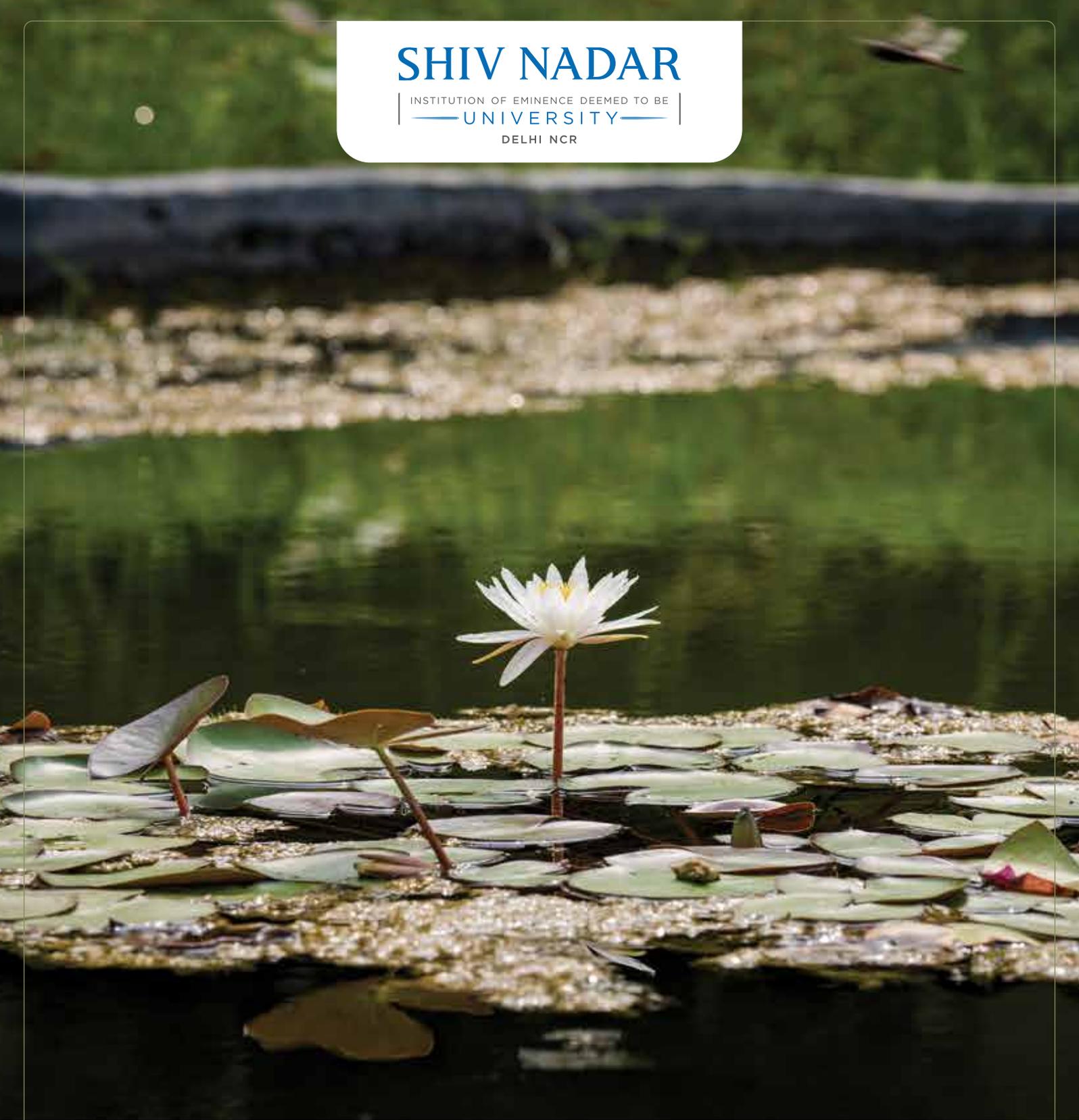


SHIV NADAR

INSTITUTION OF EMINENCE DEEMED TO BE

UNIVERSITY

