ETHNOBOTANICAL IMPLICATIONS OF PLACES OF RELIGIOUS ACTIVITIES IN CALCUTTA

SYNOPSIS OF

THESIS SUBMITTED FOR THE

DEGREE OF DOCTOR OF PHILOSOPHY

IN SCIENCE (BOTANY)

OF

THE UNIVERSITY OF BURDWAN

2012

SRILATA DE

UGC CENTRE FOR ADVANCED STUDY

DEPARTMENT OF BOTANY

THE UNIVERSITY OF BURDWAN

BURDWAN-713104
SYNOPSIS

The work at a glance:

Since the inception of human wisdom there have been endeavours to develop society linked values for optimizing environment through spiritual and ritualistic activities and faith. The present work is designed to study ethnobotanical aspects or the age-long direct man-plant relationship and the scientific wisdom thus gained from these relationships which are traditionally preserved in the matrix of religious activities guided by tenets of different religions in Calcutta. Calcutta, a cosmopolitan city of international reputation sustains a unique composite culture designed by different religious beliefs and faiths. The present work initiated in 2003 covers an exhaustive survey of 123 sites adhering to the religious activities of Hindus, Muslims, Christians, Jains, Buddhists, Sikhs, Ravidassias, Nirankaris, Brahmos, Parsees and Jews. The ethnobotanical perspectives of the survey work was based on standard methods using both primary sources in form of 82 knowledgeable persons linked with the 11 religions as mentioned and secondary sources in form of pertinent literature. For identification of the plants associated with the places of religious activities standard taxonomic methods were followed. Voucher specimens have also been preserved conventionally in the Eco-taxonomy laboratory of the Department of Botany, Burdwan University.

The concept and objective

Stocktaking and ethnobotanical perspectives of plants associated with places of religious activities for use in different occasions and in promotion of aesthetic pleasure and divine ambience deserve consideration in scientific research since the findings are likely to have benevolent virtues and eco-friendly implications. In view of the importance of biodiversity and their functional, cultural and socioeconomic perspectives as well as ecological and aesthetic values, the present work aims to prepare an account of the use pattern of the plants willfully sustained in the premises of worship and religious activities. An analysis of the scientific rationale cryptic in religious activities is likely to
enable us to use the concept as a model for improving human life and optimization of the presently deranged ecosystem in general and biodiversity conservation and sustenance in particular maintaining a harmony between plants and the lifestyle of Calcuttans.

**The outcome - An overview:**

A brief account of the findings is presented in the following in the sequence of places of religious activities linked with eleven different religions prevailing in Calcutta, the city also called Kolkata.

1. **Buddhist Monasteries:**

   In the three Buddhist monasteries and one cemetery of the city studied the total number of plant species sustained was 44 of which 19 belonged to the Yin Yee Thong Cemetery alone. Minimum number of species (6 spp.) was found in Nalanda Bidyabhavan. *Ficus religiosa* Decne.ex.Miq. was found to be the most dominant species in all four sites.

   A taxonomic analysis of plants sustained shows that the dicots dominate over the monocots; the ratio of the latter to the former being 1:2.13 at the family level, 1:1.93 at the genus level and 1:2 at the species level. It is also interesting to note that at Site No. 4 (Nippon Zen Myohoji Temple), the ratio of monocots to dicots at the genus, family and species levels is almost 1:1, which implies that it is a planned and maintained garden.

   It is evident that in respect of use categories found in all Buddhist religious sites, the decorative plants which are mainly used to enhance aesthetic effect dominate the scenario with a share of 54.55%. The next share is of fruit-bearing plants (22.73 %) and shade-giving plants (18.18%). Those decorative plants which are utilized for fencing/hedging constitute 9.09 % in totality.

