CHAPTER 3

ECOLOGY OF THE STUDY SITES

3.1. Location of the study sites

Baroda lies between 22°-0' and 22°-30' N latitude and 73°-0' and 73°-30' E longitude. It is more or less a plain area. The study sites selected for the present work lie within the following two localities :

(1) L. V. Palace compound - It is a compound of the Laxmi Vilas Palace, which is situated on the west of the Baroda city. It has an area of approx. 5 sq. km., and is an ideal example of an abandoned garden. It is very near the city proper and is protected on all sides by high iron fencing.

(2) University Campus - It is a campus locating the Faculties of Education, Science, Arts and Commerce and the University Library. It is just near the railway station, and lies on the north side of the main road leading to the city (Map 1).

3.2. Climate of Baroda

The climate of Baroda is markedly periodic and is characterized by a dry and increasingly hot summer from March to June, a dry and cold winter from November to February and a warm monsoon from July to September, October being a transition period between monsoon and winter. The climatic factors that

MAP OF BARODA

LOCALITIES OF STUDY SITES:

1 L.V. PALACE COMPOUND

2 UNIVERSITY CAMPUS

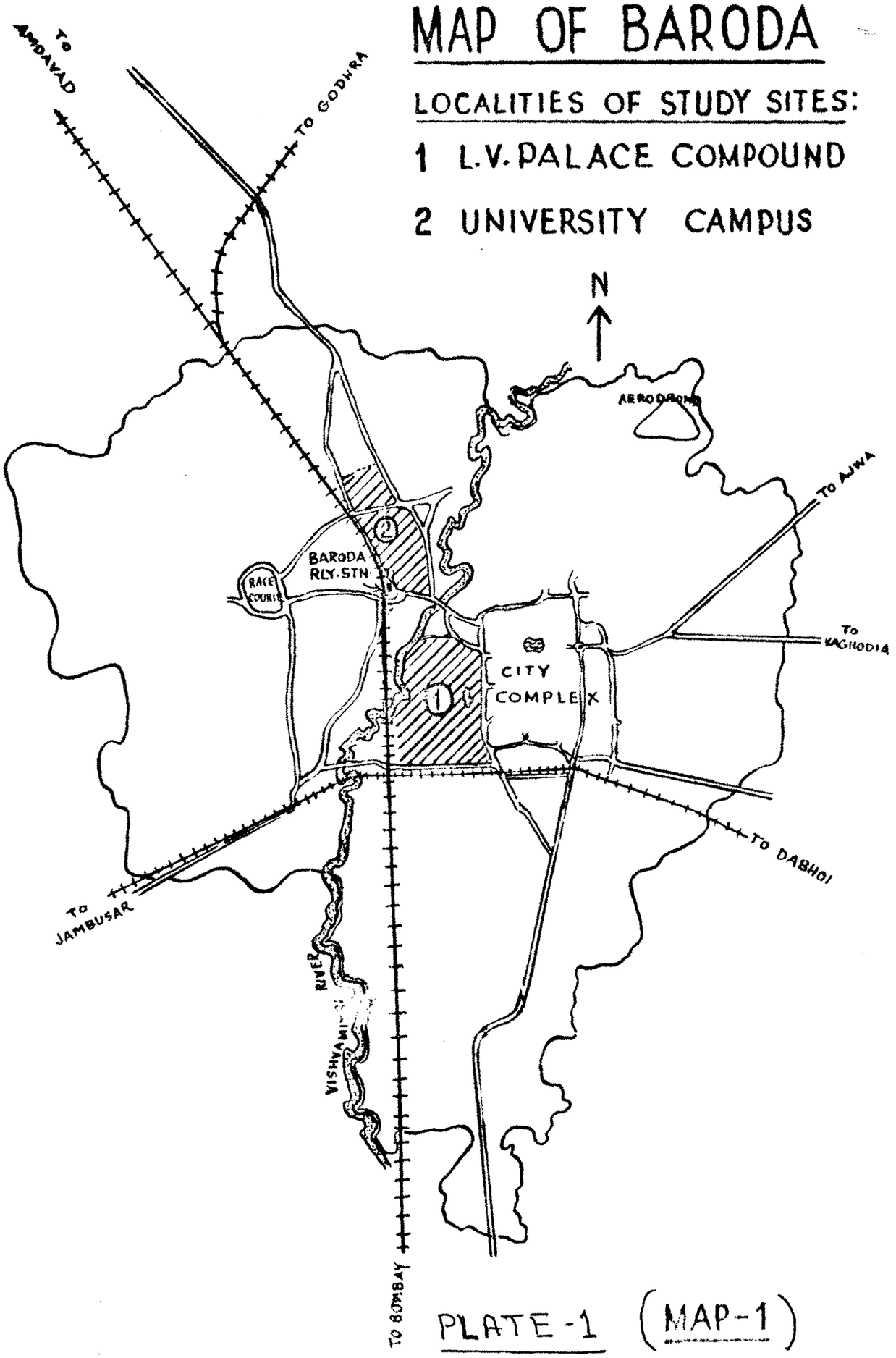


PLATE-1 (MAP-1)

are of greater importance are rainfall, temperature and relative humidity.