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# Thematic Botanic Garden

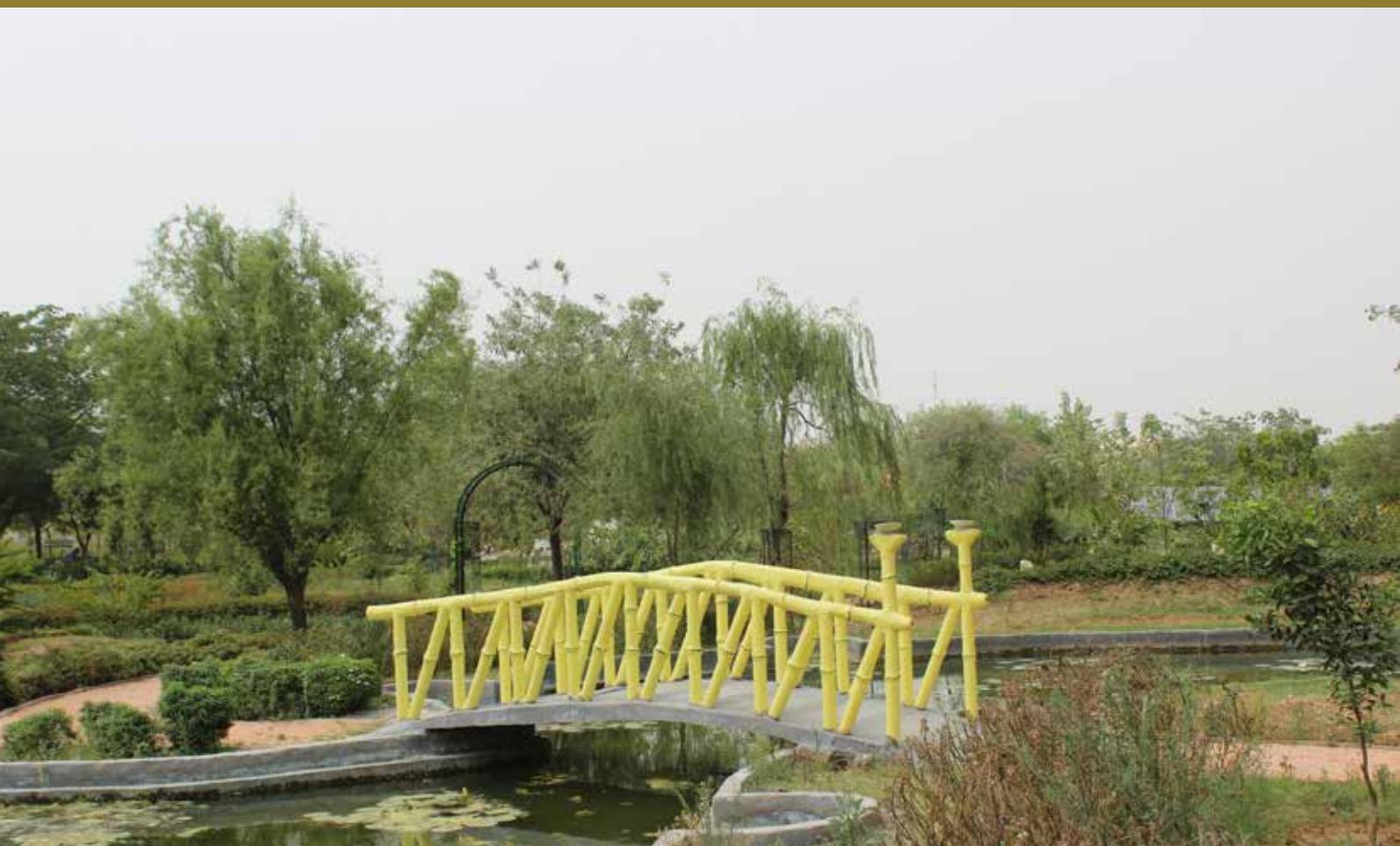
One of its kind in India!

