BOTANICAL GARDENS OF INDIA AND ABROAD

University Roll num – 17061161O028
Registration Number – 201701010541 of 2017-18
Name of the Supervisor – Dr. Moumita Basu

Acknowledgement ——

While working on the project we consulted different book on Botanical Gaarden. Various website also helped us to gather knowledge about Botanical Gaardens.

I express my sincere thanks to Dr. Moumita Basu mam, the teacher of our botany department, for her valuable suggestion and inspiration.

I am also thankful to my college friends and my group partners, who provided different types of information about Botanical Gaardens.

Content

☑ Botanical Garden: —— A botanical garden or botanic garden is a garden dedicated to the collection, cultivation, preservation and display of a wide range of plants labelled with their botanical names. It may contain specialist plant collection such as cacti and other succulent plants, herb gardens, plants from particular parts of the world, and so on, there may be greenhouse, shadehouses, again with special collections such as tropical plants, alpine plants, or other exotic plants. Visitor services at a botanic garden might includes tours, educational display, art exhibition, book rooms, open air theatrical and musical performance, and other entertainment.

Botanical gardens are often run by universities or other scientific research organizations, and often have associated herbaria and research programmes in plant taxonomy or some other aspects of botanical science. In principle, their role is to maintain documented collections of living plants for the purposes of scientific research, conservation, display and education, although this will depend on the resources available and the special interest pursued at each particular garden.

Importance of Botanical Garden :— Botanical Garden is important place of systematic study and research on flora of the region. The importance of botanical garden are as follows —

1. Aesthetic appeal— Botanical gardens have an aesthetic appeal and attract a large number of visitors for observation of general plant diversity as also the various plants, as for example, the Great Banyan Tree (Ficus benghalensis) in the Indian Botanical Garden at Kolkata.

2. Material for Botanical Research— Botanical Gardens generally have a wide range of species growing together and often ready material for botanical research, which can go a long way in understanding taxonomic affinities.

3. On site teaching — Collection of plants is often displayed according to the families, genera or habitats, and can be used for self-instruction or demonstration purpose.

4. Integrated research projects — Botanical gardens with rich living material can support broad-based research projects which can integrate information from such diverse fields as anatomy, embryology, phytochemistry, cytology, physiology, and ecology.

5. Conservation — Botanical gardens are now gaining increased importance for their role in conserving genetic diversity, as also in conserving rare and endangered species. The proceedings of the Symposium on Threatened and Endangered species, sponsored by New York Botanical Garden in 1976, published as Extinction is Forever, and the conference on practical role of botanical gardens in conservation of rare and threatend species sponsored by the Royal Botanical Garden, Kew and published as Survival and Extinction, are among the major examples of the role of Botanical Garden in conservation.

6. Seed exchange — More than 500 botanical garden across the world operate an informal seed exchange scheme, offering annual lists of available species and a free exchange of seeds.

7. Herbarium and library — Several major botanical gardens of the world have herbaria and libraries as an integral part of their facilities and offer taxonomic material for research and free exchange of seeds.

8. Public services — Botanical gardens provide information to the general public on identification of native and exotic species, methods of propagation and also supply plant material through sale or exchange.

Some famous Botanical Garden In India :——

1. Acharya Jagadish Chandra Bose Indian Botanic Garden, Shibpur, kolkata
2. Lloyd's Botanical Garden, Darjeeling
3. Lalbag Botanical Garden, Bangalore
4. Government Botanical Garden, Ooty
5. TNAU Botanical Garden, Coimbatore
6. The Agri Horticulture Society of India, Alipore, kolkata
7. National Botanical Research Institute (NBRI), lucknow
8. Botanical Garden of Forest Research Institute (FRI), Dehradun

1. Acharya Jagadish Chandra Bose Indian Botanic Garden —

The Acharya Jagadish Chandra Bose Indian Botanic Garden was founded by Colonel Robert Kyd in the year 1787. He was officer with the British East India Company. For him the main purpose of establishing the garden was to cash in on the commercial value of plants and grow species of commercial value. The very acknowledgement by Joseph Dalton Hooker who said that the credit of tea-trade in Assam and Himalayan regions go to the superintendents of the garden of Calcutta and Saharanpur, who introduced tea plants from China.

The garden was also known as Calcutta Botanical Garden, Indian Botanic garden, and Royal Botanic Garden.

The designe of Kolkata Botanical Garden was proposed by Colonel Alexander Kyd to the then Governor General lord Cornwallis. The design went through major changes and overhaul initiated by Sir George King in 1872. It was his contribution that the garden is considered to be one of the most amazing landscape garden, which are split into sections on the basis of trees sourced from various parts of country and world. The antificial lake are just the bonus here.

After independence, the garden was renamed as Indian Botanic Garden in the year 1950.

The present title was given on June 25, 2009, to honor the Bengali Genius and Scientist Jagadish Chandra Bose.

