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PLANT ECOLOGY OF DILAPIDATED WALLS IN REWA (INDIA)

Ecologie des plantes des vieux murs à Rewa (Inde)

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RESUME

Une étude critique de la flore des vieux murs d'âges divers fut poursuivie pendant deux ans à Rewa. Ce substrat fournit un habitat spécialisé. 82 espèces de la flore locale se montrèrent apte à réaliser leur ecésis. L'absence des autres plantes fait suite aux conditions extrêmes et caractéristiques de cet habitat. La flore s'enrichit avec l'augmentation de l'âge des murs suite à l'évolution du substrat, notamment l'accumulation de matières organiques. L'étude a montré un faible rapport du nombre d'espèces par genre, ce qui est en confirmation avec les observations de GHOSE (1960).

ABSTRACT

A critical study of the flora of the dilapidated walls of different ages was conducted over a two year period at Rewa. The substratum provided a specialized habitat where 82 species of the local flora were observed to be able to ecise successfully. Rest of the other species failed due to the extremes characteristically associated with these habitats. Age of the walls contributed to colonization of flora by providing a better substratum through accumulation of organic matter. The study indicated a small genus to species ratio and this was in conformity with the report of GHOSE (1960).

INTRODUCTION

Dilapidated walls are usually characterized by extremes of environmental conditions ascribable either to the attitude which cuts link with the ground water system or to the lime dominated heterogeneous substratum or both. Plants occurring in these habitats are noticed to develop

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certain adaptational features involving their morphology, physiology, ecology and life forms.

The earliest report on the wall has been made by RICHARD (1888). RIDLEY (1930) suggested a few methods whereby propagules of building walls could be carried to such habitats apparently having no contact with the ground. Subsequently, a number of workers, e.g. SALISBURY (1920), FITTER (1945), RISHBETH (1948), TURNER (1951), MISHRA & SHIVA RAO (1948), GHOSH (1960), VARSHNEY (1968), DHIEN (1970), WERETELNIK (1973), DE RIDDER (1971-1974) and LEBLANC & MALAISSE (1978) have reported on several aspects of these habitats along with plants colonizing them.

The present report is the outcome of a critical study of certain delapidated walls in Rewa, M.P. and presents information on the vegetation and their ecology of these specialized habitats. The investigation includes 18 delapidated walls of ages ranging between 2 and 100 years and distributed over four distantly located areas under same climatic environment. Observations on the periodic incidence of plant species, their morphological manifestation, density and frequency, species diversity and on the factors responsible for the microclimatic conditions were recorded at 15 days interval.

THE STUDY AREA

Climate

Rewa town is located in the interior of the subtropical Indian-continent and possesses monsoon type of climate with a dry, cool winter extending from mid October through February, and a dry, hot summer from March to early June. The rainy season extends from middle of June through September. The rainfall is irregular and uneven and thus the localities under study get seldom adequate distribution of moisture.

Microclimate on walls

One of the characteristic microclimatic peculiarities of the wall habitat is the more extremes of temperature. In summer days wall surfaces are heated up like rocks. On the middle of May the temperature of brick mortar wall top exceeds 61.7° C when temperature at the open ground surface is around 38.6° C and 33.8° C at the soil surface of a Meadow community. With height temperature relations are reversed and wall will loses more heat and becomes cooler than the surrounding air. It is well known that temperature is concomitant with other physical and biological

Months	Year	Temperature in °C		% Relative humidity		Total rainfall in mm
		Mean max.	Mean Min.	Mean max.	Mean min.	
January	1980	28.4	9.4	98	23	40.4
February	1980	29.5	4.8	96	21	24.0
March	1980	36.4	7.9	91	16	5.2
April	1980	43.9	18.0	88	23	Nil
May	1980	43.9	26.9	60	8	6.0
June	1980	44.4	25.9	87	10	73.7
July	1980	37.9	23.3	96	43	94.6
August	1980	36.4	25.6	97	52	128.0
September	1980	33.4	24.9	80	46	67.2
October	1980	30.2	22.8	78	26	2.2
November	1980	28.9	18.9	75	19	88.6
December	1980	27.5	17.8	74	18	1.0
January	1981	28.5	18.1	74	26	42.0
Average		34.5	19.1	84.15	25	572.4 *

Tab. I : Climatic data of Rewa for the period January 1980 to January 1981.*Total rainfall for the period.

attributes of the habitat. The micro-climate of walls greatly resembles that of the arid region and presents an obvious contrast to that of the ground.

