except in monsoon-'98 which indicated that the plant community had a larger number of genera as compared to the number of species (Winterringer & Vestal, 1956) in site-I.

Maturity index reflects the long accepted notion that higher the frequency percentage of each species and smaller the number of sporadic species, the more mature the plant community (Pichi-Sermolli, 1948). In this study, the community in site-I had the maturity index values ranged from 26.00 - 30.31. These values, however, were low and hence the community of site-I was far away from the climax stage of succession.

3.2.2.2. SITE-II

The results of Simpson’s Index, Shannon-Weiner Index, Hill’s diversity numbers, Richness and Evenness Indices, Generic coefficient and Maturity Index of site-II are given in Table-3.20.

The concentration of dominance or Simpson’s index ($\lambda$) for the site-II were 0.0633 and 0.1208 in monsoon-'97 & '98; 0.1651 and 0.1873 in winter-'98 & '99; 0.1715 and 0.2570 in summer-'98 & '99 seasons, respectively. The Simpson’s index was comparatively higher in summer and winter as compared to monsoon. The higher values of dominance ($\lambda$) indicated that during summer and winter seasons, herbland dominance was shared by few species.

The Shannon-Weiner index or index of diversity ($H'$) for site-II ranged from 1.8624 - 3.0965 in different seasons. It was found to be high in monsoon-'97 and '98 ($H' = 3.0965$ and 2.6639), low in summer-'98 and '99 ($H' = 2.2575$ and 1.8624) and intermediate in remaining winter-'98 and '99 seasons ($H' = 2.3855$ and 2.1800). The higher values of diversity index ($H'$) indicated that herbaceous community was more stable (suitable) in monsoon than in summer and winter at site-II.

Hill’s diversity numbers $N_1$ and $N_2$ were greatest in monsoon-'97 and '98 ($N_1= 22.1203$ and 14.3521 ; $N_2= 15.7977$ and 8.2781, respectively) than in summer-'98 and '99 ($N_1= 9.5591$ and 6.4391; $N_2= 5.8278$ and 3.8910, respectively) and winter-'98 and '99 ($N_1= 10.8644$ and 8.8463; $N_2= 6.0569$ and 5.3390, respectively) seasons at site-II. The higher values of $N_1$ and $N_2$ showed that more species were abundantly dominant during monsoon as compared to winter and summer in site-II. This was also proved by lower values of Simpson’s index ($\lambda$) and higher values of density, abundance and IVI (Table- 3.7 - 3.12).

In site-II, a total of 123 plant species were enumerated. Species richness
### Table-3.20 : Simpson’s Index, Shannon-Weiner Index, Hill’s diversity numbers, Richness and Evenness Indices, Generic Coefficient and Maturity Index of Site-II.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Season and Year</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Monsoon</td>
<td>Winter</td>
<td>Summer</td>
<td>Monsoon</td>
<td>Winter</td>
</tr>
<tr>
<td>Simpson’s Index</td>
<td></td>
<td>0.0633</td>
<td>0.1208</td>
<td>0.1651</td>
<td>0.1873</td>
<td>0.1715</td>
</tr>
<tr>
<td>Shannon-Wiener Index</td>
<td></td>
<td>3.0965</td>
<td>2.6639</td>
<td>2.3855</td>
<td>2.1800</td>
<td>2.2575</td>
</tr>
<tr>
<td>Hill’s diversity number-N0</td>
<td></td>
<td>71</td>
<td>69</td>
<td>44</td>
<td>34</td>
<td>54</td>
</tr>
<tr>
<td>Hill’s diversity number-N1</td>
<td></td>
<td>22.1203</td>
<td>14.3521</td>
<td>10.8644</td>
<td>8.8463</td>
<td>9.5591</td>
</tr>
<tr>
<td>Hill’s diversity number-N2</td>
<td></td>
<td>15.7977</td>
<td>8.2781</td>
<td>6.0569</td>
<td>5.3390</td>
<td>5.8278</td>
</tr>
<tr>
<td>Species richness</td>
<td></td>
<td>71</td>
<td>69</td>
<td>44</td>
<td>34</td>
<td>54</td>
</tr>
<tr>
<td>Richness Index-R1 (Margalef’s Index)</td>
<td></td>
<td>6.8609</td>
<td>6.9432</td>
<td>4.7591</td>
<td>3.8931</td>
<td>5.3030</td>
</tr>
<tr>
<td>Richness Index-R2 (Menhinick’s Index)</td>
<td></td>
<td>0.4323</td>
<td>0.5154</td>
<td>0.4802</td>
<td>0.4907</td>
<td>0.3648</td>
</tr>
<tr>
<td>Evenness Index E1 (Pielou’s)</td>
<td></td>
<td>0.7264</td>
<td>0.6291</td>
<td>0.6303</td>
<td>0.6182</td>
<td>0.5659</td>
</tr>
<tr>
<td>Evenness Index E2 (Sheldon’s)</td>
<td></td>
<td>0.3115</td>
<td>0.2080</td>
<td>0.2469</td>
<td>0.2601</td>
<td>0.1770</td>
</tr>
<tr>
<td>Evenness Index E3 (Heip’s)</td>
<td></td>
<td>0.3017</td>
<td>0.1963</td>
<td>0.2294</td>
<td>0.2377</td>
<td>0.1614</td>
</tr>
<tr>
<td>Evenness Index E4 (Hill’s)</td>
<td></td>
<td>0.7141</td>
<td>0.5767</td>
<td>0.5574</td>
<td>0.6035</td>
<td>0.6096</td>
</tr>
<tr>
<td>Evenness Index E5 (Alatalo’s Modified Hill’s ratio)</td>
<td></td>
<td>0.7006</td>
<td>0.5450</td>
<td>0.5126</td>
<td>0.5529</td>
<td>0.5640</td>
</tr>
<tr>
<td>Generic Coefficient (%)</td>
<td></td>
<td>81.69</td>
<td>73.91</td>
<td>88.63</td>
<td>85.29</td>
<td>77.77</td>
</tr>
<tr>
<td>Maturity Index</td>
<td></td>
<td>25.77</td>
<td>29.63</td>
<td>28.41</td>
<td>28.38</td>
<td>29.16</td>
</tr>
</tbody>
</table>

Richness indices R1 and R2 ranged from 3.8931 - 6.9432 and 0.3648 - 0.5154, respectively, in different seasons. Species richness and R1 values were higher in monsoon than summer and winter, suggesting that monsoon supports the growth of a variety of herbaceous species (annualy). Evenness indices E1, E2, E3, E4 and E5 ranged from 0.4530 - 0.7264, 0.1055 - 0.3115, 0.0906 - 0.3017, 0.5574 - 0.7141 and 0.5126 - 0.7006, respectively, in site-II. All evenness
indices were higher in monsoon-'97 at site-II.

The generic coefficient for site-II ranged from 73.91 - 88.63. It was above 80% in almost all seasons except summer-'97 (77.77 %) and monsoon-'98 (73.91%). This indicated that plant community had larger number of genera as compared to the number of species in site-II.

In the present investigation, it was also observed that the herbland community of site-II had the maturity index ranged from 23.28 - 29.63 in different seasons. Ecologically, it thus, was low and hence the community was far away from the climax stage of succession.

3.2.2.3. SITE-III

Simpson’s Index, Shannon-Weiner Index, Hill’s diversity numbers, Richness and Evenness Indices, Generic coefficient and Maturity Index of Site-III are presented in Table-3.21.

A perusal of Table-3.21 shows that Simpson’s Index ($\lambda$) or the concentration of dominance for site-III was 0.0755 in monsoon-'98, 0.0960 in winter-'99 and 0.1664 in summer-'99 seasons. It varied marginally between monsoon and winter and was comparatively much less than that of summer. The lower value of dominance ($\lambda$) inferred that in monsoon and winter, herbage dominance was shared by many species.

The index of diversity or Shannon-Weiner index ($H'$) were 2.9646, 2.8118 and 2.4630 in monsoon-'98, winter-'99 and summer-'99 seasons, respectively for site-III. The value of diversity index ($H'$), in general followed the opposite trend of concentration of dominance ($\lambda$) in each season.

Hill’s diversity numbers $N_1$ and $N_2$ were found to be highest in monsoon ($N_1=19.3869$ and $N_2=13.2450$), least in summer ($N_1=11.7399$ and $N_2=6.009$) and intermediate in winter ($N_1=16.6398$ and $N_2=10.4166$). It was, therefore, indicated that in monsoon season much more species and in winter season more species were abundantly dominant at site-III. This was also supported by Simpson’s index ($\lambda$).

In site-III a total of 98 plant species were recorded in three seasons. Species richness were 63, 46 and 55 in monsoon, winter and summer season, respectively. Richness index $R_1$ ranged from 5.1052 - 6.5494 and $R_2$ ranged from 0.4092 - 0.5606. Evenness indices $E_1$, $E_2$, $E_3$, $E_4$ and $E_5$ ranged from 0.6146 - 0.7344, 0.2134 - 0.3617, 0.1988 - 0.3475, 0.5118 - 0.6831 and 0.4663 - 0.6659, respectively. Higher values of evenness indices i.e. $E_1$ (0.7344), $E_2$ (0.3617) and $E_3$ (0.3475) were observed in winter-'99 and $E_4$ (0.6831) and $E_5$ (0.6659) were noted for monsoon- '98 in site-III.
Table-3.21: Simpson’s Index, Shannon-Weiner Index, Hill’s diversity numbers, Richness and Evenness Indices, Generic Coefficient and Maturity Index of Site-III.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Simpson’s Index</td>
<td>0.0755</td>
<td>0.0960</td>
<td>0.1664</td>
</tr>
<tr>
<td>Shannon-Wiener Index</td>
<td>2.9646</td>
<td>2.8118</td>
<td>2.4630</td>
</tr>
<tr>
<td>Hill’s diversity number-N0</td>
<td>63</td>
<td>46</td>
<td>55</td>
</tr>
<tr>
<td>Hill’s diversity number-N1</td>
<td>19.3869</td>
<td>16.6398</td>
<td>11.7399</td>
</tr>
<tr>
<td>Hill’s diversity number-N2</td>
<td>13.2450</td>
<td>10.4166</td>
<td>6.009</td>
</tr>
<tr>
<td>Species richness</td>
<td>63</td>
<td>46</td>
<td>55</td>
</tr>
<tr>
<td>Richness Index-R1 (Margalef’s Index)</td>
<td>6.5494</td>
<td>5.1052</td>
<td>5.5093</td>
</tr>
<tr>
<td>Richness Index-R2 (Menhinick’s Index)</td>
<td>0.5542</td>
<td>0.5606</td>
<td>0.4092</td>
</tr>
<tr>
<td>Evenness Index E1 (Pielou’s)</td>
<td>0.7155</td>
<td>0.7344</td>
<td>0.6146</td>
</tr>
<tr>
<td>Evenness Index E2 (Sheldon’s)</td>
<td>0.3077</td>
<td>0.3617</td>
<td>0.2134</td>
</tr>
<tr>
<td>Evenness Index E3 (Heip’s)</td>
<td>0.2965</td>
<td>0.3475</td>
<td>0.1988</td>
</tr>
<tr>
<td>Evenness Index E4 (Hill’s)</td>
<td>0.6831</td>
<td>0.6260</td>
<td>0.5118</td>
</tr>
<tr>
<td>Evenness Index E5 (Alatalo’s Modified Hill’s ratio)</td>
<td>0.6659</td>
<td>0.6020</td>
<td>0.4663</td>
</tr>
<tr>
<td>Generic Coefficient (%)</td>
<td>74.60</td>
<td>86.95</td>
<td>80.00</td>
</tr>
<tr>
<td>Maturity Index</td>
<td>23.49</td>
<td>23.69</td>
<td>24.72</td>
</tr>
</tbody>
</table>

At site-III, the generic coefficient were 74.60, 86.95 and 80.00 in monsoon-’98, winter-’99 and summer-’99 seasons, respectively. These values were nearly 80 % which indicated that this community had a large number of genera compared to the number of species.

The maturity index value for site-III ranged from 23.49 - 24.72 in different seasons. The range was very narrow. Moreover, these values were low, indicating the vegetation was far away from the climax stage of succession.
3.2.2.4. SITE-IV

The results of Simpson’s Index, Shannon-Weiner Index, Hill’s diversity numbers, Richness and Evenness Indices, Generic coefficient and Maturity Index of site-IV are given in Table-3.22.

Results indicate that the index of dominance or Simpson’s index \( (\lambda) \) of site-IV were 0.0357, 0.1571 and 0.1077 during monsoon-'98, winter-'99 and summer-'99 seasons, respectively. There was nearly a four-fold difference between the highest and lowest values of the concentration of dominance \( (\lambda) \). The least value was

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Season and Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simpson’s Index</td>
<td>0.0357</td>
</tr>
<tr>
<td>Shannon-Wiener Index</td>
<td>3.6345</td>
</tr>
<tr>
<td>Hill’s diversity number-N0</td>
<td>72</td>
</tr>
<tr>
<td>Hill’s diversity number-N1</td>
<td>37.8829</td>
</tr>
<tr>
<td>Hill’s diversity number-N2</td>
<td>28.0112</td>
</tr>
<tr>
<td>Species richness</td>
<td>72</td>
</tr>
<tr>
<td>Richness Index-R1 (Margalef's Index)</td>
<td>7.9264</td>
</tr>
<tr>
<td>Richness Index-R2 (Menhinick's Index)</td>
<td>0.8170</td>
</tr>
<tr>
<td>Evenness Index-E1 (Pielou's)</td>
<td>0.8498</td>
</tr>
<tr>
<td>Evenness Index-E2 (Sheldon’s)</td>
<td>0.5261</td>
</tr>
<tr>
<td>Evenness Index-E3 (Heip’s)</td>
<td>0.5194</td>
</tr>
<tr>
<td>Evenness Index-E4 (Hill’s)</td>
<td>0.7394</td>
</tr>
<tr>
<td>Evenness Index-E5 (Alatalo's Modified Hill's ratio)</td>
<td>0.7323</td>
</tr>
<tr>
<td>Generic Coefficient (%)</td>
<td>70.83</td>
</tr>
<tr>
<td>Maturity Index</td>
<td>26.11</td>
</tr>
</tbody>
</table>
calculated for monsoon and it thus, inferred that in this season much more species sharing the dominance in the community at site-IV.

The Shannon-Weiner index or index of diversity (H) was found to be more in monsoon (3.6345), less in winter-'99 (2.4896) and intermediate in summer-'99 (2.7068) seasons. The index of diversity (H) exhibited a negative relationship with the index of dominance (\( \lambda \)).

Hill's diversity numbers N1 and N2 of different seasons ranged from 12.0564 - 37.8829 and 6.3653 - 28.0112, respectively. Both values of N1 and N2 were much more in monsoon than in winter and summer. It, thus, emerged that much more species becoming abundantly/ very abundantly dominant in monsoon. This was also proved by Simpson's index (\( \lambda \)).

In site-IV, a total of 99 plant species were enumerated in different seasons, Season-wise species richness were 72 in monsoon-'98, 39 in winter-'99 and 44 in summer-'99. Richness index R1 ranged from 4.3693 - 7.9264 and R2 ranged from 0.3774 - 0.8170 in different seasons. Both indices were found to be high in monsoon. Evenness indices E1, E2, E3, E4 and E5 ranged from 0.6795 - 0.8498, 0.3091 - 0.5261, 0.2909 - 0.5194, 0.5279 - 0.7394 and 0.4852 - 0.7323, respectively. All the evenness indices were found to be high during monsoon in site-IV.

The generic coefficient in monsoon-'98, winter-'99 and summer-'99 were 70.83 %, 89.74 % and 84.09 %, respectively, at site-IV. These values showed that the plant community had more number of genera as compared to species during winter and summer than in monsoon.

The maturity index reflects the long accepted notion of the plant community. The values of maturity index of site-IV were 26.11, 28.33 and 30.34 in monsoon-'98, winter-'99 and summer-'99 seasons, respectively. Ecologically, these values were low and thus the community was considered to be at the disclimax or preclimax stage which was far away from the climax stage of succession.

### 3.2.3. SIMILARITY INDEX AND DISSIMILARITY INDEX

The results of Similarity matrix (Sorenson coefficient) and Dissimilarity matrix of four herblands vegetation are presented in Table-3.23. Results indicate that in almost all seasons the index of similarity (SI) was low between any two communities, except between sites-I and II which showed high degree of similarity coefficient of 0.6969 (Dissimilarity Index (DI) = 0.3031) in monsoon-'98, which increased to S1 = 0.7256 (D1 = 0.2744) in the summer-'99 and again decreased to
Table-3.23 : Similarity matrix (Sorenson coefficient) and Dissimilarity matrix of herblands vegetation of the four sites in different seasons.

<table>
<thead>
<tr>
<th>Season</th>
<th>Similarity matrix</th>
<th>Dissimilarity matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Site I</td>
<td>II</td>
</tr>
<tr>
<td>Monsoon 1998</td>
<td>I 1.0000</td>
<td>0.6969</td>
</tr>
<tr>
<td></td>
<td>II 1.0000</td>
<td>0.3484</td>
</tr>
<tr>
<td></td>
<td>III 1.0000</td>
<td>0.5037</td>
</tr>
<tr>
<td></td>
<td>IV 1.0000</td>
<td>0.5037</td>
</tr>
<tr>
<td>Winter 1999</td>
<td>I 1.0000</td>
<td>0.6363</td>
</tr>
<tr>
<td></td>
<td>II 1.0000</td>
<td>0.4250</td>
</tr>
<tr>
<td></td>
<td>III 1.0000</td>
<td>0.4705</td>
</tr>
<tr>
<td></td>
<td>IV 1.0000</td>
<td>0.4705</td>
</tr>
<tr>
<td>Summer 1999</td>
<td>I 1.0000</td>
<td>0.7256</td>
</tr>
<tr>
<td></td>
<td>II 1.0000</td>
<td>0.4482</td>
</tr>
<tr>
<td></td>
<td>III 1.0000</td>
<td>0.5252</td>
</tr>
<tr>
<td></td>
<td>IV 1.0000</td>
<td>0.5252</td>
</tr>
</tbody>
</table>

SI = 0.6363 (D1 = 0.3637) in the winter-'99.

The maximum dissimilarity was found between site-II and site-III in monsoon-'98, (D1 = 0.6516, S1 = 0.3484), between site-II and site-IV in winter-'99 (D1 = 0.7261, S1 = 0.2739) and between site-I and site-IV in summer-'99 (D1 = 0.6459, S1 = 0.3541). Besides, the coefficient of similarity were intermediary between site-III and IV in monsoon- '98 (S1 = 0.5037), in summer- '99 (S1 = 0.5252) and in winter- '99 (S1 = 0.4705) seasons and between site-I and III in summer- '99 (S1 = 0.5046) season. Moreover, similarity index between site-II and IV decreased more in the winter- '99 (S1 = 0.2739) as compared to monsoon- '98 (S1 = 0.3687) and summer- '99 (S1 = 0.3619) seasons.

The index of similarity of vegetations in the whole year (all the three seasons unitedly) between the sites showed that site-I and II also exhibited to be the most similar (S1 = 0.7234) vegetation. (Table-3.24). The least similarity was observed between site-I and IV (S1 = 0.3979), while the others treated as with intermediary similarities.
Table-24 : Similarity index and Dissimilarity index of the vegetation of four sites during the year 1998-1999.

<table>
<thead>
<tr>
<th>Site</th>
<th>Similarity matrix</th>
<th>Dissimilarity matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I</td>
<td>II</td>
</tr>
<tr>
<td>I</td>
<td>1.0000</td>
<td>0.7234</td>
</tr>
<tr>
<td>II</td>
<td>1.0000</td>
<td>0.4948</td>
</tr>
<tr>
<td>III</td>
<td>1.0000</td>
<td>0.5583</td>
</tr>
<tr>
<td>IV</td>
<td>1.0000</td>
<td></td>
</tr>
</tbody>
</table>

However, annual variation of similarity index of the same season in the same community (site-I and II) were understandable (Table-3.25). In site-I, the maximum index of similarity was $S1=0.6074$ in monsoon between 1997 and 1998. The lowest degree of similarity for site-I was recorded between 1998 and 1999 in summer ($S1=0.5794$). In site-II, the maximum ($S1=0.6923$) and minimum ($S1=0.6000$) index of similarity were recorded between 1998 and 1999 in winter and between 1997 and 1998 in monsoon, respectively.

Table-3.25 : Similarity index and Dissimilarity index of the same season in different years for Site-I and II.

<table>
<thead>
<tr>
<th>Season</th>
<th>Compared year</th>
<th>Site-I</th>
<th>Site-II</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Similarity Index</td>
<td>Dissimilarity Index</td>
<td>Similarity Index</td>
</tr>
<tr>
<td>Monsoon</td>
<td>1997 and 1998</td>
<td>0.6074</td>
<td>0.3926</td>
</tr>
<tr>
<td>Winter</td>
<td>1998 and 1999</td>
<td>0.5822</td>
<td>0.4178</td>
</tr>
<tr>
<td>Summer</td>
<td>1998 and 1999</td>
<td>0.5794</td>
<td>0.4206</td>
</tr>
</tbody>
</table>

3.2.4. TAXONOMIC REPRESENTATION OF PLANTS

A total of 227 species were recorded in all the four sites. Out of these species, 132 were of dicotyledonous and 90 were of monocotyledonous. The remaining 5 species were pteridophytes. The enumerated angiospermic species fell within 141 genera and 44 families (Table-3.26). The ratio between dicotyledonous and monocotyledous families were $6.33 : 1.00$. Taxonomically well-represented families
Table-3.26: Family-wise contribution of plants to genera and species of four sites.

