Seasonal variation of temple wall floras in Mayiladuthurai, Nagapattinam district of Tamil Nadu, India

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ABSTRACT

Wall flora is referred as, the flora grown on buildings, temples, house remains or their surrounding areas. Plant growth on monuments is responsible for the widening of gaps between adjoining blocks or increasing the dimensions of the cracks already present on the surface. Finally the architecture of the temple is fully collapse by wall floras. So an investigation has to be taken for the seasonal variation of wall floras in a famous temple Mayiladuthurai, Nagapattinam district of Tamil Nadu, India.

Keywords: Wall flora, Monuments, Temples, Eradication, Nagapattinam district

1. INTRODUCTION

Tamil Nadu has a great tradition of history and culture. In ancient, early medieval and medieval period, a number of dynasties ruled over the Tamil Land. Many of those rulers were very fond of art and architecture and gave generous patronage to men of letter, sculptors,
architects and artists. This saw the Tamil land becoming a hub of many beautiful and amazing monuments and temples which attract tourists from all over the world. As a result of such great culture achievements, the state of Tamil Nadu is referred to as the cradle of Dravidian culture, an ancient culture distinguished by unique languages and customs. Many towns and cities of Tamil Nadu are associated with beautiful monuments and Temples. Mayiladuthurai is one of those places in Tamil Nadu (Map 1). Mayiladuthurai is of considerable antiquity, cultural and religious significance. The town must have originated in the Medieval Chola period. Mayiladuthurai was ruled by the Early Cholas, Medieval Cholas, Later Cholas, Pandyas, the Vijayanagar Empire, Thanjavur Nayaks and the Thanjavur Marathas. In Mayiladuthurai and surrounding places many temples are situated. Among these temples Sri Mayuranathar temple, is of the most important temples in Mayiladuthurai. Many pilgrims are visited these temple every day. Now, the beautifulness of the temples has been degraded day by day, because the floras are growing on the temple walls and towers.

Map 1. Map showing Mayiladuthurai.
Wall flora is referred as, the flora grown on buildings, temples, house remains or their surrounding areas (Nedelcheva and Vesileva, 2009; Sankar Ganesh et al., 2009 a). Walls may be generally categorized into 5 types (i) brick cement wall (ii) stone cement wall (iii) brick mud wall (iv) stone mud wall and (v) mud wall. In the brick cement wall and stone cement wall, the cementing material used is cement, while in the brick mud wall and stone mud wall the cementing material used is mud. The mud wall is purely made of mud. Plants of herbaceous habits are the chief representatives of wall flora (Singh, 2011). The birds and animals disperse the seeds through their excreta on the temple walls and old house walls. When the conditions are favourable, the seeds germinate and become a plant on the same place. Thus, some plants are commonly grown on walls such as Ficus glamorata, F. religiosa, F. benghalensis, Cynodon dactylon, Ionidium suffruticosum, Viola oderata, Acalypha indica, Phyllanthus niruri, Trianthema portulacastrum, Boearhavia diffusa etc., (Sankar Ganesh et al., 2013).

Plant growth on monuments is responsible for the widening of gaps between adjoining blocks or increasing the dimensions of the cracks already present on the surface. Plant growth can increase the load on the surface thus resulting in the dislocation of the surface. Besides causing such type at physical damage to the monuments, it can also affect chemically with the surface. There is evidence that marble and limestone in contact with roots develop root marble due to the etching effect of the slightly acidic sap of the root cells. Rotting roots can also stain calcareous stones and they produce humic substances (Agrawal et al - 1995). Walls represent a specific environment for growing plants, which is partly similar to rocks and rock fissures (Woodell, 1979). The flora of wall habitats has received little attention in the past (Woodell and Rossiter, 1959; Segal, 1969; Payne, 1978; Karschon and Weinistein, 1985; Lisci and Pacini, 1993; Kolbek, 1997; Tripathy et al., 1999; Wojcikowska and Galera, 2005; Pavlova and Tonkov, 2005; Iatrou et al., 2007; Ezer et al., 2008; Maxwell 2009; Altay et al., 2010 and Rajalakshmi and Shanthi., 2012). Walls are man - made artificial habitats. Generally the walls having cracks and crevices often favour the growth and development of plant species. The wall plants are the result of spontaneous colonization unassisted by human actions. Several studies have been conducted to analyze the floristic composition of the wall habitats in India and abroad (Singh, 2011a, Nadelcheva, 2011 and Singh and Singh, 2014). In India, especially Tamil Nadu the study of wall floras is very meager. The study of the wall flora is of special importance for the maintenance and preservation of archeological monuments. As a result, data on the vascular flora of important Temples in Mayiladuthurai is completely lacking. So an investigation was made on the survey of wall flora in Mayuranathar Temple Mayiladuthurai - an important City in Tamil Nadu.

