ZION INTERNATIONAL PUBLIC SCHOOL

Puthur, Mappedu, Chennai - 600126

AISSCE 2023 – 2024

HERBARIUM

NAME ……..

REGISTER NO……

STD…..……SEC……

SUBJECT…….

ZION INTERNATIONAL PUBLIC SCHOOL

CHENNAI-126

BONAFIDE CERTIFICATE

Certified that this **BIOLOGY** Project Report is the bonafide work of _____

ROLL NO:_____of class XII, under my supervision and guidance.

PRINCIPAL **TEACHER-IN CHARGE**

Submitted for evaluation during the **AISSCE 2024** practical examination held on_____

INTERNAL EXAMINER **EXTERNAL EXAMINER**

ACKNOWLEDGEMENT

I really want to thank everyone who has helped me with this project. I would like to express my special thanks to my school's principal, Mrs. Jayanthi Sivakumar, and my biology teachers, Mrs. Giftyna Prabhu, Mrs. Vaishnavi, both gave me the wonderful opportunity to complete this wonderful project on the topic of ''HERBARIUM".

I am also grateful to my parents and friends for their assistance in completing this project in a timely manner. I'd also like to thank my classmates for their helpful instructions and suggestions.

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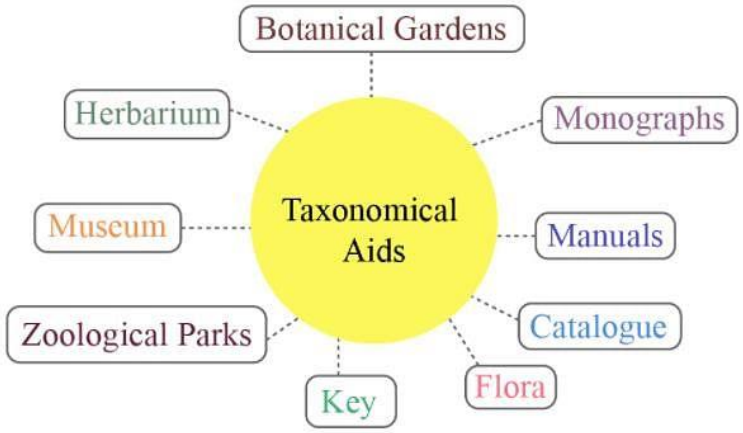
INTRODUCTION:

- Taxonomical aids are the collections of samples or preserved organisms which help in extensive research for the identification of various taxonomic hierarchy. Herbarium is one such taxonomical aid.



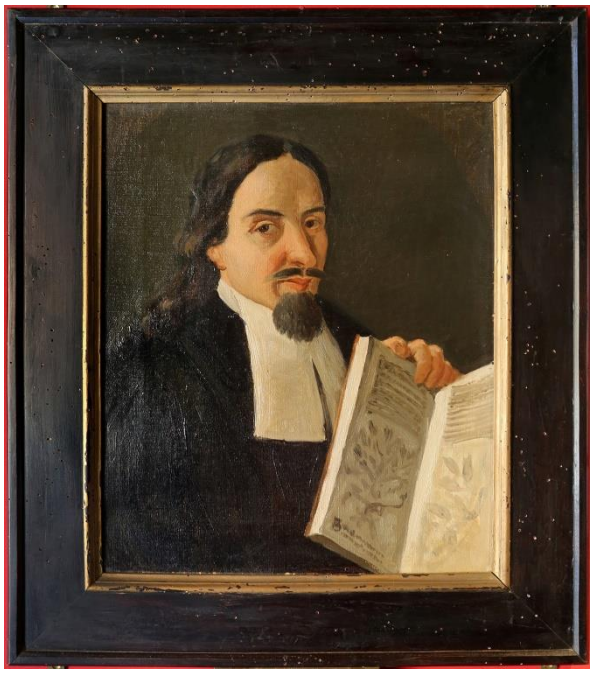
DEFINITION:

- The herbarium is a collection store of plants in their dried condition. Plants are pressed, dried, and preserved on white sheets for reference. The sheets with specimens are arranged in one of the accepted systems of classification. Herbarium aids in taxonomical studies of different species.

HISTORY OF HERBARIUM:

- The term herbarium was first used as a collection of dried medicinal plants cataloged within a bound book. In the 16th century, Luca Ghini (1490-1556) is credited to be the first person to press and preserve plants under pressure, then bind the specimens within a book. He was a Botany Professor at the University of Bologna, Italy. This practice quickly became the usual practice throughout Europe. Specimens were housed in researchers' personal collections, and extra specimens were traded with other botanist.
- In the 18th century, Carl Linnaeus (1707-1778), known as the "Father of Taxonomy" was faced with a challenge while preserving plants according to this Italian practice. As his collections expanded, it was difficult to catalog when

binding the specimens within a book. He came up with a system that mounted one specimen per large sheet of paper . After that, it would be cataloged with other closely-related plants and stored in cabinets, which provided room to add new material and allowed the shelves to function as a file cabinet. He decided the sheets of paper should be one size, that way when traded with other botanists, the collection remained uniform. These standards are still used today, several hundred years later. Not only do the standards remain, but so do the specimens.