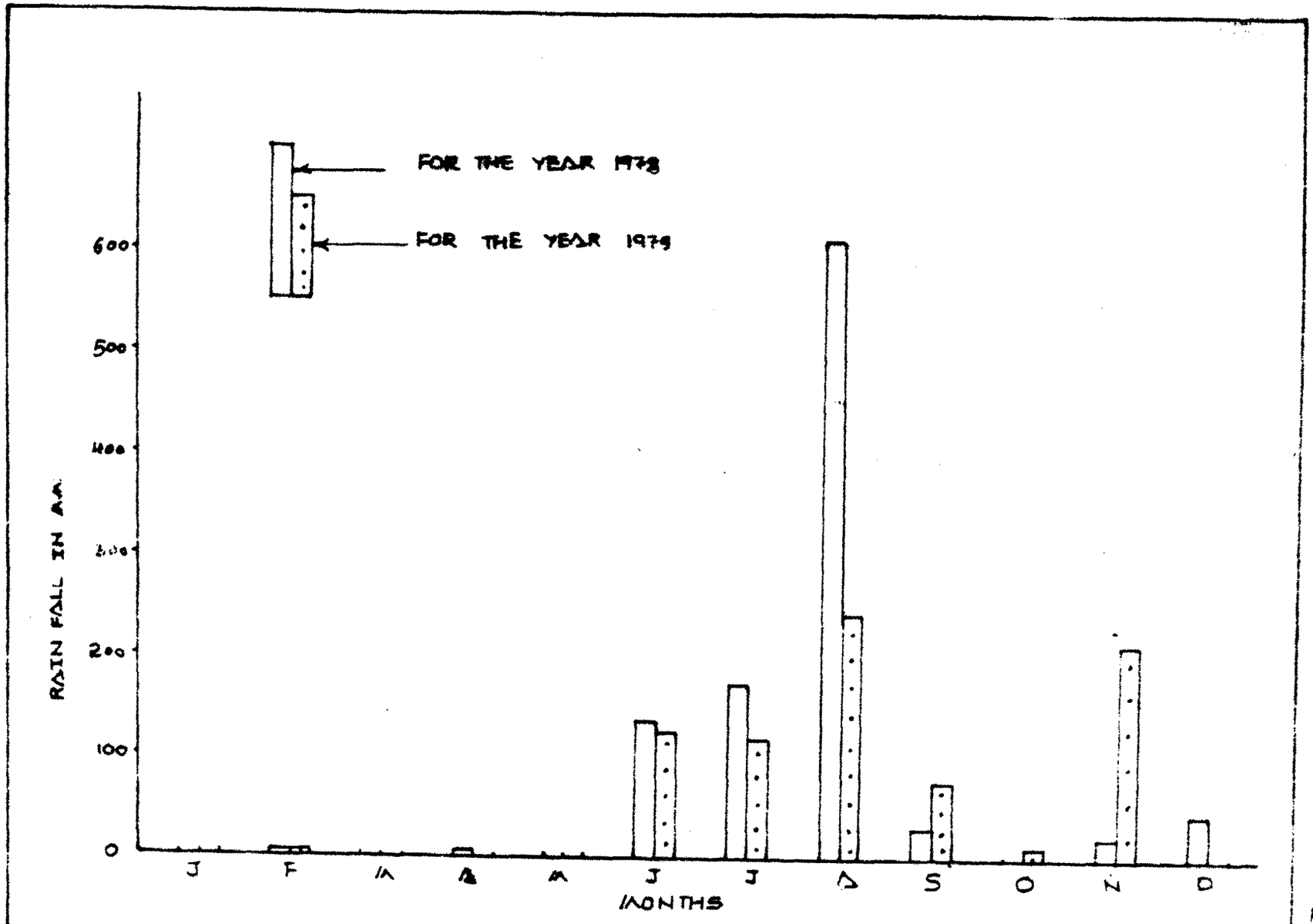
Rainfall : The monsoon every year commences in the 3rd or 4th week of June and continues till September. July and August receive the heaviest downpour. The data of monthly rainfall for the years 1978 and 1979 are presented in Table 3.1 and Graph 1. The mean annual rainfall comes to about 906 mm.

Temperature : One of the most characteristic features of the climate of Baroda is the great extremes of temperature. The heat during the summer (March-June) is intense, the temperature often rising as high as 44°-45°C during the months of April and May. Occasionally it may cross this limit also. The highest maximum temperature recorded during the period of two years 1978 and 1979 was 45.5°C. July to September is the warm monsoon, while winter sets in the months of November and continues till the middle of February. December and January are the real cold months when the temperatures drop down. The lowest minimum temperature recorded during the period of two years 1979 and 1979 was 6.8°C. The monthly mean maximum and minimum temperatures for the years 1978 and 1979 are presented in Table 3.1 and Graphs 2 and 3.

Relative Humidity : The relative humidity is minimum (about 58 to 62%) during the summer months of March, April and May, and maximum during the monsoon, especially in the month of August (about 89 to 90%). The monthly mean relative humidity