<table>
<thead>
<tr>
<th>Family</th>
<th>Genera</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Acanthaceae</em></td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><em>Amaranthaceae</em></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><em>Apocynaceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Asclepiadaceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Boraginaceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Caesalpiniaeae</em></td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td><em>Caryophyllaceae</em></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><em>Cleomaceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Compositae (Asteraceae)</em></td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td><em>Convolvulaceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Cucurbitaceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Droseraceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Euphorbiaceae</em></td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td><em>Gentianaceae</em></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><em>Hypericaceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Labiatae</em></td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td><em>Lobeliaceae</em></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><em>Loganiaceae</em></td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td><em>Lythraceae</em></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><em>Malvaceae</em></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><em>Melastomataceae</em></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><em>Menispermaceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Mimosaceae</em></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><em>Molluginaceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Oniagraceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Oxalidaceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Papilionaceae</em></td>
<td>7</td>
<td>14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Family</th>
<th>Genera</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Piperaceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Polygalaceae</em></td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td><em>Polygonaceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Rubiaceae</em></td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td><em>Scrophulariaceae</em></td>
<td>6</td>
<td>21</td>
</tr>
<tr>
<td><em>Solanaceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Sterculiaceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Tiliaceae</em></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><em>Umbelliferae</em></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><em>Urticaceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Verbenaceae</em></td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Family</th>
<th>Genera</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Commelinaceae</em></td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td><em>Cyperaceae</em></td>
<td>7</td>
<td>25</td>
</tr>
<tr>
<td><em>Costaceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Hypoxidaceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Poaceae (Gramineae)</em></td>
<td>37</td>
<td>54</td>
</tr>
<tr>
<td><em>Xyridaceae</em></td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Family</th>
<th>Genera</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Dryopteridaceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Opioglossaceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Parkeriaceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Schizaceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><em>Selaginellaceae</em></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>146</td>
<td>227</td>
</tr>
</tbody>
</table>

include Poaceae (with 53 species), Cyperaceae (25), Scrophulariaceae (21), Compositae (17), Papilionaceae (14) and Rubiaceae (9). Nearly 46% (20 families) of these families were represented by single species. Poaceae was the most speciose
and individualized family. Based on the density, monocots were abundant and dominated the vegetation in all sites. The 5 species of pteridophytes belonged to 5 separate families of which Selaginellaceae was ranked as abundant and dominant and was found to occur in all the four sites.

Plants recorded from four sites of herblands are enumerated below along with their proper author citation and protologue references. All the families, genera under the families and species under each genus are presented here in alphabetical order.

DICOTYLEDONS

ACANTHACEAE


*Rungia pectinata* (L.) Nees in DC., Prodr. 11:470, 1841

AMARANTHACEAE

*Achyranthes porphyristachya* Wall. ex moquin in DC., Prodr. 13(2):316. 1849.

*Alternanthera sessilis* (L.) R. Br. ex DC in Cat. Hort. Monsp. 77. 1813.

*Amaranthus viridis* L., Sp. Pl. 2:1405. 1763


APOCYNACEAE


ASCLEPIADACEAE


BORAGINACEAE

*Cynoglossum lanceolatum* Forssk., Fl. Aegyp. Arab. 41. 1775.

CAESALPINIACEAE


CARYOPHYLLACEAE

*Drymaria cordata* (L.) Willd. ex R & S. Syst. Veg. 5:406, 1819.

*Stellaria media* (L.) Villars var *procera* Klett & Richter, Fl. Leipz. 382. 1830.

CLEOMACEAE

*Cleome rutidosperma* D C., Prodr. 1:241. 1824.
COMPOSITAE (ASTERACEAE)


Blumea lacera (Burm. f.) DC. in Wight, Contrib. Bot. India 14, 1834.


Crassocephalum crepidioides (Benth.) Moore in J. Bot. 1912:211, 1912.


Emilia sonchifolia (L.) D. C. in Wt., Contrib. India Bot. 24. 1834.


Grangea maderaspatana (Linn.) Poir. in Lam. Encycl. Suppl. 2:825. 1811.


Vernonia cinerea (L.) Less. in Linnae 4:291: 1829.

Xanthium indicum Koen. ex Roxb., Fl. India 3:601. 1832.

Youngia japonica (L.) D C. Prodr. 7:194, 1838.

CONVOLVULACEAE


CUCURBITACEAE


DROSERACEAE


EUPHORBIACEAE


GENTIANACEAE

Exacum tetragonum Roxb., Fl. Ind. 1:413, 1820.
**Phytosociology**


**HYPERICACEAE**


**LABIATAE**


*Hyptis suaveoleus* Poit. in Ann. Mus. Rar. 7:472, t. 29. f. 2. 1806.


*Plectranthus rugosus* Wall. ex Benth. in Pl. Ast. Rar. 2:17. 1831.


**LOBELIACEAE**


*Lobelia heyneana* Roem. & Schultes, Syst. Veg. 5:50. 1819.

**LOGANIACEAE**


**LYTHRACEAE**

*Ammannia cordata* W. & A., Prodr. 1:304. 1834.


**MALVACEAE**

*Sida acuta* Burm. f. Fl. Ind. 147. 1768.


*Urena lobata* L. var. glauca (Bl.) Borssum 14:144, 1966.

**MELASTOMATACEAE**


*Osbeckia nepalensis* Hooker, Exot. Fl. 1: t. 31. 1822.

**MENISPERMACEAE**


**MIMOSACEAE**


**MOLLUGINACEAE**

**Phytosociology**

**ONAGRACEAE**


**OXALIDACEAE**


**PAPILIONACEAE**

(FABACEAE)

*Atylosia scarabaeoides* (L.) Benth., FPM 1(2):369. 1918.


*Crotalaria ferruginea* Grah. ex Benth. in Hooker’s Lond. J. Bot. 2:476, 570.


*Crotalaria pallida* Ait., Hort. kew. 3:20. 1789.

*Crotalaria prostrata* Rottl. in Willd., Enum. 747. 1809.

*Desmodium heterophyllum* (Willd.) D C. Prodr. 2:334. 1825.


*Desmodium triflorum* (L.) D C., Prodr. 2:334. 1825.


*Smithia conferta* J. E. Smith in Rees. Cyl. 33: no. 2. 1816.

**Zornia gibbosa** Span. in Linnaca 15:192, 1841.

**PIPERACEAE**

*Piper elongatum* L., Sp. PI. 1:119, 1753.

**OXALIDACEAE**

*Peperomia pellucida* (L.) H. B. K., Nov. Gen. 1:64. 1815.

**POLYGALACEAE**


*Salomonia ciliata* (L.) D C: Prodr. 1: 334 1824.

**POLYGONACEAE**


**RUBIACEAE**

*Borreria alata* (Aubl.) D C., Prodr. 4. 544. 1830.

*Borreria ocymoides* (Burm. f.) D C. Prodr. 4:544. 1830.


*Hedyotis corymbosa* (L.) Lamk., Tab. Ency. 1:272, 1791.


*Hedyotis herbacea* L. Sp. Pl. 102, 1753.
**Hedyotis pinifolia** Wall. (Cat. 25, n. 1829, nom. nud.) ex G. Don, Gen. Syst. 3:526. 1834.

**Mitracarpus verticillatus** (Schum. et Jhönn), Vatke in Linnaea 40:196. 1876.


**SCROPHULARIACEAE**

**Centranthera grandiflora** Benth., Scroph. Ind. 50. 1835.

**Centranthera indica** (L.) Gamble, F P M 971, 1924.

**Centranthera nepalensis** D. Don. Prodr. 88:1825.


**Limnophila aromatica** (Lamk.) Merrill, Inter pr. Rumph. Herb. Amb. 466. 1917.

**Limnophila heterophylla** (Roxb.) Benth., Scroph. Ind. 25. 1835.

**Limnophila micrantha** Benth. in D C., Prodr. 10:387.

**Lindernia ciliata** (Colsm.) Pennell in Brittonia 2:182, 1936.

**Lindernia cordifolia** (Colsm.) Merrill, Enum, Philipp. Fl. Pl. 3:437. 1923.

**Lindernia crustacea** (L.) F. Muell. Cens. Austral, Pl. 97. 1882.

**Lindernia diffusa** Wettst. in Engl. & Pratl. Natural Pflanzenfam. iv. 36 (1891) 73.

**Lindernia hirsuta** Wettst. in Engl. & Pratl. Natural Pflanzenfam. iv. 36 (1891) 73.

**Lindernia hookeri** (Cl.) Wettst. in Pflamilien. IV-36:80. 1891.

**Lindernia multiflora** (Roxb.) Mukerjee in JIBS 24:131. 1945.

**Lindernia parviflora** (Roxb.) Haines, Bot. Bihar & Orissa 635, 1922.

**Lindernia pyxidaria** L., Mant. Pl. 2:252. 1771.

**Lindernia Sp.**

**Mazus pumilus** (Burm. f.) Steenis in Nova Guinea n. sect. 9:31. 1958.

**Microcarpaea minima** (Koenig) Merril in Philip J. Sci. 7:100. 1912.

**Solanaceae**


**Sterculiaceae**

**Melochia corchorifolia** L., Sp. Pl. 675. 1753.

**Tiliaceae**


**Umbelliferae**

**Centella asiatica** (L.) Urban in Martius Fl. Brasil. 11:287. t, 78. f. 1. 1879.
**Phytosociology**

**Hydrocotyle sibthorpioides** Lamk., Ency. 3:153. 1789.

**URTICACEAE**


**VERBENACEAE**

*Clerodendrum serratum* (L.) Moon, Cat. Ceylon Pl. 46. 1824.


**MONOCOTYLEDONS**

**COMMELINACEAE**

*Commelina diffusa* Burm. f. Fl. Ind. 18. 1768.

*Cyanotis nudiflora*

*Cyanotis vagia* (Lour.) J. A. & J. H. Schultes, Syst. Veg. 2; 1153. 1830.


**Cyperaceae**


*Bulbostylis densa* (Wall.) Hand-Mazz. in Karsten & Schenk, Vegetation sb. 20 (7): 16, 1930.

*Carex indica* L., Mant. Alt. 2:574. 1771.

*Cyperus alulatus* Kern in Reinwardtia 1:463, 1952.


*Cyperus compressus* L., Sp. Pl. 46. 1753, emend. Dandy in Exell, Cat. S. Tome 357. 1944.

*Cyperus cyperoides* (L.) Kuntze, Rev. Gen Pl. 3(2):333, 1898.


*Cyperus juncoides* (Lam.) Kueken. in Feddes Report. 23:184, 1926.


*Cyperus laxus* Lam., 111. 1:146. 1791. emend Poir. in Lam., Encycl. 7:260. 1806.


*Cyperus iria* L., Sp. Pl. 45, 1753.

*Fimbriaria* sp.
Phytosociology


Fimbristylis aestivalis (Retz.) Vahl, Enum. Pl. 2:288. 1806.

Fimbristylis dichotoma (L.) Vahl, Enum. 2: 287, 1806.

Fimbristylis griffithii Boeck. in Flora 43:241, 1860.

Fimbristylis ovata (Burm. f.) Kern, in Blumea 15:126. 1967.


Fimbristylis umbellaris (Lam.) Vahl. Enum. Pl. 2: 291. 1806


COSTACEAE
(ZINGIBERACEAE)

Costus speciosus (Koenig) Sm. in Trans. Linn. Soc. 1:249, 1800.

HYPOXIDACEAE


POACEAE
(GRAMINEAE)


Andropogon ascinodis C. B. Cl. in J. Linn. Soc. 25: 87, t. 36. 1889.


Chloris barbata Swartz. Fl. Ind. Occ. 1:200, 1797.


Chloris dolichostachya Lagasca, Gen. & Sp. Pl. 5. 1816.

Chrysopogon aciculatus (Retz.) Trin., Fund. Agrost. 188. 1822.


Cymbopogon pendulus (Nees ex Steud.) Wats in Atkins., Gaz. N.W. Prov. Ind. 392. 1882.


Digitaria ciliaris (Retz.) Koel., Descr. Gram. 27. 1802.
Digitaria griffithii (Hook. f.) Henr. in Blumea 1:100. 1934.


Eragrostis viscosa (Retz.) Trin. in Mem. Acad. Sci. Petersb. 6, 1:397, 1830.


Eriocaulon quinquangulare L., Sp. Pl. 87. 1753.


Isolepis setacea (L.) R. Br., Prodr. 222. 1810.

Mnesithea laevis (Retz.) Kunth, Rev. Gram. 1:154. 1829.


Panicum L. sp.

Paspalidium flavidum (Retz.) A. Camus in Lecomte, Fl. Gen. de l Indo-Chine 7:419. 1922.


Paspalum scrobiculatum L., Mant. Pl. 1:29. 1767.


Saccharum spontaneum L., Mant. Alt. 2:183. 1771.


**Setaria geniculata** (Lam.) P. Beauv., Ess. Agrost. 51, 169. 178. 1812.

**Setaria pumila** (Poir.) R & S. Syst. Veg. 2:891, 1817.

**Sporobolus diander** (Retz.) P. Beauv., Agrost. 26. 1812.


**Tripogon** sp.


**XYRIDACEAE**

**Xyris indica** L., Sp. Pl. 1:42, 1753.

**Selaginellaceae**

**Selaginella sp.**

---

**Pteridophyte**

**Dryopteridaceae**

**Dryopteris filix-mas**

**Ophioglossaceae**

**Ophioglossum reticulatum** Linn.; F.I.C. 465.

**Parkeriaceae**

**Ceratopteris thalictroides** (L.) Brongn., Bull. Soc. Philom. 186. 1821.

**Sclerophyllaceae**

**Lygodium flexuosum** (L.) S W. F.I.C. 457.

**3.2.5 Interspecific Association between *Streptocaulon sylvestre* Wight and its Associate Species**

Species association are of central importance in the ecology of a species. The measurement of association helps in understanding the ecology and spatial distribution pattern of one species with respect to other species in the community. Within any given community, there are a number of biotic and abiotic factors that influence the distribution, abundance and subsequently, the interactions of species. Depending on whether or not two species select or avoid the same habitat, have some mutual attraction or repulsion, or have no interaction whatsoever, a certain pattern of *interspecific association* results (Ludwig & Reynolds, 1988). This association may be positive, negative or absent.

The study of species association involves two distinct components. The first is a statistical test of the hypothesis that two species are associated or not at some
predetermined probability level. The second is a measure of the degree or strength of the association.

There are many indices that have been used to measure the degree of association between pairs of species. Janson & Vegelius (1981) and Hubalek (1982) recommended three indices—the Jaccard (1908), Dice (1945) and Ochiai (1957) to measure the degree of association between pairs of species. These indices are equal to ‘0’ at “no association” and ‘1’ at “maximum association”. Goodall (1973) observed that Jaccard’s index was found to be generally unbiased, even at small sample units (sample units=10) and Dice index tended to underestimate the true population values at small samples, but performed well at 20 sample units.

The trend in association will normally vary with the size of sample units. There has been considerable discussion on the size and spacing of sample units used for the detection of association between species. Many workers used quadrats of different sizes depending on the type of community. McIntosh (1962) used 1 x 1 m quadrats while determining the association of a herbaceous hardwood stand. Similar (i.e. 1 x 1m) quadrats were also used by Das & Lahiri (1997) for sampling a high altitude grassland vegetation. Mall & Das (1973) used 10 x 10 cm quadrats for the study of association of species in a grassland community. Smith & Cottam (1967) used 1 x 1 ft. quadrats for the association analysis of the herbaceous species in mesic forest.

In the present investigation, the association analysis was made for *Streptocaulon sylvestre* Wight with respect to other species in its natural herbland community (Site-I and Site-II) from the presence and absence data of each 20 quadrats in summer, monsoon and winter seasons for two years (1997-1998-1999). 1 x 1 m quadrats were also used for this study and this size was found to be large enough to include most of the species of the community. The chi-square test was made for test of association and the Ochiai, Dice and Jaccard indices were used for measuring the degree of association. The details of interspecific association indices and test statistics between *Streptocaulon sylvestre* and other species in site-I and II are given in Tables-3.27 to 3.38.

### 3.2.5.1. SITE-I

#### 3.2.5.1.1. SITE-I : MONSOON SEASON

The floristic analysis of site-I revealed the presence of altogether 72 species during monsoon-'97 of which 49 species occurred in at least one quadrat with *Streptocaulon sylvestre* and the rest 22 species were never found together with
Table-3.27 : Interspecific association indices, association types and chi-square test statistics between *Streptocaulon sylvestre* and its associate species in Site-I during Monsoon 1997.

<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chi-square</th>
<th>Association Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ochiai</td>
</tr>
<tr>
<td>1. <em>S. sylvestre &amp; Ageratum conyzoides</em></td>
<td>-</td>
<td>0.067</td>
<td>0.298</td>
</tr>
<tr>
<td>2. &quot; &amp; <em>Ageratum houstonianum</em></td>
<td>-</td>
<td>0.861</td>
<td>0.000</td>
</tr>
<tr>
<td>3. &quot; &amp; <em>Amaranthus viridis</em></td>
<td>+</td>
<td>1.286</td>
<td>0.333</td>
</tr>
<tr>
<td>4. &quot; &amp; <em>Atylosia scarabaeoides</em></td>
<td>-</td>
<td>1.818</td>
<td>0.000</td>
</tr>
<tr>
<td>5. &quot; &amp; <em>Borreria alata</em></td>
<td>+</td>
<td>0.194</td>
<td>0.646</td>
</tr>
<tr>
<td>6. &quot; &amp; <em>Brachiaria reptans</em></td>
<td>+</td>
<td>1.286</td>
<td>0.333</td>
</tr>
<tr>
<td>7. &quot; &amp; <em>Carex indica</em></td>
<td>+</td>
<td>3.430</td>
<td>0.703</td>
</tr>
<tr>
<td>8. &quot; &amp; <em>Cassia mimosoides</em></td>
<td>+</td>
<td>1.286</td>
<td>0.333</td>
</tr>
<tr>
<td>9. &quot; &amp; <em>Centranthera grandiflora</em></td>
<td>+</td>
<td>2.716</td>
<td>0.471</td>
</tr>
<tr>
<td>10. &quot; &amp; <em>Centranthera tranquebarica</em></td>
<td>+</td>
<td>1.286</td>
<td>0.333</td>
</tr>
<tr>
<td>11. &quot; &amp; <em>Chromolaena odorata</em></td>
<td>-</td>
<td>0.861</td>
<td>0.000</td>
</tr>
<tr>
<td>12. &quot; &amp; <em>Chrysopogon aciculatus</em></td>
<td>+</td>
<td>0.022</td>
<td>0.471</td>
</tr>
<tr>
<td>13. &quot; &amp; <em>Clerodendrum viscosum</em></td>
<td>-</td>
<td>0.861</td>
<td>0.000</td>
</tr>
<tr>
<td>14. &quot; &amp; <em>Costus speciosus</em></td>
<td>-</td>
<td>0.861</td>
<td>0.000</td>
</tr>
<tr>
<td>15. &quot; &amp; <em>Crotalaria alata</em></td>
<td>-</td>
<td>0.861</td>
<td>0.000</td>
</tr>
<tr>
<td>16. &quot; &amp; <em>Crotalaria ferruginea</em></td>
<td>+</td>
<td>1.286</td>
<td>0.333</td>
</tr>
<tr>
<td>17. &quot; &amp; <em>Crotalaria pallida</em></td>
<td>+</td>
<td>1.286</td>
<td>0.333</td>
</tr>
<tr>
<td>18. &quot; &amp; <em>Crotalaria prostrata</em></td>
<td>+</td>
<td>4.104*</td>
<td>0.739</td>
</tr>
<tr>
<td>19. &quot; &amp; <em>Cyanotis nudiflora</em></td>
<td>-</td>
<td>0.899</td>
<td>0.333</td>
</tr>
<tr>
<td>20. &quot; &amp; <em>Cymbopogon microtheca</em></td>
<td>+</td>
<td>4.313*</td>
<td>0.577</td>
</tr>
<tr>
<td>21. &quot; &amp; <em>Cymbopogon pendulus</em></td>
<td>+</td>
<td>0.194</td>
<td>0.646</td>
</tr>
<tr>
<td>22. &quot; &amp; <em>Cynodon dactylon</em></td>
<td>-</td>
<td>0.861</td>
<td>0.000</td>
</tr>
<tr>
<td>23. &quot; &amp; <em>Desmodium heterophyllum</em></td>
<td>-</td>
<td>1.818</td>
<td>0.000</td>
</tr>
<tr>
<td>24. &quot; &amp; <em>Desmodium triflorum</em></td>
<td>+</td>
<td>5.454*</td>
<td>0.774</td>
</tr>
<tr>
<td>25. &quot; &amp; <em>Digitaria griffithii</em></td>
<td>+</td>
<td>1.286</td>
<td>0.333</td>
</tr>
<tr>
<td>26. &quot; &amp; <em>Dysophylla crassicaulis</em></td>
<td>-</td>
<td>0.861</td>
<td>0.000</td>
</tr>
<tr>
<td>27. &quot; &amp; <em>Elephantopus scaber</em></td>
<td>+</td>
<td>0.022</td>
<td>0.235</td>
</tr>
<tr>
<td>28. &quot; &amp; <em>Eleusine indica</em></td>
<td>-</td>
<td>0.861</td>
<td>0.000</td>
</tr>
<tr>
<td>29. &quot; &amp; <em>Emilia sonchifolia</em></td>
<td>-</td>
<td>0.194</td>
<td>0.192</td>
</tr>
</tbody>
</table>
### Table 3.27