The garden maintains a strict policy against plastic and littering. It is a no-plastic zone.

Apart from being a home to 12,000 perrennial plants of 1400 species, the garden has much more on it. It has conservatories, glass houses, greenhouses and 25 divisions of herbaceous plants. The garden is a major centre of horticultural and botanical research in India. The greenery and plants are a major inspiration of educational and botanical researches in India. Apart from students and researchers the garden also seems to attract photo walkers and tourism from all over the world due to its natural opulence it offeres.

- Plants of this Botanical Garden: Exotic plants such as giant water lillies, bread fruit tree, double coconut, krishnabot, the shivalinga tree and water lilies have found a home in kolkata Botanical Garden. Serpentine lake for boating is also open for the visitors.
- Location of Botanical Garden in Kolkata: The Acharaya Jagadish Chandra Bose Indian Botanic Garden is located in Shibpur, Howrah. The garden is located on the Howrah side of Hoogly River and is on the west side of Kolkata City Centre. Sprawled across 109 hectors and showcasing 12,000 exhibits, this garden is mainly governed by Botanical Survey of India of Ministry of Environment and Forest, GOI.
- The garden is one of the largest and oldest green reserves in South East Asia.
- The garden is home to over 12,000 perinnial plants species and hundreds of dried plants from all over the world.
- The latest census was conducted in the year 2007 and according to figures revealed; there are 14,000 species of trees and 13,772 species of plants. Out of these 500 species are considered endangered or rare.
- <u>The Great Banyan Tree</u>, remains the prime attraction of the garden. It is the biggest banyan tree in the world and forms the second largest canopy.
- The garden brings a rare water lily, Victoria Amazonica to you.
- This garden have trees from all over the world, The garden boasts from exotic species from nepal, Penang, Java, Sumatra and Brazil find a place to stay. Here you can spot _Mahogany trees, Cuban palms, mango trees, tamarind trees etc.
- Coconut tree from Sicily, the mad tree, collection of aquatic plants and exotic selection of bamboo, citrus, jasmine, water lily, ferns, ficus, creepers, hibiscus can be found here in their pristine state.

2. Lloyd's Botanical Garden, Darjeeling —

Lloyd's Botanical Garden, or Darjeeling Botanical Garden, is a botanical garden in Darjeeling in the Indian state of West Bengal

Lloyd's Botanical Garden was established in 1878 when 40 acres (160,000 m^2) of land was acquired at Darjeeling to form a botanic garden as a distant annex of the Calcutta Botanical Garden. The land was provided by William Lloyd, in whose name the botanical garden has been named.

- **Location of Botanical Garden :** The Garden is situated just below the Eden Sanatorium in an open slope covering an area of about 40 acres, bound by Canl Road and Hari Ghosh Road on the south, by Eden sanatorium on the east and Victoria Road on the west. This Garden is one of the main attractions to the visitors to Darjeeling with a treasury of many rare and beautiful plants as well as patches of typical forest of tall Cryptomia, Bucklandia, Alnus with thick mass of lianas and Shrubby undergrowth. It is a favourite spot of recreation with vistas across some of the loveliest slopes, a paradise to the students and research workers in Botany and an eminent institution distributing the plants and seeds and specimens of temperate and sub-temperate Himalayas to different parts of the world.
- **Collections :** The Darjeeling Botanical Garden preserves several species of bamboo, oak, magnolia, arisaema, cotoneaster, wild geranium and rhododendron – forest native plants of the Darjeeling Himalayan hill region, Sikkim region, and other neighbouring regions. Also, several exotic plants are preserved. The cacti and Succulent collection of 150 species is displayed in the Conservatory. The collection of native orchids from the Singalila Ridge in present day Singalila National park is rare and notable.

The Indian Botanical Garden Network's Garden code ascribed for this garden is WB - DBG.

3. Lalbag Botanical Garden, Bangalore ——

Lalbag Botanical Garden is located in Southern Bengaluru and is on of the prime most tourist attractions in India. It was comissioned by Hyder Ali, the ruler of Mysore in the year 1760 and finally implemented by his son Tipu Sultan. The glass house was modled after gardens in Sira, which was comissioned by Dilawar Khan. Sira is about 120 kms from the city and is in Tumkur district, Karnataka.

During that time, such gardens were in rage and dominated Mogul Architecture. While Hyder Ali laid out plants, Tipu Sultan brought Horticulture wealth from all over the world to this garden.

As reported by Captain S.S. Flower, Lalbag garden had tigers, monkey houses with an orangutan, cheetal, sambhar deer, pair of emus, peacocks by 1850 - 1860. Originally lalbag was spreaded across 45 acres and later, 30 acres, 13 acres, and then 94 acres were added to it in the year 1889, 1891, and 1894 respectively. This also includes the addition of rock with Kempegowda towers.