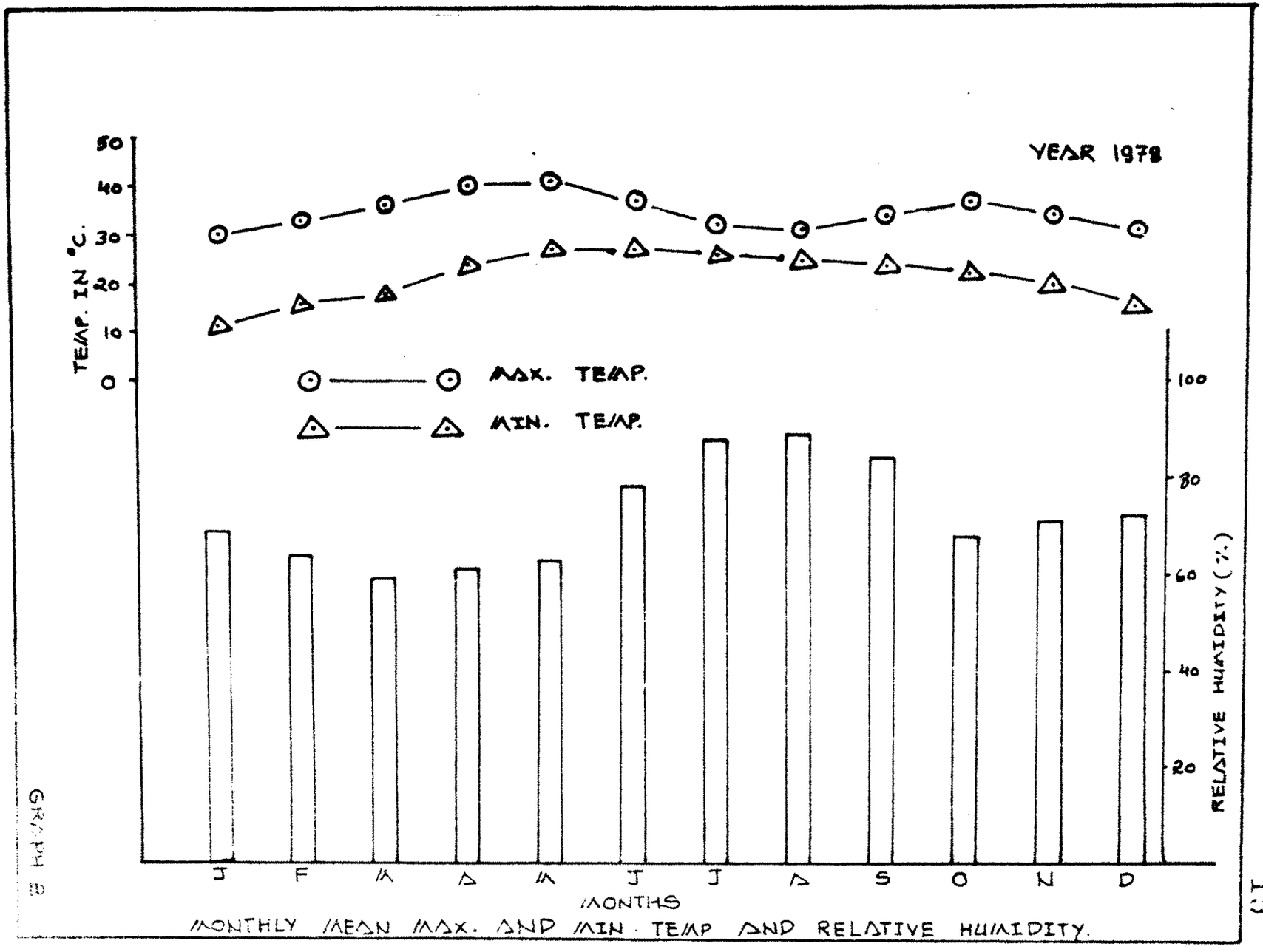
Table 3.1.: Climatic Data (Monthly Rainfall and monthly mean maximum and minimum temperature and relative humidity for the years 1978 and 1979).

Month	Year 1978				Year 1979			
	Total Rainfall (mm)	Mean Max. Temp. (°C)	Mean Min.Temp. (°C)	Mean Relative Humidity (%)	Total Rainfall (mm)	Mean Max.Temp. (°C)	Mean Min.Temp. (°C)	Mean Relative Humidity (%)
January	0.0	30.4	11.2	68.6	0.0	30.2	14.8	72.9
February	2.8	32.8	16.4	63.8	4.7	31.6	13.3	69.0
March	0.0	35.6	18.4	58.6	0.0	35.4	17.4	58.3
April	5.6	39.9	23.6	60.8	0.0	41.0	23.0	60.9
May	0.0	41.2	26.7	62.9	0.0	40.5	25.7	60.5
June	135.6	37.1	27.3	77.9	124.1	39.1	27.7	72.0
July	172.4	32.4	25.7	87.5	119.3	33.2	26.2	85.5
August	605.6	30.8	25.1	89.1	241.4	31.2	24.5	90.3
September	30.3	33.5	24.4	84.0	76.5	35.0	24.6	84.0
October	0.0	36.6	21.5	68.0	13.4	36.2	23.0	74.7
November	23.7	34.3	19.6	70.9	212.4	32.8	20.4	76.8
December	43.4	31.3	15.2	72.3	0.0	31.3	16.1	80.7
Total	1019.4				791.8			