<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chi-square</th>
<th>Association Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td>30. <em>S. sylvestre</em> &amp; <em>Eragrostis atrovirens</em></td>
<td>+</td>
<td>1.286</td>
<td>0.333 0.200 0.111</td>
</tr>
<tr>
<td>31. <em>Eragrostis unioloides</em> &amp; <em>Eragrostis atrovirens</em></td>
<td>+</td>
<td>0.669</td>
<td>0.384 0.333 0.200</td>
</tr>
<tr>
<td>32. <em>Eragrostis viscosa</em> &amp; <em>Eragrostis atrovirens</em></td>
<td>+</td>
<td>0.861</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>33. <em>Hedyotis corymbosa</em> &amp; <em>Eragrostis atrovirens</em></td>
<td>-</td>
<td>1.818</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>34. <em>Hedyotis diffusa</em> &amp; <em>Eragrostis atrovirens</em></td>
<td>+</td>
<td>1.286</td>
<td>0.333 0.200 0.111</td>
</tr>
<tr>
<td>35. <em>Hyptis suaveoleus</em> &amp; <em>Eragrostis atrovirens</em></td>
<td>-</td>
<td>4.090*</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>36. <em>Imperata cylindrica</em> &amp; <em>Eragrostis atrovirens</em></td>
<td>+</td>
<td>0.471</td>
<td>0.623 0.608 0.437</td>
</tr>
<tr>
<td>37. <em>Isachne albens</em> &amp; <em>Eragrostis atrovirens</em></td>
<td>+</td>
<td>1.286</td>
<td>0.333 0.200 0.111</td>
</tr>
<tr>
<td>38. <em>Justicia japonica</em> &amp; <em>Eragrostis atrovirens</em></td>
<td>+</td>
<td>0.022</td>
<td>0.235 0.181 0.100</td>
</tr>
<tr>
<td>39. <em>Leucas indica</em> &amp; <em>Eragrostis atrovirens</em></td>
<td>+</td>
<td>1.286</td>
<td>0.333 0.200 0.111</td>
</tr>
<tr>
<td>40. <em>Lindernia ciliata</em> &amp; <em>Eragrostis atrovirens</em></td>
<td>-</td>
<td>1.818</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>41. <em>Lindernia crustacea</em> &amp; <em>Eragrostis atrovirens</em></td>
<td>+</td>
<td>0.899</td>
<td>0.603 0.600 0.428</td>
</tr>
<tr>
<td>42. <em>Lindernia hookeri</em> &amp; <em>Eragrostis atrovirens</em></td>
<td>+</td>
<td>6.111*</td>
<td>0.666 0.615 0.444</td>
</tr>
<tr>
<td>43. <em>Lindernia multiflora</em> &amp; <em>Eragrostis atrovirens</em></td>
<td>+</td>
<td>1.818</td>
<td>0.500 0.461 0.300</td>
</tr>
<tr>
<td>44. <em>Merremia hirta</em> &amp; <em>Eragrostis atrovirens</em></td>
<td>-</td>
<td>0.861</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>45. <em>Microseris biflora</em> &amp; <em>Eragrostis atrovirens</em></td>
<td>-</td>
<td>1.818</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>46. <em>Mimosa pudica</em> &amp; <em>Eragrostis atrovirens</em></td>
<td>-</td>
<td>1.818</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>47. <em>Mitracarpus verticillatus</em> &amp; <em>Eragrostis atrovirens</em></td>
<td>-</td>
<td>0.002</td>
<td>0.444 0.444 0.285</td>
</tr>
<tr>
<td>48. <em>Mitracarpus verticillatus</em> &amp; <em>Mimosa pudica</em></td>
<td>-</td>
<td>3.299</td>
<td>0.596 0.571 0.400</td>
</tr>
<tr>
<td>49. <em>Mnesithea laevis</em> &amp; <em>Mimosa pudica</em></td>
<td>+</td>
<td>0.641</td>
<td>0.503 0.500 0.333</td>
</tr>
<tr>
<td>50. <em>Mukia maderaspatana</em> &amp; <em>Mimosa pudica</em></td>
<td>+</td>
<td>1.286</td>
<td>0.333 0.200 0.111</td>
</tr>
<tr>
<td>51. <em>Murdannia vaginata</em> &amp; <em>Mimosa pudica</em></td>
<td>-</td>
<td>0.861</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>52. <em>Ophioglosom reticulatum</em> &amp; <em>Mimosa pudica</em></td>
<td>-</td>
<td>0.861</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>53. <em>Paspalum scrobiculatum</em> &amp; <em>Mimosa pudica</em></td>
<td>+</td>
<td>0.606</td>
<td>0.447 0.428 0.272</td>
</tr>
<tr>
<td>54. <em>Phaulopsis imbricata</em> &amp; <em>Mimosa pudica</em></td>
<td>+</td>
<td>1.286</td>
<td>0.333 0.200 0.111</td>
</tr>
<tr>
<td>55. <em>Phyllanthus urinaria</em> &amp; <em>Mimosa pudica</em></td>
<td>-</td>
<td>0.736</td>
<td>0.402 0.400 0.250</td>
</tr>
<tr>
<td>56. <em>Phyllanthus virgatus</em> &amp; <em>Mimosa pudica</em></td>
<td>+</td>
<td>0.641</td>
<td>0.503 0.500 0.333</td>
</tr>
<tr>
<td>57. <em>Plectranthus rugosus</em> &amp; <em>Mimosa pudica</em></td>
<td>+</td>
<td>1.286</td>
<td>0.333 0.200 0.111</td>
</tr>
<tr>
<td>58. <em>Polygala arvensis</em> &amp; <em>Mimosa pudica</em></td>
<td>+</td>
<td>0.022</td>
<td>0.235 0.181 0.100</td>
</tr>
<tr>
<td>59. <em>Prunella vulgaris</em> &amp; <em>Mimosa pudica</em></td>
<td>+</td>
<td>3.039</td>
<td>0.629 0.625 0.454</td>
</tr>
<tr>
<td>60. <em>Pueraria phaseoloides</em> &amp; <em>Mimosa pudica</em></td>
<td>+</td>
<td>1.818</td>
<td>0.632 0.631 0.461</td>
</tr>
<tr>
<td>61. <em>Rottboellia sp.</em> &amp; <em>Mimosa pudica</em></td>
<td>-</td>
<td>1.818</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>62. <em>Rungia pectinata</em> &amp; <em>Mimosa pudica</em></td>
<td>-</td>
<td>1.818</td>
<td>0.500 0.480 0.315</td>
</tr>
<tr>
<td>Species Pairs</td>
<td>Association type</td>
<td>Chi-square</td>
<td>Association Indices</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------------------</td>
<td>------------</td>
<td>---------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ochiai</td>
</tr>
<tr>
<td>63. <em>S. sylvestre</em> &amp; <em>Saccharum spontaneum</em></td>
<td>-</td>
<td>1.286</td>
<td>0.611</td>
</tr>
<tr>
<td>64. &quot; &amp; <em>Salomonia ciliata</em></td>
<td>+</td>
<td>5.690*</td>
<td>0.769</td>
</tr>
<tr>
<td>65. &quot; &amp; <em>Schizachyrium brevifolium</em></td>
<td>+</td>
<td>4.313*</td>
<td>0.577</td>
</tr>
<tr>
<td>66. &quot; &amp; <em>Scleria parvula</em></td>
<td>-</td>
<td>0.861</td>
<td>0.000</td>
</tr>
<tr>
<td>67. &quot; &amp; <em>Selaginella sp.</em></td>
<td>+</td>
<td>0.134</td>
<td>0.471</td>
</tr>
<tr>
<td>68. &quot; &amp; <em>Sporobolus indicus</em></td>
<td>-</td>
<td>0.669</td>
<td>0.565</td>
</tr>
<tr>
<td>69. &quot; &amp; <em>Urena lobata</em></td>
<td>-</td>
<td>0.861</td>
<td>0.000</td>
</tr>
<tr>
<td>70. &quot; &amp; <em>Vernonia cinerea</em></td>
<td>-</td>
<td>1.174</td>
<td>0.251</td>
</tr>
<tr>
<td>71. &quot; &amp; <em>Zornia gibbosa</em></td>
<td>+</td>
<td>5.454*</td>
<td>0.774</td>
</tr>
</tbody>
</table>

Sign ‘+’, ‘-’ and ‘0’ indicates direction of the species association, ‘+’ for positive, ‘-’ for negative and ‘0’ for no interaction. * Significant at 5% level.

*S. sylvestre*. Out of the 71 species combinations of *S. sylvestre*, 40 combinations showing positive associations, while 31 were negatively associated (Table-3.27). Only seven species viz. *Crotalaria prostrata*, *Cymbopogon microtheca*, *Desmodium triflorum*, *Lindernia hookeri*, *Salomonia ciliata*, *Schizachyrium brevifolium* and *Zornia gibbosa* showed significant positive association with *S. sylvestre*.

The observed Ochiai, Dice and Jaccard indices of the degree of association showed that *Borreria alata*, *Carex indica*, *Crotalaria prostrata*, *Cymbopogon pendulus*, *Desmodium triflorum*, *Lindernia hookeri*, *Pueraria phaseoloides*, *Salomonia ciliata*, *Zornia gibbosa*, *Prunella vulgaris* and *Imperata cylindrica* were highly associated with *S. sylvestre*. Moreover 22 species showed indices values 0 (zero) which indicated that there were no association between these species with *S. sylvestre*.

In monsoon-'98, there were 62 species pairs with *S. sylvestre* at site-I (Table-3.28). Out of these, only 25 pairs showed positive association and 32 pairs showed negative association, while the other five pairs had no interaction. Only two species like *Eragrostis tenella* and *Phyllanthus urinaria* showed significant positive association and one species, *Hyptis suaveoleus*, showed significant negative association with *S. sylvestre*.

The Ochiai, Dice and Jaccard indices of the degree of association indicated that *Phyllanthus urinaria*, *Eragrostis tenella*, *Zornia gibbosa*, *Saccharum spontaneum* and *Sporobolus indicus* were highly associated with *S. sylvestre*. Besides, 18 species had no occurrence in any quadrat with *S. sylvestre* and reached the minimum value of the indices to ‘0’ (zero).
Table 3.28: Interspecific association indices, association types and chi-square test statistics between *Streptocaulon sylvestre* and its associated species in Site-I during Monsoon 1998.

<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chi-square</th>
<th>Association Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ochiai</td>
<td>Dice</td>
</tr>
<tr>
<td>1. <em>S. sylvestre</em> &amp; <em>Ageratum conyzoides</em></td>
<td>+</td>
<td>0.357</td>
<td>0.433</td>
</tr>
<tr>
<td>2. &quot; &amp; <em>Borreria alata</em></td>
<td>0</td>
<td>0.000</td>
<td>0.632</td>
</tr>
<tr>
<td>3. &quot; &amp; <em>Borreria ocyoides</em></td>
<td>0</td>
<td>0.000</td>
<td>0.316</td>
</tr>
<tr>
<td>4. &quot; &amp; <em>Calamagrostis scabrecens</em></td>
<td>+</td>
<td>0.092</td>
<td>0.250</td>
</tr>
<tr>
<td>5. &quot; &amp; <em>Cassia mimosoides</em></td>
<td>+</td>
<td>1.045</td>
<td>0.408</td>
</tr>
<tr>
<td>6. &quot; &amp; <em>Centranthera indica</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000</td>
</tr>
<tr>
<td>7. &quot; &amp; <em>Chloris delicatula</em></td>
<td>+</td>
<td>2.552</td>
<td>0.530</td>
</tr>
<tr>
<td>8. &quot; &amp; <em>Chrysopogon aciculatus</em></td>
<td>-</td>
<td>0.065</td>
<td>0.204</td>
</tr>
<tr>
<td>9. &quot; &amp; <em>Clerodendrum viscosum</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000</td>
</tr>
<tr>
<td>10. &quot; &amp; <em>Coryza canadensis</em></td>
<td>+</td>
<td>1.578</td>
<td>0.353</td>
</tr>
<tr>
<td>11. &quot; &amp; <em>Crotalaria ferruginea</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000</td>
</tr>
<tr>
<td>12. &quot; &amp; <em>Crotalaria prostrata</em></td>
<td>+</td>
<td>0.357</td>
<td>0.433</td>
</tr>
<tr>
<td>13. &quot; &amp; <em>Cymbopogon microtheca</em></td>
<td>+</td>
<td>0.092</td>
<td>0.250</td>
</tr>
<tr>
<td>14. &quot; &amp; <em>Cymbopogon pendulus</em></td>
<td>0</td>
<td>0.000</td>
<td>0.632</td>
</tr>
<tr>
<td>15. &quot; &amp; <em>Cyperus juncoides</em></td>
<td>-</td>
<td>0.036</td>
<td>0.490</td>
</tr>
<tr>
<td>16. &quot; &amp; <em>Desmodium heterophyllum</em></td>
<td>-</td>
<td>2.154</td>
<td>0.235</td>
</tr>
<tr>
<td>17. &quot; &amp; <em>Desmodium triflorum</em></td>
<td>-</td>
<td>0.134</td>
<td>0.426</td>
</tr>
<tr>
<td>18. &quot; &amp; <em>Drymaria cordata</em></td>
<td>+</td>
<td>1.570</td>
<td>0.353</td>
</tr>
<tr>
<td>19. &quot; &amp; <em>Eleusine indica</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000</td>
</tr>
<tr>
<td>20. &quot; &amp; <em>Emilia sonchifolia</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000</td>
</tr>
<tr>
<td>21. &quot; &amp; <em>Eragrostis tenella</em></td>
<td>+</td>
<td>4.444*</td>
<td>0.632</td>
</tr>
<tr>
<td>22. &quot; &amp; <em>Eragrostis unioloides</em></td>
<td>-</td>
<td>1.481</td>
<td>0.000</td>
</tr>
<tr>
<td>23. &quot; &amp; <em>Exacum tetragonum</em></td>
<td>+</td>
<td>1.578</td>
<td>0.353</td>
</tr>
<tr>
<td>24. &quot; &amp; <em>Fimbristylis dichotoma</em></td>
<td>-</td>
<td>1.481</td>
<td>0.000</td>
</tr>
<tr>
<td>25. &quot; &amp; <em>Hedyotis corymbosa</em></td>
<td>-</td>
<td>0.468</td>
<td>0.176</td>
</tr>
<tr>
<td>26. &quot; &amp; <em>Hedyotis diffusa</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000</td>
</tr>
<tr>
<td>27. &quot; &amp; <em>Hedyotis herbacea</em></td>
<td>+</td>
<td>2.552</td>
<td>0.530</td>
</tr>
<tr>
<td>28. &quot; &amp; <em>Hyptis rhomboidea</em></td>
<td>-</td>
<td>1.481</td>
<td>0.000</td>
</tr>
<tr>
<td>29. &quot; &amp; <em>Hyptis suaveolens</em></td>
<td>-</td>
<td>4.444*</td>
<td>0.000</td>
</tr>
<tr>
<td>30. &quot; &amp; <em>Imperata cylindrica</em></td>
<td>+</td>
<td>0.034</td>
<td>0.510</td>
</tr>
</tbody>
</table>

*Table Contd.*
<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chi-square</th>
<th>Association Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ochia</td>
</tr>
<tr>
<td>31. <em>S. sylvestre</em> &amp; <em>Lindernia crustacea</em></td>
<td>+</td>
<td>0.036</td>
<td>0.400</td>
</tr>
<tr>
<td>32. &quot; &amp; <em>Lindernia hirsuta</em></td>
<td>+</td>
<td>1.578</td>
<td>0.353</td>
</tr>
<tr>
<td>33. &quot; &amp; <em>Lindernia hookeri</em></td>
<td>+</td>
<td>0.208</td>
<td>0.353</td>
</tr>
<tr>
<td>34. &quot; &amp; <em>Lindernia pyxidaria</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000</td>
</tr>
<tr>
<td>35. &quot; &amp; <em>Lindernia sp</em></td>
<td>+</td>
<td>0.092</td>
<td>0.250</td>
</tr>
<tr>
<td>36. &quot; &amp; <em>Lobelia alsinoides</em></td>
<td>+</td>
<td>1.578</td>
<td>0.353</td>
</tr>
<tr>
<td>37. &quot; &amp; <em>Lygodium flexuosum</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000</td>
</tr>
<tr>
<td>38. &quot; &amp; <em>Melochia corchorifolia</em></td>
<td>-</td>
<td>2.352</td>
<td>0.000</td>
</tr>
<tr>
<td>39. &quot; &amp; <em>Merremia hirta</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000</td>
</tr>
<tr>
<td>40. &quot; &amp; <em>Mimosa pudica</em></td>
<td>-</td>
<td>0.158</td>
<td>0.288</td>
</tr>
<tr>
<td>41. &quot; &amp; <em>Mitracarpus verticillatus</em></td>
<td>0</td>
<td>0.000</td>
<td>0.547</td>
</tr>
<tr>
<td>42. &quot; &amp; <em>Mitrasacme pygmaea</em></td>
<td>+</td>
<td>1.578</td>
<td>0.353</td>
</tr>
<tr>
<td>43. &quot; &amp; <em>Mnesithea laevis</em></td>
<td>-</td>
<td>0.158</td>
<td>0.288</td>
</tr>
<tr>
<td>44. &quot; &amp; <em>Murdannia nudiflora</em></td>
<td>-</td>
<td>1.250</td>
<td>0.250</td>
</tr>
<tr>
<td>45. &quot; &amp; <em>Paspalum scrobiculatum</em></td>
<td>-</td>
<td>1.649</td>
<td>0.589</td>
</tr>
<tr>
<td>46. &quot; &amp; <em>Phyllanthus amarus</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000</td>
</tr>
<tr>
<td>47. &quot; &amp; <em>Phyllanthus urinaria</em></td>
<td>+</td>
<td>4.444*</td>
<td>0.730</td>
</tr>
<tr>
<td>48. &quot; &amp; <em>Phyllanthus virgatus</em></td>
<td>-</td>
<td>3.333</td>
<td>0.000</td>
</tr>
<tr>
<td>49. &quot; &amp; <em>Prunella vulgaris</em></td>
<td>0</td>
<td>0.000</td>
<td>0.447</td>
</tr>
<tr>
<td>50. &quot; &amp; <em>Pueraria phaseoloides</em></td>
<td>-</td>
<td>1.045</td>
<td>0.514</td>
</tr>
<tr>
<td>51. &quot; &amp; <em>Rottboellia</em> <em>sp.</em></td>
<td>-</td>
<td>1.481</td>
<td>0.000</td>
</tr>
<tr>
<td>52. &quot; &amp; <em>Rungia pectinata</em></td>
<td>-</td>
<td>1.578</td>
<td>0.567</td>
</tr>
<tr>
<td>53. &quot; &amp; <em>Saccharum spontaneum</em></td>
<td>+</td>
<td>0.701</td>
<td>0.648</td>
</tr>
<tr>
<td>54. &quot; &amp; <em>Salomonia ciliata</em></td>
<td>+</td>
<td>0.833</td>
<td>0.559</td>
</tr>
<tr>
<td>55. &quot; &amp; <em>Schizachyrium brevifolium</em></td>
<td>-</td>
<td>0.158</td>
<td>0.288</td>
</tr>
<tr>
<td>56. &quot; &amp; <em>Scleria caricina</em></td>
<td>+</td>
<td>1.318</td>
<td>0.534</td>
</tr>
<tr>
<td>57. &quot; &amp; <em>Scleria parvula</em></td>
<td>-</td>
<td>1.481</td>
<td>0.000</td>
</tr>
<tr>
<td>58. &quot; &amp; <em>Selaginella</em> <em>sp.</em></td>
<td>-</td>
<td>0.036</td>
<td>0.490</td>
</tr>
<tr>
<td>59. &quot; &amp; <em>Smithia conferta</em></td>
<td>+</td>
<td>1.578</td>
<td>0.353</td>
</tr>
<tr>
<td>60. &quot; &amp; <em>Sporobolus indicus</em></td>
<td>+</td>
<td>0.701</td>
<td>0.648</td>
</tr>
<tr>
<td>61. &quot; &amp; <em>Vernonia cinerea</em></td>
<td>-</td>
<td>0.468</td>
<td>0.176</td>
</tr>
<tr>
<td>62. &quot; &amp; <em>Zornia gibbosa</em></td>
<td>+</td>
<td>3.333</td>
<td>0.670</td>
</tr>
</tbody>
</table>

Sign ‘+’ for positive direction, ‘-‘ for negative direction and ‘0’ for no interaction of the species association. * Significant at 5% level.
EXPLANATIONS OF PHOTOGRAPHS

Plate I.
Natural associates of *Streptocaulon sylvestre* Wight:

Photo 1. *Smithia conferta*
Photo 2. *Cyperus compressus*
Photo 3. *Saccharum spontaneum*
Photo 4. *Prunella vulgaris*
Photo 5. *Chloris delicatula*
Photo 6. *Cassia mimosifolia*
Photo 7. *Eragrostis tenella*
Photo 8. *Hyptis suaveolens*
Photo 9. *Atylosia scarabaeoides*
Photo 10. *Desmodium triflorum*
Photo 11. *Desmodium heterophyllum*
Photo 12. Appearance of *Mimosa pudica* seedlings in June
Photo 13. *Ludwigia perennis*
Photo 14. *Eragrostis gangetica*
3.2.5.1.2. SITE-I : WINTER SEASON

Species composition of site-I revealed the presence of total 46 species combinations with S. sylvestre during winter-'98 (Table-3.29). Out of these, only 18 combinations showing positive association and 21 showing negative association, while the other 7 combinations showed no interaction. Only one species, Sporobolus indicus, had the significant negative association value. On the basis of Ochiai, Dice and Jaccard indices it was determined that six species viz. Borreria alata, Cymbopogon pendulus, Saccharum spontaneum, Mitracarpus verticillus, Desmodium triflorum and Phyllanthus urinaria showed high association values with S. sylvestre. 13 species combinations, on the other hand, had the minimum indices value of ‘0’ which indicated that there were no association between these species and S. sylvestre.