2. MATERIALS AND METHODS

The Percent study deals with the floras growing on walls of Mayuranathar temple Mayiladuthurai, Tamil Nadu, India.

Site description

Mayiladuthurai is one of the famous cities in Tamil Nadu. The town is situated on a flat plain on the banks of the river Cauvery. Mayiladuthurai and surrounding places have many temples.
Field observation

An extensive field study was conducted from September - 2013 to February - 2014. The walls and towers of the flora included the main boundary wall surrounding the temples, and towers. The collected plants were preserved and maintained in the form of herbarium for future studies. All the plants collected in the study were identified with in the collecting place. The identified plant species were conformed by using standard taxonomic floras proposed by Mathew (1991) and Gamble (1936).

3. DISCUSSION

No life can be expected on earth without vegetation but the growth of plants on historic buildings and monuments can cause serious problems. The problems can be quite serious in tropical countries like India, particularly in Tamil Nadu. Where, the climatic condition is quite favorable to plant growth.

One of the principal stages in the evolution of civilization has been the construction of buildings and their decoration with sculptures. Tamil Nadu, becoming a hub of many beautiful and amazing monuments, and temples, which attracts tourists from all over the world. These monuments and forts speak volumes about the artistic skills and excellence of the sculptors and architects of that period. But now a day these archeological monuments and temples are loss their original structure day by day. Because, the floras grown on the walls and towers of temples. These floras are classified under herb, shrub, climbers and sometimes trees. These plants are rooted well in the gap of the walls. After a long time we cannot consider these plants, they are collapse the original structure of the temples, forts, buildings etc.

Plants can live in aquatic, terrestrial and organic environments. Their growth in these environments is influenced by many parameters. There are habitats in which the extreme conditions lead to the selection of species with morphological and physiological adoptions enabling them to survive. Walls constitute a specialized microhabitats, since there are built by man, they are restricted to inhabitant for plants their dampness & aspects are of great importance of the plants upon them (Lisci and Paccini - 1993). The Mayurnathaswami temple in mayiladuthurai is built in the Dravidian style of architecture. This Temple was built during the time of the Medievel Cholas and is 719 feet long and 52 feet wide. The gopuram at the eastern entrance is 164 feet high.

Walls of buildings and of their constructions made of bricks, stones or concreted belongs to specific, polyhemerobic habitats, which can be a substitute habitats for rock plants. They are common but rarely colonized, because of their vertical and even surface, characterized by unfavorable water and temperature regimes and recurrent concentration of the walls (Francis, 2011). This insufficient inflow of Diasporas can also be a reason for slow colonization of walls, especially in centers of large agglomerations. Vascular plants can normally grow on sites where at least a small amount of humus has accumulated. This kind of substrate is formed in calcium containing mortar or slits and fissures of the walls, previously colonized by lichens and mosses (Boratynski et al., 2003).

The plants found on walls and towers of temples in Mayiladuthurai is belonging to the families of Aizoaceae, Amaranthaceae, Solanaceae, Euphorbiaceae, Capparidaceae, Malvaceae, Poaceae, Nyctaginaceae, Cucurbitaceae, Moraceae, Rubiaceae, Acanthaceae,
Caricaceae, Lamiaceae, Commelinaceae, Atraceae, Menispermaceae, Meliaceae, Magnoliaceae, Convolvulaceae, Anacardiaceae and Cyperaceae (Table 1 & Plate 1-5). Among the families the higher genus was recorded mainly to the Amaranthaceae (5 taxa), Solanaceae (4 taxa), Cucurbitaceae (3 taxa), Acanthaceae (3 taxa) and Moraceae (3). The largest number of species belongs to the genera is Solanum (3), Ficus (3) Amaranthus (3), Andrographis (2) and Sida (2).