   The plants considered sacred by the followers of Lord Buddha have been enumerated, amongst which *Ficus religiosa* Decne.ex.Miq. (banyan) can be found in most of the temple gardens.
A taxonomic analysis of plant-diversity associated with Buddhist Monasteries and Cemeteries shows 17 dicotyledonous families having 27 genera and 28 species and 8 monocotyledonous families having 14 genera and 14 species. Thus the dicots and monocots represent 65.85% and 34.15% of the flora at generic level and 66.67% and 33.33% at species level respectively. Pteridophytes and gymnosperms have a share of 3.70% each. Of the 17 dicotyledonous families, it is Apocynaceae has the highest number of genera, next to which is the Leguminosae. Out of the 8 monocotyledonous families recorded it is Palmae which has the highest number of genera and species, followed by Gramineae. Only one family each of Gymnosperms and Pteridophytes could be recorded.

ii. Churches and Cemeteries:

As many as 6 cemeteries and 33 churches were visited wherefrom 48 dicotyledonous families having 137 genera and 156 species and 10 monocotyledonous families having 31 genera and 34 species could be documented. Thus 81.55% of the taxa were dicots and 18.45% monocots at generic level and 82.11% were dicots and 17.89% monocots at species level. Pteridophyta and Gymnosperms represent 4.62% and 6.15% of the total trachaeophytes present. Out of 48 dicotyledonous families, Leguminoceae has the maximum number of genera, followed by Annonaceae. Maximum number of species has been noted in Leguminoceae, followed by Annonaceae. Out of 10 monocotyledonous families, Palmae has the highest number of genera and species, followed successively by Araceae and Scitamineae. There are 4 families of Gymnosperm and 3 families of Pteridophyta having the same number of genera and species as that of the respective family. Incidentally *Thuja odorata* Doi. (Jhau) is present in 27 sites followed by *Cycas revoluta* Bedd. of Cycadaeace family. That the dicots dominate over the monocots is evident from the ratio of 1: 4.8 at the family level, 1: 4.42 at the genus level and 1 : 4.59 at the species level respectively. Of all the Church sites Oxford Mission Church (Site No. 8) houses the maximum number of species (76 spp.) whereas Lower Circular Road Cemetery (Site No. 50) amongst all cemeteries has the maximum number of plant species (47 spp.). *Polyalthia longifolia*
Benth. & Hook. f.ex.Hook. (Debdaru) is found in maximum number of Churches whereas *Caesalpinia pulcherrima* G.Don. (Krishnachura) is found in maximum number of cemeteries. But in totality, *Polyalthia longifolia* Benth. & Hook. f.ex.Hook (Debdaru) happens to be the most prevalent species in respect of all 39 Christian religious sites.

In respect of utility of the plants found in all Christian religious sites, plants which enhance aesthetic effect of the site constitute majority amongst all, i.e., about 84.62%. Next come the shade-giving plants which are about 12.31% of total species found. Fruit-bearing plants and vegetables constitute 9.74% and 5.64% respectively. There are only 6.67% of total plants parts of which are utilized particularly for offering to God during festivals or decorating the Churches/Cemeteries. 2.05% of total plants are utilized as fencing and/or demarcating gardens, pathways inside the premises etc.

A list of plants considered to be sacred by the followers of Jesus Christ or the plants which are included in Bible has also been prepared. Out of 9 such plants, *Citrus maxima* Merrill. (Lebu), *Nerium oleander* L. ‘Roseum’ (Golapi Karabi) and *Punica granatum* L.(Dalim) are found in 11, 7 and 4 sites respectively.

### iii. Fire temples and Tower of Silence of Zoroastrians:

The two Zoroastrian study-sites of Calcutta, i.e. the Fire Temple and the Tower of Silence, sustain 21 dicotyledonous families having 46 genera and 50 species and 7 monocotyledonous families having 15 genera and 16 species. The dicots represent 75.41% and 75.76% while monocots 24.59% and 24.24% at generic and species levels respectively. Pteridophytes and gymnosperms contribute 3.23% and 6.45% of total vascular plants respectively.

Out of 23 dicotyledonous families, Leguminosae has the highest number of genera and species next is Apocynaceae, followed by Rubiaceae and Cactaceae. The dicots dominate over the monocots; the ratio of the latter to the former is 1: 3 at the family level, 1: 3.07 at the generic level and 1 : 3.13 at the species level. Only one species i.e., *Tabernaemontana coronaria* Willd. (Tagar), was found to be common in both the sites.