Edaphic environment

The edaphic environment comprises the exposed surfaces characterised by cracks and cervices, and partially disintegrated building materials containing bricks and mortar, intermingled with some organic matter incorporated every year by annual flora. Suitability of the edaphic environment for plant growth is dependent on the age of the wall.

Biotic factor

Among the agents affecting development of vegetation on these specialized environments are the insects, birds, rodents, cats and man. Some pathogenic fungi and termites also interfere with the growth activities of some species in these habitats.

S.No	Locality	Name of buildings	Facing towards sun	Appro. Age	Attended since (years)
1.	Panden tola	Misra building	North	100	50
2.	Uprahati	Baradari	West	200	100
		Temple of Ramkishore	West	50	10
		Misra buiding	North	10	5
		8th placed walls of fort	All around the direction	400	150
3.	Amahia	Tiwari building	West	75	25
		Amahia	North	75	30
		Katra	West	50	5
		Akharghat	East	25	5
4.	Chira haula	Laxaman bagh	West	10	2
		Chira haula	North	10	5

Tab. II : Approximate age of buildings.

RESULTS

Frequency, density and longevity of the plants

Results are given in table III and IV. Frequency and density studies indicate that the vegetation is heterogeneous which is ascribable to the heterogeneity in the environment. It has been observed that 3.65 % of the species live for five months. 13.41 % for six months, 10.97 % for seven months, 13.41 % for eight months, 7.34 % for nine months, 7.34 % for ten months, 10.97 % for eleven months, 6.09 % for twelve months and 28.82 % were perennial (Tab. IV). Factors influencing longevity of species may be summarized to be topography of the walls, direction of the sun, wind and source of water supply.

Seasonal succession of plants

May and June represent the hottest part of the year when majority of the species on the exposed walls die down. A few woody perennials perinate through root stocks and rhizomes only. Soon after the first of monsoon in the end of June seedlings of annual species e.g. *Argemone maxicana*, *Vernonia cinerea*, *Blumea lacera*, *Amaranthus viridis*, *Bidens biternata*, *Aercea lanata*,*Dicanthium annulatum*, *Setaria intermedia* appear almost simultaneously. As monsoon progresses species like *Boerhaavia diffusa*, *Tridax procumbens*, *Lindenbergia urticaefolia*, *Euphorbia hirta*, *Eclipta prostrata*, *Achyranthes aspara*, *Amaranthus viridis*, *Amaranthus*