Table 1. Periodical Survey of wall floras grown on the walls & Towers of Sri Mayuranathar Temple, Mayiladuthurai.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Family with Botanical Name</th>
<th>Common name</th>
<th>Habit</th>
<th>Voucher number</th>
<th>Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Acanthaceae Andrographis echoides (Nees)</td>
<td>Vettukaya sedi</td>
<td>Annual herb</td>
<td>AVCCWF-04</td>
<td>✓ ✓ ✓ ✓ x</td>
</tr>
<tr>
<td>2.</td>
<td>Andrographis paniculata (Nees)</td>
<td>Siriyanangai</td>
<td>Annual herb</td>
<td>AVCCWF-38</td>
<td>x x x ✓ ✓ ✓</td>
</tr>
<tr>
<td>3.</td>
<td>Ruelia prostrata. (Linn)</td>
<td>Veedikaai</td>
<td>Annual herb</td>
<td>AVCCWF-24</td>
<td>✓ ✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>4.</td>
<td>Aizoaceae Mullugo cereviana (Linn)</td>
<td>Thiruakkothu</td>
<td>Annual herb</td>
<td>AVCCWF-10</td>
<td>✓ ✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>5.</td>
<td>Trianthema portulacastrum (Linn)</td>
<td>Saranai</td>
<td>Annual herb</td>
<td>AVCCWF-06</td>
<td>✓ ✓ x x ✓ x</td>
</tr>
<tr>
<td>6.</td>
<td>Amaranthaceae Amaranthus caudatus. L</td>
<td>Kozhikkondai</td>
<td>Annual herb</td>
<td>AVCCWF-42</td>
<td>x x x x x ✓</td>
</tr>
<tr>
<td>7.</td>
<td>Amaranthus viridis (Linn)</td>
<td>Kuppai kirai</td>
<td>Annual herb</td>
<td>AVCCWF-02</td>
<td>✓ ✓ ✓ ✓ ✓ x</td>
</tr>
<tr>
<td>8.</td>
<td>Aerva lanata (Juss)</td>
<td>Sirukanpoolai</td>
<td>Annual herb</td>
<td>AVCCWF-22</td>
<td>✓ ✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>9.</td>
<td>Gomphrena globosa (Linn)</td>
<td>Vadamalli</td>
<td>Annual herb</td>
<td>AVCCWF-36</td>
<td>x x x ✓ ✓ ✓</td>
</tr>
<tr>
<td>10.</td>
<td>Amaranthus spinosus (Linn)</td>
<td>Mullukerai</td>
<td>Annual herb</td>
<td>AVCCWF-39</td>
<td>x x x x x ✓</td>
</tr>
<tr>
<td>11.</td>
<td>Apocynaceae Catharanthus roseus (L) G. Don</td>
<td>Nithiyakalyani</td>
<td>Annual herb</td>
<td>AVCCWF-18</td>
<td>✓ ✓ ✓ ✓ x x</td>
</tr>
<tr>
<td>No.</td>
<td>Family</td>
<td>Genus and Species</td>
<td>Common Name</td>
<td>Life Habit</td>
<td>Code</td>
</tr>
<tr>
<td>-----</td>
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<td>----------------------------------------</td>
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</tr>
<tr>
<td>12.</td>
<td>Asteraceae</td>
<td><em>Tagetes erecta</em> (Linn)</td>
<td>Samanthi</td>
<td>Annual herb</td>
<td>AVCCWF- 41</td>
</tr>
<tr>
<td>13.</td>
<td>Tridax</td>
<td><em>Tridax procumbens</em> (Linn)</td>
<td>Thathapoo sedi</td>
<td>Annual herb</td>
<td>AVCCWF- 23</td>
</tr>
<tr>
<td>14.</td>
<td>Bignoniaceae</td>
<td><em>Tecoma stans.</em> (Linn)</td>
<td>Punal poo</td>
<td>Shrub</td>
<td>AVCCWF- 01</td>
</tr>
<tr>
<td>15.</td>
<td>Capparidaceae</td>
<td><em>Cleome viscosa</em> (Linn)</td>
<td>Naai Kadugu</td>
<td>Annual herb</td>
<td>AVCCWF- 03</td>
</tr>
<tr>
<td>16.</td>
<td>Commelianeae</td>
<td><em>Commelina benghalensis</em> (Linn)</td>
<td>Kanangozhai</td>
<td>Annual herb</td>
<td>AVCCWF- 40</td>
</tr>
<tr>
<td>17.</td>
<td>Convolulaceae</td>
<td><em>Convolvulus arvensis</em> (Linn)</td>
<td>Elikkadukkerai</td>
<td>Annual herb</td>
<td>AVCCWF- 34</td>
</tr>
<tr>
<td>18.</td>
<td>Cucurbitaceae</td>
<td><em>Coccinia indica</em> L</td>
<td>Koovai</td>
<td>Annual herb</td>
<td>AVCCWF- 09</td>
</tr>
<tr>
<td>19.</td>
<td>Melothria</td>
<td><em>maderaspatana</em> (Cong)</td>
<td>Musumusukkai</td>
<td>Annual herb</td>
<td>AVCCWF- 12</td>
</tr>
<tr>
<td>20.</td>
<td>Memordica</td>
<td><em>dioica</em> (Roxb)</td>
<td>Midhipagai</td>
<td>Annual herb</td>
<td>AVCCWF- 35</td>
</tr>
<tr>
<td>22.</td>
<td>Cyperus</td>
<td><em>rotundus</em> (Linn)</td>
<td>Paaikoorai</td>
<td>Annual herb</td>
<td>AVCCWF- 26</td>
</tr>
<tr>
<td>23.</td>
<td>Euphorbiaceae</td>
<td><em>Phyllanthus amarus</em> (Linn)</td>
<td>Kezhanelli</td>
<td>Annual herb</td>
<td>AVCCWF- 19</td>
</tr>
<tr>
<td>24.</td>
<td>Achlypha</td>
<td><em>indica</em> (Linn)</td>
<td>Kuppaimeni</td>
<td>Annual herb</td>
<td>AVCCWF- 05</td>
</tr>
<tr>
<td>25.</td>
<td>Lamiaceae</td>
<td><em>Ocimum canum</em> (sims)</td>
<td>Naaithulasi</td>
<td>Annual herb</td>
<td>AVCCWF- 20</td>
</tr>
<tr>
<td>26.</td>
<td>Leucas aspera</td>
<td><em>spreng</em></td>
<td>Thumbai</td>
<td>Annual herb</td>
<td>AVCCWF- 11</td>
</tr>
<tr>
<td>27.</td>
<td>Malvaceae</td>
<td><em>Sida cardifolia</em> (Linn)</td>
<td>Arivalmanipoondu</td>
<td>Annual herb</td>
<td>AVCCWF- 28</td>
</tr>
<tr>
<td>28.</td>
<td>Sida accuta</td>
<td>(Linn)</td>
<td>Mookkuthi poo</td>
<td>Annual herb</td>
<td>AVCCWF- 32</td>
</tr>
<tr>
<td>29.</td>
<td>Moraceae</td>
<td><em>Ficus religiosa</em> (Linn)</td>
<td>Arasamaram</td>
<td>Tree</td>
<td>AVCCWF- 07</td>
</tr>
</tbody>
</table>
In the month of November to January Lower plants like Fungi (Agaricus bisporus and Volveriella volvacea) and Bryophyte (Funaria) were grown frequently on the gaps of walls. It may be due to the moisture content is high and temperature is low in the surrounding atmosphere. It is one of the main reasons for these plants frequently grown on the walls. This lower plants are cannot grown in the months of September, October and February also It may be due to Temperature is high and the moisture content is low in the surrounding atmosphere. The total number of vascular plants growing spontaneously on walls included 33 genera with 20 families. Among the 33 Genera, 42 species were recorded. Out of the 42 species, 36 species were Dicotyledons and remaining 6 species were Monocotyledons.
Plate : 1 Plants grown on the walls and towers