In all Zoroastrian religious sites, the species mainly used to enhance aesthetic effect of the site, constitute majority amongst all, i.e., about 77.14% in totality. Next comes the
fruit-bearing (14.29 %) and shade-giving plants (8.57%). Other decorative plants which
are used for fencing and/or demarcating gardens, road and pathways inside the premises
etc. constitute about 2.86% of the total species. *Tabernaemontana coronaria* Willd.
(Tagar) is found in both the temple-gardens plenty in number. The name of the plants
considered sacred by the Zoroastrians and the sites of sustenance have been tabulated. Of
these plants characteristically, *Mangifera indica* Blume (Aam) and *Rosa centifolia* L.
(Golap) are found mostly.

iv. *Gurdwaras:*

As many as 6 Gurdwara study-sites wherefrom 5 dicotyledonous families having 6
genera and 6 species and 2 monocotyledonous families having 3 genus and 3 species
could be recorded. The dicots represent 67% and monocots 33% both at generic and
specific levels. No Pteridophyta could be found at any of the sites, although 2
gymnospermous families having 2 genera and 2 species could be recorded. Apocynaceae
was found with the highest number of genera and species.
The dicots were seen to dominate over the monocots, the ratio of the latter to the former
being 1 : 2.5 at the family level, 1 : 2 at both the genus and species levels.
Almost all of the plants found in these sites are decorative which give immense aesthetic
pleasure. There is only one species each belonging to the category of fruit-bearing and
Shade-giving plants. Not a single plant could be found, whose parts (flower, fruit, seed
etc.) are offered to the deity/God during festivals or used in decorating the shrine or in
fencing and/or demarcating gardens, paths etc. inside the premises. No plant was found to
be grown for vegetables. No plant considered sacred by the Sikhs or adhering to their
Holy Guru Granth Sahib was found at any of the sites under study.

v. *Guru Ravidass Mandir:*

Only 9 dicotyledonous families having 13 genera and 13 species and 1
monocotyledonous family having 1 genus and 1 species could be recorded from Guru
Ravidass temple, the only temple of its kind in the city, better known as ‘temple of
dalits’. Thus dicots were found to represent 92.86% and monocots 7.14% both at generic and specific levels. Neither any pteridophyte nor any gymnosperms could be observed at the site. Out of 10 dicotyledonous families, Rubiaceae family has the maximum number of genera and followed by Leguminosae in the same context. There is only 1 monocotyledonous family having solitary genus and species.

The dicots dominate over the monocots; the ratio of the latter to the former being 1 : 9 at the family level, 1 : 13 at both the genus and species levels. Species of Rubiaceae family were found to be most dominant in this religious site.

Majority of the plants sustained in this site are decorative which enhance beauty of the site and give aesthetic pleasure being 57.14%. Next share is of the fruit-bearing plants which are about 35.17% of the total species noted. Shade-giving plants constitute 28.57% of the total species. Not a single species could be found, whose flower, fruit, seeds etc. are offered to the deity/God during festivals or used in decorating the shrine or in fencing and/or demarcating gardens, paths etc. inside the premises. No plant was found to be grown for vegetables.

vi. Jain Temples:

From the five Jain temples studied 23 dicotyledonous families represented by 49 genera and 58 species and 5 monocotyledonous families by 17 genera and 22 species have been observed. The dicots represent 74.24% and monocots 25.76% at the generic- and 72.50% dicots and 27.50% monocots at species- levels. Pteridophyta and Gymnosperms represent 3.03% and 12.12% of the total vascular plants respectively.

Out of the 23 dicotyledonous families scored, Leguminosae has highest number of genus followed by Euphorbiaceae. Maximum number of species were also noted in Euphorbiaceae family, followed by Leguminosae.

Out of 5 monocotyledonous families, Palmae has the largest number of genus and species, followed by Liliaceae. Only 4 families of Gymnosperms and 1 family of Pteridophyta have been identified.

The dicots dominate over the monocots; the ratio of the latter to the former is 1 : 4.60 for the family level, 1 : 2.88 for the genus level and 1 : 2.64 for the species level in totality. It
is also interesting to note that at Swetambar Jain Temple, the ratio of monocot to dicot at the genus and species level is almost 1:1, which implies that it is a planned and maintained garden.