<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chi-square</th>
<th>Association Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ochiai</td>
</tr>
<tr>
<td>1. S. sylvestre &amp; Ageratum conyzoides</td>
<td>0</td>
<td>0.000</td>
<td>0.223</td>
</tr>
<tr>
<td>2. &quot; &amp; Borreria alata</td>
<td>+</td>
<td>1.052</td>
<td>0.725</td>
</tr>
<tr>
<td>3. &quot; &amp; Borreria ocymoides</td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
</tr>
<tr>
<td>4. &quot; &amp; Breynia retusa</td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
</tr>
<tr>
<td>5. &quot; &amp; Chrysopogon aciculatus</td>
<td>+</td>
<td>1.052</td>
<td>0.316</td>
</tr>
<tr>
<td>6. &quot; &amp; Clerodendrum viscosum</td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
</tr>
<tr>
<td>7. &quot; &amp; Crotalaria alata</td>
<td>0</td>
<td>0.000</td>
<td>0.223</td>
</tr>
<tr>
<td>8. &quot; &amp; Crotalaria prostrata</td>
<td>+</td>
<td>0.202</td>
<td>0.527</td>
</tr>
<tr>
<td>9. &quot; &amp; Cymbopogon microtheca</td>
<td>+</td>
<td>3.529</td>
<td>0.547</td>
</tr>
<tr>
<td>10. &quot; &amp; Cymbopogon pendulus</td>
<td>+</td>
<td>1.052</td>
<td>0.725</td>
</tr>
<tr>
<td>11. &quot; &amp; Cynodon dactylon</td>
<td>0</td>
<td>0.000</td>
<td>0.223</td>
</tr>
<tr>
<td>12. &quot; &amp; Desmodium heterophyllum</td>
<td>-</td>
<td>0.392</td>
<td>0.182</td>
</tr>
<tr>
<td>13. &quot; &amp; Desmodium triflorum</td>
<td>+</td>
<td>0.219</td>
<td>0.614</td>
</tr>
<tr>
<td>14. &quot; &amp; Digitaria ciliaris</td>
<td>+</td>
<td>3.529</td>
<td>0.547</td>
</tr>
<tr>
<td>15. &quot; &amp; Eleusine indica</td>
<td>+</td>
<td>1.052</td>
<td>0.316</td>
</tr>
<tr>
<td>16. &quot; &amp; Emilia sonchifolia</td>
<td>+</td>
<td>1.052</td>
<td>0.316</td>
</tr>
</tbody>
</table>

Table Contd.
### Contd. Table-3.29

<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chi-square</th>
<th>Association Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ochiai</td>
</tr>
<tr>
<td><em>S. sylvestre</em> &amp; <em>Eragrostis nigra</em></td>
<td>-</td>
<td>0.392</td>
<td>0.182</td>
</tr>
<tr>
<td>18. &quot; &amp; <em>Eragrostis tenella</em></td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
</tr>
<tr>
<td>19. &quot; &amp; <em>Eragrostis unioloides</em></td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
</tr>
<tr>
<td>20. &quot; &amp; <em>Hedyotis corymbosa</em></td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
</tr>
<tr>
<td>21. &quot; &amp; <em>Hyptis suaveoleus</em></td>
<td>-</td>
<td>0.392</td>
<td>0.182</td>
</tr>
<tr>
<td>22. &quot; &amp; <em>Imperata cylindrica</em></td>
<td>+</td>
<td>0.202</td>
<td>0.527</td>
</tr>
<tr>
<td>23. &quot; &amp; <em>Isachne albens</em></td>
<td>+</td>
<td>1.052</td>
<td>0.316</td>
</tr>
<tr>
<td>24. &quot; &amp; <em>Lindernia ciliata</em></td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
</tr>
<tr>
<td>25. &quot; &amp; <em>Lindernia crustacea</em></td>
<td>+</td>
<td>1.052</td>
<td>0.316</td>
</tr>
<tr>
<td>26. &quot; &amp; <em>Lindernia pyxidaria</em></td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
</tr>
<tr>
<td>27. &quot; &amp; <em>Mikania micrantha</em></td>
<td>+</td>
<td>1.052</td>
<td>0.316</td>
</tr>
<tr>
<td>28. &quot; &amp; <em>Mimosa pudica</em></td>
<td>0</td>
<td>0.000</td>
<td>0.223</td>
</tr>
<tr>
<td>29. &quot; &amp; <em>Mitracarpus verticillatus</em></td>
<td>+</td>
<td>0.266</td>
<td>0.653</td>
</tr>
<tr>
<td>30. &quot; &amp; <em>Mnesithea laevis</em></td>
<td>+</td>
<td>0.392</td>
<td>0.365</td>
</tr>
<tr>
<td>31. &quot; &amp; <em>Murdannia nudiflora</em></td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
</tr>
<tr>
<td>32. &quot; &amp; <em>Osbeckia nepalensis</em></td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
</tr>
<tr>
<td>33. &quot; &amp; <em>Paspalum scrobiculatum</em></td>
<td>0</td>
<td>0.000</td>
<td>0.387</td>
</tr>
<tr>
<td>34. &quot; &amp; <em>Phyllanthus urinaria</em></td>
<td>+</td>
<td>1.978</td>
<td>0.597</td>
</tr>
<tr>
<td>35. &quot; &amp; <em>Phyllanthus virgatus</em></td>
<td>-</td>
<td>0.202</td>
<td>0.381</td>
</tr>
<tr>
<td>36. &quot; &amp; <em>Prunella vulgaris</em></td>
<td>-</td>
<td>0.219</td>
<td>0.358</td>
</tr>
<tr>
<td>37. &quot; &amp; <em>Pueraria phaseoloides</em></td>
<td>-</td>
<td>0.202</td>
<td>0.572</td>
</tr>
<tr>
<td>38. &quot; &amp; <em>Rungia pectinata</em></td>
<td>0</td>
<td>0.000</td>
<td>0.707</td>
</tr>
<tr>
<td>39. &quot; &amp; <em>Saccharum spontaneum</em></td>
<td>+</td>
<td>1.250</td>
<td>0.711</td>
</tr>
<tr>
<td>40. &quot; &amp; <em>Selaginella sp</em></td>
<td>-</td>
<td>1.250</td>
<td>0.158</td>
</tr>
<tr>
<td>41. &quot; &amp; <em>Sporobolus indicus</em></td>
<td>-</td>
<td>6.666*</td>
<td>0.408</td>
</tr>
<tr>
<td>42. &quot; &amp; <em>Triumfetta rhomboidea</em></td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
</tr>
<tr>
<td>43. &quot; &amp; <em>Urena lobata</em></td>
<td>+</td>
<td>1.052</td>
<td>0.316</td>
</tr>
<tr>
<td>44. &quot; &amp; <em>Vernonia cinerea</em></td>
<td>0</td>
<td>0.000</td>
<td>0.500</td>
</tr>
<tr>
<td>45. &quot; &amp; <em>Vetiveria zizanioides</em></td>
<td>-</td>
<td>1.800</td>
<td>0.000</td>
</tr>
<tr>
<td>46. &quot; &amp; <em>Zornia gibbosa</em></td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Sign '+', '-' and '0' indicate direction of the species association, '+' for positive, '-' for negative and '0' for no interaction. * Significant at 5% level.
Floristic survey of site-I during winter-'99 revealed the presence of 31 species pairs with *S. sylvestre* (Table-3.30). Of these, only 13 pairs were positively associated while 18 pairs showed negative association. The observed values of Ochiai, Dice and Jaccard indices of the degree of association for 11 species pairs were 0 (zero). Moreover, these indices showed that *Desmodium triflorum, Sporobolus indicus, Pueraria phaseoloides, Vernonia cinerea, Imperata cylindrica, Cymbopogon pendulus, Rungia pectinata* and *Saccharum spontaneum* were highly associated with *S. sylvestre* at site-I in winter-'99 season.

Table-3.30: Interspecific association indices, association types and chi-square test statistics between *Streptocaulon sylvestre* and its associated species at Site-I in Winter, 1999.

<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chi-square</th>
<th>Association Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ochiai</td>
</tr>
<tr>
<td>1. <em>S. sylvestre</em> &amp; <em>Ageratum conyzoides</em></td>
<td>-</td>
<td>2.716</td>
<td>0.000</td>
</tr>
<tr>
<td>2. &quot; &amp; *Axonopus compressus&quot;</td>
<td>-</td>
<td>1.286</td>
<td>0.000</td>
</tr>
<tr>
<td>3. &quot; &amp; <em>Borreria alata</em></td>
<td>+</td>
<td>0.861</td>
<td>0.301</td>
</tr>
<tr>
<td>4. &quot; &amp; <em>Centella asiatica</em></td>
<td>-</td>
<td>1.286</td>
<td>0.000</td>
</tr>
<tr>
<td>5. &quot; &amp; <em>Chloris barbata</em></td>
<td>+</td>
<td>0.861</td>
<td>0.301</td>
</tr>
<tr>
<td>6. &quot; &amp; <em>Chrysopogon aciculatus</em></td>
<td>-</td>
<td>0.022</td>
<td>0.213</td>
</tr>
<tr>
<td>7. &quot; &amp; <em>Clerodendrum serratum</em></td>
<td>-</td>
<td>1.286</td>
<td>0.000</td>
</tr>
<tr>
<td>8. &quot; &amp; <em>Cymbopogon pendulus</em></td>
<td>-</td>
<td>1.818</td>
<td>0.639</td>
</tr>
<tr>
<td>9. &quot; &amp; <em>Desmodium triflorum</em></td>
<td>+</td>
<td>1.625</td>
<td>0.725</td>
</tr>
<tr>
<td>10. &quot; &amp; <em>Digitaria ciliaris</em></td>
<td>-</td>
<td>0.669</td>
<td>0.174</td>
</tr>
<tr>
<td>11. &quot; &amp; <em>Eleusine indica</em></td>
<td>-</td>
<td>1.286</td>
<td>0.000</td>
</tr>
<tr>
<td>12. &quot; &amp; <em>Emilia sonchifolia</em></td>
<td>-</td>
<td>1.286</td>
<td>0.000</td>
</tr>
<tr>
<td>13. &quot; &amp; <em>Eragrostis nigra</em></td>
<td>+</td>
<td>0.861</td>
<td>0.301</td>
</tr>
<tr>
<td>14. &quot; &amp; <em>Eragrostis tenella</em></td>
<td>-</td>
<td>1.286</td>
<td>0.000</td>
</tr>
<tr>
<td>15. &quot; &amp; <em>Eragrostis unioloides</em></td>
<td>+</td>
<td>0.303</td>
<td>0.533</td>
</tr>
<tr>
<td>16. &quot; &amp; <em>Euphorbia thymifolia</em></td>
<td>-</td>
<td>1.286</td>
<td>0.000</td>
</tr>
<tr>
<td>17. &quot; &amp; <em>Hyptis suaveoleus</em></td>
<td>+</td>
<td>0.861</td>
<td>0.301</td>
</tr>
<tr>
<td>Species Pairs</td>
<td>Association type</td>
<td>Chi-square</td>
<td>Association Indices</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------------------</td>
<td>------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>18. <em>S. sylvestre</em> &amp; <em>Ichnocarpus frutescens</em></td>
<td>-</td>
<td>1.286</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>19. &quot; &amp; <em>Imperata cylindrica</em></td>
<td>-</td>
<td>0.194</td>
<td>0.658 0.642 0.473</td>
</tr>
<tr>
<td>20. &quot; &amp; <em>Mimosa pudica</em></td>
<td>+</td>
<td>0.067</td>
<td>0.404 0.375 0.230</td>
</tr>
<tr>
<td>21. &quot; &amp; <em>Mitracarpus verticillatus</em></td>
<td>-</td>
<td>0.022</td>
<td>0.213 0.153 0.083</td>
</tr>
<tr>
<td>22. &quot; &amp; <em>Mukia maderaspatana</em></td>
<td>+</td>
<td>0.861</td>
<td>0.301 0.166 0.090</td>
</tr>
<tr>
<td>23. &quot; &amp; <em>Ophiuros exaltatus</em></td>
<td>+</td>
<td>0.861</td>
<td>0.301 0.166 0.090</td>
</tr>
<tr>
<td>24. &quot; &amp; <em>Paspalum scrobiculatum</em></td>
<td>+</td>
<td>1.683</td>
<td>0.539 0.500 0.333</td>
</tr>
<tr>
<td>25. &quot; &amp; <em>Pueraria phaseoloides</em></td>
<td>+</td>
<td>0.050</td>
<td>0.678 0.666 0.500</td>
</tr>
<tr>
<td>26. &quot; &amp; <em>Rungia pectinata</em></td>
<td>-</td>
<td>0.067</td>
<td>0.622 0.615 0.444</td>
</tr>
<tr>
<td>27. &quot; &amp; <em>Saccharum spontaneum</em></td>
<td>+</td>
<td>0.134</td>
<td>0.609 0.608 0.437</td>
</tr>
<tr>
<td>28. &quot; &amp; <em>Sporobolus indicus</em></td>
<td>-</td>
<td>0.861</td>
<td>0.691 0.666 0.500</td>
</tr>
<tr>
<td>29. &quot; &amp; <em>Tripogon sp.</em></td>
<td>-</td>
<td>0.022</td>
<td>0.213 0.153 0.083</td>
</tr>
<tr>
<td>30. &quot; &amp; <em>Triumfetta rhomboidea</em></td>
<td>-</td>
<td>0.022</td>
<td>0.213 0.153 0.083</td>
</tr>
<tr>
<td>31. &quot; &amp; <em>Vernonia cinerea</em></td>
<td>+</td>
<td>0.641</td>
<td>0.669 0.666 0.500</td>
</tr>
</tbody>
</table>

Sign '+' for positive direction, '-' for negative direction and '0' for no interaction of the species association.

### 3.2.5.1.3. SITE-I: SUMMER SEASON

Table-3.31 shows that there were 54 species pairs with *S. sylvestre* in site-I during summer-'98. Out of these, 22 pairs each showed positive and negative associations, while 10 pairs had no interaction. From the observed values of Ochiai, Dice and Jaccard indices it was seen that *Borreria alata*, *Pueraria phaseoloides*, *Cymbopogon pendulus*, *Desmodium triflorum*, *Sporobolus indicus*, *Saccharum spontaneum* and *Mitracarpus verticillatus* were highly associated with *S. sylvestre*. On the other hand, 16 species pairs had the minimum indices value of '0' which suggested that there were no association between these species with *S. sylvestre*, in site-I during summer-'98.

<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chi-square</th>
<th>Association Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. <em>S. sylvestre</em> &amp; <em>Ageratum conyzoides</em></td>
<td>0</td>
<td>0.000</td>
<td>0.223 0.166 0.090</td>
</tr>
<tr>
<td>2. &quot; &amp; <em>Alloteropsis cimicina</em></td>
<td>+</td>
<td>1.052</td>
<td>0.316 0.181 0.100</td>
</tr>
<tr>
<td>3. &quot; &amp; <em>Andropogon ascinodis</em></td>
<td>+</td>
<td>1.052</td>
<td>0.316 0.181 0.100</td>
</tr>
<tr>
<td>4. &quot; &amp; <em>Atylosia scaraboides</em></td>
<td>0</td>
<td>0.000</td>
<td>0.223 0.166 0.090</td>
</tr>
<tr>
<td>5. &quot; &amp; <em>Borreria alata</em></td>
<td>+</td>
<td>3.529</td>
<td>0.767 0.740 0.588</td>
</tr>
<tr>
<td>6. &quot; &amp; <em>Cassia mimosoides</em></td>
<td>+</td>
<td>2.222</td>
<td>0.447 0.333 0.200</td>
</tr>
<tr>
<td>7. &quot; &amp; <em>Chrysopogon aciculatus</em></td>
<td>-</td>
<td>3.529</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>8. &quot; &amp; <em>Clerodendrum viscosum</em></td>
<td>-</td>
<td>0.000</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>9. &quot; &amp; <em>Crotalaria alata</em></td>
<td>-</td>
<td>1.052</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>10. &quot; &amp; <em>Crotalaria ferruginea</em></td>
<td>+</td>
<td>1.052</td>
<td>0.316 0.181 0.100</td>
</tr>
<tr>
<td>11. &quot; &amp; <em>Crotalaria pallida</em></td>
<td>+</td>
<td>1.052</td>
<td>0.316 0.181 0.100</td>
</tr>
<tr>
<td>12. &quot; &amp; <em>Crotalaria prostrata</em></td>
<td>+</td>
<td>1.978</td>
<td>0.597 0.588 0.416</td>
</tr>
<tr>
<td>13. &quot; &amp; <em>Cymbopogon pendulus</em></td>
<td>+</td>
<td>2.222</td>
<td>0.745 0.714 0.555</td>
</tr>
<tr>
<td>14. &quot; &amp; <em>Cynodon dactylon</em></td>
<td>+</td>
<td>1.052</td>
<td>0.316 0.181 0.100</td>
</tr>
<tr>
<td>15. &quot; &amp; <em>Cyperus compressus</em></td>
<td>0</td>
<td>0.000</td>
<td>0.387 0.375 0.230</td>
</tr>
<tr>
<td>16. &quot; &amp; <em>Cyperus laxus</em></td>
<td>-</td>
<td>2.222</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>17. &quot; &amp; <em>Desmodium heterophyllum</em></td>
<td>-</td>
<td>1.052</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>18. &quot; &amp; <em>Desmodium laxiflorum</em></td>
<td>-</td>
<td>1.052</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>19. &quot; &amp; <em>Desmodium triflorum</em></td>
<td>+</td>
<td>1.978</td>
<td>0.701 0.695 0.533</td>
</tr>
<tr>
<td>20. &quot; &amp; <em>Digitaria ciliaris</em></td>
<td>+</td>
<td>1.978</td>
<td>0.597 0.588 0.416</td>
</tr>
<tr>
<td>21. &quot; &amp; <em>Dysophylla crassicaulis</em></td>
<td>0</td>
<td>0.000</td>
<td>0.223 0.166 0.090</td>
</tr>
<tr>
<td>22. &quot; &amp; <em>Elephantopus scaber</em></td>
<td>0</td>
<td>0.000</td>
<td>0.223 0.166 0.090</td>
</tr>
<tr>
<td>23. &quot; &amp; <em>Eleusine indica</em></td>
<td>-</td>
<td>1.052</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>24. &quot; &amp; <em>Emilia sonchifolia</em></td>
<td>-</td>
<td>0.266</td>
<td>0.282 0.266 0.153</td>
</tr>
<tr>
<td>25. &quot; &amp; <em>Eragrostis nigra</em></td>
<td>-</td>
<td>0.392</td>
<td>0.182 0.153 0.083</td>
</tr>
<tr>
<td>26. &quot; &amp; <em>Eragrostis tenella</em></td>
<td>0</td>
<td>0.000</td>
<td>0.447 0.444 0.285</td>
</tr>
<tr>
<td>27. &quot; &amp; <em>Fimbriaria sp.</em></td>
<td>-</td>
<td>1.052</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>28. &quot; &amp; <em>Hedyotis corymbosa</em></td>
<td>-</td>
<td>1.052</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>29. &quot; &amp; <em>Hedyotis diffusa</em></td>
<td>+</td>
<td>1.052</td>
<td>0.316 0.181 0.100</td>
</tr>
<tr>
<td>30. &quot; &amp; <em>Hyptis suaveoleus</em></td>
<td>-</td>
<td>0.266</td>
<td>0.282 0.266 0.153</td>
</tr>
</tbody>
</table>

Table Contd.
Contd. Table-3.31

<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chi-square</th>
<th>Association Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ochiai</td>
</tr>
<tr>
<td>31. S. sylvestre &amp; Imperata cylindrica</td>
<td>-</td>
<td>0.266</td>
<td>0.571</td>
</tr>
<tr>
<td>32. &quot; &amp; Isachne albens</td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
</tr>
<tr>
<td>33. &quot; &amp; Leucas indica</td>
<td>+</td>
<td>1.052</td>
<td>0.316</td>
</tr>
<tr>
<td>34. &quot; &amp; Lindernia pyxidaria</td>
<td>+</td>
<td>1.052</td>
<td>0.316</td>
</tr>
<tr>
<td>35. &quot; &amp; Melochia corchorifolia</td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
</tr>
<tr>
<td>36. &quot; &amp; Mikania micrantha</td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
</tr>
<tr>
<td>37. &quot; &amp; Mimosa pudica</td>
<td>-</td>
<td>0.392</td>
<td>0.182</td>
</tr>
<tr>
<td>38. &quot; &amp; Mitracarpus verticillatus</td>
<td>+</td>
<td>0.266</td>
<td>0.653</td>
</tr>
<tr>
<td>39. &quot; &amp; Mnesithea laevis</td>
<td>+</td>
<td>0.202</td>
<td>0.572</td>
</tr>
<tr>
<td>40. &quot; &amp; Paspalum scrobiculatum</td>
<td>+</td>
<td>0.202</td>
<td>0.572</td>
</tr>
<tr>
<td>41. &quot; &amp; Phyllanthus virgatus</td>
<td>0</td>
<td>0.000</td>
<td>0.591</td>
</tr>
<tr>
<td>42. &quot; &amp; Polygala arvensis</td>
<td>+</td>
<td>1.052</td>
<td>0.316</td>
</tr>
<tr>
<td>43. &quot; &amp; Pueraria phaseoloides</td>
<td>+</td>
<td>3.809</td>
<td>0.760</td>
</tr>
<tr>
<td>44. &quot; &amp; Rungia pectinata</td>
<td>0</td>
<td>0.000</td>
<td>0.316</td>
</tr>
<tr>
<td>45. &quot; &amp; Saccharum spontaneum</td>
<td>+</td>
<td>0.392</td>
<td>0.690</td>
</tr>
<tr>
<td>46. &quot; &amp; Salomonia ciliata</td>
<td>0</td>
<td>0.000</td>
<td>0.387</td>
</tr>
<tr>
<td>47. &quot; &amp; Setaria pumila</td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
</tr>
<tr>
<td>48. &quot; &amp; Sida rhombifolia</td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
</tr>
<tr>
<td>49. &quot; &amp; Sporobolus indicus</td>
<td>0</td>
<td>0.000</td>
<td>0.707</td>
</tr>
<tr>
<td>50. &quot; &amp; Triumfetta rhomboidea</td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
</tr>
<tr>
<td>51. &quot; &amp; Urena lobata</td>
<td>+</td>
<td>0.392</td>
<td>0.365</td>
</tr>
<tr>
<td>52. &quot; &amp; Vernonia cinerea</td>
<td>-</td>
<td>1.818</td>
<td>0.316</td>
</tr>
<tr>
<td>53. &quot; &amp; Zornia gibbosa</td>
<td>+</td>
<td>1.978</td>
<td>0.597</td>
</tr>
<tr>
<td>54. &quot; &amp; Graminae-unidentified</td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Sign ‘+’, ‘-’ and ‘0’ indicate direction of the species association, ‘+’ for positive, ‘-’ for negative and ‘0’ for no interaction.