Name of species	Sites									
	P		U		A		C		Average	
	**F	*D	F	D	F	D	F	D	F	D
1	2	3	4	5	6	7	8	9	10	11
Orthosiphon pallidus Royle	50C	1.7	60C	2.1	40B	1.8	60C	2.3	52.5C	1.97
Jatropha gossipifolia Linn.	30B	.1	40B	.2	-	-	-	-	35 B	.15
Argemone maxicana Linn.	40B	.4	50C	1.1	30B	.6	50C	.8	42.5C	.72
Portulaca oleracea Linn.	90E	.1	80D	.3	90E	.2	82E	.1	85.5E	.17
Corchorus capsularis Linn.	40B	.4	-	-	20A	.3	10A	.2	23.3B	.3
Melia azadirachta Linn.	10A	.1	10A	.4	50C	.6	10A	.3	20 A	.35
Mangifera indica Linn.	10A	.1	30B	.3	-	-	-	-	20 A	.2
Tamarindus indica Linn.	10A	.3	-	-	10A	.4	10A	.1	10 A	.26
Vernonia cinerea Less.	30B	.4	30B	.6	40B	.8	50C	.7	37.5B	.62
Blumea lacera DC	20A	.5	20A	.5	20A	.3	10A	.2	17.5A	.37
Eclipta prostrata Linn.	20A	.2	15A	.6	40B	.3	20A	.1	23.8B	.3
Tridax procumbens Linn.	60C	2.7	70D	3.4	60C	4.9	70D	5.3	65 D	4.02
Euphorbia birta Linn.	50C	1.7	50C	2.2	40B	1.9	30B	2.1	42.5C	1.97
Euphorbia microphylla Heyne	20A	.2	30B	1.5	50C	2.7	30B	1.2	32.5B	1.4
Euphorbia hypercifolia Linn.	10A	.1	40B	1.2	30B	.8	20A	.7	25 B	.7
Cynodon dactylon Pers.	40B	1.7	20A	2.2	60C	.5	40B	3.5	40 B	3.77
Calotropis procera R.Br.	-	-	10A	.3	20A	.2	20A	.4	16.7A	.3
Solanum nigrum Linn.	-	-	10A	.4	10A	.3	-	-	10 A	.35
Lycopersicum esculentum Mill	-	-	10A	.1	10A	.2	-	-	10 A	.15
Capsicum fruitescens Linn.	10A	.1	-	-	-	-	-	-	10 A	.1
Datura metal Linn.	-	-	40C	.7	30B	.5	20A	.2	31.7B	.35
Lindenbergia urticaefolia Linn.	20A	2.7	50C	3.2	60C	3.5	20A	1.8	37.5B	2.8
Andrographis echiodes Nees	-	-	50C	1.8	20A	.8	30B	1.2	33.3B	1.26
Adhatoda visica Nees	-	-	48B	.8	-	-	20A	.3	30 B	.55
Boerhaavia diffusa Linn.	70D	.2	60C	.8	30B	.5	20A	.2	45 C	.42
Amaranthus viridis Linn.	90E	.3	80C	1.7	82E	1.8	82E	1.2	83 E	1.25
Lantana camara Linn.	-	-	30B	.3	20A	.2	20A	.4	23.3B	.3
Amaranthus spinosus Linn.	-	-	30B	.4	30B	.2	20A	.3	26.7B	.3
Achyranthes aspera Linn.	30B	.8	20A	.3	10A	.4	20A	.2	20 A	.42
Phyllanthus niruri Hook	50C	1.8	70D	1.2	50C	2.6	50C	1.7	55 C	1.82
Ficus benghalensis Linn.	30B	.3	40B	.4	30B	.2	40B	.4	35 B	.32
Ficus religiosa Linn.	10A	.1	30B	.3	30B	.4	20A	.2	22.5B	.25
Ficus glomerata Roxb	-	-	20A	.2	10A	.1	20A	.3	16.7A	.2
Commelina benghalensis Linn.	50C	.6	50C	.8	20A	.3	30B	.4	37.5B	.52
Kyllingia brevifolia Roxb	10A	.3	50C	.9	40B	.6	50C	.5	37.5B	.57