The maximum number of plant species found in all five Jain temples of Kolkata is 87, out of which Parsanath Digambar Jain temple garden singly contributes 51 species. Minimum number of species (07) found amongst all five temples is in Chandra Prabhuji Ka Mandir. The Setwambar Jain Temple is having 24 genera of plants mostly of shrubs and a few tree varieties, whereas the Parsanath Digambar Jain temple had large number of trees. Gymnospermous plants (4 in total) are found mostly in Parsanath Digambar Jain temple garden and there is only one such species in Sri Sri Mahavir Mandir garden. *Mangifera indica* Blume and *Rosa centifolia* L. were found to be the most dominant species in respect of all five Jain religious sites.

In all Jain sites, the decorative plants constitute majority amongst all, i.e., about 80.46% of the totality and 6.90% of the total decorative species are utilized for offering to the deities or decorating the temples. As many as 6.90% of the species are used for fencing and 2.3% for shade giving. The fruit-bearing plants have a share of 9.2% of the species sustained. Both *Mangifera indica* Blume (Aam) and *Rosa centifolia* L. (Golap) can be found almost in all temple-gardens in plenty of number, which not only enhance the beauty of the gardens but also are used as offerings especially during religiously performed ceremonies.

vii. **Mosques and Burial Grounds:**

From the 27 Islamic religious sites (17 mosques and 10 burial grounds) studied as many as 39 dicotyledonous families having 98 genera and 113 species and 10 monocotyledonous families having 22 genera and 22 species could be recorded. In this composition dicots represent 81.61% and 83.70% whereas monocots 18.33% and 16.30% at generic and species levels respectively. Not a single species of Pteridophyta could be found in 27 sites. Gymnosperms represent 3.92% of the total vascular plants. The dicots were seen to dominate over the monocots; the ratio of the latter to the former being 1:3.9 at the family level, 1:4.45 at the genus level and 1:5.14 at the species level.
Out of 39 dicotyledonous families, Leguminosae followed by large number of genera in Euphorbiaceae and Rubiaceae and Compositae is observed. Out of 10 monocotyledonous families, Palmae has the largest number of genera and species followed by Gramineae and Liliaceae.

Among Gymnosperms only 2 families, viz. Pinaceae and Cycadaceae could be scored each of which was with one genus and one species. The ornamental plant Thuja odorata Doi. (Jhau) was found sustained in 6 out of 27 studied sites. Among angiosperms Psidium guayava L. was found sustained in maximum number of mosques whereas Phoenix sylvestris Roxb. and Tabernaemontana coronaria Willd. were found in maximum number of burial grounds. But in totality Mangifera indica Blume and Psidium guayava L. were found to be the most dominant species in respect of all the Islamic sites studied.

So far utilitarian aspect of the plants Islamic sites was concerned, decorative plants were found to constitute majority amongst all, i.e., about 65%. Next to come were the shade-giving and fruit-bearing plants each of which composed 12% of total species recorded. Of all decorative plants found in the Islamic sites, plants offered to the Almighty or used for decorating the mosque were very few being 1.28%,. However 93% of the decorative plants were found sustained for enhancing the aesthetics of the site.

Plants considered sacred by the followers of Islam as well as those included in the Holy Quran have been enumerated, amongst which Phoenix sylvestris Roxb. deserve mention for having been found in 12 sites. Among others Lawsonia inermis L. found in 7 sites, Punica granatum L. in 4 sites and Brassica nigra Koch. in 1 site deserve mention.

viii. Nirankari Temple:

Sant Nirankari Satsang Mandal, the only temple, is situated at South-eastern fringe of Kolkata wherein 18 dicotyledonous families having 26 genera and 28 species and 3 monocotyledonous families having 4 genera and 4 species are sustained. The dicots represent 86.67% and 87.50% where as the monocots represent 13.33% and 12.50% at generic and species levels respectively. The dicots dominate over the monocots; the ratio
of the latter to the former is 1 : 6 at the family level, 1 : 6.5 at the genus level and 1 : 7 at the species level. Each of both Pteridophyta and Gymnosperms represents 4.35% of total vascular plants concerned. Out of 18 dicotyledonous families, Annonaceae, Leguminosae and Rubiaceae have the highest number of genera as well as species, followed by Cucurbitaceae. Out of the 3 monocotyledonous families sustained, Palmae has the maximum number of genera and species. There is 1 family each from Gymnosperm and Pteridophyta having one genus and one species.