A perusal of Table-3.32 shows that there were 51 species combinations with S. sylvestre in site-I during summer-’99 season. 28 combinations of them showed positive association and 22 showed negative association. Only a single species Sporobolus indicus showed no interaction with S. sylvestre. Two species, Hyptis suaveoleus and Tonningia axillaris, showed significant negative association.
Table-3.32 : Interspecific association indices, association types and chi-square test statistics between *Streptocaulon sylvestre* and its associated species at Site-I in Summer-1999.

<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chi-square</th>
<th>Association Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ochiai</td>
</tr>
<tr>
<td>1. <em>S. sylvestre</em> &amp; <em>Borreria alata</em></td>
<td>+</td>
<td>0.022</td>
<td>0.710</td>
</tr>
<tr>
<td>2. &quot; &amp; <em>Brachiaria reptans</em></td>
<td>+</td>
<td>0.861</td>
<td>0.301</td>
</tr>
<tr>
<td>3. &quot; &amp; <em>Cassia mimosoides</em></td>
<td>+</td>
<td>0.471</td>
<td>0.492</td>
</tr>
<tr>
<td>4. &quot; &amp; <em>Chrysopogon aciculatus</em></td>
<td>-</td>
<td>3.103</td>
<td>0.301</td>
</tr>
<tr>
<td>5. &quot; &amp; <em>Clerodendrum viscosum</em></td>
<td>-</td>
<td>1.286</td>
<td>0.000</td>
</tr>
<tr>
<td>6. &quot; &amp; <em>Crotalaria pallida</em></td>
<td>+</td>
<td>1.818</td>
<td>0.426</td>
</tr>
<tr>
<td>7. &quot; &amp; <em>Crotalaria prostrata</em></td>
<td>+</td>
<td>0.861</td>
<td>0.301</td>
</tr>
<tr>
<td>8. &quot; &amp; <em>Curculigo orchioides</em></td>
<td>+</td>
<td>0.861</td>
<td>0.301</td>
</tr>
<tr>
<td>9. &quot; &amp; <em>Cymbopogon microtheca</em></td>
<td>+</td>
<td>0.861</td>
<td>0.301</td>
</tr>
<tr>
<td>10. &quot; &amp; <em>Cymbopogon pendulus</em></td>
<td>+</td>
<td>2.716</td>
<td>0.781</td>
</tr>
<tr>
<td>11. &quot; &amp; <em>Cyperus alulatus</em></td>
<td>-</td>
<td>0.022</td>
<td>0.213</td>
</tr>
<tr>
<td>12. &quot; &amp; <em>Cyperus cyperoides</em></td>
<td>+</td>
<td>0.861</td>
<td>0.301</td>
</tr>
<tr>
<td>13. &quot; &amp; <em>Cyperus junoides</em></td>
<td>-</td>
<td>0.202</td>
<td>0.476</td>
</tr>
<tr>
<td>14. &quot; &amp; <em>Desmodium heterophyllum</em></td>
<td>+</td>
<td>1.818</td>
<td>0.426</td>
</tr>
<tr>
<td>15. &quot; &amp; <em>Desmodium triflorum</em></td>
<td>+</td>
<td>0.669</td>
<td>0.731</td>
</tr>
<tr>
<td>16. &quot; &amp; <em>Digitaria bicornis</em></td>
<td>+</td>
<td>0.861</td>
<td>0.301</td>
</tr>
<tr>
<td>17. &quot; &amp; <em>Digitaria ciliaris</em></td>
<td>+</td>
<td>0.067</td>
<td>0.404</td>
</tr>
<tr>
<td>18. &quot; &amp; <em>Digitaria griffithii</em></td>
<td>-</td>
<td>0.022</td>
<td>0.213</td>
</tr>
<tr>
<td>19. &quot; &amp; <em>Elephantopus scaber</em></td>
<td>+</td>
<td>1.818</td>
<td>0.426</td>
</tr>
<tr>
<td>20. &quot; &amp; <em>Eleusine indica</em></td>
<td>+</td>
<td>0.861</td>
<td>0.301</td>
</tr>
<tr>
<td>21. &quot; &amp; <em>Emilia sonchifolia</em></td>
<td>-</td>
<td>1.286</td>
<td>0.000</td>
</tr>
<tr>
<td>22. &quot; &amp; <em>Eragrostis gangetica</em></td>
<td>-</td>
<td>1.286</td>
<td>0.000</td>
</tr>
<tr>
<td>23. &quot; &amp; <em>Eragrostis nigra</em></td>
<td>-</td>
<td>0.050</td>
<td>0.301</td>
</tr>
<tr>
<td>24. &quot; &amp; <em>Eragrostis tenella</em></td>
<td>-</td>
<td>1.625</td>
<td>0.246</td>
</tr>
<tr>
<td>25. &quot; &amp; <em>Euphorbia orbiculata</em></td>
<td>-</td>
<td>1.286</td>
<td>0.000</td>
</tr>
<tr>
<td>26. &quot; &amp; <em>Hyptis suaveoleus</em></td>
<td>-</td>
<td>8.148*</td>
<td>0.000</td>
</tr>
<tr>
<td>27. &quot; &amp; <em>Imperata cylindrica</em></td>
<td>-</td>
<td>0.067</td>
<td>0.622</td>
</tr>
<tr>
<td>28. &quot; &amp; <em>Imperata latifolia</em></td>
<td>-</td>
<td>1.286</td>
<td>0.000</td>
</tr>
<tr>
<td>29. &quot; &amp; <em>Lindernia sp.</em></td>
<td>-</td>
<td>1.286</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table Contd.
Contd. Table-3.32

<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chi-square</th>
<th>Association Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ochiai</td>
</tr>
<tr>
<td>30. S. sylvestre &amp; Mariscus cyperinus</td>
<td>-</td>
<td>2.716</td>
<td>0.000</td>
</tr>
<tr>
<td>31. &quot; &amp; Mimosa pudica</td>
<td>-</td>
<td>2.716</td>
<td>0.000</td>
</tr>
<tr>
<td>32. &quot; &amp; Mitracarpus verticillatus</td>
<td>-</td>
<td>1.818</td>
<td>0.150</td>
</tr>
<tr>
<td>33. &quot; &amp; Mnesithea laevis</td>
<td>+</td>
<td>1.818</td>
<td>0.667</td>
</tr>
<tr>
<td>34. &quot; &amp; Mukia maderaspatana</td>
<td>+</td>
<td>0.861</td>
<td>0.301</td>
</tr>
<tr>
<td>35. &quot; &amp; Murdannia nudiflora</td>
<td>+</td>
<td>0.861</td>
<td>0.301</td>
</tr>
<tr>
<td>36. &quot; &amp; Paspalum scrobiculatum</td>
<td>-</td>
<td>3.103</td>
<td>0.301</td>
</tr>
<tr>
<td>37. &quot; &amp; Pennisetum glaucum</td>
<td>+</td>
<td>1.818</td>
<td>0.426</td>
</tr>
<tr>
<td>38. &quot; &amp; Phyllanthus urinaria</td>
<td>+</td>
<td>0.669</td>
<td>0.731</td>
</tr>
<tr>
<td>39. &quot; &amp; Polygala glomerata</td>
<td>-</td>
<td>0.669</td>
<td>0.174</td>
</tr>
<tr>
<td>40. &quot; &amp; Pouzolzia zeylanica</td>
<td>+</td>
<td>0.861</td>
<td>0.301</td>
</tr>
<tr>
<td>41. &quot; &amp; Pueraria phaseoloides</td>
<td>+</td>
<td>1.649</td>
<td>0.696</td>
</tr>
<tr>
<td>42. &quot; &amp; Rottboellia sp.</td>
<td>-</td>
<td>1.286</td>
<td>0.000</td>
</tr>
<tr>
<td>43. &quot; &amp; Rungia pectinata</td>
<td>+</td>
<td>1.818</td>
<td>0.426</td>
</tr>
<tr>
<td>44. &quot; &amp; Saccharum spontaneum</td>
<td>+</td>
<td>0.022</td>
<td>0.710</td>
</tr>
<tr>
<td>45. &quot; &amp; Salomonia ciliata</td>
<td>+</td>
<td>0.303</td>
<td>0.533</td>
</tr>
<tr>
<td>46. &quot; &amp; Sporobolus indicus</td>
<td>0</td>
<td>0.000</td>
<td>0.741</td>
</tr>
<tr>
<td>47. &quot; &amp; Tonningia axillaris</td>
<td>-</td>
<td>4.313*</td>
<td>0.000</td>
</tr>
<tr>
<td>48. &quot; &amp; Triumfetta rhomboidea</td>
<td>+</td>
<td>1.818</td>
<td>0.426</td>
</tr>
<tr>
<td>49. &quot; &amp; Vernonia cinerea</td>
<td>-</td>
<td>2.154</td>
<td>0.435</td>
</tr>
<tr>
<td>50. &quot; &amp; Vetiveria zizanioides</td>
<td>+</td>
<td>1.818</td>
<td>0.426</td>
</tr>
<tr>
<td>51. &quot; &amp; Zornia gibbosa</td>
<td>+</td>
<td>0.002</td>
<td>0.502</td>
</tr>
</tbody>
</table>

Sign ‘+’, ‘-’ and ‘0’ indicates direction of the species association, ‘+’ for positive, ‘-’ for negative and ‘0’ for no interaction. * Significant at 5% level.

The Ochiai, Dice and Jaccard indices of the degree of association indicated that seven species like Cymbopogon pendulus, Sporobolus indicus, Desmodium triflorum, Phyllanthus urinaria, Borreria alata, Saccharum spontaneum and Pueraria phaseoloides were highly associated with S. sylvestre. Besides, 11 species recorded the minimum indices values of ‘0’ (zero) due to not sharing a quadrat with S. sylvestre at site-I during summer-’99.
3.2.5.2. SITE-II

3.2.5.2.1. SITE-II: MONSOON SEASON

Vegetational analysis of the present study for site-II revealed the presence of total 71 species in monsoon- '97 (Table-3.33). There were 70 species pairs when each species was matched once with S. sylvestre. Out of these, 34 pairs each showed positive and negative association and the remaining 2 pairs showed no interaction. Only 2 species viz. *Merremia hirta* and *Schizachyrium brevifolium* showed significant positive association with *S. sylvestre*.

The Ochiai, Dice and Jaccard indices of the degree of association indicated that *Crotalaria prostrata, Schizachyrium brevifolium, Merremia hirta, Desmodium triflorum, Saccharum spontaneum, Desmodium heterophyllum, Borreria alata* and *Sporobolus indicus* were highly associated with *S. sylvestre* in site-II during monsoon- '97. With *S. sylvestre*, while, 26 species had no co-existance in any quadrat, and reached the minimum value of the indices to '0' (zero).

Table-3.33 : Interspecific association indices, association types and chi-square test statistics between *Streptocaulon sylvestre* and its associated species at Site-II during Monsoon-1997.

<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chi-square</th>
<th>Ochiai</th>
<th>Dice</th>
<th>Jaccard</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <em>S. sylvestre &amp; Ageratum conyzoides</em></td>
<td>-</td>
<td>0.952</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>2. &quot; &amp; Apocopsis paleacea</td>
<td>-</td>
<td>0.451</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>3. &quot; &amp; Atylosia scarabaeoides</td>
<td>-</td>
<td>0.451</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>4. &quot; &amp; Axonopus compressus</td>
<td>+</td>
<td>2.456</td>
<td>0.408</td>
<td>0.285</td>
<td>0.166</td>
</tr>
<tr>
<td>5. &quot; &amp; Borreria alata</td>
<td>0</td>
<td>0.000</td>
<td>0.547</td>
<td>0.461</td>
<td>0.300</td>
</tr>
<tr>
<td>6. &quot; &amp; Carex indica</td>
<td>+</td>
<td>0.010</td>
<td>0.453</td>
<td>0.421</td>
<td>0.266</td>
</tr>
<tr>
<td>7. &quot; &amp; Cassia mimosoides</td>
<td>+</td>
<td>0.423</td>
<td>0.288</td>
<td>0.250</td>
<td>0.142</td>
</tr>
<tr>
<td>8. &quot; &amp; Chrysopogonaciculatus</td>
<td>-</td>
<td>2.780</td>
<td>0.136</td>
<td>0.133</td>
<td>0.071</td>
</tr>
<tr>
<td>9. &quot; &amp; Crotalaria juncea</td>
<td>-</td>
<td>0.451</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>10. &quot; &amp; Crotalaria linifolia</td>
<td>-</td>
<td>0.451</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>11. &quot; &amp; Crotalaria palida</td>
<td>+</td>
<td>2.456</td>
<td>0.408</td>
<td>0.285</td>
<td>0.166</td>
</tr>
<tr>
<td>12. &quot; &amp; Crotalaria prostrata</td>
<td>+</td>
<td>3.778</td>
<td>0.617</td>
<td>0.615</td>
<td>0.444</td>
</tr>
<tr>
<td>13. &quot; &amp; Cyanotis nudiflora</td>
<td>+</td>
<td>0.045</td>
<td>0.333</td>
<td>0.333</td>
<td>0.200</td>
</tr>
</tbody>
</table>

*Table Contd.*
Contd. Table-3.33

<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chi-square</th>
<th>Association Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ochiai</td>
</tr>
<tr>
<td>14. <em>S. sylvestre</em> &amp; <em>Cyanotis vaga</em></td>
<td>+</td>
<td>2.456</td>
<td>0.408</td>
</tr>
<tr>
<td>15. &quot;   &amp; <em>Cymbopogon pendulus</em></td>
<td>+</td>
<td>0.317</td>
<td>0.527</td>
</tr>
<tr>
<td>16. &quot;   &amp; <em>Cynodon dactylon</em></td>
<td>-</td>
<td>0.317</td>
<td>0.182</td>
</tr>
<tr>
<td>17. &quot;   &amp; <em>Cyperus compressus</em></td>
<td>-</td>
<td>0.451</td>
<td>0.000</td>
</tr>
<tr>
<td>18. &quot;   &amp; <em>Dactyloctenium aegyptium</em></td>
<td>-</td>
<td>0.451</td>
<td>0.000</td>
</tr>
<tr>
<td>19. &quot;   &amp; <em>Desmodium heterophyllum</em></td>
<td>+</td>
<td>2.857</td>
<td>0.547</td>
</tr>
<tr>
<td>20. &quot;   &amp; <em>Desmodium triflorum</em></td>
<td>+</td>
<td>1.266</td>
<td>0.566</td>
</tr>
<tr>
<td>21. &quot;   &amp; <em>Digitaria ciliaris</em></td>
<td>+</td>
<td>2.456</td>
<td>0.408</td>
</tr>
<tr>
<td>22. &quot;   &amp; <em>Drosera burmannii</em></td>
<td>-</td>
<td>0.451</td>
<td>0.000</td>
</tr>
<tr>
<td>23. &quot;   &amp; <em>Drymaria cordata</em></td>
<td>-</td>
<td>0.451</td>
<td>0.000</td>
</tr>
<tr>
<td>24. &quot;   &amp; <em>Dysophylla crassicaulis</em></td>
<td>+</td>
<td>0.317</td>
<td>0.365</td>
</tr>
<tr>
<td>25. &quot;   &amp; <em>Echinochloa crusgalli</em></td>
<td>-</td>
<td>0.451</td>
<td>0.000</td>
</tr>
<tr>
<td>26. &quot;   &amp; <em>Elephantopus scaber</em></td>
<td>+</td>
<td>0.423</td>
<td>0.288</td>
</tr>
<tr>
<td>27. &quot;   &amp; <em>Eragrostis unioloides</em></td>
<td>+</td>
<td>0.018</td>
<td>0.235</td>
</tr>
<tr>
<td>28. &quot;   &amp; <em>Fimbristylis dichotoma</em></td>
<td>-</td>
<td>0.451</td>
<td>0.000</td>
</tr>
<tr>
<td>29. &quot;   &amp; <em>Fimbristylis umbellartis</em></td>
<td>-</td>
<td>0.451</td>
<td>0.000</td>
</tr>
<tr>
<td>30. &quot;   &amp; <em>Hedyotis corymbosa</em></td>
<td>-</td>
<td>0.059</td>
<td>0.204</td>
</tr>
<tr>
<td>31. &quot;   &amp; <em>Hedyotis diffusa</em></td>
<td>+</td>
<td>2.456</td>
<td>0.408</td>
</tr>
<tr>
<td>32. &quot;   &amp; <em>Hyptis suaveoleus</em></td>
<td>-</td>
<td>2.142</td>
<td>0.000</td>
</tr>
<tr>
<td>33. &quot;   &amp; <em>Imperata cylindrica</em></td>
<td>-</td>
<td>2.539</td>
<td>0.235</td>
</tr>
<tr>
<td>34. &quot;   &amp; <em>Indigofera glabra</em></td>
<td>-</td>
<td>1.512</td>
<td>0.000</td>
</tr>
<tr>
<td>35. &quot;   &amp; <em>Isachne albens</em></td>
<td>-</td>
<td>0.317</td>
<td>0.182</td>
</tr>
<tr>
<td>36. &quot;   &amp; <em>Lindernia ciliata</em></td>
<td>-</td>
<td>0.451</td>
<td>0.000</td>
</tr>
<tr>
<td>37. &quot;   &amp; <em>Lindernia crustacea</em></td>
<td>+</td>
<td>0.952</td>
<td>0.408</td>
</tr>
<tr>
<td>38. &quot;   &amp; <em>Lindernia hookeri</em></td>
<td>+</td>
<td>0.357</td>
<td>0.433</td>
</tr>
<tr>
<td>39. &quot;   &amp; <em>Lindernia multiflora</em></td>
<td>+</td>
<td>0.045</td>
<td>0.333</td>
</tr>
<tr>
<td>40. &quot;   &amp; <em>Lindernia pyxidaria</em></td>
<td>-</td>
<td>0.952</td>
<td>0.000</td>
</tr>
<tr>
<td>41. &quot;   &amp; <em>Merremia hirta</em></td>
<td>+</td>
<td>5.185*</td>
<td>0.577</td>
</tr>
<tr>
<td>42. &quot;   &amp; <em>Micromeria biflora</em></td>
<td>+</td>
<td>0.018</td>
<td>0.235</td>
</tr>
<tr>
<td>43. &quot;   &amp; <em>Mimosa pudica</em></td>
<td>-</td>
<td>2.142</td>
<td>0.000</td>
</tr>
<tr>
<td>44. &quot;   &amp; <em>Mitracarpus verticillalus</em></td>
<td>+</td>
<td>0.847</td>
<td>0.463</td>
</tr>
</tbody>
</table>

*Table Contd.*
Floristic composition of site-II revealed the presence of total 68 species pairs with *S. sylvestre* during monsoon-'98 (Table-3.34). Out of these, an equal number of 33 pairs showing positive and negative association and the remaining 2 pairs had no interaction. Only *Chrysopogon aciculatus* showed significant negative association value.

