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Plant diversity in mural Habitates of of Janjgir-Champa District (C.G.)

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Abstract
During the investigation of plant diversity in mural habitates of Janjgir-Champa district, Chhattisgarh a total of 65 species of which 60 species belonging to 31 families of Angiosperms and 5 species belonging to 4 families of pteridophytes were enumerated. Among angiosperms 49 species are dicots and 11 species are monocots representing 46 and 11 genera respectively. The dominant families are Asteraceae among dicots and Poaceae among monocots. Four wall tree species *viz*. *Azadirachta indica*, *Ficus benghalensis*, *Ficus religiosa*, *Ficus Cunea* and *Zizyphus mauritiana* were also recorded.

Keywords: plant diversity, wall flora, janjgir-champa, angiosperms, pteridophytes, tree species.

Introduction
Certain plants adapt themselves to grow on walls in addition to their natural habitats. It is simply a way to complete their life cycle utilizing limited nutrition and water present on walls of building as well as fences without any special obligation. These plants usually have a wide range of adaptations from mesic to xeric conditions. The term *wall flora* circumscribes all those plants that grow on walls including both cryptogams and phanerogams. Their reproductive ecology is stretched to the extent of sexual as well as asexual reproduction on walls, development of potent diaspores and their efficient dispersal.

While epiphytic plants are mostly considered for studies among extra-terrestrial plants (Mukherjee 1991) [1], works on epimural plants in India is meagre. Research on epimural plant life had been done by Misra (1945) [2], Singh & Chowdhury (1975) [3], Ghosh and Pal (1997) [4], Palit (2012) [5]. Sultan (1993) [6] reported 200 species of epimural flowering plants from Bhopal. Segal (1969) [7] and Varshney (1964, 1968) [8-9] also envisaged ecological aspects of these plants.

The present work is based upon survey and exploration of wall flora of Janjgir-Champa and restricted to the town only. At present, no or little documented work has been done to such a historically important place as Janjgir-Champa and the present work is merely a preliminary study focusing on enumeration of plants of growing on different types of wall.

The Janjgir-Champa district is bounded by East longitudes of 82°17’ to 83°19’ and by North Latitudes of 21°40’ to 22°15’30” having geographical area of 4467 sq. km. and is surrounded by Raigarh and Raipur district in South, Bilaspur district in west, Korba and Raigarh district in North and East respectively. The district headquarters Janjgir and Champa - the twin towns are well connected with roads as well as rail. National highway No. 200 passes through both the towns. Janjgir is 180 km from Raipur, 75 km from Bilaspur and 94 km from Raigarh. Both Janjgir and Champa are connected with Howrah and Mumbai by SECR Mumbai- Nagpur - Howrah main line. There is a good network of State Highways in the district.

Around 20% of the total area of the district is covered by forest. About 98% of the district is covered by plain land (dissected Pedi plain). The land is very fertile and is mostly used for the agriculture purposes with surface irrigation facilities. However, residual hills are found in parts of northern area, which forms 2% of the total area of the district. The eastern bank of Hasdeo River and parts of northern bank of Mahanadi is occupied by Alluvial Plain. The district does not have any large or medium scale irrigation project of its own. However the multipurpose Hasdeo-Bango project of Korba district feeds Janjgir-Champa district through its right bank and left bank canals. The Hasdeo-Bango project has been considered as life supporting canal irrigation facility for the district. Nearly 73% of the net sown area of the district is irrigated by all the sources. Irrigation by surface water alone covers almost 92% of the net irrigated area. The irrigation intensity in the district is the highest in the state. Nearly 113.62 sq. km area

spread over the entire district (6% of the net irrigated area) is irrigated by ground water. The walls in this area differs in age & size, are grouped on the basis of materials of constructions into i) Mortar walls (M) where lime is used for cementing bricks, ii) Brick mortar walls (BM) where mud is utilized for cementing bricks, iii) Mud walls (MW) which are made up of mud only and does not contain bricks. The vegetation zones on the walls are characterized into i) Horizontal top end of the wall (HT), ii) Vertical face of the wall (V), iii) Base of the wall (B).

Material and Methods

The present work is an eco-taxonomic survey of plants growing on different types of walls along with seasonal variation in Janjgir-Champa town. The plant specimens were collected from different study sites in different seasons of the year, identified using taxonomic methods and relevant literature (Prain, 1903) [10] and were dried for preservation. The dried specimens were then mounted on herbarium sheets and labelled. The species of magnoliophytes (angiosperms) were arranged according to A. Cronquist (1981) [11] and the specimens of Pteridophytes were arranged alphabetically giving information about their seasonal distribution on the basis of nature and vegetation zones of the wall.