Majority i.e. 55.88% of the plants sustained in this site are decorative enhancing the aesthetic effect of the site. Next share is of the fruit-bearing plants 23.53% followed by the shade-giving plants 17.64%. Plants utilized in fencing and/or demarcating gardens, paths inside the premises etc. were found to be only 2.94% of the total species. Plants utilized as vegetables also have the same share of 2.94%. No plant whose parts are utilized for offering to the deity/God during festivals or for decorating the shrine were found sustained. It was encouraging to find that a separate area inside the premises was earmarked and prepared by the authority for cultivation of medicinal plants, especially the antidiabetic ones.

ix. Synagogues:

In the two Jews religious sites studied, 11 dicotyledonous families having 14 genera and 15 species and 3 monocotyledonous families having 4 genera and 4 species were found getting sustained. The dicots represent 77.78% and 78.95% where as the monocots represent 22.22% and 21.05% at generic and species levels respectively. There is no Pteridophyta in any of the sites. Gymnosperms have only one family with a single genus and solitary species to constitute 6.67% of the total number of vascular plants sustained.

Each of the families like Annonaceae, Myrtaceae and Lytheraceae has two genera and two species sustained while each of all the 8 remaining families has a single genus. Only one of these genera is represented by two species and all the rest are with solitary species each.
In respect of utility of the plants sustained in the Jewish sites, the ornamental species constitute about 47.37% in totality, whereas fruit-bearing and shade-giving plants constitute 31.58% and 15.79% respectively. Other decorative plants which are used for fencing and/or demarcating gardens, paths inside the premises etc. comprise 5.26% of the total species sustained. The names of the plants considered sacred by the Jews along with their occurrence have been tabulated of which *Punica granatum* L. (Pomegranate) found in Maghen David Synagogue is noteworthy.

x. Hindu Temples and Burning Ghats:

In as many as 23 temples, 4 ‘Guru-ashramas’, 6 crematoriums and one burial ground associated with the Hindu religion of the city 45 dicotyledonous families having 94 genera and 104 species and 8 monocotyledonous families having 17 genera and 17 species were found getting sustained. The MahanirvanMath (Site No. 49) houses maximum number i.e. 65 species whereas it is Keoratala Mahasmasan (Site No. 10) amongst all crematoriums which has the maximum number of species, i.e. 23. *Mangifera indica* Blume (Aam) and *Cocos nucifera* L. (Narkol), were found sustained in maximum number of temples and *Ficus religiosa* Decne. ex Miq. (Aswatha) in maximum number of Burning Ghats. In respect of all 34 Hindu religious sites studied *Mangifera indica* Blume (Aam) seems to be the most dominant species. In the taxonomic census the dicots and monocots represent 84.68% and 15.32% at generic level and 85.95% and 14.05% at species level respectively. Gymnosperms represent 1.85% of the total vascular plants and not a single pteridophyte was found getting willfully sustained.

Out of 45 dicotyledonous families recorded, Leguminosae has the highest number of genera, followed by Apocynaceae. Maximum number of species has also been noted in case of Leguminosae, followed by that of Apocynaceae. Out of 8 monocotyledonous families recorded, Palmae and Scitamineae has the highest number of genera and species, followed by Gramineae.

As many as 2 families of Gymnosperms (Cupressaceae) were found to have representation in form of 2 genera and 2 species. *Thuja odorata* Doi. (Bilati Jhau) was
found sustained in 4 sites and *Cycas revoluta* Bedd. (Fern palm) could be recorded from only one crematorium.