Broadly speaking, a botanic garden or botanical garden is a garden dedicated to collecting, cultivating, and displaying a wide range of plants labeled with their botanical names for scientific study and displayed to the public for general awareness. In a way, a botanic garden showing a variety of plants also helps in the ex-situ conservation of valuable plant diversity.

### **Shiv Nadar Thematic Botanic Garden – a new concept**

The Thematic Botanic Garden at Shiv Nadar IoE was conceptualized as a main garden with separate theme gardens of different categories of plants. The garden is a unique concept where cultivated and wild plants of economic importance and vulnerable from the conservation point of view are grouped based on their uses, habits or taxonomic groups. Besides playing a crucial role in conservation and research on various genotypes conserved in the garden, it provides an opportunity to see a wide range of plants belonging to the same theme/category/group in one place, which is otherwise not possible in a classical botanic garden. Each theme/group/category is in the form of mini gardens within the large main garden.

The unique Thematic Botanic Garden, established to increase awareness about a wide variety of plants with which we deal in our daily life and conserve their unique germplasm for education and research purpose, is the first of its kind in northern India. It provides an opportunity for the visitor to explore plants, which are becoming rare and uncommon but economically significant due to various anthropogenic factors that are not observed in any of the botanic gardens except in their native range of cultivation.



## Location of Shiv Nadar Thematic Botanic Garden

The Thematic Botanic Garden is located in an area of 4.2 ha (10.4 acres) near the eastern boundary of the sprawling campus of Shiv Nadar IoE. About one-fourth of the area adjacent to the boundary is part of Bil Akbarpur Wetlands, where a natural population of *Equisetum* is conserved. After the eco-restoration of the site in 2014, planting started in February 2015.



Thematic Botanic Garden



Location of Thematic Botanic Garden in the Campus

## Introduction of Plant Diversity

The Thematic Botanic Garden has about 3000 plants belonging to 805 plant species, including varieties. All these species belong to 148 families and 502 genera. The garden has been provided with a bio-fencing of the *Carrisa carandus* (Karonda) plantation on all four sides. The boundary plantation consists of 81 plant species belonging to 29 families. Of the 81 plant species, 59 belong to small to large-sized trees and 22 shrub species.

To increase the plant diversity in the garden and conservation of the germplasm, about 50 rare and economically valuable tree species were planted along the path and between the theme gardens. Some of these trees which can be observed in the garden are *Barringtonia*, *Boabab* (*Kalpriksha*), *Buddha Coconut*, *Camphor Tree*, *Chinar*, *Indian Tree of Heaven*, *Fern Leaf Tree*, *Fiddle-Leaf Fig*, *Kattha*, *Lemon-Scented Gum*, *Magnolia*, *Mahogany*, *Mahua*, *Red Sandalwood*, *Rudraksha*, *Sandalwood Tree*, *Spathodea*, *Shikakai*, *Reetha*, *Singapore Cherry*, *Tea Tree*, *West Indian Elm*, *Willow Trees* (4 species), etc.

*Equisetum* is one of the oldest living genera of vascular plants and is also the sole living representative of a large and ancient group of Equisetales, which inhabited the Earth during the Jurassic period. The Botanic Garden has a natural population of *Equisetum ramosissimum* (Horsetail), a living fossil species which is being conserved in the wetland part of the garden. One can walk to the *Equisetum* trail to observe the luxurious growth of *Equisetum* in the wild.

## Theme Gardens

The Thematic Botanic Garden has 12 theme gardens as listed below:

1. Medicinal Plants Garden
2. Ferns and Fern-Allies Garden (Fern House)
3. Rare, Endangered & Threatened (RET) Plants Garden
4. Palm Garden
5. Gymnosperms Garden
6. Ficus Garden
7. Hydrophytes Garden (Aquatic Plants)
8. Butterfly Garden
9. Bamboo Garden (Bambusetum)
10. Fruit Plants Garden
11. Spices, Condiments and Herbs Garden
12. Xerophytes Garden (Arid & Semi-Arid Zone Plants)