1	2	3	4	5	6	7	8	9	10	11
Eragrostis pilosa Beauv.	10A	.2	40B	1.2	50C	.8	60C	.6	40 B	.7
Polygala chinensis Linn.	40B	1.2	55C	.9	40B	.6	40C	1.2	43.8C	.97
Indigofera cordifolia Heyne	60C	1.8	60C	2.2	80C	1.6	50C	1.2	65 D	1.7
Indigofera inifolia Petz	30B	.5	40B	.8	60C	1.2	70D	.8	50 C	.82
Borreria hispida Ksehum	40B	1.7	55C	.6	60C	.8	50C	.7	51.3C	.7
Borreria stricta Linn.	60C	1.5	50C	.8	40B	.7	45C	.4	47.5C	.85
Bidens pilosa Linn.	50C	2.5	60C	1.8	40B	1.5	50C	2.7	50 C	2.12
Echinops echinatus Roxb	20A	.3	-	-	-	-	10A	.3	15A	.3
Evolvulus alsinoides Linn.	20A	.3	20A	.8	25B	.6	10A	.5	18.8A	.55
Aercea lanata Juss	-	-	50C	1.7	30B	.8	10A	.1	30 B	.86
Dicanthium annulatum Stapf	60C	1.8	80D	1.2	60C	1.6	50C	.8	62.3D	1.35
Pergularia pallida W & A	10A	.1	-	-	10A	.1	-	-	10 A	.1
Aristida setacea Retz	20A	.9	60C	1.6	50C	1.2	60C	1.3	47.5C	1.25
Apluda aristata Hack	60C	2.1	70D	3.5	70D	2.9	67D	1.2	66.7D	2.42
Alteranthera sessilis R.Br.	50C	1.6	60C	1.8	50C	.8	60C	1.2	55 C	1.35
Dactylectenium aegyptium Linn.	30B	1.2	50B	.8	40B	1.2	40B	.7	40 B	.97
Ocimum sanctum Linn.	10A	.5	40B	.3	20A	.6	10A	.2	20 A	.4
Oplismenus compositus Beauv	-	-	60C	2.7	50C	1.8	45C	1.2	51.6C	1.9
Caradiospermum helicacabum Linn.	10A	.2	-	-	10A	.1	-	-	10 C	.15
Hemidismus indicus R.Br.	-	-	20A	.2	-	-	-	-	20 A	.2
Cocculus vilosus Dc. Syst.	-	-	10A	.3	10A	.2	-	-	10 A	.25
Coccinia indica W & A Prod.	20A	.3	40B	.5	20A	.2	20A	.3	25 B	.32
Launaea asplenifolia Hook P	10A	.1	-	-	10A	.3	20A	.5	13.3A	.3
Emicostema littorale Enrt.	30B	.7	-	-	20A	.5	-	-	25 B	.6
Vitis latifolia Roxb	10A	.1	-	-	-	-	-	-	10 A	.1
Echinochloa colonum Linn.	80D	2.7	90E	1.8	90E	4.2	80D	2.7	85 E	2.85
Setaria glauca Blauv	10A	.3	70D	.5	60C	.4	50C	.9	47.5C	.52
Medicago sativa Linn.	10A	.3	-	-	20A	.1	-	-	15 A	.2
Solanum xanthocarpum Schred	10A	.1	-	-	20A	.3	10A	.1	13.3A	.16
Carica papaya Linn.	-	-	10A	.1	-	-	-	-	10 A	.1
Cucurbita maxima Duchesne	10A	.2	20A	.4	10A	.1	20A	.3	15 A	.25
Clitoria ternatea Linn.	10A	.1	-	-	10A	.2	10A	.1	10 A	.13
Psidium guajava Linn.	-	-	10A	.1	-	-	-	-	10 A	.1
Syzygium cumini Gaestri	-	-	10A	.1	-	-	-	-	10 A	.1
Cleome viscosa Linn.	10A	.2	-	-	10A	.3	10A	.1	10 A	.2
Setaria intermedia Roem	40B	2.1	70D	1.8	60C	1.6	50C	.8	55 C	1.57
Plucaria angustifolia I'C	20A	.1	40B	.3	30B	.6	20A	.2	27.5B	.3
Zizyphus mauritiana Lamk	10A	.1	10A	.3	10A	.6	10A	.2	10 A	.3