Well grown *Amaranthes caudatus*

Well grown *Cleome viscosa*

Well grown *Cleome viscosa* and *Amaranthes viridis*

Well grown *Cleome viscosa* and *Mullugo cereviana*
Plate : 2 Plants grown on the walls and towers

*Mukkia madaraspatna*  
*Phyllanthus amarus*

Well grown *Boerhaavia diffusa*  
*Ficus religiosa*
Plate: 3 Plants grown on the walls and towers

Gousuma tomentosa  
Tridax procumbens and Chloris barbata

Mosses and Cassia occidentalis  
Well grown Aerva lanata
Plate: 4 Plants grown on the walls and towers

Leucus aspera

Leucus aspera, Acalypha indica and Ficus glamorata

Hybanthes ennesiformis

Andrographis echioides
Plate : 5  Plants grown on the walls and towers

Partially dead *Amaranthus viridis*

Partially dead *Chloris barbata*

Fully dead *Andrographis echioides*

Fully dead *Cleome viscosa*
All the plants studied in the temple walls also present near by the surrounding areas of the temple. This group comprises mainly annual, biennial or perennial herbs, small shrubs and trees. These plants are observed in rock fissures or in close proximity to gardens and houses where the soil layer is thicker. They are heliophilous or shade-tolerant, warm-loving species, some of them requiring higher humidity.