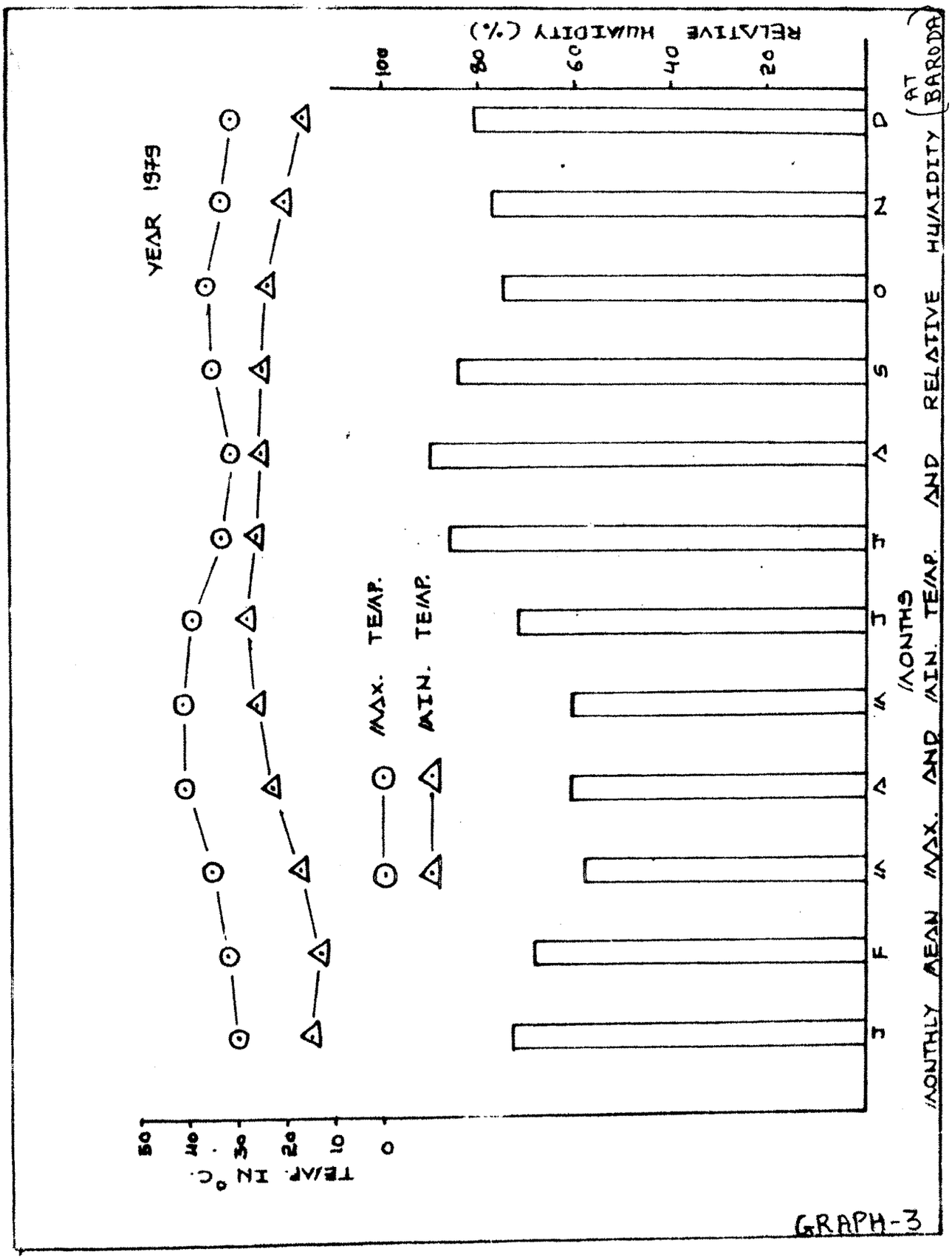
MONTHLY RAINFALL AT BARODA FOR THE YEARS 1978 AND 1979.

GRAPH-1



GRAPH 2

MONTHLY MEAN MAX. AND MIN. TEMP AND RELATIVE HUMIDITY.


MONTHLY MEAN MAX. AND MIN. TEMP. AND RELATIVE HUMIDITY (AT BARODA)
MONTHS
J F M A M J J A S O N D
RELATIVE HUMIDITY (%)
100 80 60 40 20
MAX. TEMP.
MIN. TEMP.
YEAR 1979
TEMP. IN °C.
50 40 30 20 10 0

GRAPH-3

data (at 8-30 a.m.) for the years 1978 and 1979 are also presented in Table 3.1 and Graphs 2 and 3.

3.3. Microclimatic Data

Temperature and relative humidity at 8-30, 11-30 and 17-30 hrs. at the two localities of the study sites, viz., L. V. Palace compound and University Campus were critically studied for the two years 1978 and 1979. The data are presented in Table 3.2 and Graphs 4 and 5.