<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chi-square</th>
<th>Association Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ochiai</td>
</tr>
<tr>
<td>45. <em>S. sylvestre</em> &amp; <em>Mitrasacme pygmaea</em></td>
<td>+</td>
<td>2.259</td>
<td>0.471</td>
</tr>
<tr>
<td>46. <em>S. sylvestre</em> &amp; <em>Mitreola petiolata</em></td>
<td>+</td>
<td>2.456</td>
<td>0.408</td>
</tr>
<tr>
<td>47. <em>S. sylvestre</em> &amp; <em>Mnesitha laevis</em></td>
<td>-</td>
<td>0.317</td>
<td>0.182</td>
</tr>
<tr>
<td>48. <em>S. sylvestre</em> &amp; <em>Mukia maderaspatana</em></td>
<td>-</td>
<td>0.451</td>
<td>0.000</td>
</tr>
<tr>
<td>49. <em>S. sylvestre</em> &amp; <em>Murdannia spirata</em></td>
<td>-</td>
<td>0.451</td>
<td>0.000</td>
</tr>
<tr>
<td>50. <em>S. sylvestre</em> &amp; <em>Paspalum scrobiculatum</em></td>
<td>-</td>
<td>2.857</td>
<td>0.000</td>
</tr>
<tr>
<td>51. <em>S. sylvestre</em> &amp; <em>Phaulopsis imbricata</em></td>
<td>+</td>
<td>0.423</td>
<td>0.288</td>
</tr>
<tr>
<td>52. <em>S. sylvestre</em> &amp; <em>Phyllanthus urinaria</em></td>
<td>+</td>
<td>1.632</td>
<td>0.500</td>
</tr>
<tr>
<td>53. <em>S. sylvestre</em> &amp; <em>Phyllanthus virgatus</em></td>
<td>-</td>
<td>0.847</td>
<td>0.339</td>
</tr>
<tr>
<td>54. <em>S. sylvestre</em> &amp; <em>Polygala arvensis</em></td>
<td>-</td>
<td>0.451</td>
<td>0.000</td>
</tr>
<tr>
<td>55. <em>S. sylvestre</em> &amp; <em>Prunella vulgaris</em></td>
<td>+</td>
<td>0.158</td>
<td>0.471</td>
</tr>
<tr>
<td>56. <em>S. sylvestre</em> &amp; <em>Pueraria phaseoloides</em></td>
<td>+</td>
<td>0.086</td>
<td>0.408</td>
</tr>
<tr>
<td>57. <em>S. sylvestre</em> &amp; <em>Pupalia lappacea</em></td>
<td>+</td>
<td>1.269</td>
<td>0.408</td>
</tr>
<tr>
<td>58. <em>S. sylvestre</em> &amp; <em>Rottboellia sp.</em></td>
<td>-</td>
<td>0.451</td>
<td>0.000</td>
</tr>
<tr>
<td>59. <em>S. sylvestre</em> &amp; <em>Rungia pectinata</em></td>
<td>-</td>
<td>0.010</td>
<td>0.308</td>
</tr>
<tr>
<td>60. <em>S. sylvestre</em> &amp; <em>Saccharum spontaneum</em></td>
<td>+</td>
<td>0.451</td>
<td>0.562</td>
</tr>
<tr>
<td>61. <em>S. sylvestre</em> &amp; <em>Salomonia ciliata</em></td>
<td>+</td>
<td>0.059</td>
<td>0.510</td>
</tr>
<tr>
<td>62. <em>S. sylvestre</em> &amp; <em>Schizachyrium brevifolium</em></td>
<td>+</td>
<td>4.821*</td>
<td>0.612</td>
</tr>
<tr>
<td>63. <em>S. sylvestre</em> &amp; <em>Scleria parvula</em></td>
<td>-</td>
<td>1.512</td>
<td>0.000</td>
</tr>
<tr>
<td>64. <em>S. sylvestre</em> &amp; <em>Selaginella sp.</em></td>
<td>+</td>
<td>0.086</td>
<td>0.408</td>
</tr>
<tr>
<td>65. <em>S. sylvestre</em> &amp; <em>Sida rhombifolia</em></td>
<td>-</td>
<td>0.451</td>
<td>0.000</td>
</tr>
<tr>
<td>66. <em>S. sylvestre</em> &amp; <em>Smithia conferta</em></td>
<td>-</td>
<td>0.952</td>
<td>0.000</td>
</tr>
<tr>
<td>67. <em>S. sylvestre</em> &amp; <em>Sporobolus indicus</em></td>
<td>0</td>
<td>0.000</td>
<td>0.547</td>
</tr>
<tr>
<td>68. <em>S. sylvestre</em> &amp; <em>Vernonia cinerea</em></td>
<td>+</td>
<td>0.010</td>
<td>0.453</td>
</tr>
<tr>
<td>69. <em>S. sylvestre</em> &amp; <em>Vetiveria zizanioides</em></td>
<td>-</td>
<td>1.512</td>
<td>0.000</td>
</tr>
<tr>
<td>70. <em>S. sylvestre</em> &amp; <em>Zornia gibbosa</em></td>
<td>+</td>
<td>0.471</td>
<td>0.492</td>
</tr>
</tbody>
</table>

Sign '+' , '-' and '0' indicates direction of the species association, '+' for positive, '-' for negative and '0' for no interaction. * Significant at 5% level.
On the basis of Ochiai, Dice and Jaccard indices it was seen that *Paspalum scrobiculatum*, *Pueraria phaseoloides*, *Borreria alata*, *Cymbopogon pendulus*, *Phyllanthus urinaria*, *Rungia pectinata*, *Saccharum spontaneum* and *Sporobolus indicus* were found to be highly associated with *S. sylvestre*. On the other hand, 19 species pairs showed the minimum indices value of '0', which indicated that there were no association between *S. sylvestre* and these species at site-II during monsoon- '98.

Table-3.34 : Interspecific association indices, association types and chi-square test statistics between *Streptocaulon sylvestre* and its associated species at Site-II during Monsoon-1998.

<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chi-square</th>
<th>Association Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ochiai</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Dice</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Jaccard</td>
</tr>
<tr>
<td>1. <em>S. sylvestre</em> &amp; <em>Ageratum conyzoides</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000</td>
</tr>
<tr>
<td>2. <em>S. sylvestre</em> &amp; <em>Apocopis paleacea</em></td>
<td>+</td>
<td>0.092</td>
<td>0.250</td>
</tr>
<tr>
<td>3. <em>S. sylvestre</em> &amp; <em>Borreria alata</em></td>
<td>+</td>
<td>0.701</td>
<td>0.648</td>
</tr>
<tr>
<td>4. <em>S. sylvestre</em> &amp; <em>Borreria ocymooides</em></td>
<td>-</td>
<td>0.065</td>
<td>0.204</td>
</tr>
<tr>
<td>5. <em>S. sylvestre</em> &amp; <em>Bulbostylis densa</em></td>
<td>-</td>
<td>1.481</td>
<td>0.000</td>
</tr>
<tr>
<td>6. <em>S. sylvestre</em> &amp; <em>Calamagrostis scabrescens</em></td>
<td>+</td>
<td>3.333</td>
<td>0.500</td>
</tr>
<tr>
<td>7. <em>S. sylvestre</em> &amp; <em>Carex indica</em></td>
<td>-</td>
<td>1.481</td>
<td>0.000</td>
</tr>
<tr>
<td>8. <em>S. sylvestre</em> &amp; <em>Cassia mimosoides</em></td>
<td>-</td>
<td>0.468</td>
<td>0.176</td>
</tr>
<tr>
<td>9. <em>S. sylvestre</em> &amp; <em>Centella asiatica</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000</td>
</tr>
<tr>
<td>10. <em>S. sylvestre</em> &amp; <em>Chloris delicatula</em></td>
<td>+</td>
<td>0.092</td>
<td>0.250</td>
</tr>
<tr>
<td>11. <em>S. sylvestre</em> &amp; <em>Chrysopogon aciculatus</em></td>
<td>-</td>
<td>5.714*</td>
<td>0.000</td>
</tr>
<tr>
<td>12. <em>S. sylvestre</em> &amp; <em>Crotalaria alata</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000</td>
</tr>
<tr>
<td>13. <em>S. sylvestre</em> &amp; <em>Crotalaria ferruginea</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000</td>
</tr>
<tr>
<td>14. <em>S. sylvestre</em> &amp; <em>Crotalaria pallida</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000</td>
</tr>
<tr>
<td>15. <em>S. sylvestre</em> &amp; <em>Crotalaria prostrata</em></td>
<td>+</td>
<td>0.208</td>
<td>0.353</td>
</tr>
<tr>
<td>16. <em>S. sylvestre</em> &amp; <em>Cymbopogon pendulus</em></td>
<td>+</td>
<td>0.701</td>
<td>0.648</td>
</tr>
<tr>
<td>17. <em>S. sylvestre</em> &amp; <em>Cyperus alalatus</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000</td>
</tr>
<tr>
<td>18. <em>S. sylvestre</em> &amp; <em>Cyperus cyperoides</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000</td>
</tr>
<tr>
<td>19. <em>S. sylvestre</em> &amp; <em>Cyperus juncoides</em></td>
<td>+</td>
<td>0.134</td>
<td>0.471</td>
</tr>
<tr>
<td>20. <em>S. sylvestre</em> &amp; <em>Desmodium heterophyllum</em></td>
<td>+</td>
<td>3.333</td>
<td>0.500</td>
</tr>
<tr>
<td>21. <em>S. sylvestre</em> &amp; <em>Desmodium triflorum</em></td>
<td>+</td>
<td>0.065</td>
<td>0.600</td>
</tr>
<tr>
<td>22. <em>S. sylvestre</em> &amp; <em>Digitaria griffithii</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table Contd.
## Table-3.34

<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chi-square</th>
<th>Association Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ochiai   Dice Jaccard</td>
</tr>
<tr>
<td>23. <em>S. sylvestre</em> &amp; <em>Elephantopus scaber</em></td>
<td>+</td>
<td>0.357</td>
<td>0.433    0.428 0.272</td>
</tr>
<tr>
<td>24. &quot; &amp; <em>Emilia sonchifolia</em></td>
<td>+</td>
<td>0.092</td>
<td>0.250    0.200 0.111</td>
</tr>
<tr>
<td>25. &quot; &amp; <em>Eragrostis nigra</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000    0.000 0.000</td>
</tr>
<tr>
<td>26. &quot; &amp; <em>Eragrostis tenella</em></td>
<td>+</td>
<td>0.357</td>
<td>0.433    0.428 0.272</td>
</tr>
<tr>
<td>27. &quot; &amp; <em>Eragrostis unioloides</em></td>
<td>+</td>
<td>1.578</td>
<td>0.353    0.222 0.125</td>
</tr>
<tr>
<td>28. &quot; &amp; <em>Eriocaulon cinereum</em></td>
<td>-</td>
<td>0.468</td>
<td>0.176    0.166 0.090</td>
</tr>
<tr>
<td>29. &quot; &amp; <em>Eulalia fastigiata</em></td>
<td>+</td>
<td>1.045</td>
<td>0.408    0.363 0.222</td>
</tr>
<tr>
<td>30. &quot; &amp; <em>Hedyotis corymbosa</em></td>
<td>-</td>
<td>0.468</td>
<td>0.176    0.166 0.090</td>
</tr>
<tr>
<td>31. &quot; &amp; <em>Hedyotis diffusa</em></td>
<td>+</td>
<td>0.092</td>
<td>0.250    0.200 0.111</td>
</tr>
<tr>
<td>32. &quot; &amp; <em>Hedyotis herbacea</em></td>
<td>+</td>
<td>2.552</td>
<td>0.530    0.500 0.333</td>
</tr>
<tr>
<td>33. &quot; &amp; <em>Hedyotis pinifolia</em></td>
<td>+</td>
<td>1.578</td>
<td>0.353    0.222 0.125</td>
</tr>
<tr>
<td>34. &quot; &amp; <em>Hyptis suaveoleus</em></td>
<td>-</td>
<td>0.158</td>
<td>0.288    0.285 0.166</td>
</tr>
<tr>
<td>35. &quot; &amp; <em>Imperata cylindrica</em></td>
<td>+</td>
<td>0.468</td>
<td>0.618    0.583 0.411</td>
</tr>
<tr>
<td>36. &quot; &amp; <em>Isachne albens</em></td>
<td>-</td>
<td>0.065</td>
<td>0.204    0.181 0.100</td>
</tr>
<tr>
<td>37. &quot; &amp; <em>Laggera aurita</em></td>
<td>+</td>
<td>1.578</td>
<td>0.353    0.222 0.125</td>
</tr>
<tr>
<td>38. &quot; &amp; <em>Lindernia ciliata</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000    0.000 0.000</td>
</tr>
<tr>
<td>39. &quot; &amp; <em>Lindernia crustacea</em></td>
<td>-</td>
<td>0.034</td>
<td>0.375    0.375 0.230</td>
</tr>
<tr>
<td>40. &quot; &amp; <em>Lindernia hookeri</em></td>
<td>-</td>
<td>0.065</td>
<td>0.204    0.181 0.100</td>
</tr>
<tr>
<td>41. &quot; &amp; <em>Lindernia parviflora</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000    0.000 0.000</td>
</tr>
<tr>
<td>42. &quot; &amp; <em>Lindernia sp.</em></td>
<td>-</td>
<td>0.065</td>
<td>0.204    0.181 0.100</td>
</tr>
<tr>
<td>43. &quot; &amp; <em>Lobelia alsinoides</em></td>
<td>+</td>
<td>3.333</td>
<td>0.500    0.400 0.250</td>
</tr>
<tr>
<td>44. &quot; &amp; <em>Mitracarpus verticillatus</em></td>
<td>-</td>
<td>3.333</td>
<td>0.500    0.461 0.300</td>
</tr>
<tr>
<td>45. &quot; &amp; <em>Mitracarpus pygmaea</em></td>
<td>+</td>
<td>0.208</td>
<td>0.353    0.333 0.200</td>
</tr>
<tr>
<td>46. &quot; &amp; <em>Mnesithea laevis</em></td>
<td>+</td>
<td>1.578</td>
<td>0.353    0.222 0.125</td>
</tr>
<tr>
<td>47. &quot; &amp; <em>Murdannia nudiflora</em></td>
<td>-</td>
<td>0.303</td>
<td>0.353    0.352 0.214</td>
</tr>
<tr>
<td>48. &quot; &amp; <em>Ophioglossum reticulatum</em></td>
<td>+</td>
<td>1.578</td>
<td>0.353    0.222 0.125</td>
</tr>
<tr>
<td>49. &quot; &amp; <em>Paspalum scrobiculatum</em></td>
<td>+</td>
<td>2.154</td>
<td>0.639    0.631 0.461</td>
</tr>
<tr>
<td>50. &quot; &amp; <em>Phyllanthus urinaria</em></td>
<td>+</td>
<td>0.701</td>
<td>0.648    0.592 0.421</td>
</tr>
<tr>
<td>51. &quot; &amp; <em>Phyllanthus virgatus</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000    0.000 0.000</td>
</tr>
<tr>
<td>52. &quot; &amp; <em>Prunella vulgaris</em></td>
<td>+</td>
<td>0.586</td>
<td>0.588    0.571 0.400</td>
</tr>
</tbody>
</table>

Table Contd.
Contd. Table-3.34

<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chi-square</th>
<th>Association Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ochiai</td>
</tr>
<tr>
<td>53. <em>S. sylvestre</em> &amp; <em>Pueraria phaseoloides</em></td>
<td>+</td>
<td>1.481</td>
<td>0.666</td>
</tr>
<tr>
<td>54. &quot; &amp; <em>Rungia pectinata</em></td>
<td>+</td>
<td>0.701</td>
<td>0.648</td>
</tr>
<tr>
<td>55. &quot; &amp; <em>Saccharum spontaneum</em></td>
<td>0</td>
<td>0.000</td>
<td>0.632</td>
</tr>
<tr>
<td>56. &quot; &amp; <em>Salomonia ciliata</em></td>
<td>+</td>
<td>0.134</td>
<td>0.471</td>
</tr>
<tr>
<td>57. &quot; &amp; <em>Schizachyrium brevifolium</em></td>
<td>+</td>
<td>0.134</td>
<td>0.471</td>
</tr>
<tr>
<td>58. &quot; &amp; <em>Scleria caricina</em></td>
<td>-</td>
<td>0.158</td>
<td>0.288</td>
</tr>
<tr>
<td>59. &quot; &amp; <em>Scleria parvula</em></td>
<td>+</td>
<td>0.092</td>
<td>0.250</td>
</tr>
<tr>
<td>60. &quot; - &amp; <em>Selaginella sp.</em></td>
<td>-</td>
<td>0.303</td>
<td>0.353</td>
</tr>
<tr>
<td>61. &quot; &amp; <em>Smithia conferta</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000</td>
</tr>
<tr>
<td>62. &quot; &amp; <em>Sporobolus indicus</em></td>
<td>0</td>
<td>0.000</td>
<td>0.632</td>
</tr>
<tr>
<td>63. &quot; &amp; <em>Stephania japonica</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000</td>
</tr>
<tr>
<td>64. &quot; &amp; <em>Triumfetta rhomboidea</em></td>
<td>-</td>
<td>1.481</td>
<td>0.000</td>
</tr>
<tr>
<td>65. &quot; &amp; <em>Urena lobata</em></td>
<td>+</td>
<td>1.578</td>
<td>0.353</td>
</tr>
<tr>
<td>66. &quot; &amp; <em>Vernonia cinerea</em></td>
<td>-</td>
<td>0.036</td>
<td>0.490</td>
</tr>
<tr>
<td>67. &quot; &amp; <em>Vetiveria zizanioides</em></td>
<td>-</td>
<td>0.701</td>
<td>0.000</td>
</tr>
<tr>
<td>68. &quot; &amp; <em>Zornia gibbosa</em></td>
<td>+</td>
<td>0.158</td>
<td>0.567</td>
</tr>
</tbody>
</table>

Sign ‘+’ for positive direction, ‘-’ for negative direction and ‘0’ for no interaction of the species association. * Significant at 5% level.

3.2.5.2.2. SITE-II: WINTER SEASON

Table-3.35 exhibits that there were 43 species pairs with *S. sylvestre* in site-II during winter-’98. Out of these, only 16 combinations had positive association values, 21 showed negative association and 6 combinations showed no interaction. Three species viz. *Crotalaria prostrata*, *Elephantopus scaber* and *Phyllanthus virgatus* showed significant positive association with *S. sylvestre* in this site.

The observed Ochiai, Dice and Jaccard indices of the degree of association also indicated that *Phyllanthus virgatus*, *Elephantopus scaber*, *Crotalaria prostrata* and *Vernonia cinerea* were highly associated with *S. sylvestre*. In addition, 16 species showed association indices values of ‘0’ (Zero) due to their non occurrence in any quadrat with *S. sylvestre* in site-II during winter-’98.
Table-3.35 : Interspecific association indices, association types and chi-square test statistics between *Streptocaulon sylvestre* and its associated species at Site-II in Winter-1998.

<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chi-square</th>
<th>Association Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ochiai</td>
</tr>
<tr>
<td>1. <em>S. sylvestre</em> &amp; <em>Ageratum conyzoides</em></td>
<td>-</td>
<td>0.350</td>
<td>0.000</td>
</tr>
<tr>
<td>2. &quot; &amp; <em>Ageratum houstonianum</em></td>
<td>-</td>
<td>0.350</td>
<td>0.000</td>
</tr>
<tr>
<td>3. &quot; &amp; <em>Apocopsis paleacea</em></td>
<td>-</td>
<td>0.350</td>
<td>0.000</td>
</tr>
<tr>
<td>4. &quot; &amp; <em>Borreria alata</em></td>
<td>+</td>
<td>0.659</td>
<td>0.496</td>
</tr>
<tr>
<td>5. &quot; &amp; <em>Centella asiatica</em></td>
<td>+</td>
<td>3.157</td>
<td>0.447</td>
</tr>
<tr>
<td>6. &quot; &amp; <em>Chrysopogon aciculatus</em></td>
<td>0</td>
<td>0.000</td>
<td>0.223</td>
</tr>
<tr>
<td>7. &quot; &amp; <em>Crotalaria prostrata</em></td>
<td>+</td>
<td>4.355*</td>
<td>0.600</td>
</tr>
<tr>
<td>8. &quot; &amp; <em>Cynoglossum lanceolatum</em></td>
<td>-</td>
<td>0.350</td>
<td>0.000</td>
</tr>
<tr>
<td>9. &quot; &amp; <em>Cymbopogon pendulus</em></td>
<td>-</td>
<td>0.317</td>
<td>0.358</td>
</tr>
<tr>
<td>10. &quot; &amp; <em>Cynodon dactylon</em></td>
<td>+</td>
<td>3.267</td>
<td>0.516</td>
</tr>
<tr>
<td>11. &quot; &amp; <em>Desmodium heterophyllum</em></td>
<td>0</td>
<td>0.000</td>
<td>0.223</td>
</tr>
<tr>
<td>12. &quot; &amp; <em>Desmodium triflorum</em></td>
<td>-</td>
<td>0.266</td>
<td>0.282</td>
</tr>
<tr>
<td>13. &quot; &amp; <em>Digitaria ciliaris</em></td>
<td>-</td>
<td>0.350</td>
<td>0.000</td>
</tr>
<tr>
<td>14. &quot; &amp; <em>Drosera burmannii</em></td>
<td>+</td>
<td>0.740</td>
<td>0.316</td>
</tr>
<tr>
<td>15. &quot; &amp; <em>Elephantopus scaber</em></td>
<td>+</td>
<td>6.666*</td>
<td>0.632</td>
</tr>
<tr>
<td>16. &quot; &amp; <em>Eleusine indica</em></td>
<td>0</td>
<td>0.000</td>
<td>0.223</td>
</tr>
<tr>
<td>17. &quot; &amp; <em>Emilia sonchifolia</em></td>
<td>0</td>
<td>0.000</td>
<td>0.223</td>
</tr>
<tr>
<td>18. &quot; &amp; <em>Eragrostis nigra</em></td>
<td>+</td>
<td>3.267</td>
<td>0.516</td>
</tr>
<tr>
<td>19. &quot; &amp; <em>Eragrostis unioloides</em></td>
<td>+</td>
<td>0.130</td>
<td>0.258</td>
</tr>
<tr>
<td>20. &quot; &amp; <em>Eriocaulon quinquangulare</em></td>
<td>+</td>
<td>0.740</td>
<td>0.316</td>
</tr>
<tr>
<td>21. &quot; &amp; <em>Hedyotis corymbosa</em></td>
<td>+</td>
<td>3.267</td>
<td>0.516</td>
</tr>
<tr>
<td>22. &quot; &amp; <em>Hedyotis diffusa</em></td>
<td>-</td>
<td>1.666</td>
<td>0.000</td>
</tr>
<tr>
<td>23. &quot; &amp; <em>Hyptis suaveolens</em></td>
<td>-</td>
<td>1.176</td>
<td>0.000</td>
</tr>
<tr>
<td>24. &quot; &amp; <em>Imperata cyldrica</em></td>
<td>+</td>
<td>0.659</td>
<td>0.496</td>
</tr>
<tr>
<td>25. &quot; &amp; <em>Leucas indica</em></td>
<td>-</td>
<td>0.350</td>
<td>0.000</td>
</tr>
<tr>
<td>26. &quot; &amp; <em>Mimosa pudica</em></td>
<td>-</td>
<td>2.857</td>
<td>0.000</td>
</tr>
<tr>
<td>27. &quot; &amp; <em>Mitracarpus verticillatus</em></td>
<td>-</td>
<td>0.740</td>
<td>0.421</td>
</tr>
</tbody>
</table>
During winter-'99, there were 33 species pairs when each species was coupled once with *S. sylvestre* in site-II (Table- 3.36). Out of them, only 11 pairs showed positive association and 14 pairs showed negative association. The remaining 8 pairs had no interaction. From the observed values of Ochiai, Dice and Jaccard indices it was postulated that *Sporobolus indicus*, *Rungia pectinata*, *Cymbopogon pendulus*, *Desmodium triflorum* and *Pueraria phaseoloides* were highly associated with *S. sylvestre*. Moreover 8 species pairs had the minimum indices value of ‘0’ which indicated that there were no association of these species with *S. sylvestre* in site-II during winter-'99.
Table 3.36: Interspecific association indices, association types and chi-square test statistics between *Streptocaulon sylvestre* and its associated species at Site-II in Winter-1999.