The lalbag Rock is dated and reported to 3,000 millions years, making the oldest rock formation on the planet.

Thanks to the efforts of Tipu Sultan, the garden has rare and exotic plants that are originally found in France, Persia and Afganistan.

Another wonderful that can be credited to the Mogul Architecture is its well sorted and well planned irrigation system. The aesthetically planned garden has such irrigation and watering system in place since then that water reaches every pool, pond, fountain, flowerbeds and lawns. Moreover every plant and tree is labelled for easy identification and information of the public.

- The flower shows at Lalbag Botanical Garden: The flower shows are conducted every year on Independence Day and Republic Day to promote flower enthusiasts and to create awareness in children as well as commoners with regards to cultivation and conservation of plants and flowers.

During the construction of Bangalore metro rail, trees falling under the acquired land of Lalbag were supposed to be cut. In the year 2009, about 500 feet of wall were cut to make way for the tracks. Bangalore citizens took it on themselves to preserve the rich heritage of Lalbag and environment and started protesting on the land acquisition by the metro authorities and to protect the greenery of the city.

4. Government Botanical Garden, Ooty —

The Government Botanical Garden is a botanical garden in Udhagamandalam, near Coimbatore (Ooty) Tamil Nadu state, India laid out in 1848. The gardens, divided into several sections, cover an area around 55 hectares and lie on the lower slopes of Doddabetta peak. The Garden has a terraced layout. It is maintained by Tamil Nadu Horticulture Department.

It ascends the slops of the hill at an elevation of 2250 - 2500 meters above Mean sea level. The Garden enjoys a temperate climate, with an average rainfall of 140 cm, the most of which is received during south-west monsoon, with frosty nights from november to february. The maximum and minimum temperatures are 28°c and 0°c respectively.

- The Government Botanical Garden Udhagamandalm was established in 1848. Its architect was William Graham Mclvor. The Marquis of Tweedale prepared the initial layout during the late 1840. The gardens were established by a subscription of Rs 3 per month amongst the European residents for the purpose of supplying vegetable at reasonable cost. During the time that Ootacamund was under British control, considerable cultivation of vegetables for the market was carried on by European settlers and others. Captain Molyneux of the 2nd European Regiment managed the vegetable cultivation. The subscribers received vegetables free of cost. But this arrangement did not work out in early 1847, a fund was raised by means of donations and subscriptions with a view to forming a horticulture society and a public garden.

- Collections: The garden have around a thousand species, both exotic and indigenous, of plants, shrubs, ferns, trees, herbal and bonsai plants. In the centre of the Garden lies a fossilized tree trunk estimated to be 20 million years old. The Gardens consists of several lawns with flowering plants, ponds with lilies, beds of flower and fern laid out in an Italian style, several plots of flowering plants, a variety of medicinal plants.

5. TNAU Botanical Garden, Coimbatore ——

Tamil Nadu Agriculture University is situated in Coimbatore and maintains this huge 300 Acres Botanical Garden called TNAU Botanical Garden. There are so many varities of plants and trees and each species is labeled with its common name as well as scientific name. Tourists are allowed inside and it is very very green all over the place. They also have certain plants in incubators where the conditions (temperature etc) are regulated for their growth. They also maintain a nursery where they not only sell plants but helps people with technique of plant husbandry, organic pesticides etc. Once you are inside its like a forrest, and you ought to be careful with the big type of mosquitoes and ants there are present. They conduct plant / flower shows once in a year where about a lakh of people visit to see various plants and flowers grown in house as well as the ones imported for the event.

It is known for ——

i) TNAU Botanical Garden is spread over 300 acres of land and has different plants and trees in its activity.

ii) This garden is also equipped with the various incubators for growing the non-seasonal plants.

iii) This garden also educates the guests with the different types of species as well.

iv) The lush green surroundings also serve as a spot for spending leisure time.

6. The Agri Horticulture Society of India, Alipore, Kolkata —

In 1820, Rev. Dr William Carey founded the Agri Horticulture society of India, the oldest institution of its kind in the country. William Carrey was a distinguished Orientalist and botanists. He was encouraged and supported by the Governor-General of India, the marquis of Hastings, who was also the first patron of the society. Thus this natural heritage site has a 200 years old history.

The society's role in the promotion and development of agriculture and horticulture in the country remains unparalled. It acted as India's de facto Department in the government machinary. It was Rev. Carey who brought extinct species of plants and nurtured them in the society's garden. He also brought maize, cotton, tea, from different countries and installed plantation habits in different parts of the country.

- **Collection :** In horticulture, several species and varities arising from hybridisation or mutations are named after Lancaster and his family. A few noteable ones are —

- Acalypha lancasteri
- Antignon lancasteri
- Crinum lancasteri
- Panax lancasteri

This garden has flowers garden, a research laboratory, a library, a massive collection of plants and flowers. It has a significant collection of botanical varities, including Cannas, a large vanity of ferns and medicinal plants and thousands of fruit and flowering plant and trees.