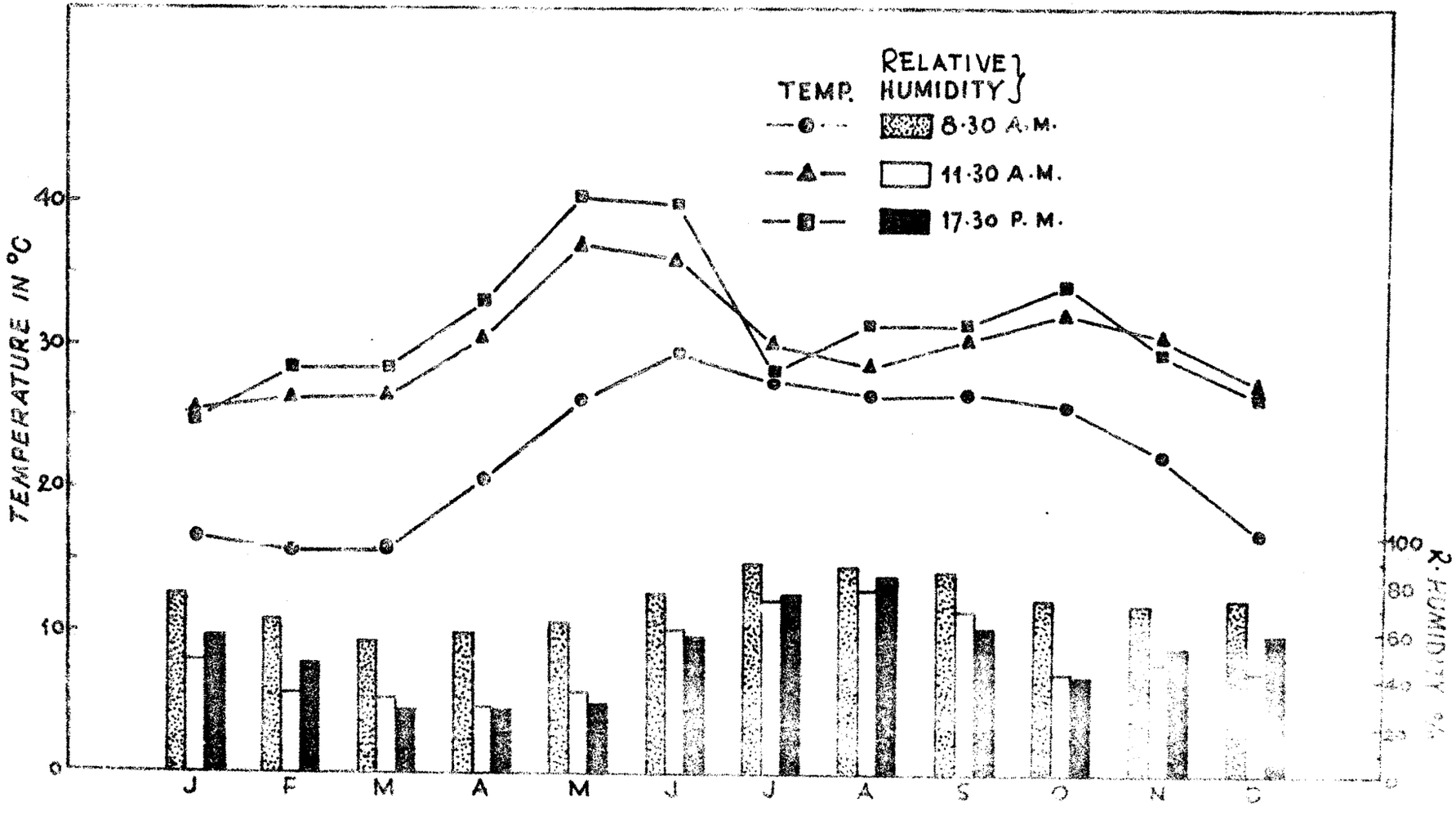
A glance at Table 3.2 clearly shows that temperature at L. V. Palace compound is lower than that at University Campus, while relative humidity at L. V. Palace compound is higher than that at University Campus throughout the year. Thus L. V. Palace compound remains comparatively cooler and more humid than University Campus throughout the year.

3.4. Soil Properties

The soil samples collected from the different study sites were analysed for the following characters : (1) water holding capacity, (2) pH, (3) Organic Carbon, (4) Organic matter, (5) Total Nitrogen, (6) Carbonate, (7) Bicarbonate, (8) Chloride, (9) Exchangeable Calcium, (10) Exchangeable Magnesium, (11) Exchangeable Sodium, (12) Exchangeable Potassium, (13) Electrical Conductivity and (14) Total Soluble Salts.

Table 3.2 : Microclimatic Data (Temperature and Relative Humidity)