### 1. Medicinal Plants Garden

As we enter from the main gate of the Thematic Botanic Garden, the first theme garden we see is Medicinal Plants Garden. Behind the Welcome Rock, one can find a cluster of trees of *Harad*, *Bahera*, and *Amla* used in Ayurvedic medicines such as *Triphala* and *Arjun*, the bark of which is used for various cardiovascular ailments. A total of 180 species of medicinal plants have been planted in the Botanic Garden. Most of these plants are growing wild in the university and surrounding areas of Chithara Village Panchayat. Some of the important medicinal plants in the garden are *Akarkara*, *Aloe vera*, *Ashwagandha*, *Asthma Plant*, *Bhang*, *Bhringraj*, *Bhui Amla*, *Brahmi*, *Chandan*, *Clove*, *Giloy*, *Gokhru*, *Gotu Kala/Brahmi*, *Guggul*, *Haldi*, *Insulin Plant*, *Isabgol*, *Kali Musli*, *Kapoor*, *Kulanjan*, *Lavender*, *Punarnava*, *Reetha*, *Safed Musli*, *Sarpgandha*, *Shikakai*, *Vajradanti*, *Vasaka*, etc.



*Insulin Plant*



*Ashwagandha*



*Brahmi*



*Bhringraj*

## 2. Ferns and Fern-Allies Garden (Fern House)

A fern is a member of a group of vascular plants (plants with xylem and phloem) that reproduce by producing spores and have neither seeds nor flowers. Ferns have complex leaves called megaphylls. Most ferns are leptosporangiate, producing coiled fiddleheads that uncoil and expand into fronds. Ferns, usually grown in gardens and as indoor plants, are herbaceous perennials, but they lack woody growth. The Fern House has a collection of more than 25 species of ferns, including terrestrial, aquatic and epiphytic ferns, and three species of bryophytes, including mosses and liverworts.



*Fern House (Outside)*



*Fern House (Inside)*



*Salvinia, an aquatic fern*



*Plagiochasma (liverwort) along with mosses*



### 3. Rare, Endangered & Threatened (RET) Plants Garden

Adjacent to the Medicinal Plants Garden is the Rare, Endangered & Threatened (RET) Plants Garden, where five RET species are conserved. Ten plants of *Saraca asoca* (Sita Ashok), five plants each of *Commiphora wightii* (Guggul), and *Commiphora mukul* (Guggul), and one plant each of *Gardenia gummifera* (Gummy Gardenia), *Sapindus mukorossi* (Soapnut) designated as a rare and endangered category have been planted in the RET Garden. These species are becoming rare in their natural population due to threats such as habitat destruction, climate change or pressure from invasive species.



Sita Ashok in RET Garden

### 4. Palm Garden (Palmetum)

Palms are woody monocotyledons belonging to the family *Arecaceae* (old name *Palmae*). Palms are one of the multi-use monocots confined to tropical regions of the world. They have significant economic importance, providing a range of products necessary for daily life. The aesthetic value of palms is no less critical than their traditional and commercial values, especially for landscaping purposes in gardens. In Palm Garden, 34 species of palms have been assembled, such as *Areca catechu* (Supari Palm), *Beaucarnea recurvata* (Nolina Palm), *Bismarckia nobilis* (Bismarck Palm), *Caryota urens* (Fish Tail Palm), *Dyopsis lutescens* (Areca Palm), *Livistona chinensis* (Chinese Fan Palm), *Phoenix dactylifera* (Date Palm), *Ravenala madagascariensis* (Travellers Palm), *Rhapis excelsa* (Lady Palm), *Roystonea regia* (Royal Palm), *Wodyetia bifurcata* (Fox Tail Palm), etc.