7. National Botanical Research Institute (NBRI), Lucknow ——

The National Botanical Research Institute (NBRI) is a research institute of CSIR in Lucknow. It is engaged in the field of taxonomy and modern biology.

Originally conceptualised and set up as the National Botanic Gardens (NBG) by professor Kailas Nath Kaul on behalf of the state government of Uttar pradesh, it was taken over by the CSIR in 1953. Dr. Triloki Nath Khoshoo joined in 1964 as the Assistant Director, shortly afterwards becoming the Director. Initially engaged in research work in the classical botanical disciplines, the NBG went on laying an increasing emphasis in keeping with the national needs and priorities in the field of plant science, on its applied and developmental research activities. Due to the untiring efforts of Dr. Khoshoo, the institute rose to the stature of being the National Botanical Research Institute in 1978, reflecting the correct nature and extent of its aims and objectives, functions and R & D activities. Sikandar Bagh is a famous and historic pleasure garden, located in the grounds of institute.

NBRI developed a new variety of bougainvillea named Los Banos Variegata - Jayanthi.

8. Botanical Garden of Forest Research Institute (FRI), Dehradun —

The Forest Research Institute (FRI) is an institute of the Indian Council of Forestry Research and Education and is a premier institution in the field of forestry research in India. It is located at Dehradun in Uttarakhand, and is among the oldest institution of its kind. In 1991, it was declared a deemed university by the University Grants Commision.

Botanical Garden of the forest research institute was established in 1906 at Dehradun. It is a primen institution in the field of forestry research in India. Here, botanical research is carried out under disciplines Systematic Botany, Plant physiology and Wood anatomy.

Established as Imperial Forest Research Institute in 1906, was first situated Chandbagh on the Mall road. A much larger campus at the present location was acquired ca 1923. Construction of new buildings commenced thereafter. Styled in Greco-Roman Architecture by C.G. Blomfield, the main building was inaguarated in 1929. It is now a National Heritage.

This institute has built over 450 hectares, with the outer Himalaya forming its back drop. The institute has developed a infrastructure of all equipped laboratories, library, herbarium, arboreta, printing press and experimental field areas.

The botanical garden is the specialized gardens have the collection of living plants for references.

Plant species in these gardens are grown for identification purposes and each plant is labeled indicating its botanical/scientific name and its family.

☑ Some famous Botanical Gardens in Abroad :——

1. Royal Botanic Granden, Kew
2. Missouri Botanical Granden, USA
3. Berlin Botanic Granden and Museum, Berlin - Dallem
4. Cambridge University Botanical Garden
5. Brooklyn Botanic Granden, New york city, USA
6. Singapore Botanic Granden, Singapore
7. Denver Botanic Gardens, Colorado, USA
8. Montreal Botanical garden, Canada

1. Royal Botanic Garden, Kew —

More popularly known as 'Kew Gardens' this historical garden is undoubtly the first botanical garden and Botanical research and resource centre in the world. The garden was developed in 1600s by Kew House owned by Richard Bennet. The widow of prince of Wales commissioned the garden in 1759. Sir Joseph Banks introduced large collection from different part of the world.

The garden has since grown into a premiere Research and Educational institute with excellent herbarium and library. Originally the garden covered an area of 120 ha. The outstation of the Royal Botanic garden, Kew at Wakehurst Place near Ardingly in West Sussex in a rural estate of 202 ha. Gardens Kew has directed and financed its development so that Wakehurst Place now makes a vital contribution in maintaining the international reputation of living Collections Department.

There are substantive differences in the layout and content of the collections at Wakehurst Place which act to complement those at Kew. In particular botanical collections are laid out in a floristic manner reflecting the way that temperate plant communities have evolved.

The Royal Botanic Garden's 'Living collections at Kew and Wakehurst Place are multilevel encyclopedic reference collection reflecting global plant diversity and providing a reference source which serves all the aspects of botanical and Horticulture science within Kew, Great Britain and throughout the world. The two sites provide quite different environments allowing the development of two different but complementary collections. The living collections at Kew are most diverse with 351 families, 5465 genera and over 28000 species growing successfully. The arboretum covers the greatest area with large mature temperate trees. Tropical plants are maintained indoor, including Aroid House, Palm House, Filmy Fern House etc. Several interesting plants such as Victoria amazonica from south America and Welwitschia mirabilis from Angola are also growing here. Kew herbarium undoubtly most famous herbarium of the world, maintains over 6 million specimen of vascular plant and fungi.

Kew maintains database on plant names taxonomic literature, economic botany, plants for arid lands and plants group of special economic and conservation value. Kew also makes about 10,000 identifications a year through its Herbarium service and provides specialist advice on taxonomy and nomenclature in different cases. Kew is involved in major biodiversity research programmes in many parts of the world, including tropical and West Asia, SE Asia, Africa, Madagaskar, South America and the pacific and Indian Oceanic islands. The herbarium runs an international Diploma Course in Herbarium techniques. The General catalogue now contains over 122,000 records and is available throughout RBG Kew on the network.