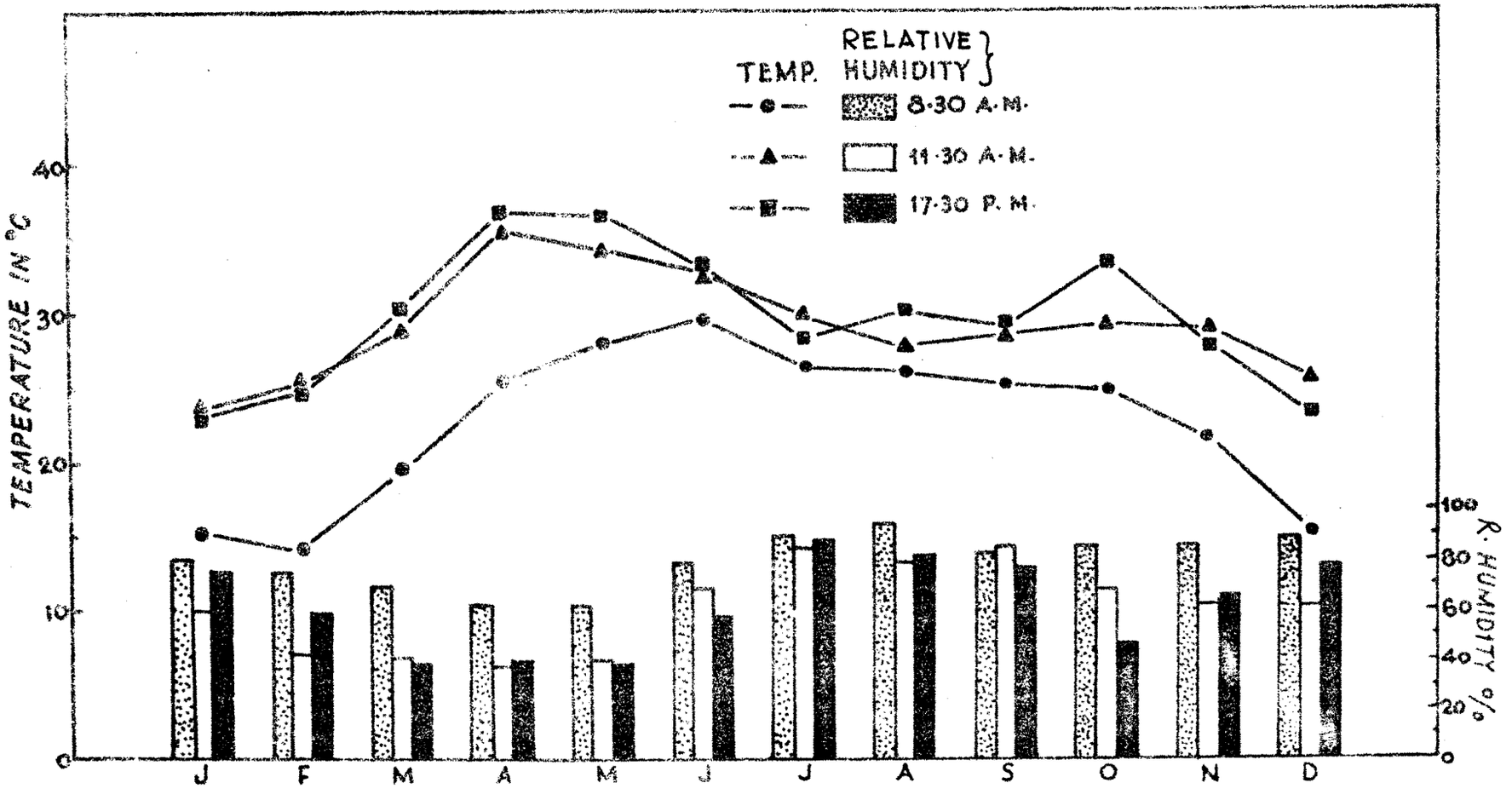
	Time	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
I. L. V. Palace Compound													
Temperature (°C)	8.30	15.1	14.0	19.2	25.2	27.8	28.7	26.2	25.8	25.0	24.5	21.5	15.2
	11.30	23.8	25.2	28.7	35.8	34.2	32.8	29.5	27.5	28.5	29.0	28.8	25.6
	17.30	22.8	24.6	30.3	36.8	36.4	33.0	28.0	29.8	29.4	33.2	28.0	23.1
Relative Humidity (%)	8.30	80.5	74.8	69.4	62.0	60.5	78.0	89.0	94.5	84.0	85.2	85.0	89.5
	11.30	60.0	42.0	40.8	37.0	39.2	68.6	83.8	78.4	85.0	68.4	62.0	62.0
	17.30	76.0	58.5	39.0	39.8	38.5	56.4	88.0	81.2	77.0	46.0	66.0	78.0
II. University Campus													
Temperature (°C)	8.30	16.2	15.7	20.6	26.2	29.4	29.8	27.4	26.4	26.5	25.7	22.3	16.8
	11.30	25.2	26.3	30.4	36.8	35.8	33.4	30.0	28.4	30.3	32.1	30.5	27.1
	17.30	24.7	28.3	32.8	40.2	39.7	34.5	28.5	31.4	31.4	34.0	29.6	26.2
Relative Humidity (%)	8.30	75.8	65.4	55.2	59.3	63.2	75.8	88.0	87.3	85.1	73.0	70.8	73.7
	11.30	46.4	33.0	30.8	27.0	32.9	59.7	73.1	77.7	68.1	42.0	47.5	43.0
	17.30	56.8	46.0	26.4	26.6	28.8	57.0	77.2	82.8	61.5	41.8	53.6	58.0



TEMPERATURE & RELATIVE HUMIDITY

IN UNIVERSITY CAMPUS AT BARODA

GRAPH-4



TEMPERATURE & RELATIVE HUMIDITY

IN L. V. PALACE COMPOUND AT BARODA

GRAPH- 5

The soil analysis data are presented in Table 3.3.

The following comments can be made from the data :

Water Holding Capacity - It is comparatively lower (ranging from 32.57 to 40.83%) in the sites of E. geniculata than in those of A. ramosum (ranging from 42.63 to 48.08%) and R. humilis (ranging from 41.03 to 51.50%).

Soil pH - It ranges from 6.7 to 7.0 in the sites of A. ramosum, from 6.9 to 8.1 in the sites of E. geniculata, and from 7.5 to 7.6 in the sites of R. humilis. Thus A. ramosum grows in slightly acidic to neutral soils, E. geniculata grows in slightly acidic to alkaline soils, and R. humilis grows in slightly alkaline soils.

Organic Carbon, organic matter and Total Nitrogen - The values for these characters are a little higher (ranging from 1.48 to 2.06%, 1.76 to 3.74% and 0.09 to 0.17% respectively) in the sites of A. ramosum and R. humilis than in those of E. geniculata (ranging from 0.51 to 0.83%, 1.18 to 1.64% and 0.05 to 0.06% respectively).

Carbonate - It is absent in all the sites.

Bicarbonate - It ranges from 0.26 to 0.52 meq/100 g in different sites, thus not showing much variation.

Chloride - It ranges from 0.20 to 0.46 meq/100 g in different sites, thus not showing much variation.

Exchangeable Calcium - It is a little more (ranging from 2.80 to 3.20 meq/100 g) in sites of E. geniculata and R. humilis than in sites of A. ramosum (ranging from 1.20 to 1.60 meq/100 g). However, in none of them the soil can be said to be calcareous.