Date Palm

## 5. Gymnosperms Garden

Gymnosperms, woody perennials, are a group of seed-producing vascular plants that includes conifers, pines, cycads, Ginkgo, Ephedra and Gnetum. The term "Gymnosperm" comes from the Greek composite word meaning "naked seeds", after the unenclosed condition of their seeds in a fruit. The Gymnosperms Garden has several 33 Gymnosperm plant species, including cycads, pines, etc., planted on a mound representing the hill. The important Gymnosperms are *Abies pindrow*, *Agathis robusta*, *Araucaria bidwillii*, *A. cunninghamii*, *Cedrus deodara*, *Cycas circinalis*, *Dioon edule*, *D. spinulosum*, *Ginkgo biloba*, *Pinus roxburghii* (Chir Pine), *Zamia furfuracea*, etc.



Cycad



Pine

## 6. Ficus Garden

Ficus Garden, the only one of its kind in the country, is situated adjacent to Butterfly and Hydrophytes Gardens. Ficus belongs to the Fig family, Moraceae. Many of the Ficus trees have their role as keystone species in various ecosystems and provide a home to numerous species of birds, butterflies, monkeys, bats and insects. *Ficus religiosa*, native to the Indian subcontinent, is one of the important religious trees of India. *Ficus racemosa* (Cluster Fig Tree or Gooler) is a popular medicinal plant in India, which has long been used in Ayurveda for various diseases/disorders, including diabetes and liver disorders. A total of 24 plant species, including varieties of Ficus, have been assembled in the Ficus Garden, including *Ficus benghalensis*, *F. benjamina*, *F. elastica*, *F. hispida*, *F. krishnae*, *F. lyrata*, *F. natalensis* subsp. *leprieurii*, *F. racemosa*, *F. religiosa*, *F. retusa*, *F. virens*, etc.



Krishna Ficus leaf



Gooler tree with fruits

## 7. Hydrophytes Garden (Aquatic Plants)

Hydrophytes or aquatic plants are found in swampy or marshy habitats. Hydrophytes Garden consisting of an aesthetically designed pond, is situated within the Butterfly Garden next to the Palm Garden. The Hydrophytes Garden has a collection of 31 hydrophytes, such as *Nelumbo nucifera*, *Hydrilla verticillata* (Water thyme), two species of Potamogeton, *Ceratophyllum demersum* (Coon's Tail), *Vallisneria spiralis* (Tape Grass), *Eichhornia crassipes* (Water Hyacinth), *Typha domingensis* (Elephant Grass, Reed), several *Nymphaea spp.* (Water Lily), *Pistia stratiotes* (Water Lettuce), *Cyperus alopecuroides* (Foxtail Flatsedge), etc. and aquatic Pteridophytes (*Azolla pinnata*, *Marsilea quadrifolia*, *Salvinia adnata*) and Algae (*Nitella sp.*, *Chara sp.*)



Different varieties of Lilies

## 8. Butterfly Garden

Butterflies are some of the most attractive and remarkable insects on earth. The types of plants used in the Butterfly Garden decide which species of butterflies will visit the garden. This is done by planting known larval and adult host plants. The Butterfly Garden has been developed around the aquatic plants' pond since butterflies prefer moist areas, and a waterbody like a pond provides conducive microclimatic conditions for butterflies. A total of 128 host and nectar plant species were planted in the Butterfly Garden to attract several butterflies. A record number (35 species) of butterflies have been observed in the Thematic Botanic Garden, including the Butterfly Garden. Some common butterflies are *Plain Tiger*, *Striped Tiger*, *Peacock Pansy*, *Caper White*, *Leopard*, *Common Grass Yellow*, *Danaid Eggfly*, *Common Lime*, *Common Mormon*, etc.



Plain Tiger



Peacock Pansy



Leopard



## 9. Bamboo Garden (Bambusetum)

Bamboo Garden or Bambusetum is situated next to the Butterfly Garden along the eastern side of the garden, where 14 species of Bamboo are conserved, viz., *Bambusa heterostachya* (Malay Dwarf Variegated Bamboo), *B. nana* (Hedge Bamboo), *B. ventricosa* (Buddha Belly Bamboo), *B. vulgaris* (Golden Bamboo), *Dendrocalamus giganteus* (Giant Bamboo), *D. longispathus* (Long-Sheath Bamboo), *Guadua angustifolia* (Colombian Timber Bamboo), etc. Bambusetum also includes *Dendrocalamus asper*, an edible bamboo species cultivated for its tender shoots used in Chinese cuisine.