2. Missouri Botanical Gaarden, USA ——

Considered one of the top three botanical gardens in the world, The Missouri Botanical Garden is a National Historical Landmark and a centre for botanical research, education and horticulture display. The garden was founded by an Englishman Henry Shaw and opened to public in 1859 with active help from Asa Gray and Sir William Hooker Enelmann. Today, the garden covers 79 acres and operates world's most active tropical botany research programme.

America, with a proud collection of Hamerocallis, Iris, roses, Hosta, and several economic plants. There are also Chinese, English, German, Victorian Gardens. Over 4000 trees thrive on the ground including some rare and unusual varities.

With more than 5.3 million specimens, the herbarium ranks second in the USA and 6th in the world. It has collections dating back to back to mid 1700s. The herbarium specializes in having collection of Gr. Boehman, Joseph Bank, D. Solander and Charls Darwin. During the last five years, the herbarium has added an average of 120,000 mounted specimens per year to its collection. In addition to the many gift specimens sent to the specialists, this herbarium loans an average of 34,000 specimen annually, and borrowes about 27000 species. The herbarium staff also provides identifications from their area expertise.

Among the major research activities include Flora of North America project, five volumes having already been published, covering the plants of USA, Canada and Greenland. The garden also coordinates Flora of China project, 25 volume being planned to be completed in 15 years starting from 1994.

3. Berlin Botanic Granden and Museum, Berlin - Dahlem ——

The Berlin Botanic Granden and Museum is a botanical garden in German capital city of Berlin, with an area of 43 hectares and around 22,000 different plant species. It was constructed between 1897 and 1910, under the guidance of architect Adlof Englen, in order to present exotic plants returned from German colonies.

The garden is located at Lichterfelde locality of the borough of Steglitz - Zehlendrof. When it was founded a part of it was located in Dahlem, a fact reflected in its name.

Today the Granden is part of the Free University of Berlin. The botanical museum together with the herbarium Berolinense and large scientific library, is attached to the garden. The herbarium Berolinense is the largest herbarium in Germany and holds more than 3.5 million preserved specimen.

The complex consists of several buildings and glass-house, such as Cactus Pavilion and Pavilion Victoria. The garden's open air areas, sorted by geographical origin, have a total area of 13 hectares. The garden's arboretum is 14 hectares.

The best known part of the garden is the Great Pavilion. The temperature inside is maintained at 30°c and air humidity is kept high. Among the many tropical plants it hosts a giant bamboo.

In the year 1573, during the time of Electon John George, the first noteworthy assembly of plants of the enlargement of the national collection was achieved, under the leadership of chief gardener at the kitchen garden of the Berlin city Palace. Desiderius Corbianus. Even the expression 'Botanic Granden' did not exist at the time, it was, in fact, the first such in Berlin. The existing Pleasure Granden has developed from the original one. In 1679 at the Potsdam Street - in place of the present kleistpark - a hop garden was laid out, which was used, as a purpose of the electrical brewery as a fruits and kitchen garden. Carl Ludwig Willdenow achieved the garden area assigned in 1809 to the Berlin Friedarrick William university.

4. Cambridge University Botanical Garden —

The Cambridge University Botanical Garden is a botanical garden located in Cambridge England associated with the university Department of Plant sciences. It lies between Trumpington Road to the west, Bateman street to the north and Hills road to the east.

The garden covers an area of 16 hectares. The site is almost entirely on level ground and in addition to its scientific value, the garden is highly rated by gardening enthusiasts. It holds a plant collection of over 8000 plants species from all over the world to facilitate teaching and research. The garden was created for the university of Cambridge in 1831 by professor John Stevens Henslow and was opened to public in 1846.

After several unsuccessful attempts during the 16th, 17th, and early 18th centuries, a University Botanic Garden was finally established at Cambridge between 1760 and 1763. This was not on the site of the present Garden, but in the centre of the town on about 5 acres of the land occupied by 'The Mansion House' of the old Augustinian friary, and today by the New Museums Site and other university buildings.

The planting of the New Garden was carried out by Prof. Henslow, assisted by young Candale Babington. The land was flat and unpromising as a garden site, but the layout was planned with great skill, utilizing an old gravel pit to construct a lake with a high mound running into it. Trees and shrubs were planted according to their botanical sequence, a range of glasshouses was built in 1860s and a rock garden, one of the earliest of its kind in the country, was constructed about the same time. The garden has also been known for its many fine specimens of rare trees. By the 1870s the main features of the Garden had been developed and, it was ready to play its part in the great expansion of botanical teaching and research that was about to take place at Cambridge. The garden has many parts such as autumn colours garden, bed of british native plants, dry garden, fern display, genetic garden, glasshouse, herbaceous borders, lake etc.