Exchangeable Magnesium, Sodium and Potassium - These cations range from 0.40 to 2.00 meq/100 g, 1.28 to 2.02 meq/100 g and 0.10 to 0.45 meq/100 g respectively, thus not showing much variation.

EC and Total Soluble Salts - EC varies from 0.11 to 0.21 m mhos/cm, and total soluble salts vary from 0.07 to 0.14%, thus not showing much variation.

3.5. Plant Associates

Associates of A. ramosum, E. geniculata and R. humilis in the different study sites are listed in Tables 3.4, 3.5 and 3.6 respectively with frequency symbols.

*****

Table 3.4 : Associates of *A. ramosum* Guill. & Perr. in various study sites.

(Locality - L. V. Palace compound).

Sr. No.	Species	Study sites 1	2	3
	Plants growing under the shade of the following trees :-			
1.	*Cordia dichotoma* Forst.	P	-	-
2.	*Diospyros montana* Roxb.	P	-	-
3.	*Ficus religiosa* L.	P	-	-
4.	*Holoptelea integrifolia* (Roxb.) Planch.	P	P	-
5.	*Salvadora persica* L.	P	-	-
6.	*Streblus asper* Lour.	P	-	-
7.	*Swietenia mahagoni* Jacq.	P	-	-
8.	*Tamarindus indica* L.	-	P	P
	List of Associates			
1.	*Abelmoschus manihot* (L.) Medic.	-	r	-
2.	*Abelmoschus moschatus* Medic.	of	-	-
3.	*Abutilon indicum* L. Sweet.	f	f	a
4.	*Acalypha indica* L.	-	f	-
5.	*Achyranthes aspera* L. var. *porphyristachya* Hook. f.	a	a	a
6.	*Aerva lanata* L.	a	f	-
7.	*Alternanthera sessilis* (L.) DC.	-	-	a

...contd.

Table: 3.4 : contd.

Sr. No.	Species	Study sites 1	2	3
8.	Barleria prionitis L.	of	-	f
9.	Blepharis maderaspatensis (L.) Roth	a	f	-
10.	Boerhavia chinensis (Burm. f.) Druce.	-	-	r
11.	Bremekampia neilgherryensis (Wight) Sreem.	of	-	-
12.	Cadaba fruticosa (L.) Druce	-	r	r
13.	Capparis sepiaria L.	r	-	-
14.	Commelina benghalensis L.	f	of	-
15.	Commelina diffusa Burm. f.	of	-	f
16.	Dactyloctenium aegypticum L. Beauv.	f	-	-
17.	Desmodium gangeticum (L.) Sweet.	r	-	-
18.	Elytraria acaulis (L. f.) Linday.	-	-	r
19.	Euphorbia hirta L.	f	f	-
20.	Hedyotis corymbosa (L.) Lamk.	r	-	-
21.	Iseilema laxum (Hack.)	f	-	-
22.	Lantana camara L. var. aculeata (L.) Mold.	of	-	-
23.	Malvastrum coromandelianum (L.) Garcke.	-	f	-
24.	Martynia annua L.	f	-	-
25.	Ocimum americanum L.	of	-	r
26.	Peristrophe bicalyculata (Retz.) Nees	a	f	a
27.	Plumbago zeylanica L.	-	r	of
28.	Pupalia lappacea (L.) Juss.	f	-	-

...contd.

Table: 3.4 : contd.

Sr. No.	Species	Study sites		
		1	2	3
29.	Rhynchosia minima (L.) DC.	r	-	-
30.	Ruellia tuberosa L.	r	r	-
31.	Sclerocarpus africanus Jacq.	-	a	f
32.	Setaria verticillata (L.) P. Beauv.	-	f	-
33.	Sida acuta Burm.	f	a	a
34.	Sida cordata (Burm.) Borssum.	-	-	r
35.	Teremnus labialis (L. f.) Spr.	of	-	-
36.	Vernonia cinerea (L.) Less.	of	-	f
37.	Xanthium strumarium L.	of	-	-

Study sites :

1. Temple Area,
2. Navlakhi Area,
3. Museum Area.

a = abundant, f = frequent, of = occasionally found,

r = rare, P = Present, - = absent.

Table 3.5 : Associates of E. geniculata Orteg. in various study sites (Locality - University Campus).

Sr. No.	Species	Study sites 1	2	3
	Plants growing near the hedge of Clerodendrum inerme (L. f.) Gae. and Lawsonia inermis L. and under the shade of the following trees :-			
1.	Aegle marmelos (L.) Correa.	-	P	P
2.	Bougainvillea spectabilis Willd.	P	P	P
3.	Cassia fistula L.	P	P	P
4.	Clerodendrum phlomidis L. f.	P	-	P
5.	Cordia gharaf (Forsk.) E. & A.	-	-	P
6.	Crataeva adansonii De. ssp. odora (Buch.-Ham.) Jacobs	-	P	P
7.	Eucalyptus panicula Sm.	P	-	P
8.	Phoenix sylvestrys (L.) Roxb.	P	-	P
9.	Pterospermum acerifolium Willd.	P	-	P
10.	Sapindus emarginatus Vah.	-	-	P
11.	Santalum album Linn.	-	-	P
	List of Associates			
1.	Abutilon indicum (L.) Sweet.	of	of	of
2.	Acalypha ciliata Forsk.	f	f	f
3.	Acalypha indica Linn.	f	f	f
4.	Achyranthes aspera L. var. porphyristachya Hook. f.	a	f	f

...contd.