The plants which enhance aesthetic effect of the site constitute majority, i.e. about 67.48% amongst all. Next to come are the fruit-bearing plants which constitute about 17.07% of total species recorded. Furthermore there are 14.63% of total species, the parts of which are utilized particularly for offering to God during festivals or considered as sacred. Shade-giving plants and vegetables constitute 13.08% and 11.38% of the total number of species respectively. As much as 3.25% of the total plants are utilized in fencing and/or demarcating gardens, paths inside the premises etc. the plants considered sacred and the ones with parts offered to the God have also been enumerated.

**xi. Upasanalayas of Brahmos:**

No less than 14 dicotyledonous families having 18 genera and 18 species and 3 monocotyledonous families having 5 genera and 6 species have been recorded from the two Upasanalayas. Of these Upasanalayas Brahmo Sammilan Samaj sustains the maximum number of species i.e.17 out of 24. The dicots represent 78.26% and 75.00% where as the monocots represent 21.74% and 25.00% at generic and species levels respectively. Out of 14 dicotyledonous families, Apocynaceae family has the maximum number of genera and species, followed by Myrtaceae. There are 3 monocotyledonous families of which Palmae has the maximum number of genera and species.

Neither any pteridophyte nor any gymnosperms could be found at any of the sites.

From utilitarian aspect, majority of the plants (87.50%) found in this site are decorative plants which enhance aesthetic effect of the site. Next share is of fruit-bearing plants which constitute about 16.67% of the total species found. Shade-giving plants constitute 4.16% of total plants. No plant was found the flowers, fruits, seed etc. of which were offered to the deity/God during festivals or for decorating the shrine or in fencing and/or demarcating gardens, paths etc. inside the premises. No plant was grown for use as vegetables. *Tabernaemontana coronaria* Willd.(Tagar) was found sustained in profusion in both the temple-gardens.

From all religious sites studied a total of 762 plants species are recorded.
Conclusion:

In the matters of relentless efforts to sustain the earth’s environment as viable in optimum state for future generations, environmental studies have not so far adequately evaluated the role of different religions although the present author could realize subsequently that ecology is deeply ingrained in it and nature, and its destiny, human virtues and ethics are guided and conditioned by religious beliefs and teachings. It is certain that religious tenets, views and practices can guide and mould our attitudes towards nature and her biotic as well as abiotic components and functions. Religion sets the guidelines to build up sustainable relations of our materialistic lives with the ecosystem in the best possible way and help us to reappraise our behaviour with the flora, fauna and environment and reorient us towards a successful life with optimum resources. This kind of faith augmented the present author to address a new field of study in the arena of Hinduism and ten other religions as conceptualized and practiced under the conditions existing in Calcutta to reveal their environmental implications and distill the contemporary environmental ethics percolating from their direct man-plant relationship for use in optimization of lives and the environment.

The present work has aptly explored the ecological or more precisely the environmental underpinnings and implications of the direct man-plant relationship or rather the ethnobotanical knowledge and wisdom traditionally preserved in the tenets, principles, rites, taboos faith and practices of different religions in Calcutta. The findings of this work can find practical application in planning strategies by the public policy makers, developmental and administrative authorities in urban landscape designing in the most public inclusive and sustainable ways. Ethnobotanical excerpts from the man-plant relationships revealed in the work is a valuable document to inspire further research in evaluation of the religion associated species in biomonitoring the state of the environment as indicators as well as scavengers. Judicious integration of religious wisdom and activities in the most secular way with our urbanscape would not only afford aesthetic rejuvenation and spiritual invigoration but also promote plant conservation and phytoremediation, alleviation of stress, tension and social evils, and improvement of quality and tenure of life. Once the idea catches on, landscape
designers and other experts can explore opportunities to further optimize environment and evolve models for application in other rural and urban areas.

To sum up it may be said that this work, new of its kind, is likely to inspire the activities of both indigenous and exotic religions and enlighten the followers with the sense of humanity, fraternity, amity and peace to ensure the religious-system a respectable and sustainable niche in the noosystem i.e. the ecosystem, in its complete sense, covering social, cultural, economic, physical and biological components and function. The present author would consider her efforts successful if the sum and substance of this work find application in optimization of life and living with a green, stress free, peaceful, pleasant and healthy environment.