5. Brooklyn Botanic Garden, New york city, USA ——

Brooklyn Botanic Garden is a botanical garden in the borrough of Brooklyn, New York City. It was founded in 1910 and is located in Mount Prospect Park. in central Brooklyn, adjacent to Prospect Park and the Brooklyn Museum. The 52 acre garden holds over 14000 taxa of plants and has nearly a million visitors each year. It includes a numbers of speciality 'gardens within the Garden', plant collections, the Steinhardt Conservatory that houses the C.V. starr Bonsai Museum, three climate-themed plant pavilions, a white cast-iron and-glass aquatic plant house, and an art gallery.

The impetus to build Prospect Park stemmed from an April 18, 1859, act of New york State legislature that empowered a twelve member commision to recommand sites for parks in the city of Brooklyn. In February 1860, a group of 15 commisioners submitted suggestions for park locations in Brooklyn, including a 320 acres.

• Specially gardens and collection :——

There are several garden parts,

Cherry trees, Brooklyn Botanic Garden has more than 200 cherry trees of 42 asian species and cultivated varities, making it one of the foremost cherry-blossom-viewing sites outside Japan. The first cherry trees, a gift from the Japanese government.

In 1897 as the city moved toward consolidation, legislation reserved 39 acres for a botanic garden, which has founded in 1910. Initially known as the institute park, the garden was run under the auspices of Brooklyn Institute of Arts and Science, which until the 1970s included Brooklyn museum, Brooklyn Children museum and Brooklyn Academy of music. The garden opened as the Brooklyn Botanic garden on May 13, 1911, with the Native Flora garden as the first established section.

6. Singapore Botanic Garden, Singapore ——

The Singapore Botanic Garden is a 161 year old tropical garden located at the fringe of Singapore's Orchard Road shopping district. It is one of three gardens, and the only tropical garden to be honoured as a UNESCO World Heritage Site. The Botanic garden has been ranked Asia's top park attraction since 2013, by TripAdvisor Traveller's Choice Awards. It was declared the inaugural Garden of the year, International Garden Tourism Awards in 2012, and received Michelin's three star rating in 2008.

The Botanic Garden was founded at its present site in 1859 by an agri-horticultural society. It played a pivotal role in the region's rubber trade boom in the early 20th century, when its first scientific director Henry Nicholas Ridley, headed research into the plant's cultivation. By perfecting the technique of rubber extraction, still in use today, and promoting its economic value to planters in the region, rubber output expand rapidly at its height in 1920s, the Malayan peninsula commend half of the global latex production.

The first 'Botanical and Experimental Garden' in Singapore was established in 1822 on Government Hill at Fort Canning by Sir Stamford Raffels, the founder of modern Singapore and keen naturalist. The Garden's main task was to evaluate for cultivation crops which were of potential economic importance including those yielding fruits, vegetables, spices and other raw materials. This first Garden closed in 1829.

It was not until 30 years later than the present Singapor Botanic Gardes began in 1859, when the Singapore Agri-horticulture society was granted 32 hectares of land in Tanglin by the colonical government which had obtained it from the merchent Hoo Ah Kay, known as Whampoa, in exchange for land at Boat Quay.

7. Denver Botanic Garden, Colorado, USA——

The Denver Botanic Garden is a public botanical garden located in the Cheesman Park neighborhood of Denver, Colorado. The 23 acre park contains a conservatory, a variety of theme garden and a sunken amphitheater, which hosts various concerts in the summer.

There are three diverse location that are part of Denver Botanic Gardens as a whole. The main location, and the formal garden, is the York street location in east central Denver. Denver Botanic Garden at Chatfield features natural meadow and riparian areas, as well as a historic farm and homestead. Mt. Goliath, on the route to Mount Evans, is an alpine wildflowers garden.

The Denver Botanic Gardens, along with nearby Cheesman Park and Congress Park, sit atop what used to be prospect Hill cemetery. Although the majority of bodies were removed in 1893, the interred continued to be removed as late as 1950s. As recently as 2010, graves were uncovered during revolution of the park's irrigation and sprinkler systems.

Denver Botanic Garden features North America's largest collection of plants from cold temperate climates around the world, as well as 7 diverse gardens that mostly include plants from Colorado and Neighbouring states.

The Denver Botanic Garden also boasts the first conservatory in America that was made entirely concrete and Plexiglas panes, each of which were designed to channel condensation to the sides of the walls so it would not drip on visitors. The Boettcher Memorial Tropical Conservatory was awarded landmark status in 1973.