<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chi-square</th>
<th>Chi-square</th>
<th>Chi-square</th>
<th>Chi-square</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ochiai</td>
<td>Dice</td>
<td>Jaccard</td>
<td>Ochiai</td>
<td>Dice</td>
</tr>
<tr>
<td>1. <em>S. sylvestre</em> &amp; <em>Ageratum conyzoides</em></td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>2. &quot; &amp; <em>Ageratum houstonianum</em></td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>3. &quot; &amp; <em>Borreria alata</em></td>
<td>-</td>
<td>0.392</td>
<td>0.182</td>
<td>0.153</td>
<td>0.083</td>
</tr>
<tr>
<td>4. &quot; &amp; <em>Brachiaria reptans</em></td>
<td>0</td>
<td>0.000</td>
<td>0.223</td>
<td>0.166</td>
<td>0.09</td>
</tr>
<tr>
<td>5. &quot; &amp; <em>Centella asiatica</em></td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>6. &quot; &amp; <em>Cymbopogon pendulus</em></td>
<td>-</td>
<td>1.052</td>
<td>0.653</td>
<td>0.620</td>
<td>0.450</td>
</tr>
<tr>
<td>7. &quot; &amp; <em>Cynodon dactylon</em></td>
<td>0</td>
<td>0.000</td>
<td>0.223</td>
<td>0.166</td>
<td>0.090</td>
</tr>
<tr>
<td>8. &quot; &amp; <em>Desmodium heterophyllum</em></td>
<td>+</td>
<td>1.052</td>
<td>0.316</td>
<td>0.181</td>
<td>0.100</td>
</tr>
<tr>
<td>9. &quot; &amp; <em>Desmodium triflorum</em></td>
<td>+</td>
<td>0.800</td>
<td>0.600</td>
<td>0.600</td>
<td>0.428</td>
</tr>
<tr>
<td>10. &quot; &amp; <em>Digitaria ciliaris</em></td>
<td>+</td>
<td>0.266</td>
<td>0.424</td>
<td>0.400</td>
<td>0.250</td>
</tr>
<tr>
<td>11. &quot; &amp; <em>Digitaria griffithii</em></td>
<td>+</td>
<td>1.052</td>
<td>0.316</td>
<td>0.166</td>
<td>0.100</td>
</tr>
<tr>
<td>12. &quot; &amp; <em>Drosera burmannii</em></td>
<td>+</td>
<td>1.052</td>
<td>0.316</td>
<td>0.181</td>
<td>0.100</td>
</tr>
<tr>
<td>13. &quot; &amp; <em>Elephantopus scaber</em></td>
<td>-</td>
<td>0.266</td>
<td>0.282</td>
<td>0.266</td>
<td>0.153</td>
</tr>
<tr>
<td>14. &quot; &amp; <em>Emilia sonchifolia</em></td>
<td>+</td>
<td>1.052</td>
<td>0.316</td>
<td>0.181</td>
<td>0.100</td>
</tr>
<tr>
<td>15. &quot; &amp; <em>Eragrostis tenella</em></td>
<td>0</td>
<td>0.000</td>
<td>0.223</td>
<td>0.166</td>
<td>0.090</td>
</tr>
<tr>
<td>16. &quot; &amp; <em>Eragrostis unioloides</em></td>
<td>0</td>
<td>0.000</td>
<td>0.316</td>
<td>0.285</td>
<td>0.166</td>
</tr>
<tr>
<td>17. &quot; &amp; <em>Hyptis suaveoleus</em></td>
<td>+</td>
<td>1.052</td>
<td>0.316</td>
<td>0.166</td>
<td>0.100</td>
</tr>
<tr>
<td>18. &quot; &amp; <em>Imperata cylindrica</em></td>
<td>-</td>
<td>0.266</td>
<td>0.571</td>
<td>0.560</td>
<td>0.388</td>
</tr>
<tr>
<td>19. &quot; &amp; <em>Isachne albens</em></td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>20. &quot; &amp; <em>Merremia hirta</em></td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>21. &quot; &amp; <em>Mimosa pudica</em></td>
<td>-</td>
<td>2.222</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>22. &quot; &amp; <em>Mitracarpus verticillatus</em></td>
<td>0</td>
<td>0.000</td>
<td>0.500</td>
<td>0.500</td>
<td>0.333</td>
</tr>
<tr>
<td>23. &quot; &amp; <em>Paspalum scrobiculatum</em></td>
<td>-</td>
<td>1.818</td>
<td>0.381</td>
<td>0.380</td>
<td>0.235</td>
</tr>
<tr>
<td>24. &quot; &amp; <em>Phyllanthus urinaria</em></td>
<td>-</td>
<td>2.222</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>25. &quot; &amp; <em>Phyllanthus virgatus</em></td>
<td>-</td>
<td>1.052</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>26. &quot; &amp; <em>Pueraria phaseoloides</em></td>
<td>+</td>
<td>0.800</td>
<td>0.600</td>
<td>0.600</td>
<td>0.428</td>
</tr>
<tr>
<td>27. &quot; &amp; <em>Raingia pectinata</em></td>
<td>0</td>
<td>0.000</td>
<td>0.670</td>
<td>0.642</td>
<td>0.473</td>
</tr>
<tr>
<td>28. &quot; &amp; <em>Saccharum spontaneum</em></td>
<td>-</td>
<td>2.400</td>
<td>0.489</td>
<td>0.480</td>
<td>0.315</td>
</tr>
<tr>
<td>29. &quot; &amp; <em>Sporobolus indicus</em></td>
<td>0</td>
<td>0.000</td>
<td>0.707</td>
<td>0.666</td>
<td>0.500</td>
</tr>
<tr>
<td>30. &quot; &amp; <em>Triumfetta rhomboidea</em></td>
<td>+</td>
<td>1.052</td>
<td>0.316</td>
<td>0.181</td>
<td>0.100</td>
</tr>
<tr>
<td>31. &quot; &amp; <em>Urena lobata</em></td>
<td>+</td>
<td>0.392</td>
<td>0.365</td>
<td>0.307</td>
<td>0.181</td>
</tr>
<tr>
<td>32. &quot; &amp; <em>Vernonia cinerea</em></td>
<td>0</td>
<td>0.000</td>
<td>0.500</td>
<td>0.500</td>
<td>0.333</td>
</tr>
<tr>
<td>33. &quot; &amp; <em>Vetiveria zizanioides</em></td>
<td>+</td>
<td>3.529</td>
<td>0.547</td>
<td>0.461</td>
<td>0.300</td>
</tr>
</tbody>
</table>

Sign '+' for positive direction, '-' for negative direction and '0' for no interaction of the species association.
EXPLANATIONS OF PHOTOGRAPHS

Plate II.
Natural associates of *Streptocaulon sylvestre* Wight (continued):

- Photo 1. *Borreria alata*
- Photo 2. *Elephantopus scaber*
- Photo 3. *Vernonia cinerea*
- Photo 4. *Centranthera indica*
- Photo 5. *Paspalum scrobiculatum*
- Photo 6. *Rungia pectinata*
- Photo 7. *Pennisetum glaucum*
- Photo 8. *Pueraria phaseoloides*
- Photo 9. *Cassia occidentalis*
- Photo 10. *Mitracarpus verticillatus*
- Photo 11. *Crotalaria prostrata*
- Photo 12. *Phyllanthus urinaria*
- Photo 13. *Zornia gibbosa*
- Photo 14. *Hedyotis corymbosa*
- Photo 15. *Sacciolepis myosuroides*
- Photo 16. *Salomonia ciliata*
3.2.5.2.3. SITE-II : SUMMER SEASON

Floristic composition of site-II revealed the presence of altogether 53 different species which paired with *S. sylvestre* in summer-'98 (Table-3.37). Out of these, 22 pairs showed positive and 26 pairs showed negative association values; 4 of them viz. *Digitaria ciliaris, Pueraria phaseoloides, Schizachyrium brevifolium* and *Zornia gibbosa* also had significant positive association values. The remaining 5 pairs had no interaction.

Table-3.37 : Interspecific association indices, association types and chi-square test statistics between *Streptocaulon sylvestre* and its associated species at Site-II during Summer-1998.

<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chi-square</th>
<th>Association Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ochiai  Dice  Jaccard</td>
</tr>
<tr>
<td>1. <em>S. sylvestre</em> &amp; <em>Ageratum conyzoides</em></td>
<td>-</td>
<td>0.350</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>2. &quot; &amp; <em>Ageratum houstonianum</em></td>
<td>-</td>
<td>0.350</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>3. &quot; &amp; <em>Andropogon ascinodis</em></td>
<td>+</td>
<td>0.130</td>
<td>0.258 0.250 0.142</td>
</tr>
<tr>
<td>4. &quot; &amp; <em>Apocopis paleacea</em></td>
<td>-</td>
<td>0.350</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>5. &quot; &amp; <em>Borreria alata</em></td>
<td>0</td>
<td>0.000</td>
<td>0.500 0.400 0.250</td>
</tr>
<tr>
<td>6. &quot; &amp; <em>Carex indica</em></td>
<td>-</td>
<td>0.740</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>7. &quot; &amp; <em>Cassia mimosoides</em></td>
<td>+</td>
<td>0.740</td>
<td>0.316 0.285 0.166</td>
</tr>
<tr>
<td>8. &quot; &amp; <em>Chrysopogon aciculatus</em></td>
<td>+</td>
<td>0.606</td>
<td>0.447 0.428 0.272</td>
</tr>
<tr>
<td>9. &quot; &amp; <em>Crotalaria alata</em></td>
<td>+</td>
<td>3.157</td>
<td>0.447 0.333 0.200</td>
</tr>
<tr>
<td>10. &quot; &amp; <em>Crotalaria ferruginea</em></td>
<td>+</td>
<td>1.666</td>
<td>0.447 0.444 0.285</td>
</tr>
<tr>
<td>11. &quot; &amp; <em>Crotalaria prostrata</em></td>
<td>+</td>
<td>3.157</td>
<td>0.447 0.333 0.200</td>
</tr>
<tr>
<td>12. &quot; &amp; <em>Cyanotis nudiflora</em></td>
<td>-</td>
<td>0.350</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>13. &quot; &amp; <em>Cymbopogon microtheca</em></td>
<td>-</td>
<td>0.350</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>14. &quot; &amp; <em>Cymbopogon pendulus</em></td>
<td>+</td>
<td>1.666</td>
<td>0.559 0.476 0.312</td>
</tr>
<tr>
<td>15. &quot; &amp; <em>Cyperus alulatus</em></td>
<td>-</td>
<td>0.350</td>
<td>0.000 0.000 0.000</td>
</tr>
<tr>
<td>16. &quot; &amp; <em>Cyperus compressus</em></td>
<td>+</td>
<td>0.740</td>
<td>0.316 0.285 0.166</td>
</tr>
<tr>
<td>17. &quot; &amp; <em>Cyperus cyperoides</em></td>
<td>-</td>
<td>1.111</td>
<td>0.158 0.153 0.083</td>
</tr>
<tr>
<td>18. &quot; &amp; <em>Desmodium heterophyllum</em></td>
<td>+</td>
<td>0.130</td>
<td>0.258 0.250 0.142</td>
</tr>
<tr>
<td>19. &quot; &amp; <em>Desmodium triflorum</em></td>
<td>-</td>
<td>1.111</td>
<td>0.258 0.235 0.133</td>
</tr>
<tr>
<td>20. &quot; &amp; <em>Digitaria ciliaris</em></td>
<td>+</td>
<td>4.355*</td>
<td>0.600 0.600 0.428</td>
</tr>
<tr>
<td>21. &quot; &amp; <em>Elephantopus scaber</em></td>
<td>+</td>
<td>0.740</td>
<td>0.316 0.285 0.166</td>
</tr>
</tbody>
</table>

*Table Contd.*
Table 3.37

<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chi-square</th>
<th>Association Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ochiai</td>
</tr>
<tr>
<td>22. <em>S. sylvestre &amp; Emilia sonchifolia</em></td>
<td>+</td>
<td>1.666</td>
<td>0.447</td>
</tr>
<tr>
<td>23. * &amp; Eragrostis nigra*</td>
<td>-</td>
<td>0.350</td>
<td>0.000</td>
</tr>
<tr>
<td>24. * &amp; Eragrostis tenella*</td>
<td>+</td>
<td>1.111</td>
<td>0.474</td>
</tr>
<tr>
<td>25. * &amp; Eragrostis unioloides*</td>
<td>-</td>
<td>0.350</td>
<td>0.000</td>
</tr>
<tr>
<td>26. * &amp; Hedyotis corymbosa*</td>
<td>-</td>
<td>0.350</td>
<td>0.000</td>
</tr>
<tr>
<td>27. * &amp; Hedyotis diffusa*</td>
<td>-</td>
<td>0.350</td>
<td>0.000</td>
</tr>
<tr>
<td>28. * &amp; Hypsista suaveoleus*</td>
<td>0</td>
<td>0.000</td>
<td>0.223</td>
</tr>
<tr>
<td>29. * &amp; Imperata cylindrica*</td>
<td>+</td>
<td>0.740</td>
<td>0.527</td>
</tr>
<tr>
<td>30. * &amp; Leucaena leucocephala*</td>
<td>-</td>
<td>0.350</td>
<td>0.000</td>
</tr>
<tr>
<td>31. * &amp; Leucas indica*</td>
<td>+</td>
<td>0.740</td>
<td>0.316</td>
</tr>
<tr>
<td>32. * &amp; Lindernia cordifolia*</td>
<td>-</td>
<td>0.350</td>
<td>0.000</td>
</tr>
<tr>
<td>33. * &amp; Lindernia crustacea*</td>
<td>+</td>
<td>0.317</td>
<td>0.365</td>
</tr>
<tr>
<td>34. * &amp; Mimosa pudica*</td>
<td>-</td>
<td>1.176</td>
<td>0.000</td>
</tr>
<tr>
<td>35. * &amp; Mitracarpus verticillatus*</td>
<td>-</td>
<td>0.317</td>
<td>0.358</td>
</tr>
<tr>
<td>36. * &amp; Mnesithea laevis*</td>
<td>-</td>
<td>0.067</td>
<td>0.298</td>
</tr>
<tr>
<td>37. * &amp; Paspalum scrobiculatum*</td>
<td>-</td>
<td>0.606</td>
<td>0.269</td>
</tr>
<tr>
<td>38. * &amp; Phyllanthus virgatus*</td>
<td>+</td>
<td>0.740</td>
<td>0.527</td>
</tr>
<tr>
<td>39. * &amp; Prunella vulgaris*</td>
<td>-</td>
<td>0.740</td>
<td>0.000</td>
</tr>
<tr>
<td>40. * &amp; Pueraria phaseoloides*</td>
<td>+</td>
<td>5.454*</td>
<td>0.674</td>
</tr>
<tr>
<td>41. * &amp; Rottboellia sp.*</td>
<td>-</td>
<td>0.350</td>
<td>0.000</td>
</tr>
<tr>
<td>42. * &amp; Rungia pectinata*</td>
<td>+</td>
<td>0.130</td>
<td>0.258</td>
</tr>
<tr>
<td>43. * &amp; Saccharum spontaneum*</td>
<td>0</td>
<td>0.000</td>
<td>0.500</td>
</tr>
<tr>
<td>44. * &amp; Salomonia ciliata*</td>
<td>+</td>
<td>2.400</td>
<td>0.565</td>
</tr>
<tr>
<td>45. * &amp; Schizachyrium brevifolium*</td>
<td>+</td>
<td>4.444*</td>
<td>0.632</td>
</tr>
<tr>
<td>46. * &amp; Setaria pumila*</td>
<td>-</td>
<td>0.350</td>
<td>0.000</td>
</tr>
<tr>
<td>47. * &amp; Sporobolus indicus*</td>
<td>0</td>
<td>0.000</td>
<td>0.500</td>
</tr>
<tr>
<td>48. * &amp; Triumfetta pilosa*</td>
<td>-</td>
<td>0.350</td>
<td>0.000</td>
</tr>
<tr>
<td>49. * &amp; Triumfetta rhomboidea*</td>
<td>-</td>
<td>0.350</td>
<td>0.000</td>
</tr>
<tr>
<td>50. * &amp; Urena lobata*</td>
<td>-</td>
<td>0.350</td>
<td>0.000</td>
</tr>
<tr>
<td>51. * &amp; Vernonia cinerea*</td>
<td>0</td>
<td>0.000</td>
<td>0.447</td>
</tr>
<tr>
<td>52. * &amp; Vetiveria zizanioides*</td>
<td>-</td>
<td>1.666</td>
<td>0.000</td>
</tr>
<tr>
<td>53. * &amp; Zornia gibbosa*</td>
<td>+</td>
<td>4.444*</td>
<td>0.645</td>
</tr>
</tbody>
</table>

Sign ‘+’, ‘-’ and ‘0’ indicates direction of the species association, ‘+’ for positive, ‘-’ for negative and ‘0’ for no interaction. * Significant at 5% level.
Based on the Ochiai, Dice and Jaccard indices it was seen that *Pueraria phaseoloides*, *Zornia gibbosa*, *Schizachyrium brevifolium* and *Digitaria ciliaris* were highly associated with *S. sylvestre*. On the other hand, 21 species pairs showed the minimum indices value of ‘0’ due to no occurrence in any quadrat with *S. sylvestre* in site-II during summer-’98.

Vegetation analysis of site-II community in summer-’99 season showed 60 species to pair with *S. sylvestre* (Table-3.38). Of these pairs, 33 pairs were positively associated while 26 pairs showed negative association. Only a single species *Saccharum spontaneum* showed no interaction with *S. sylvestre*. On the basis of Ochiai, Dice and Jaccard indices of the degree of association it was indicated that *Sporobolus indicus*, *Saccharum spontaneum*, *Imperata cylindrica*, *Desmodium triflorum* and *Pueraria phaseoloides* were highly associated with *S. sylvestre*. But, 14 species pairs had the minimum indices value of ‘0’ indicating that these species were never associated with *S. sylvestre* in site-II during summer-’99.

**Table-3.38 : Interspecific association indices, association types and chi-square test statistics between Streptocaulon sylvestre and its associated species at Site-II in Summer-1999.**

<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chisquare</th>
<th>Ochiai</th>
<th>Dice</th>
<th>Jaccard</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <em>S. sylvestre &amp; Acacia auriculiformis</em></td>
<td>-</td>
<td>0.861</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>2. &quot; &amp; *Atylosia scarabaeoides&quot;</td>
<td>+</td>
<td>0.022</td>
<td>0.235</td>
<td>0.181</td>
<td>0.100</td>
</tr>
<tr>
<td>3. &quot; &amp; <em>Borreria alata</em></td>
<td>-</td>
<td>2.716</td>
<td>0.549</td>
<td>0.518</td>
<td>0.350</td>
</tr>
<tr>
<td>4. &quot; &amp; <em>Brachiaria reptans</em></td>
<td>+</td>
<td>0.022</td>
<td>0.235</td>
<td>0.181</td>
<td>0.100</td>
</tr>
<tr>
<td>5. &quot; &amp; <em>Cassia mimosoides</em></td>
<td>-</td>
<td>0.179</td>
<td>0.462</td>
<td>0.454</td>
<td>0.294</td>
</tr>
<tr>
<td>6. &quot; &amp; <em>Centranthera nepalensis</em></td>
<td>-</td>
<td>0.861</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>7. &quot; &amp; <em>Chrysopogon aciculatus</em></td>
<td>-</td>
<td>0.471</td>
<td>0.272</td>
<td>0.266</td>
<td>0.153</td>
</tr>
<tr>
<td>8. &quot; &amp; <em>Crotalaria ferruginea</em></td>
<td>+</td>
<td>0.669</td>
<td>0.384</td>
<td>0.333</td>
<td>0.200</td>
</tr>
<tr>
<td>9. &quot; &amp; <em>Crotalaria pallida</em></td>
<td>+</td>
<td>0.669</td>
<td>0.384</td>
<td>0.333</td>
<td>0.200</td>
</tr>
<tr>
<td>10. &quot; &amp; <em>Cymbopogon pendulus</em></td>
<td>-</td>
<td>2.716</td>
<td>0.549</td>
<td>0.518</td>
<td>0.350</td>
</tr>
<tr>
<td>11. &quot; &amp; <em>Cyperus alulatus</em></td>
<td>-</td>
<td>1.818</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>12. &quot; &amp; <em>Cyperus compressus</em></td>
<td>+</td>
<td>0.669</td>
<td>0.384</td>
<td>0.333</td>
<td>0.200</td>
</tr>
<tr>
<td>13. &quot; &amp; <em>Cyperus cyperoides</em></td>
<td>+</td>
<td>1.286</td>
<td>0.333</td>
<td>0.200</td>
<td>0.111</td>
</tr>
<tr>
<td>14. &quot; &amp; <em>Cyperus juncoideus</em></td>
<td>-</td>
<td>0.736</td>
<td>0.402</td>
<td>0.400</td>
<td>0.250</td>
</tr>
<tr>
<td>15. &quot; &amp; <em>Cyperus kyllingia</em></td>
<td>+</td>
<td>0.022</td>
<td>0.235</td>
<td>0.181</td>
<td>0.100</td>
</tr>
<tr>
<td>16. &quot; &amp; <em>Cyperus rotundus</em></td>
<td>+</td>
<td>1.286</td>
<td>0.333</td>
<td>0.200</td>
<td>0.111</td>
</tr>
</tbody>
</table>

