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A contribution to the study of wall flora of Sidhi Distirct, Madhya Pradesh, India

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Abstract
The wall flora are a very interesting group of stress tolerant plants capable of thriving in nutritionally deficient substrates. The walls provide shelter to the species seeking refuge in then. While doing so the walls in rural as well as urban areas contribute towards conservation of rare and threatened plants. Some species settled on walls often prove damaging to buildings and must be eradicated. The present work which covered the wall flora of five major zones of Sidhi district, could record as many as 28 species belonging to 24 genera of 16 families. When the flora is analyzed according to the type of supporting wall very interesting results were obtained. Of the five different types of walls studied the cemented brick walls sustained the highest number of species i.e. 27. The work on wall flora is emphasized since it can not only unveil many mysteries of plant adaptation but also hand over information in landscape planning, protection of old buildings especially the heritage buildings and monuments.

Keywords: contribution, wall flora, Sidhi, India

Introduction
Angiosperms, the highest evolved among plants, are ubiquitous with distribution in terrestrial as well as aquatic systems spreading from the equator to the near arctic regions of the globe. Their adaptive radiation and evolutionary flexibility and rapidity are praiseworthy. They grow in wild abodes as well as human cared systems organized according to the principles and practices off agriculture, horticulture, silviculture, aquaculture etc. They are well adapted to epiphytic lifestyle, mycotrophism, insectivory etc. Certain plants design their biology for extraterrestrial life on walls in addition to their life in natural habitats as an additional strategy to interact with other species in such a way so as to avoid completion and exclusion from the ecosystem so as to compromise through spatial resource partitioning. It is also likely that such plants use the walls as a stepping stone for future success in their ecological growth and spread. These plants usually have wide range of adaptations from mesic (moderate state of hydration) to xeric (dehydrated state) conditions. Studies on extraterrestrial plant life mostly concern the epiphytes (Mukherjee, 1991) [1]. The ecological aspect of these extraterrestrial plants has been envisaged in the work of Varshney (1968) [2] and Singh (2011) [3]. Work on wall flora is rather meager in India (Pal *et al.* 2000; Sahu, 1984, Murti and Panigrahi, 1999 and Singh *et al.* 1979) [4, 7] although these plants occupy very important structural as well as functional positions in the trophic framework of the rural as well as urban ecosystems. In view of the importance of the wall flora, the present work was undertaken in such a historically important place as Sidhi district. The Sidhi District in located in the north eastern part of Madhya Pradesh State having a total geographical area of 10526 sq kms and extend by north latitude 23°45' and 24°45' and east longitudes 81°15' and 83°00' and lies in survey of India Top sheet Nos. 63H&I respectively.

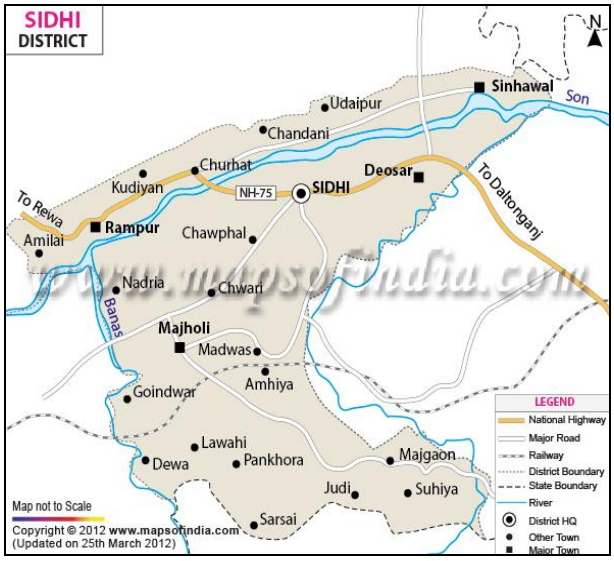

Fig 1: Map of Sidhi District

Materials and Methods
The present study was initiated in March 2017 and field studies were performed from time to time during the pre-monsoon season. Plants growing-on walls and fences of rural and urban regions of Sidhi were collected, processed for herbarium preservation and identified following standard methods involving dissection, description and reference to (Figs. 1 and 2) literature (Prain, 1903; Guha Bakshi, 1984; Bennet, 1987, Panigrahi and Murti, 1989) [8-11], and the rest processed for herbarium preservation as voucher specimens following Jain and Rao (1977) [12].