8. Montreal Botanical Garden, Canada ——

Montreal Botanical Garden in Montreal founded in 1936 by Frere Marie - Victorian, one of the greatest of Canadian Botanist. Spanning more than 75 hectares, the Montreal Botanical Garden has approximately 20,000 plant species and cultivars under cultivation and maintains a herbarium consisting of nearly 100000 reference specimen. Of the garden's many greenhouses, 10 are for public display and 23 for service function and research collection. Its significant collections and special gardens contain commercially important plants, woodland plants. ferns, bonsai, cacti and othe succelents, begonias, orchids. Other notable features include water gardens, a rock garden arranged by geographic region, a First - Nations garden with plants of ethnobotanical importance to Native Americans, a collections of cultivated perennial herbaceous plants for home gardeners and an arboretum. The plant Biology Research Institute of the University of Montreal uses some of the garden's facalities, and, together the two institutes from an important botanical research centre.

The garden was founded in 1931, in the height of Great Depression, by mayor Camilien Houde, after years of campaigning by brother Marie - Victorin. The grounds were designed by Henry Teuscher, while the Art Deco style administration building was designed by Henry Teuscher.

☑ Arboretum :—

An arboretum in a general sence is a botanical collection composed exclusively of trees. More commonly a modern arboretum is a botanical garden containing living collections of woody plants and is intended at least in part for scientific study.

An arboretum specializing in growing conifers is known as a pinetum, Other specialist arboreta includes salicetа, populetа, and quercetа.

The ferm arboreta was first used in an English publication by John Claudius Loudon in 1833 in Gardeners's Magazine but the concept was already long-established by then.

Related collections include a fruticetum the Latin frutex, and a viteetum from the Latin vitis.

Example of some arboretum —

1. Udhagamandalam (Ooty) Arboretum, The Nilgiris, India, Asia

The arboretum at Ooty was established in 1992 with an aim of conserving native and indegenous trees, it occupies 1.58 hectares near Ooty lake. It was established during the year 1992 and maintained by Department of Horticulture with Hill Area Development Programme funds. Both indegenous and exotic species are present here including the following species: Alnus nepalensis, Eugenia apiculata, Populus deltoides, Salix babylonica etc.

2. Eastwoodhill Arboretum, Gisborne, New Zealand

Probably the largest collection of Northern Hemisphere trees in the Southern Hemisphere can be found at Eastwoodhill Arboretum.

The arboretum is the realization of the dream of William Douglas Cook (1884-1967), who started planting trees on his farm shortly after the first world war. The arboretum is now national Arboretum of New Zealand, and holds some 40,00 different trees, shrubs and climbers.

3. Taitua Arboretum, Hamilton, New Zealand

The Arboretum was offered to Hamilton residents in 1997. Trees and shrubs were planted there from 1973 by John and Bunny Mortimer to provide shelter and shade for local animals. The arboretum is a popular picnic spot.

4. RJ Hamer Arboretum, Victoria, Australia

Parks Victoria RJ Hamer Arboretum, visitors to the RJ Hamer Arboretum can take a quite, peaceful stroll along the many walking tracks and rodes providing access to the 126 hectares of breath taking scenery and tranquil beauty that the Arboretum has to offer. A basic planting desgine was completed in 1950 and planting was carried out for next 15 years.

5. The Tasmanian Arboretum, Devonport, Tasmania

The Tasmanian Arboretum was established in 1984 on the Don river in Devonport, Tasmania, Australia. The main site is 58 ha, There are over 2500 plants in the geographic and thematic collections along with riparian revegetation.

6. The National Arboretum, Canberra, Australian Capital Territory

National Arboretum Canberra is being developed on a 250 hectare site in the Greenhills Forest Areas west of the Tuggeranong Parkway and Lake Burley Griffin, Canberra, Australia. It includes an existing stand of 5000 Himalayan Cedars and the 80-years old Cork Oak plantation which were damaged by the 2001 and 2003 Canberra bushfires.

7. Lindsay Prayon National Arboretum, Canberra, Australian Capital Territory

Located at Yarramundi Reach on the shores of Lake Burley Griffin, the Lindsay Prayon National Arboretum is a 30-hectare site originally planted by Prof. Prayon Between 1954 and 1957 to improve the view from Government.

8. Bank Hall arboretum, Lancashire, England

A small arboretum at Bank Hall Gardens, Bentham in Lancashire, contain a yew thought to be at least 550 years old, the oldest in Lancashire. George Anthony Legh Keck had the arboretum planted in the gardens which were abandoned from 1970s until 1995 when Bank Hall Action Group cleaned the grounds. It contains one of two known fallen Sequoia sempervirens in the UK, Wellingtonia dawn redwood, Atlas cedar, Western Hemlock etc. It also has many specimen of snowdrop, daffodil and bluebell.

Herbarium:—

It was Luca Ghini who initiated who initiated the art of Herbarium making by pressing and drying specimens on sheet of papers. This art was disseminated throughout Europe by his students who mounted sheets and bounded them into book volumes.