A view of Bamboo Garden

## 10. Fruit Plants Garden

India is one of the largest producers of fruits in the world and is known as the fruit basket of the world. The major fruits grown in India, both belonging to tropical and temperate climates, are *Mango* (national fruit), *Grapes*, *Apple*, *Apricots*, *Cherry*, *Peach*, *Plum*, *Orange*, *Kinnow*, *Kiwi*, *Banana*, *Avocados*, *Guava*, *Loquat*, *Lychee*, *Papaya*, *Sapota*, *Pineapple*, *Walnuts*, *Almonds*, *Coconut*, etc. – these can be seen in the garden. The garden also has many traditional fruits such as *Khirni*, *Barhal*, *Kaitha*, *Phalsa*, etc., which are disappearing due to the younger generation's food preferences and changing socio-economic conditions. This fruit conservatory has a total of 106 varieties of fruit plants which provides an opportunity to see most of the fruit plants in one place itself. Exotic fruits, such as *Avocado* and *Dragon Fruit*, can also be found here.



Almonds



Water Apple



Dragon Fruit



Star fruit



Phalsa



Cherry



Loquat

## 11. Spices, Condiments and Herbs Garden

India is known as the 'home of spices'. No other country in the world produces as many kinds of spices as India. The Spices, Condiments and Herbs Garden has about 50 plant species. Some important spices and condiments plants in the garden are *All Spice*, *Indian Bay Leaf*, *Black Pepper*, *Cinnamon*, *Cardamom*, *Curry Leaf*, *Hing*, *Nutmeg (Jaiphall)*, *Oregano*, *Rosemary*, *Thyme*, *Turmeric*, etc. Annual species of herbs, such as *Garlic*, *Onion*, *Fennel*, *Coriander*, etc., are also raised annually during the season.



Cardamom



Indian Bay Leaf

## 12. Xerophytes Garden (Arid & Semi-Arid Zone Plants)

The last theme garden in the Thematic Botanic Garden is Xerophytes Garden, situated on a raised area simulating dunes and a semi-arid zone with rocky outcrops. A total of 108 xerophytic plant species/taxa have been planted in the Xerophytes Garden.

Xerophytic trees such as *Acacia concinna* (Sikakai), *Ailanthus excelsa* (Indian Tree of Heaven), *Albizia lebbek* (Siris), *Butea monosperma* (Flame of the Forest), *Dichrostachys cinerea* (Sickle Bush), *Parkinsonia aculeata* (Jerusalem Thorn), *Prosopis cineraria* (Khejri Tree), *Salvadora persica* and *S. oleoides* (Miswak), *Senegalia catechu* (Cutch Tree, Khair), *S. senegal* (Gum Arabic Tree) were planted around the mound.

In addition, *Agave spp.*, numerous Cactii and *Euphorbia spp.*, *Barleria prionitis* (Vajradanti), *Commiphora wightii* and *C. mukul* (Guggul), *Capparis decidua*, *Calotropis procera*, and *Yucca spp.* among others are planted on the sandy mounds between the rocks.