1	2	3	4	5	6	7	8	9	10	11
Phoenix humilis Royle	-	-	10A	.1	-	-	10A	.1	10 A	.1
Bombax ceiba Linn.	-	-	20A	.1	20A	.2	10A	.1	16.6A	.25
Gomphrena celosioides Mart	-	-	10A	.1	-	-	10A	.1	10 A	.1
Alysicarpus monolifer DC	20A	1.2	30B	.8	40B	.6	40B	1.2	32.5B	.95
Phaseolus trilobus Aithort	20A	1.8	40B	.6	20A	1.2	20A	.9	25 B	.87
Crozophora rotlleri	10A	.1	20A	.2	20A	.4	30B	.6	20 A	.32
Cassia obtusifolia	10A	.1	-	-	20A	.3	10A	.1	13.3A	.16
Ipomea pestigridis Linn.	-	-	10A	.1	20A	.3	10A	.1	13.3A	.16
Martynia diandra Glox	-	-	10A	.1	-	-	-	-	10 A	.1

Tab. III : Frequency and density of species at four sites. P : Panden Tola, U : Uprahati, A : Amahia, C : Chirahula, ** frequency, * density.

spinosus,*Tridax procumbens*, *Phyllanthus niruri*, *Cynodon dactylon*, *Adhatoda viscae*, *Capsicum fruitescens*, *Eragrostis piolosa* appear on the walls followed by *Vernonia cinerea*, *Portulaca oleracea*, *Blumea lacera*, *Commelina benghalensis*, *Argemone maxicana*, *Andrographic echioides*, *Amaranthus viridis*, *Corchorus capsularis*, *Lycopersicum esculentum*, *Ipomea pestigridis*, *Solanum nigrum*. Woody perennials such as *Azadirachta indica*, *Calotropis procera*, *Lantana camara*, *Ficus religiosa*, *Ficus benghalensis*, *Mangifera indica*, *Tamarindus indica* and *Zizyphus mauritiana* commence their vegetative activities once again in July and August.

DISCUSSION

An attempt has been made in this study to bring out the characteristic feature of the floristic composition and ecology of the specialised wall flora around Rewa.

Species like *Dicanthium annulatum*, *Apluda aristata*, *Borreria hispida*, *Borreria stricta*, *Alternanthera sesselis*, *Orthosiphon pallidus*, *Echinochloa colonum*, *Tridax procumbens*, *Phyllanthus niruri*, *Ocimum sanctum* and so on, which are common to the area do better on these specialized habitats simply because of relief from biotic pressure. About 20 species of the flora can be said to be truly characteristic of the wall flora of this area with a frequency distribution of more than 50 %. Rest of the other species may be taken as adventurers. The wall species are characterised by possession of :

a. sticky and small seeds,

b. perennating rhizomes and root stock,

Name of species	Month of first appearance	Flowering period	Month of death	Total surviving period in months
Orthosiphon pallidus Royle	June	Nov-Dec W	Jan.	7
Jatropha gossipifolia Linn.	-	Nov-Dec W	-	Perennial
Argemone maxicana Linn.	Jan.	May-June S	Oct.	10
Portulaca oleraceae Linn.	July	Oct-Nov W	Dec.	6
Corchorus capsularis Linn.	Jan.	Oct-Nov W	Nov.	6
Melia azadirachta Linn.	-	No	-	Perennial
Mangifera indica Linn.	-	No	-	Perennial
Tamarindus indica Linn.	-	No	-	Perennial
Vernonia cinerea Less	June	Sept-Oct R	Nov.	6
Blumea lacera DC	June	Nov-Dec W	Feb.	9
Eclipta prostrata Linn.	July	Sept-Oct R	Feb.	8
Tridax procambens Linn.	June	Oct-Nov W	Dec.	6
Euphorbia hirta Linn.	July	Aug-Sept R	Feb.	9
Euphorbia microphylla Heyne	June	Oct-Nov W	Nov.	6
Euphorbia hypercifolia Linn.	July	Sept-Dec W	Feb.	8
Cynodon dactylon Bers	June	Jan-Feb W	May	12
Calotropis procera R.Br.	-	Jan-May S	-	Perennial
Solanum nigrum Linn.	July	Oct-Nov W	Nov.	5
Lycopersicum esculentum Mill	June	Sept-Oct R	Nov.	6
Capsicum frutescens Linn.	June	Nov-Dec W	Feb.	9
Datura metal Linn.	June	Sept-Oct R	May	12
Lindenbergia urticaefolia Lehm.	June	Sept-May S	May	12
Andrographis echioides Nees.	June	Sept-Jan S	Jan.	7
Adhatoda visica Nees	-	No	-	Perennial shrub
Boerhaavia diffusa Linn.	June	Nov-Dec W	May	11
Amaranthus viridis Linn.	June	Sept-Nov W	Feb.	9
Lantana camara Linn.	-	No	-	Perennial
Amaranthus spinosus Linn.	June	Sept-Jan W	Jan.	8
Achyranthus aspera Linn.	July	Oct-Nov W	May	11
Phyllanthus niruri Hook	Aug.	Sept-Oct R	Jan.	6
Ficus benghalensis Linn.	-	No	-	Perennial
Ficus religiosa Linn.	-	No	-	Perennial
Ficus glomerata Roxb.	-	No	-	Perennial
Commelina benghalensis Linn.	July	Nov-Jan W	May	11
Kyllingia brevifolia Roxb.	Aug.	Sept-Nov W	Dec.	5