Although the herbarium technique was a well-known botanical practice at the time of Linnaeus, he departed from the convention of mounting and binding the specimens on single sheets. Storing them horizotally, a practice followed even today.

From isolated personal collection, herbaria have grown into large institutions of national and international stature with millions of specimens from different parts of the world. Index Herbarium, edited by Patricia Holmgren lists the world's important herbaria. Each herbarium is identified by an abbreviation that is valuable in locating the type specimen of various species. The major herbaria of the world with approximate number of specimens in the order of importance.

According to Simpson "A herbaria are the repositories of living plant collection usually in form of pressed and dried plant specimen mounted on a herbarium sheet of papers.

Importance of Herbarium —

1. Repository of plant specimens: Primary role of a herbarium is to store dried plant specimens, safeguard these against loss and destruction by insects, and make them available for study.
2. Safe custody of type specimen: Type specimens are the principal proof of the existence of a species or an infraspecific taxon. These are kept in safe custody, often in rooms with restricted access
3. Compilation of Flora, Manuals and Monograph: Herbarium specimens are the 'Original documents' upon which to knowledge of taxonomy, evolution and plant distribution rests.
4. Training in herbarium methods: Mainly herbaria carry facilities for taining graduates and undergraduates in herbarium practice.
5. Identification of specimens: The majority of herbaria have a wide ranging collection of specimen and offer facilities for one-site identification or having the specimens sent to the herbarium identified by experts.
6. Preservation of voucher specimens: Voucher specimens preserved in various herbaria provide an index of specimens on which a chromosomal, phytochemical, ultrastructural or any specialized study has been undertaken.

Some major Herbaria of the world :—

- Museum of natural History, paris, 10 million
- Royal Botanic Gardens, Kew, 6 million
- Komarov Botanical Institute, Leningrad, 5.7 million
- Conservatory and Botanical Garden, Geneva, 5 million
- Combined Herbaria, Harvard University, Cambridge, 5million
- New york Botanhical Gronden, Bronx, 5 million
- Royal Botanic Granden, Edinburgh, 1.7 million
- U.S. National Herbarium, Washington, 4.1 million
- British Museum of Natural History, 4 million
- Natural History museum, Vienna, 3.5 million
- Missouri Botanical Granden, Saint Louis, 2.1 million
- Field Museum of Natural History, Chicago, 2.1 million
- National Botanical Granden of Belgium, Brussels, 2.1 million
- Botanical Gearden and Botanical Museum, Berlin, 2million
- Academy of Natural Scienes, Philadelphia, 2 million

Acronym : —— An acronym is a word or name formed from the initial components of a longer name or phrase, usually using individual initial letters as in NATO (North Atlantic Treaty Organization) or EU (European Union). Similarly acronyms are sometimes pronounced as words as in NASA or UNESCO, sometime as individual letters as in FBI or ATM or mixture of of two as JPEG or IUPAC.

The broader sense of acronym inclusive of terms pronounced as the individual letters is sometime criticized, but it is the term's original meaning and is in common use

- Major herbaria of the world, listed in the order of number of specimens with their acronym ——

Herbarium	Acronym	No. of specimen
1. Museum National d'Histoire Naturelle (Museum of Natural History) Paris, France	P, PC	9,337,300
2. New York Botanical Garden, New York, USA	NY	7,000,000
3. Komarov Botanic Institute, Saint Petersburg (Formerly, Leningrad), Russia	LE	7,000,000
4. Royal Botanic Gardens, Kew, Surrey UK	K	7,000,000
5. Missouri Botanical Garden, Saint Louis, Missouri, USA	MO	6,000,000
6. British Museum of Natural History. London, UK	BM	5,200,000
7. Combined Herbaria, Harvard University, Cambridge, Massachusetts, USA	A, FH, GH, ECON, ANES	5,000,500

Conclusion :—— Botanical garden play an important role as the ex situ conservation for plant and also the in situ conservation site. The conservation of plant diversity is critical for sustainable development of botanic gardens are playing a key role as centres of conservation action.

They conserve endangered plant species through living collections as well as through seed bank, and they benifit pollinators like butterflies. Honeybees, bats, and birds which play an important role in the production of our crops and maintaining the health of other plant life.

Reference :——

1. Singh. G. (2012) Plant Systematics : Theory and Practice Oxford & IBH Pvt. Ltd, - New Delhi, 3nd edition.
2. Jeffery, C. (1982). An Introduction to Plant Taxonomy, Cambridge University Press, Cambridge
3. Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.F. (2002). Plant Systematic A - Polygenic Approach, Sinauer Associates Inc., U.S.A. 2nd edition.
4. Radford, A.E. (1986). Fundamental of Plant Systematics, Happen and Row, New York.
5. Richard W. Smiley, Peter H. Dernoeden, Bruce B. Clarke, Compendium of Turfgrass Diseases.
6. Jineton R.J., Clark P.F., A Dictionary of Ecology, Evolution and Systematics