A view of Desert Garden



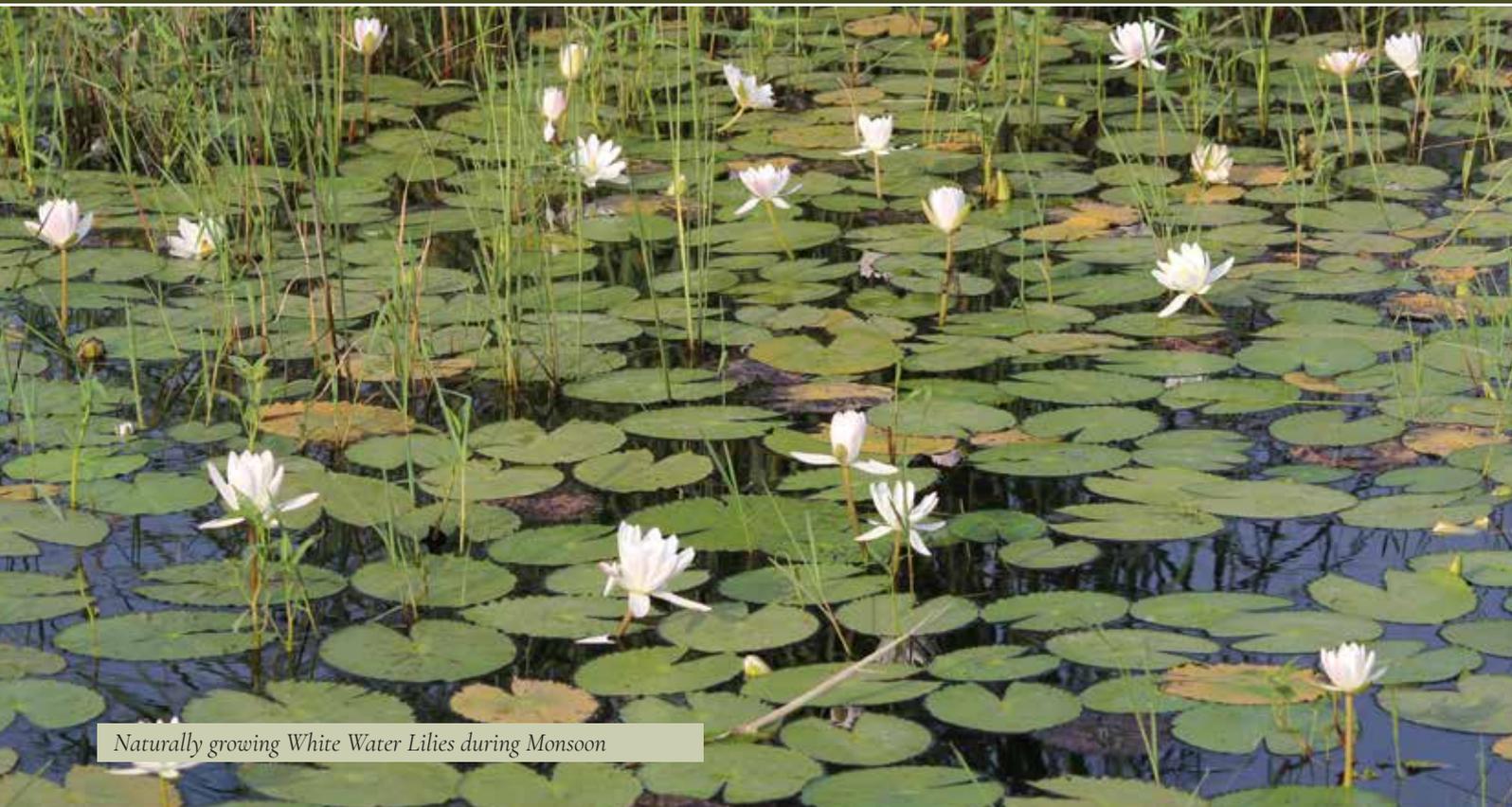
Barrel Cactus



Royle's Spurge

## Wetland part of the Garden

The low-lying wetland area of the Garden adjacent to the eastern boundary wall is largely the conservation area of a living fossil species, *Equisetum ramosissimum* (Horsetail). In the rainy season, the site is equipped with the profuse growth of White Water Lily. The wetland part of the garden has bushy growth of tall grass species such as *Saccharum spontaneum* (Kans), *S. munja* (Munj) and *Phragmites karka* (Tall Reed).