Table 1: An enumeration of plants constituting wall flora of Janjgir-Champa town along with seasonal distribution: (PM- Pre- Monsoon; M- Monsoon; POM- Post monsoon)

Sl. No.	Name of the Plants	Family	Nature of wall	Vegetation zones	Seasonal distribution
1.	*Adiantum caudatum* L.	Adiantaceae	BM	V	M
2.	*A. capillus veneris* L.	Adiantaceae	BM	V	M
3.	*Christella dentata* (Forrsk.)	Thelypteridaceae	BM, MW	B, HT	M, POM
4.	*Lygodium flexuosum* SW	Schizaeaceae	BM	HT	PM, M
5.	*Pteris vittata* L.	Pteridaceae	BM	B	M, POM
6.	*Paperomia pellucida* (L.) Kunth	Piperaceae	M	B	M
7.	*Argemone Mexicana* L.	Papavaraceae	M	B	POM
8.	*Ficus religiosa* L.	Moraceae	M	V	PM,M, POM
9.	*F. benghalensis* L.	Moraceae	M	V	PM, M, POM
10.	*F. cunea* L.	Moraceae	M	V	M
11.	*Boerhaavia repens* L.	Nyctaginaceae	BM	HT	M, POM
12.	*Amaranthus spinosus* L.	Amaranthaceae	BM	HT, B	PM, M
13.	*Alternanthera Sessilis* (L.) R.Br.	Amaranthaceae	BM	B	PM, POM
14.	*Aerva aspera* L.	Amaranthaceae	BM	HT	PM, POM
15.	*Portulaca quadrifolia* L.	Portulacaceae	MW	V	M
16.	*Mollugo oppostifolia* L.	Molluginaceae	BM	V	M
17.	*Sida acuta* Burn.	Malvaceae	BM	HT, V	PM
18.	*Coccinia grandis* (L.) Voigt.	Cucurbitaceae	BM	HT	M
19.	*Cleome viscosa* L.	Capparidaceae	BM	HT	PM, M
20.	*Rorippa indica* (L.) Hiern.	Brassicaceae	BM	B	POM
21.	*Crotalaria incana* L.	Fabaceae	BM	V	POM
22.	*Desmodium gangeticum* (L.) DC.	Fabaceae	BM	HT	POM
23.	*D. triflorum* (L.) DC.	Fabaceae	MW	B	M, POM
24.	*Tephrosia purpurea* (L.) Pers.	Fabaceae	BM	B	POM
25.	*Acalypha indica* L.	Euphorbiaceae	BM	HT, B	PM, M, POM
26.	*Croton bonplandianum* Baill.	Euphorbiaceae	BM	HT, B	PM, M, POM
27.	*Euphorbia hirta* L.	Euphorbiaceae	BM	V	PM
28.	*Phyllanthus simplex* Retz.	Euphorbiaceae	BM	B	PM
29.	*Crozophora rottleri* (Geis) A.Juss ex Spreng.	Euphorbiaceae	BM	B	PM, M
30.	*Ziziphus mauritiana* Lam.	Rhamnaceae	BM	HT	POM
31.	*Azadirachta indica* A. Juss	Meliaceae	BM	HT	M
32.	*Oxalis corniculata* L.	Oxalidaceae	MW	B	PM, M
33.	*Catharanthus roseus* (L.) G. Don	Apocynaceae	BM	HT	M
34.	*Calotropis procera* R.Br.	Asclepiadaceae	BM	B	PM, POM
35.	*Nicotiana plumbaginifolia* Viv. Planch	Solanaceae	BM	HT	M
36.	*Clerodendrum viscosum* Vent.	Verbenaceae	BM	HT	PM
37.	*Lantana camara* L.	Verbenaceae	BM	HT	PM, M, POM
38.	*Ocimum sanctum* L.	Lamiaceae	BM	B	PM, M
39.	*Leonurus sibricus* L.	Lamiaceae	BM	HT	PM
40.	*Scoparia dulcis* L.	Scrophulariaceae	BM	HT	PM, M, POM
41.	*Lindenbergia urticaefolia* Lehm.	Scrophulariaceae	BM	HT	PM, M, POM
42.	*Lindernia crustacean* (L.) F.Muell.	Scrophulariaceae	M, BM	HT	M
43.	*Peristrophe bicalyculata* (Retz.) Nees	Acanthaceae	M, BM	HT	PM, M
44.	*Ruellia prostrata* Poir.	Acanthaceae	BM	V	M
45.	*Dentella repens* Forst	Rubiaceae	BM	B	M, POM
46.	*Oldenlandia corymbosa* L.	Rubiaceae	BM	HT	M, POM
47.	*Ageratum conyzoides* L.	Asteraceae	BM	HT	POM
48.	*Eupatorium odorata* L.	Asteraceae	BM	B	M, POM
49.	*Eclipta prostata* L.	Asteraceae	BM	B, V	POM
50.	*Tridax procumbens* L.	Asteraceae	M, BM	V, HT	POM
51.	*Mikania scandens* B.L.Rob.	Asteraceae	BM	HT	PM, POM
52.	*Sonchus aspera* (L.) Hill	Asteraceae	BM	V	PM, POM