1	2	3	4	5
Eragrostis pilosa Beauv.	July	Oct-Nov W	Dec.	6
Polygala chinensis Linn.	July	Aug-Sept R	Jan.	7
Indigofera cordifolia Heyne	June	Sept-Nov W	Dec.	7
Indigofera linifolia Petz.	July	Oct-Nov W	Feb.	8
Borreria hispida Kschum	Aug.	Oct-Nov W	May	10
Borreria stricta Linn.	Aug.	Aug-Sept R	May	10
Bidens pilosa Linn.	July	Oct-Nov W	Dec.	6
Echinops echinatus Roxb.	June	Nov-Apr W	May	11
Evolvulus alsinoides Linn.	Aug.	Oct-Nov W	Dec.	5
Aercea lanata Juss	Nov.	Oct-Nov W	May	7
Dicanthium annulatum Stapf.	July	Sept-Oct R	May	11
Pergularia pallida W & A	-	Oct-Nov W	-	Perennial shrub
Aristida setacea Retz.	Aug.	Aug-Sept R	Jan.	6
Apluda aristata Halk	July	Aug-Nov R	Jan.	7
Alternanthera sessilis R.Br.	Aug.	Oct-Nov W	May	10
Dactyloctenium aegyptium Linn.	Aug.	Sept-Oct R	Mar.	8
Ocimum santum Linn.	Aug.	Aug-Sept R	Jan.	Perennial
Oplismenus compositus Beauv.	July	Dec. W	Jan.	7
Cardiospermum helicacabum	June	Nov-Jan W	Apr.	11
Hemidismus indicus R.Br.	-	No	-	Perennial
Cocculus villosus DC Syst	July	Jul-Aug R	Mar.	9
Coccinia indica W & A prod.	July	Nov-Dec W	Apr.	10
Launaea aspleniifolia Hook.f.	July	Nov-Feb W	Apr.	11
Enicostema verticellatum Enrt.	June	Sept-Oct R	Jan.	8
Vitis latifolia Roxb.	-	Nov-Dec W	-	Perennial shrub
Echinochloa colonum Linn.	Aug.	Nov-Jan W	Mar.	8
Setaria glauca Beauv.	Nov.	Sept-Oct R	May	7
Medicago sativa Linn.	July	Sept-Oct R	June	12
Solanum xanthocarpum Schred.	July	Nov-Mar. W	June	11
Carica papaya Linn.	-	No	-	Perennial
Cucurbita maxima Duchesne	-	Sept-Jan S	-	Bineal shrub
Clitoria ternatea Linn.	June	Mar-Apr. W	May	12
Psidium guajava Linn.	-	No	-	Perennial
Syzygium cumini Skeels	-	No	-	Perennial
Cleome viscosa Linn.	July	Aug-Sept R	Feb.	8
Setaria intermedia Roem.	Aug.	Sept-Oct R	Feb.	6