Most of taxa recorded in the temple walls and towers of the temple are herbs than in shrubs, climbers and woody plants. The specific conditions on the walls are also a reason for the limited number of species that can survive and complete their life-cycle there. *Morinda tinctoria* their appearance depends on the permanent supply of Diasporas from the neighborhood. Seeds of phanerophytes are delivered by birds or by wind. Similarly, the immediate neighborhood at parental specimens is due to the occurring herbaceous plants growing, flowering and fruiting in rock fissures, produce large amount of anemochorous seeds (Boratynski et al., 2003 and Aparecida et al., 2006).

Factors affecting the flora of walls include aspect, construction, shading, moisture content and the type of adjacent habitats, which have an important role in providing species to colonies the walls. It is difficult to demonstrate how much influence each of these has and in some cases difficult to actually measure the factors involved (Williams, 1988). The tendency of vascular plants to be found only towards the top of the walls also appears to be universal. The phenomenon is largely related to the preference of vascular plants for horizontal rather than vertical surfaces and is directly related to the greater ability of horizontal surfaces to retain soil and water. In particular, the top of the wall had an important effect upon the wall flora by providing such horizontal surfaces and helping to retain water within the rooting substrate (Darlington, 1981). Plants growing at the extreme base of a wall in temples were ignored, since these would probably be rooted in the ground and therefore not truly rupestral. Similary, wall tops with an obvious accumulation of soil were excluded from the survey. They often have typical forms, dried or injured stems with intensive seed production and vegetative propagation, able to occupy free areas and to grow in the conditions of scarce and unequal soil moisture (Nedelcheva and Vasileva, 2009 & Osma et al., 2010).

The number of annual species is bigger at the top of the wall and on the vertical wall surface and there are fissures have perennials, which are typical for the wall base and the surrounding area. This is due to the favorable environmental conditions in the basal zone i.e., more humidity and nutrients are available there (Darlington, 1981). Moreover, physiological limits of early plant development exist horizontal growth of radical of young plants prevents many species from successful establishment and regular occurrence in horizontal fissures (Segal, 1969 and Wajcikowska, 1988, 1992, 2000 & Singh., 2011a). The more or less flat top a wall clearly receives more light and rain than the vertical sides and accumulates more debris that leads to the formation of rudimentary soils. Fruits and seeds dropped or evacuated by birds are much more likely to arrive on the top of a wall than on its sides. It seemed probable, therefore, that certain species would tend to be found on the expose tops of wall, while shade sowing plants and those not primarily dispersed by birds would be more at home on their sides (Payne, 1989). The latter could be characterized as accidental species. They usually reach only low covers on walls and indicate a strong limitation to wall environment and competitive exclusion in a small-scale habitat (Duchoslav, 2002). The results show a high level of specificity regarding the species diversity at each site. It is impossible to separate a single group of species that is identical for all sites and especially for the walls. (Brandes, 1995 and Chhetri, 2008).
Buildings and all types of walls are urban features represent a specific environment (Narain, 2010). The colonization of plants on walls is favoured by the wall ages, the presence of lime mortar, exposure to rain, etc., and such aspects occurred vertically. Most true wall species are only found on vertical. Walls and as the angle of inclination decreases an ever widening range of common species colonies (Gilbert, 1991). The wall habitat is different from natural habitat and rocks, depending on many different properties related to wall structures. Buildings contain binding materials, which structurally and chemically differ from the original building materials. Usually most of them are cleaned repeatedly; thus, they basically are temporary habitat. Walls are generally isolated, small, and their microclimate is more affected by changes of climatic factors such as temperature, precipitation and irradiation than that of rocks. Wall surfaces resemble each other and have a uniform slope and areas, so wall flora is influenced by the nearby semi - natural vegetation (Duchoslav, 2002).