Table 3.5 : contd.

Sr. No.	Species	Study sites 1	2	3
5.	Aerva lanata (L.) Juss.	a	a	a
6.	Ageratum conyzoides L.	a	a	a
7.	Alternanthera pungens H. B. & K.	of	of	of
8.	Amaranthus spinosus L.	of	-	of
9.	Amaranthus viridis L.	of	of	-
10.	Blumea lacera (Burm. f.)	f	-	of
11.	Brachiaria ramosa (L.) Stapf	f	-	-
12.	Cassia occidentalis L.	-	of	of
13.	Cenchrus ciliaris L.	of	f	f
14.	Chloris virgata Sw.	f	-	-
15.	Cissampelos pareira L.	-	-	r
16.	Coccinia grandis (L.) Voigt.	-	of	of
17.	Commelina benghalensis L.	f	f	f
18.	Corchorus trilocularis L.	-	f	f
19.	Crotolaria medicaginea Lamk.	-	f	of
20.	Cynodon dactylon (L.) Pers.	f	a	f
21.	Cyperus rotundus L.	f	-	of
22.	Datura metel L.	of	-	of
23.	Datura innoxia Mill.	of	of	-
24.	Desmodium gangeticum (L.) DC.	-	-	r
25.	Digera muricata (L.) Mart.	of	f	f
26.	Eclipta alba L.(Hassk.)	a	f	a
27.	Erogrostis poaeoides Beauv.	of	of	of
28.	Euphorbia heterophylla L.	f	-	-
29.	Euphorbia hirta L.	f	f	f

... contd.

Table 3.5 : contd.

Sr. No.	Species	Study sites 1	2	3
30.	Ficus hispida L. (seedling)	-	r	r
31.	Hibiscus lobatus (Murray) O. K.	-	-	of
32.	Indigofera linnaei Al.	-	f	f
33.	Ipomoea pestigridis L.	of	f	f
34.	Lantana camara L. var. aculeata (L.) Moldenke	of	of	of
35.	Oplismenus burmannii (Retz.) Beauv.	of	-	-
36.	Oxalis corniculata L.	f	-	of
37.	Peristrophe bicalyculata (Retz.) Nees	f	f	f
38.	Phyllanthus fraternus Webster	of	-	of
39.	Physalis minima L.	f	-	of
40.	Portulaca oleracea L.	f	f	f
41.	Rauvolfia tetraphylla L.	-	-	of
42.	Ruellia tuberosa L.	f	f	f
43.	Sida acuta Burm.	f	f	a
44.	Sida cordifolia L.	-	f	a
45.	Teramnus labialis (L. f.) Spreng.	-	-	of
46.	Triumfetta rotundifolia Lamk.	-	-	of
47.	Vernonia cinerea (L.) Less.	f	f	a

Study sites :

1. Wire House compound, 2. Arts Faculty Area,
3. University Library Area.

a = abundant, f = frequent, of = occasionally found,

r = rare, P = Present, - = absent.

Table 3.6 : Associates of R. humilis Linn. in various study sites (Locality : L. V. Palace compound)

Sr. No.	Species	Study sites 1	Study sites 2
	Plants growing under the shade of the following trees :-		
1.	Diospyros montana Roxb.	P	-
2.	Ficus hispida L.	P	P
3.	Guazuma ulmifolia Lamk.	P	-
4.	Holoptelea integrifolia (Roxb.) Planch.	P	-
5.	Peltophorum inerme (Roxb.) Naveo.	P	P
6.	Tabernaemontana divaricata (L.) R. Br.	P	-
7.	Tamarindus indica L.	P	P
	List of Associates		
1.	Abutilon indicum (L.) Sweet.	f	f
2.	Abutilon ramosum Guill. & Perr.	r	-
3.	Acalypha ciliata Forsk.	of	of
4.	Achyranthes aspera L. var. porphyristachya Hook. f.	f	f
5.	Aerva lanata (L.) Juss.	f	f
6.	Amaranthus viridis L.	of	-
7.	Antigonon leptopus Hk. & Arn.	-	a
8.	Azadirachta indica A. Juss. (seedling)	r	-
9.	Blumea lacera (Burm. f.) DC.	of	of
10.	Commelina diffusa Burm. f.	f	f
11.	Dalbergia sissoo Roxb. (seedling)	r	-
12.	Euphorbia hirta L.	f	f

...contd.

Table 3.6 : contd.

Sr. No.	Species	Study sites 1	Study sites 2
13.	Lantana camara (L.) var. aculeata (L.) Moldenke	of	of
14.	Laportea interrupta (L.) (Chew.)	a	f
15.	Luffa acutangula (L.) (Roxb.)	r	-
16.	Malvastrum coromandelianum (L.) Gar.	f	of
17.	Peristrophe bicalyculata (Retz.) Nees	f	f
18.	Pupalia lappacea L.	of	of
19.	Ruellia tuberosa L.	f	of
20.	Sclerocarpus africanus Jacq.	f	f
21.	Setaria verticillata (L.) P. Beauv.	f	f
22.	Sida acuta Burm.	f	of
23.	Synedrella nodiflora (L.) Gaer.	f	-
24.	Vernonia cinerea (L.) Nees	f	f

Study sites :

1. Navlakhi Area - I (Area towards South and East of the Navlakhi Vav).

2. Navlakhi Area -II (Area towards North and West of the Navlakhi Vav).

a = abundant, f = frequent, of = occasionally found,

r = rare, P = Present, - = absent.