*Table Contd.*
### Table 3.38

<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chi-square</th>
<th>Association Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ochiai</td>
</tr>
<tr>
<td>17. <em>S. sylvestre</em> &amp; <em>Desmodium heterophyllum</em></td>
<td>-</td>
<td>1.818</td>
<td>0.000</td>
</tr>
<tr>
<td>18. &quot; &amp; <em>Desmodium triflorum</em></td>
<td>+</td>
<td>0.067</td>
<td>0.602</td>
</tr>
<tr>
<td>19. &quot; &amp; <em>Digitaria bicornis</em></td>
<td>-</td>
<td>0.019</td>
<td>0.377</td>
</tr>
<tr>
<td>20. &quot; &amp; <em>Digitaria ciliaris</em></td>
<td>+</td>
<td>0.022</td>
<td>0.235</td>
</tr>
<tr>
<td>21. &quot; &amp; <em>Elephantopus scaber</em></td>
<td>+</td>
<td>0.641</td>
<td>0.503</td>
</tr>
<tr>
<td>22. &quot; &amp; <em>Eleusine indica</em></td>
<td>+</td>
<td>1.818</td>
<td>0.500</td>
</tr>
<tr>
<td>23. &quot; &amp; <em>Emilia sonchifolia</em></td>
<td>+</td>
<td>1.286</td>
<td>0.333</td>
</tr>
<tr>
<td>24. &quot; &amp; <em>Eragrostis gangetica</em></td>
<td>+</td>
<td>1.286</td>
<td>0.333</td>
</tr>
<tr>
<td>25. &quot; &amp; <em>Eragrostis nigra</em></td>
<td>+</td>
<td>2.716</td>
<td>0.471</td>
</tr>
<tr>
<td>26. &quot; &amp; <em>Eragrostis tenella</em></td>
<td>+</td>
<td>0.0202</td>
<td>0.235</td>
</tr>
<tr>
<td>27. &quot; &amp; <em>Eragrostis unioloides</em></td>
<td>-</td>
<td>0.861</td>
<td>0.000</td>
</tr>
<tr>
<td>28. &quot; &amp; <em>Euphorbia orbiculata</em></td>
<td>+</td>
<td>1.286</td>
<td>0.333</td>
</tr>
<tr>
<td>29. &quot; &amp; <em>Fimbrillaria</em> sp.*</td>
<td>+</td>
<td>1.286</td>
<td>0.333</td>
</tr>
<tr>
<td>30. &quot; &amp; <em>Fimbrystylis dichotoma</em></td>
<td>+</td>
<td>1.286</td>
<td>0.333</td>
</tr>
<tr>
<td>31. &quot; &amp; <em>Hedyotis corymbosa</em></td>
<td>-</td>
<td>0.861</td>
<td>0.000</td>
</tr>
<tr>
<td>32. &quot; &amp; <em>Hypis suaveoles</em></td>
<td>+</td>
<td>0.606</td>
<td>0.447</td>
</tr>
<tr>
<td>33. &quot; &amp; <em>Imperata cylindrica</em></td>
<td>+</td>
<td>0.899</td>
<td>0.603</td>
</tr>
<tr>
<td>34. &quot; &amp; <em>Leucas indica</em></td>
<td>+</td>
<td>1.286</td>
<td>0.333</td>
</tr>
<tr>
<td>35. &quot; &amp; <em>Lindernia ciliata</em></td>
<td>-</td>
<td>0.861</td>
<td>0.000</td>
</tr>
<tr>
<td>36. &quot; &amp; <em>Lindernia sp.</em></td>
<td>-</td>
<td>0.861</td>
<td>0.000</td>
</tr>
<tr>
<td>37. &quot; &amp; <em>Mimosa pudica</em></td>
<td>+</td>
<td>0.2202</td>
<td>0.235</td>
</tr>
<tr>
<td>38. &quot; &amp; <em>Mitracarpus verticillatus</em></td>
<td>+</td>
<td>1.818</td>
<td>0.500</td>
</tr>
<tr>
<td>39. &quot; &amp; <em>Mnesithea laevis</em></td>
<td>+</td>
<td>0.050</td>
<td>0.333</td>
</tr>
<tr>
<td>40. &quot; &amp; <em>Mukia maderaspatana</em></td>
<td>+</td>
<td>1.286</td>
<td>0.333</td>
</tr>
<tr>
<td>41. &quot; &amp; <em>Ophioglossum reticulatum</em></td>
<td>-</td>
<td>0.861</td>
<td>0.000</td>
</tr>
<tr>
<td>42. &quot; &amp; <em>Paspalum scrobiculatum</em></td>
<td>-</td>
<td>0.471</td>
<td>0.272</td>
</tr>
<tr>
<td>43. &quot; &amp; <em>Pennisetum glaucum</em></td>
<td>+</td>
<td>0.022</td>
<td>0.235</td>
</tr>
<tr>
<td>44. &quot; &amp; <em>Phyllanthus urinaria</em></td>
<td>-</td>
<td>3.103</td>
<td>0.301</td>
</tr>
<tr>
<td>45. &quot; &amp; <em>Polygala linariifolia</em></td>
<td>-</td>
<td>0.861</td>
<td>0.000</td>
</tr>
<tr>
<td>46. &quot; &amp; <em>Pueraria phaseoloides</em></td>
<td>-</td>
<td>1.286</td>
<td>0.611</td>
</tr>
<tr>
<td>47. &quot; &amp; <em>Rottboellia sp.</em></td>
<td>-</td>
<td>0.861</td>
<td>0.000</td>
</tr>
<tr>
<td>48. &quot; &amp; <em>Rungia pectinata</em></td>
<td>-</td>
<td>1.818</td>
<td>0.000</td>
</tr>
<tr>
<td>49. &quot; &amp; <em>Saccharum spontaneum</em></td>
<td>0</td>
<td>0.000</td>
<td>0.670</td>
</tr>
<tr>
<td>50. &quot; &amp; <em>Salomonia ciliata</em></td>
<td>-</td>
<td>0.861</td>
<td>0.000</td>
</tr>
</tbody>
</table>

*Table Contd.*
Analysis of phytosociological data of plant communities of the four different sites presented in the foregoing pages revealed distinct influences of climatic seasonality on vegetation characteristics. Monsoon and summer seasons were the most congenial period for plants because of the prevalence of warm ambient temperature, adequate moisture and less edaphic stress of terrestrial habitat which never submerged in water. The impact of climatic fluctuations was reflected in community characteristics like floristic make-up, density, abundance, basal area and species diversity which showed marked seasonal variations. Generally density and frequency of herbage in winter remain low, perhaps, because most of the plants complete their life cycle by this time and the seeds of a good proportion of therophytes remain dormant in the soil. In February and early March density and frequency of plants, in general, were reduced to a great extent. The main cause for this decrease may be the response of herbage species to moisture deficiency in soil and the climate which is characterized by low humidity and considerably low temperature. This is in agreement with the observations of Tripathi & Misra (1971) and Singh & Yadava (1974).

In April, the density of herbage was shoot up. In early April shooting was followed by early showers of monsoon which was helpful in the emergence of numerous seedlings and showed rapid growth during the month of June, reaching a maximum in August (monsoon). These results were in consistence with those of

<table>
<thead>
<tr>
<th>Species Pairs</th>
<th>Association type</th>
<th>Chi-square</th>
<th>Association Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ochiai</td>
</tr>
<tr>
<td>51. &quot; &amp; Schizachyrium brevifolium &amp; Sida rhombifolia &amp; Triumfetta rhomboidea &amp; Urena lobata &amp; Vernonia cinerea &amp; Vetiveria zizanioides &amp; Youngia japonica &amp; Zornia gibbosa</td>
<td>+</td>
<td>0.669</td>
<td>0.384</td>
</tr>
<tr>
<td>52. &quot; &amp; Seta pumila     &amp; Sporobolus indicus &amp; Triumfetta rhomboidea &amp; Urena lobata &amp; Vernonia cinerea &amp; Vetiveria zizanioides &amp; Youngia japonica &amp; Zornia gibbosa</td>
<td>+</td>
<td>0.022</td>
<td>0.235</td>
</tr>
<tr>
<td>53. &quot; &amp; Sida rhombifolia &amp; Sporobolus indicus &amp; Triumfetta rhomboidea &amp; Urena lobata &amp; Vernonia cinerea &amp; Vetiveria zizanioides &amp; Youngia japonica &amp; Zornia gibbosa</td>
<td>+</td>
<td>1.286</td>
<td>0.333</td>
</tr>
<tr>
<td>54. &quot; &amp; Sporobolus indicus &amp; Triumfetta rhomboidea &amp; Urena lobata &amp; Vernonia cinerea &amp; Vetiveria zizanioides &amp; Youngia japonica &amp; Zornia gibbosa</td>
<td>+</td>
<td>0.861</td>
<td>0.688</td>
</tr>
<tr>
<td>55. &quot; &amp; Triumfetta rhomboidea &amp; Urena lobata &amp; Vernonia cinerea &amp; Vetiveria zizanioides &amp; Youngia japonica &amp; Zornia gibbosa</td>
<td>+</td>
<td>0.022</td>
<td>0.235</td>
</tr>
<tr>
<td>56. &quot; &amp; Urena lobata    &amp; Vernonia cinerea &amp; Vetiveria zizanioides &amp; Youngia japonica &amp; Zornia gibbosa</td>
<td>-</td>
<td>0.861</td>
<td>0.000</td>
</tr>
<tr>
<td>57. &quot; &amp; Vernonia cinerea &amp; Vetiveria zizanioides &amp; Youngia japonica &amp; Zornia gibbosa</td>
<td>-</td>
<td>0.019</td>
<td>0.377</td>
</tr>
<tr>
<td>58. &quot; &amp; Vetiveria zizanioides &amp; Youngia japonica &amp; Zornia gibbosa</td>
<td>-</td>
<td>0.194</td>
<td>0.192</td>
</tr>
<tr>
<td>59. &quot; &amp; Youngia japonica &amp; Zornia gibbosa</td>
<td>+</td>
<td>1.286</td>
<td>0.333</td>
</tr>
<tr>
<td>60. &quot; &amp; Zornia gibbosa</td>
<td></td>
<td>0.019</td>
<td>0.377</td>
</tr>
</tbody>
</table>

Sign '+' for positive direction, '-' for negative direction and '0' for no interaction of the species association.

Contd. Table-3.38

In the present investigation it was observed that major flora of all the four sites were comprised of many perennial grasses. With their massive perennating bodies, these grasses had better means of propagation and had the ability to recover quickly after the adverse period. Mac Arthur & Wilson (1967) and Pianka (1970) showed that under stress conditions there is natural selection for those species which have more efficient means to recover and propagate after the release of stress.

The four communities were different in vegetation characters, although there was a broad similarity in major species composition. When compared to sites-III and IV, sites-II and I showed greater plant density and basal area cover. Relatively higher similarity between the sites-I and II was obviously because these are adjacent and located within the same climatic region. Moreover, sites-III and IV were more disturbed as remaining as an open field due to anthropogenic activities. On the other hand, sites-I and II were controlled by the University authority and was comparatively less disturbed specially during monsoon and summer seasons.

Out of the total 227 species, recorded through quadrat sampling, only 33 species were common for all the four sites (Table-3.39). Again, 19 species were represented by only one individual in only one quadrat in one site (Table-3.40). It is not that all the plants recorded in Table-3.40 are rare plants, rather, majority of those are common in places around the demarcated sites. But, due to the special structure of selected pieces of vegetation these plants could not grow there properly or luxuriently.

The overall plant community of site-I and II, based on dominant species in different seasons, could be named as Borreria -Sporobolus-Cymbopogon community. The site-III was dominated by Borreria alata, Echinochloa crusgalli and Saccharum spontaneum, which could be named as Borreria-Echinochloa-Saccharum community. Similarly site-IV could be named as Imperata-Cynodon community which was dominated by Imperata cylindrica and Cynodon dactylon.

Further, analysis of results also indicated that most of the association between Streptocaulon sylvestre and other species in different seasons were not strong as evident from different indices of association (Ochiai, Dice and Jaccard) and some of them showed no association at all. Although a few species viz. Borreria alata, Phyllanthus urinaria, Cymbopogon pendulus, Desmodium triflorum, Sporobolus indicus, Pueraria phaseoloides, Saccharum spontaneum, Crotalaria prostrata, Paspalum scrobiculatum, Phyllanthus virgatus, Elephantopus scaber, Rungia pectinata,
### Table-38: List of common and uncommon species in four Sites under present survey.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Common species found in all Sites</th>
<th>Site-I</th>
<th>Site-II</th>
<th>Site-III</th>
<th>Site-IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Ageratum conyzoides</em></td>
<td>Ageratum conyzoides</td>
<td>Ageratum conyzoides</td>
<td>Acacia auriculiformis</td>
<td>Achyranthes porphyristachya</td>
</tr>
<tr>
<td>2</td>
<td><em>Axonopus compressus</em></td>
<td>Axonopus compressus</td>
<td>Breynia retusa</td>
<td>Bulbosystis densa</td>
<td>Alternanthera sessilis</td>
</tr>
<tr>
<td>3</td>
<td><em>Borreria alata</em></td>
<td>Borreria alata</td>
<td>Centranthera grandiflora</td>
<td>Centranthera nepalensis</td>
<td>Blumea lacerca</td>
</tr>
<tr>
<td>4</td>
<td><em>Brachiaria reptans</em></td>
<td>Brachiaria reptans</td>
<td>Centranthera indica</td>
<td>Crotalaria juncea</td>
<td>Ceratopteris thalictroides</td>
</tr>
<tr>
<td>5</td>
<td><em>Chrysopogon aciculatus</em></td>
<td>Chrysopogon aciculatus</td>
<td>Centranthera tranquebarica</td>
<td>Crotalaria linifolia</td>
<td>Chloris dolichostachya</td>
</tr>
<tr>
<td>6</td>
<td><em>Cynodon dactylon</em></td>
<td>Cynodon dactylon</td>
<td>Chloris barbata</td>
<td>Cyanotis vaga</td>
<td>Crassocephalum crepidioides</td>
</tr>
<tr>
<td>7</td>
<td><em>Cyperus alulatus</em></td>
<td>Cyperus alulatus</td>
<td>Chromolaena odorata</td>
<td>Dactyloctenium aegyptium</td>
<td>Dentella serpyllifolia</td>
</tr>
<tr>
<td>8</td>
<td><em>Cyperus compressus</em></td>
<td>Cyperus compressus</td>
<td>Clerodendrum serratum</td>
<td>Eulalia fastigiata</td>
<td>Digitaria sanguinalis</td>
</tr>
<tr>
<td>9</td>
<td><em>Desmodium triflorum</em></td>
<td>Desmodium triflorum</td>
<td>Conyza canadensis</td>
<td>Eriocaulon cinereum</td>
<td>Dryopteris filix-mas</td>
</tr>
<tr>
<td>10</td>
<td><em>Digitaria bicornis</em></td>
<td>Digitaria bicornis</td>
<td>Costus speciosus</td>
<td>Hedyotis pinifolia</td>
<td>Gnaphalium pensylvanicum</td>
</tr>
<tr>
<td>11</td>
<td><em>Digitaria ciliaris</em></td>
<td>Digitaria ciliaris</td>
<td>Curculigo orchidoides</td>
<td>Indigofera glabra</td>
<td><em>Fimbristylis aestivalis</em></td>
</tr>
<tr>
<td>12</td>
<td><em>Eleusine indica</em></td>
<td>Eleusine indica</td>
<td>Cyperus laxus</td>
<td>Laggera aurita</td>
<td><em>Grangea maderaspatana</em></td>
</tr>
<tr>
<td>13</td>
<td><em>Eragrostis gangetica</em></td>
<td>Eragrostis gangetica</td>
<td>Desmodium laxiflorum</td>
<td>Leucaena leucocephala</td>
<td><em>Hydrocotyle sibtorpioides</em></td>
</tr>
<tr>
<td>14</td>
<td><em>Eragrostis nigra</em></td>
<td>Eragrostis nigra</td>
<td>Eragrostis atrovirens</td>
<td>Lindernia cordifolia</td>
<td><em>Hygrophiola polysperma</em></td>
</tr>
<tr>
<td>15</td>
<td><em>Fimbriciaria sp.</em></td>
<td>Fimbriciaria sp.</td>
<td>Eragrostis viscosa</td>
<td>Mitreola petiolata</td>
<td><em>Hypericum japonicum</em></td>
</tr>
<tr>
<td>16</td>
<td><em>Fimbristylis dichotoma</em></td>
<td>Fimbristylis dichotoma</td>
<td>Euphorbia thymifolia</td>
<td>Polygala linarifolia</td>
<td><em>Isolepis setacea</em></td>
</tr>
</tbody>
</table>
### Phytosociology

**Contd. Table-3.39**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Common species found in all Sites</th>
<th>Site-I</th>
<th>Site-II</th>
<th>Site-III</th>
<th>Site-IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.</td>
<td>Hedyotis corymbosa</td>
<td>Exacum tetragonum</td>
<td>Pupalia lappacea</td>
<td>Paspalum conjugatum</td>
<td>Ixeris polycephala</td>
</tr>
<tr>
<td>18.</td>
<td>Hedyotis diffusa</td>
<td>Hyptis rhomboidea</td>
<td>Stephania japonica</td>
<td>Richardia scabra</td>
<td>Limnophila aquatica</td>
</tr>
<tr>
<td>19.</td>
<td>Imperata cylindrica</td>
<td>Ichnocarpus frutescens</td>
<td>Triumphetta pilosa</td>
<td>Setaria geniculata</td>
<td>Limnophila heterophylla</td>
</tr>
<tr>
<td>20.</td>
<td>Lindernia ciliata</td>
<td>Imperata latifolia</td>
<td></td>
<td>Sida acuta</td>
<td>Limnophila micrantha</td>
</tr>
<tr>
<td>21.</td>
<td>Lindernia crustacea</td>
<td>Justicia japonica</td>
<td></td>
<td>Sporobolus diander</td>
<td>Lobelia heyneana</td>
</tr>
<tr>
<td>22.</td>
<td>Lindernia multiflora</td>
<td>Lygodium flexuosum</td>
<td></td>
<td>Stellaria media</td>
<td>Mazus pumilus</td>
</tr>
<tr>
<td>23.</td>
<td>Lindernia pyxidaria</td>
<td>Murdannia vaginata</td>
<td></td>
<td>Xanthium indicum</td>
<td>Microcarpaea minima</td>
</tr>
<tr>
<td>24.</td>
<td>Lobelia alsinoides</td>
<td>Ophiuro s exaltatus</td>
<td></td>
<td></td>
<td>Mitrasacme indica</td>
</tr>
<tr>
<td>25.</td>
<td>Merremia hirta</td>
<td>Osbeckia nepalensis</td>
<td></td>
<td></td>
<td>Murdannia japonica</td>
</tr>
<tr>
<td>26.</td>
<td>Murdannia nudiflora</td>
<td>Plectranthus rugosus</td>
<td></td>
<td></td>
<td>Oxalis corniculata</td>
</tr>
<tr>
<td>27.</td>
<td>Paspalum scrobiculatum</td>
<td>Polygala glomerata</td>
<td></td>
<td></td>
<td>Peperomia pellucida</td>
</tr>
<tr>
<td>28.</td>
<td>Phyllanthus virgatus</td>
<td>Tripogon sp.</td>
<td></td>
<td></td>
<td>Pseudognaphalium luteo-album</td>
</tr>
<tr>
<td>29.</td>
<td>Rungia pectinata</td>
<td>Unidentified gramineae</td>
<td></td>
<td></td>
<td>Rotala rotundifolia</td>
</tr>
<tr>
<td>30.</td>
<td>Saccharum spontaneum</td>
<td></td>
<td></td>
<td></td>
<td>Solanum nigrum</td>
</tr>
<tr>
<td>31.</td>
<td>Selaginella sp.</td>
<td></td>
<td></td>
<td></td>
<td>Xyris indica</td>
</tr>
<tr>
<td>32.</td>
<td>Sporobolus indicus</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33.</td>
<td>Vernonia cinerea</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table-3.40 : List of species represented by single individual in only one quadrat in one season in one Site only.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of Species</th>
<th>Site-I</th>
<th>Site-II</th>
<th>Site-III</th>
<th>Site-IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><em>Acacia auriculiformis</em></td>
<td></td>
<td>Summer-'99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td><em>Breynia retusa</em></td>
<td>Winter-'99</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td><em>Cassia occidentalis</em></td>
<td></td>
<td></td>
<td>Monsoon-'98</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td><em>Centranthera indica</em></td>
<td>Monsoon-'98</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td><em>Centranthera nepalensis</em></td>
<td></td>
<td>Summer-'99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td><em>Chromolaena odorata</em></td>
<td>Monsoon-'97</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td><em>Conyza canadensis</em></td>
<td>Monsoon-'98</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td><em>Crotalaria juncea</em></td>
<td></td>
<td>Monsoon-'97</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td><em>Curculigo ochroides</em></td>
<td>Summer-'99</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td><em>Desmodium laxiflorum</em></td>
<td>Summer-'98</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td><em>Exacum tetragonum</em></td>
<td>Monsoon-'98</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td><em>Ixeris polycephala</em></td>
<td></td>
<td></td>
<td></td>
<td>Winter-'99</td>
</tr>
<tr>
<td>13.</td>
<td><em>Lewecna leucocephala</em></td>
<td></td>
<td>Summer-'98</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td><em>Osbeckia nepalensis</em></td>
<td>Winter-'98</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td><em>Polygala linarifolia</em></td>
<td></td>
<td>Summer-'99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td><em>Stephania japonica</em></td>
<td></td>
<td>Monsoon-'98</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td><em>Xanthium indicum</em></td>
<td></td>
<td></td>
<td>Winter-'99</td>
<td></td>
</tr>
</tbody>
</table>

Zornia gibbosa, Imperata cylindrica, Vernonia cinerea, Mitracarpus verticillatus, Schizachyrium brevifolium etc. were highly associated with *Streptocaulon sylvestre*. In addition, the type of association of most of the pairs were negative and the chi-square value for most of them were not significant. This supported Thorhallsdottir's (1990) observations who found few positive associations among the grasses but numerous negative ones. Misra & Misra (1981) observed that each species in grassland community showed at least one significant association, either positive or negative.

In general, many factors are operating for the association of species in a community. A slight variation in the environment can affect such association leading to a change of their positive or negative association values between pairs. No doubt, the microenvironment of these sites had played a major role in bringing the positive and negative association between different species, though it has not been analysed in the present study. Nevertheless, mowing of grasses for fodder and cattle grazing are common practices in these sites.