1	2	3	4	5
Plucaria angustifolia DC	Aug.	Sept-Oct R	Feb.	7
Zizyphys mauritiana Lamk.	-	Aug-Sept R	-	Perennial
Phoenix humilis Royle	-	No	-	Perennial
Bombax ceiba Linn.	-	No	-	Perennial
Gomphrena celosioides Mart.	July	Oct-Nov W	Mar.	9
Alysicarpus monolifer DC	July	Aug-Jan R	May	11
Phaseolus trilobus aithort.	Aug.	Sept-Oct R	May	8
Crozophora rotlleri Hook	-	Mar-Apr W	-	Perennial shrub
Cassia obtusifolia Linn.	Aug.	Nov-Dec	Mar.	8
Ipomea pestigridis Linn.	July	Dec-Jan W	Feb.	8
Martynia diandra Glox.	Aug.	Nov-Dec	May	10

Tab. IV : Longevity of the plants. R : rainy season, W : winter season, S : summer season.

c. higher reproductive capacity,

d. high lime requirement.

Species of *Ficus* particularly, *Ficus religiosa* show the highest frequency. The other two trees which show higher frequency are *Azadirachta indica* and *Zizyphus mauritiana* and also a shrub *Lantana camara*. However these can at the best be regarded as accidentals to the wall flora.

The seeds get entrapped in crevices and the plants do not proceed growing beyond the stage of sapling. The most successful herbaceous species are : *Lindenbergia urtaecifolia*, *Blumea lacera*, *Launia splenifolia*, *Tridax procumbens*, *Adhatoda visica*, *Orthosiphon pallidus*, *Argemone maxicana*, *Euphorbia hirta*, *Dicanthium annulatum*, *Amaranthus viridis*, *Achyranthes aspara*, *Phyllanthus niruri*, *Commelina benghalensis*, *Kyllingia brevifolia*, *Eragrostis pilosa*,*Polygala chinensis*, *Indigofera cordifolia*, *Evolvulus alsinoides*, *Aerus lanata*, *Apluda aristata*, *Coccinia indica*, *Cocculus villosus*, *Capsicum frutescens*, *Alysicarpus monolifer*.

As compared to terrestrial plants the wall flora shows in general stunted appearance,and are xeromorphic in character. The root system in most cases is superficial in nature with spreading branches the ends penetrating the crevices of the substratum. Plants like *Azadirachta indica*, *Ficus religiosa*, *Ficus benghalensis*, *Lantana camara*, *Mangifera indica*, *Zizyphus mauritiana*, *Calotropis procera* show the presence of deeply pe-

netrating tap roots, with few lateral branches which extend laterally in the substratum. Morphological variations in respect to (a) height of plants, (b) the shape and nature of their leaves, are noticeable in the wall flora.

Reduction in height has been specially noted in *Lindenbergia urticaefolia, Adhatoda visica, Vernonia cinerea, Euphorbia hirta, Portulaca oleracea, Borreria hispida* etc... Reduction of size of leaves has been noted in such plants as *Capsicum frutescens*. Succullence of leaves has been observed in *Portulaca oleracea* and *Calotropis procera*.

The present study indicates the occurrence of 82 species distributed over 73 genera and 35 families of Angiosperms. These include mostly annuals and perennials, the former appeared at about the same time during two successive years indicating thereby that the seeds remained dormant in situ, till favourable condition prevailed. The perennials remained mostly in an aphyllus condition during the summer and resumed growth and activity with the commencement of monsoon.