53.	*Vernonia cinereal* Less.	Asteraceae	BM	V	POM
54.	*Pseudelephantopus spicatus* Rohr ex Gleason	Asteraceae	BM	V	POM
55.	*Murdannia nudiflora* (L.) Brenan	Commelinaceae	MW	B	M
56.	*Cyperus rotundus* L.	Cyperaceae	MW	B	PM, M
57.	*Fimbryistylis aestivalis* Nahl.	Cyperaceae	BM	HT	M
58.	*Kyllinga brevifolius* Rottb.	Cyperaceae	BM	HT	M, POM
59.	*Chloris barbata* Sw.	Poaceae	BM	HT	M, POM
60.	*Digitaria ciliaris* (Retz.) Koel	Poaceae	BM	HT	PM, M
61.	*Elusine indica* Gareth.	Poaceae	MW	B	PM, M
62.	*Eragrostis tenella* (L.) P. Beauv.ex Roem & Suchit	Poaceae	BM	HT	M, POM
63.	*Oplismenus composites* (L.) P. Beauv	Poaceae	BM	B	POM
64.	*Panicum paludosum* (L.) Roxb.	Poaceae	BM	HT	PM, POM
65.	*Setaria glauca* (L.) P. Beauv	Poaceae	BM	B	PM, POM

Results and Discussion

From the present investigation 60 species of plants belonging to 31 families of angiosperms growing on the wall are recorded. Among these 49 species are dicots and 11 species are monocots belonging to 46 and 11 genera respectively. 5 species of pteridophytes belonging to 4 families are also recorded during this work. Asteraceae among dicots is the most dominant family exhibiting 8 species whereas Poaceae with 7 species is considered as the most dominant family among monocots.

So far, the vegetational zones are concerned most of the species are found to occur at the horizontal top of the wall (HT) and in respect to habitat preference, most of the plants are found in brick mortar walls (BM). The number of species occurring in the horizontal top of the wall (HT) are 26. Least number of species are found to occur on the vertical face of the wall (V) which is 13 while the base of the wall (B) has given shelter to 19 species. But there are 4 species which are distributed at both base and the horizontal top of the wall (B+HT), 2 species occupy in horizontal top and the vertical face of the wall (HT+V) and only 1 species is found to occur at the both vertical face and base of the wall (B+V).

As far the habitat preference is concerned, 50 species are found to occur on brick mortar walls (BM), 6 species on mortar walls (M) and 5 species on mud walls (MW). Three plant species are also found on both brick mortar and mortar walls (BM+M) and 1 species on both brick mortar and mud walls (BM+MW).

According to seasonal preferences, 14 species are recorded to prevail only in monsoon (M) only and least number of species which is 5 only grows in pre-monsoon (PM) period. Post monsoon (POM) period is represented by 12 species, 7 species are found in both pre-monsoon and post monsoon (PM+POM) period, 10 species are recorded in both pre-monsoon and monsoon (PM+M) period, as well as in monsoon and post monsoon period (M+POM) also. Seven species are found to occur throughout the year (PM+M+POM).

Scarcity of species in pre-monsoon period is mainly due to the dry heat that prevails in the study area during that period where as relatively lower temperature and abundance of humidity in monsoon period aided the growth of plant species on the walls. Though the post monsoon period is represented by dry winter, walls in moist places give refuge to species of certain families which is considerably higher than the number of species found in pre-monsoon period.

From the study, it is quite evident that the red soil found in the study area is quite nutritionally deficient and the presence of iron oxides prevent the vegetation to flourish. The study area exhibits different grades of laterisation in soil formation. Soils are well drained; water retention is quite low and huge amount of soil erosion occurs due to excess run off. Water stress is prevalent throughout the year, especially during pre-monsoon period. This may have driven plants to seek secondary refuge where water retention is better. Tree species as well as herbs thrive better on the extra-terrestrial substrata, often producing cracks and fissures on the wall.

The wall flora composes a very rich biodiversity and the walls provide a mean for conservation of germplasm. In future, there is scope for the study regarding detailed taxonomic relationships and ecological adaptive features of plants growing on walls.

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