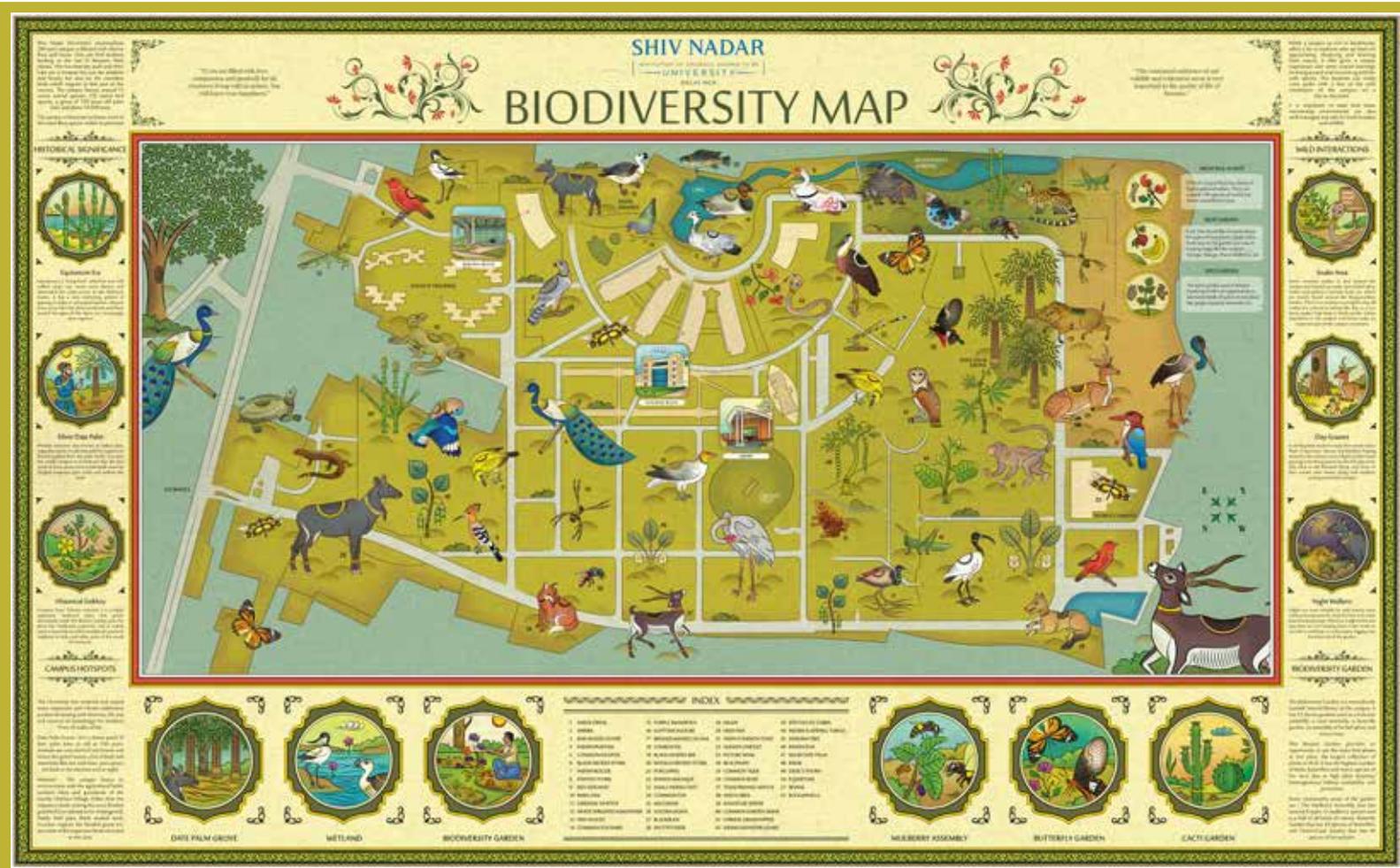
Naturally growing White Water Lilies during Monsoon



*Equisetum ramosissimum* (Horsetail), a living fossil species

# Wild Fauna in and around Thematic Botanic Garden

Due to the large diversity of terrestrial and aquatic plant species, the garden has become home to several species of birds, mammals, reptiles, and insects, especially butterflies, moths, dragonflies, damselflies, spiders, beetles, etc. This was possible due to the large variety of plants providing shelter, food and protection from predators. Hence, the Thematic Botanic Garden is aptly referred to as the Biodiversity Garden encompassing diverse flora and fauna.



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