Temperature, topography of the wall and its exposure to the sun were important in determining the types of vegetation and longevity of the plants. The angiospermic flora of town contains 31 families, 61 genera and 69 species of dicotyledons and 4 families, 12 genera, 13 species of monocotyledons (Tab. V) while the floral studies on herbaceous plants by SINGH (1978) reported 103 species for dicotyledons and 24 species for monocotyledons and those for woody plants by MISHRA (1979) reported 94 species for dicotyledons and 4 species for monocotyledons. Therefore, it appears that number of plants growing on dilapidated walls are quite satisfactory and the plants thriving on usual habitats may adopt such abnormal habitats such as the dilapidated walls.

The climatic conditions during the study period were quite adverse and most of the annual and herbaceous species started drying out by the end of August. Woody sp. of shrubby habit with xerophytic potential are able to withstand such adverse climatic conditions.

The dilapidated walls under study are quite old (Tab. II) and are unattended for a quite long time. It is because of this fact that the plant life is thriving well on these high walls far away from the reach of herbivores. The constructive activities in form of dispersal of disseminules appears to be obvious so that the plant grow on such a high distant places. Wind currents must also be playing important role in dispersing the seed of such plants. During the summer months the annuals are

not apparent while the shruby plants are observed in almost leafless condition, a characteristic of the xerophytes. It appears, therefore, that the shruby and woody plants can endure the hotter month in leafless condition. At the beginning of monsoonic rains new shoots appear and the annuals appear in the form of their seedlings.

The present study indicates that the area under study is quite heterogeneous, because of the present findings are contradictory to those of RAUNKIAER (1932). It may be due to smaller locality and the biotic and abiotic factors prevailing here in the thickly populated town.

Out of the 82 species 23 species undergo flowering and fruiting during rainy season, 40 species during the winter and only 5 species during the summer (Tab. IV). It is conclusive, that, winter months provide a better condition for the wall flora to undergo flowering and fruiting. It is apparent from the present studies that some of 14 arborescent species do not undergo flowering and fruiting while the same have been observed to undergo flowering and fruiting under natural habitats. It appears therefore that these species have not attained a full vegetative growth and maturity to initiate flowering and thereafter fruiting. In such species it may be probable that the increase in plant number must be due to the foreign disseminules.

The ratio of genera and species for flora on dilapidated wall comes to 1 : 1.2. The dilapidated walls under study are 10 to 100 years old and are unattended for the last 2 to 100 years so that the vegetation growing on them is free from human interference.

The floristics indicate that the dicotyledons are overdominating the monocotyledons. Compositae and Leguminosae are the largest families having 8 species each. *Euphorbia* and *Ficus* are the largest genera represented by 3 species each (Tab. V).

Of 82 species explored, 68 species undergo flowering and fruiting the remaining 14 species remain under vegetative condition. Winter is the optimum season as for flowering and fruiting of majority of the species (Tab. IV).

Summer is the ban period for vegetation when only a few arborescent species are observed in leafless condition.

Family	No. of genera	No. of species
Menispermaceae	1	1
Papaveraceae	1	1
Capparidaceae	1	1
Polygalaceae	1	1
Portulaceae	1	1
Malvaceae	1	1
Tiliaceae	1	1
Meliaceae	1	1
Rhamnaceae	1	1
Amphelideae	1	1
Sapindaceae	1	1
Anacardiaceae	1	1
Leguminosae	7	8
Myrtaceae	2	2
Passifloreae	1	1
Cucurbitaceae	2	2
Rubiaceae	1	2
Compositae	8	8
Asclepiadaceae	3	3
Gentianaceae	1	1
Convolvulaceae	2	2
Solanaceae	4	5
Scrophulariaceae	1	1
Pedaliaceae	1	1
Acanthaceae	2	2
Verbenaceae	1	1
Labiatae	2	2
Nyctaginaceae	1	1
Amaranthaceae	5	6
Euphorbiaceae	4	6
Urticaceae	1	3
Commelinaceae	1	1
Palmae	1	1
Cyperaceae	1	1
Gramineae	9	10
Total	73	82

Tab. V : Familywise number of genera and species.

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