Plants growing on walls reach these habitats by wind (anemchorous), animals (zochorous), mostly by birds and by stolen fragments (autochorous) (Yarci and Ozcelic., 2002) and grow there randomly, Deep - rooted plants can be destructive. Although their roots are weak at the beginning of growth, they become stronger in time and cause widening of cracks. Most of these plants absorb little water from the substrate, but absorb it from the air. Although wall plants are often aesthetically appealing, the local municipalities occasionally clean up the walls to prevent damage by the plants. It would be more preferable if the clean - up was more selective by allowing for plant type and degree of damage. The ecological differentiation and the contrasting topography of the habitats are the factors that may explain the low number of species occurring both on the wall tops and the vertical surfaces (Duchoslav., 2002.) According to Segal (1969), Woodell (1979) and Krigas et al (1999) among plants found only on walls are inhabitants or rocky or stony places, their most similar natural habitats. These plants are well adapted to soils with insufficient humus and mineral substances, but rich in nitrates. Such aggressive plants reproduce quite successfully by viable seeds and vegetative, thus being capable of invading open areas within a short time (Singh, 2010).

Among the study the tree species such as Morinda tinctoria, Ficus religiosa, F. glamorata, and F. benghalensis were recorded. Trees negatively affect the structure of the wall and are the main problem for the preservation of the wall. These species can be found in the environmental landscape vegetation and they are moved by their Diasporas. This type of species has characteristic elements of the flora of urban spaces, especially on sidewalls, walls of buildings, etc., i.e. places directly affected by human activities, with the existence of a minimal quantity of soil, lacking in humus and mineral substances, and rich in space around the mineral pool this effect has been achieved as a result of trampling of the reaction of the soil as a result of the mineral water.

The space around the pool is not regularly cleaned and is a constant source of Diasporas. Nature has provided needs with a number of devices that help them to be disseminated widely. The agencies that facilitate the dispersal of weed seeds far and wide are water, wind and animals, including man. The have the remarkable capacity to germinate under varied conditions, but vary characteristically. They are season bound and the peak period of germination always takes place in certain seasons in regular succession year after year. To avoid such a situation a wise step is to follow the principal prevention is better than cure (Kaya and Curran, 2006).
Generally there are two methods for the eradication of plants from monuments and Temples. They are:

1. Physical method &
2. Chemical method.

1) Physical Method

In this method, the plants are controlled by uprooting them at their initial stages of developments. The fully grown plants can be controlled by cutting them with suitable sharp cutting instruments like Khukri, Sickle, knife etc. This method is not a permanent solution for the control of plant growth in the monuments and historic buildings because plants like Peepal tree, banyan tree, *Morinda* may regenerate with more vigour when they are cut. However it may be a very effective method for the prevention of plant growth when applied during initial stages of development of plants in the historic building and monuments (Sivagamasundari, 2011).

2) Chemical Method

In this method certain chemicals are applied which are able to kill the plants in a few weeks of time. These chemicals usually called as herbicides effects the killings of plants in two ways. In one case, these herbicides block the photosynthetic activities of the plants and thus the plants are gradually killed in a couple of months. In another case, certain chemicals used as herbicides destroy the cells and tissues of the plants thus resulting of the gradual killing of the plants. Herbicides like Glyphosate (Glycin 41%), Paraquat, 2,4-D (Disodium salt), Atrazine (Wettable powder) etc., when sprayed over the leaves of plants can kill the plants by blocking the photosynthetic activities. 1% solution of sodium arsenate or arsenite in water can destroy the cells and tissues of plant when injected in the stem of plants (Deivarasan, 2013). After the plants are dead, it should be carefully removed by dismantling certain portions of the monuments. After removal of plants the cracks and gaps should also be repaired along with the repair of the dismantled portions so as to prohibit further growth of plants. (Agrawal *et al.*, 1995).

4. CONCLUSION

The study of wall flora provides a better understanding of the urban environment. At the same time the investigation of those artificial habitats are of special importance in the maintenance and preservation of archeological monuments. So, the present study shows the dynamics of species diversity on the walls and towers of Sri Mayuranathar temple Mayiladuthurai, Nagapattinam district of Tamil Nadu. Prevention is better than cure. Regular care and maintenance can reduce the chances of plant growth on monuments. To prevent the growth of plants on monuments and temples, the following preventive measures can be taken. Regular cleaning of the monuments will ensure the removal of dead organic matter which is a good source of nutrients for the growth of plants. Higher plants generally grow in the cracks and cavities present on the temples. Therefore repair of such cracks and cavities at the earliest will prevent higher plant growth.
References


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