Results

Table 1: An account of prevalence of the plant Species in different walls

S.No.	Name of the plant	Family	Attendance in study site					Percentage (%)
			1	2	3	4	5	
1.	*Ageratum conizoides*	Asteraceae	-	+	-	-	-	20.00
2.	*Amaranthus viridis*	Amaranthacee	-	+	-	-	-	20.00
3.	*Andrographis paniculata*	Acanthaceae	-	+	-	-	-	20.00
4.	*Argemone mexicana*	Papaveraceae	-	-	+	-	-	20.00
5.	*Azadirachta indica*	Meliaceae	-	-	+	-	-	20.00
6.	*Barleria cristata*	Acanthaceae	-	+	-	-	-	20.00
7.	*Blumea lacera*	Asteraceae	-	+	-	-	-	20.00
8.	*Boerhaavia repens*	Nyctaginaceae	-	+	-	-	-	20.00
9.	*Cajanus cajan*	Papilionaceae	-	-	-	-	+	20.00
10.	*Cleome viscosa*	Cleomecaceae	-	-	+	+	-	40.00
11.	*Clerodendrum viscosum*	Verbinaceae	-	-	+	-	-	20.00
12.	*Coccinia grandis*	Cucurbitaceae	-	-	-	-	+	20.00
13.	*Dentella repens*	Rubiaceae	-	+	-	-	-	20.00
14.	*Eclipta alba*	Asteraceae	+	+	-	-	-	40.00
15.	*Euphoriba hirita*	Euphorbiaceae	-	+	-	-	-	20.00
16.	*Ficus benghalensis*	Moraceae	-	-	+	-	-	20.00
17.	*Ficus hispida*	Moraceae	-	-	+	-	-	20.00
18.	*Ficus racemosa*	Moraceae	-	+	-	-	-	20.00
19.	*Ficus religiosa*	Moraceae	+	-	+	+	+	80.00
20.	*Hemigraphis hirta*	Acanthaceae	-	+	+	-	-	40.00
21.	*Oxalis corniculata*	Oxalidaceae	+	-	-	-	-	20.00
22.	*Parthenium hysterophorus*	Asteraceae	+	-	-	-	-	20.00
23.	*Rumex nigricans*	Polygonaceae	+	+	-	+	-	60.00
24.	*Rungia parviflora*	Acanthaceae	-	+	-	-	-	20.00
25.	*Sida acuta*	Malvaceae	-	+	-	-	-	20.00
26.	*Trichosanthes cucumerina*	Cucurbitaceae	-	+	-	-	-	20.00
27.	*Tridax procumbens*	Asteraceae	-	+	-	-	-	20.00
28.	*Vernonia cinerea*	Asteraceae	-	+	-	-	-	20.00

1=Chorhat, 2=Sidhi, 3= Sihawal, 4=Chitrangi and 5 = Majhauli.

Table 2: Species distribution on walls of different regions of Sidhi District

S. No.	Place/ Data point	Number of plant species growing on wall
1.	Chorhat	5
2.	Sidhi	17
3.	Sihawal	9
4.	Chitrangi	3
5.	Majhauli	3

Discussion

The present work which covered the wall flora of five major zones viz. Chorhat, Sidhi, Sihawal, Chitrangi and Majhauli, could record as many as 28 species belonging to 24 genera of 16 families. Incidentally all the families were dicotyledonous. The number of species appears to be quite low compared to the ruderal flora associated with the walls studied. The reasons are obvious. The climate was very dry and hot during the pre-monsoon season in Chorhat which did not allow a rich wall flora. Even the grasses which were presumably annuals appeared during monsoon which were observed but not recorded.

The number of species 17 was highest in walls of Sidhi area. The next to come in the list is Majhauli area with 9 species. There were 5 species in Chorhat and 3 species in each case of Majhauli, Chitrangi and Majhauli (Tables 1 and 2).

When the flora is analyzed according to the type of supporting wall very interesting results were obtained. Six different types of walls were studied of which cemented brick walls sustained the highest number of species i.e. 27. The walls made of brick, mud and lime could accommodate 4 species and simply mud walls and stone-brick walls sustained 3 species each. Other two types of walls, i.e. brick wall and mud wall supported on species each. Since the muds were compact, dry and impervious the plants were incapab of settling on walls. Only the highly xeric species like *Ficus religiosa, F. racemosa, F. bengalensis hispida* were capable of thriving under such stressful habitats. *Ficus* was the most successful among all the genera recorded in the present work by virtue of its four species. The cemented brick walls were mostly old with cracks and porosity due to sand mixed with cement. The conditions thus were suitable for 27 species in procuring retained water and moisture and aeration in walls (Table 1).

Taxonomic analysis of the wall flora revals Asteraceae to be most successful with 6 species which was followed by Moraceae and Acanthaceae each with with 4 species. Cucurbitaceae had 2 represent species. Each of the remaining 12 families was represented by a single species.

Habit analysis of wall plants shows species of 19 herbs, 3 shrubs and 6 trees. Among the herbs four species are climbers with roots anchored on walls and six species are creepers. Thus habit of wall plants shows full range diversity.

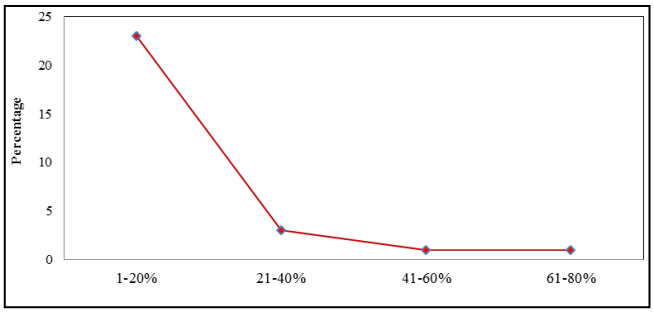

Fig 2: Graphics analysis of prevalence categories of species composiing wall flor

When prevalence values of the concerned species were considered no less than 23 species were very preferential as evident from their utilization of 20% of the wall types. Only three species to occupy 21-40% of the wall types which speaks of their broader ecological amplitude. Only one species each showed their efficiency to use 41-60% (*Rumex nigricans*) and 61-80% (*Ficus religiosa*) of the different wall types studied. Thus rather more non-selective than majority of the species. Interestingly no totally indifferent species (81 prevalence value) could be recorded.

Conclusion

The wall flora composes a very interesting group of stress tolerant plants capable of thinning in nutritionally deficient substrates. The walls provide shelter to the species seeking refuge in them. While doing so the walls in rural as well as urban areas contribute towards conservation of rare and threatened plants. The tree species settled on walls often prove damaging to buildings and must be eradicated. Work of this kind can afford opportunity to formulate strategies for conservation of rare and useful species in one hand and work out strategies for weed control other hand. Extensive studies are thus needed for a better understanding of the biology of the wall plants since they might have several benevolent implications still not known to us.

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