LEGALITIES AND ETHICAL CONSIDERATIONS:

- When engaging in herbarium conservation or any plant collection activities, it's crucial to be aware of and adhere to legal considerations to ensure ethical and sustainable practices. Legal requirements may vary depending on the country, state, or region. Here are some general considerations:

1. Permits and Permissions:

- Collecting Permits: Obtain the necessary permits before collecting plant specimens. Many areas, especially protected natural areas, require permits for plant collection.
- Landowner Permissions: If the collection site is private property, obtain permission from the landowner.

2. Endangered and Protected Species:

- Be aware of local and international regulations regarding the collection of endangered or protected plant species.
- Some plants are listed under international agreements such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Ensure compliance with such agreements.

3. Ethical Collection Practices:

- Follow ethical guidelines for plant collection to minimize environmental impact. Collect only what is necessary for scientific or educational purposes.
- Avoid damaging the habitats or populations of the collected species.

4. Institutional Policies:

- If you are conducting the herbarium conservation as part of an academic or institutional project, be aware of and adhere to the policies and guidelines set by your institution.

5. Data Sharing and Access:

- Ensure that your herbarium data comply with data-sharing standards and that you have the necessary permissions to share the collected data.

6. Intellectual Property:

- Respect intellectual property rights associated with the identification and naming of plant specimens. Provide proper attribution to authors of taxonomic works.

7. International Collaboration:

- If your herbarium project involves international collaboration, be aware of regulations governing the transportation of plant material across borders.

8. Community Engagement:

- Engage with local communities, if applicable, and respect indigenous knowledge and cultural practices related to plant use and conservation.

9. Data Privacy:

- If your project involves collecting data on private land, be mindful of data privacy laws and seek consent when necessary.

10. Documentation and Record-Keeping:

- Keep detailed records of all permits, permissions, and collection details. Proper documentation is essential for compliance and future reference.

11. Consultation with Experts:

- Consult with botanical experts or authorities in your region to ensure compliance with local regulations and ethical standards.
- Always remember that respecting legal and ethical considerations is essential not only for the success of your project but also for the conservation of plant biodiversity and the ecosystems in which these plants are found. If in doubt, seek guidance from local authorities, botanical experts, or legal professionals familiar with environmental regulations in your area.

NATIVE SPECIES OF CHENNAI:

1. Neem Tree (Azadirachta indica):

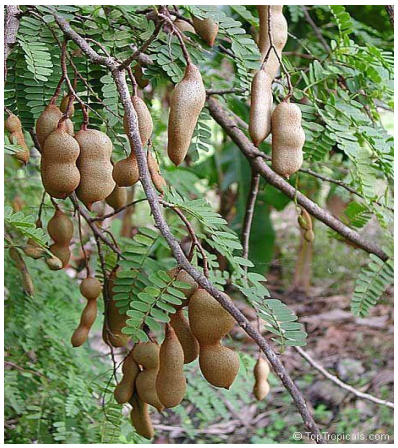
- Common in Chennai homes.
- Acts as an indicator for underground water.
- Flowers before Tamil New Year, used in New Year pachadi.
- Medicinally important as a vermifugal.

2. Palms:

- Coconut trees are ubiquitous in Chennai.
- Other palms include Fish tail palm, Royal palm, and Palmyrah palm.

3. Leguminous Trees:

- Gliricidia, a medium-sized tree with excellent green manure.
- Coral tree (Erythrina indica) is gorgeously flowering.
- Agati Maram (Sesbania grandiflora) was commonly grown in backyards.



4. Tamarind Tree (Tamarindus indica):

- Evergreen tree with economic importance.
- Yields puli, a flavored ingredient in South Indian sambar.

5. Rain Tree (Samanea saman):

- Most common avenue tree in Chennai.

6. Sacred Trees:

- Callophyllum inophyllum (Punnai) is revered, considered Lord Krishna's favorite.
- Banyan tree (Ficus benghalensis) at Theosophical Society, landmark in Chennai.

7. Trees with Showy Flowers:

- Trumpet flower (Stenolobium stans), Tabebuia rosea, Plumeria alba, and Thespesia populnea.

8. Attractive-leaved Trees:

- Mast tree (Polyalthia longifolia), Indian almond (Terminalia catappa), Curry leaf tree (Murraya koengi).

9. Not-so-common Trees:

- Terminalia Arjuna, the Arjun tree, known for folklore.
- White silk cotton tree (Illavampanju) is common in Chennai gardens.
- Mahogany tree (Meliaceae family) shares features with neem.

10. Uncommon Trees:

- Baobab tree (Adansonia digitata) introduced from Africa.
- Wild almond tree on the campus of St George's orphanage.

11. Fruit-bearing Trees:

- Psidium guavava (Koyya) widely grown in Chennai backyards.
- Jack tree (Artocarpus heterophyllus) is popular, tasty, and has medicinal value.

This rich biodiversity reflects the coexistence of similarities and dissimilarities within the same family in Chennai.

SPECIMEN PRESERVATION:

- Commensurate with the need to identify the specimen, it is essential to include in an herbarium sheet as much of the plant as possible or at least representative parts of them in the case of large specimens.
- To preserve their form and colour, plants collected in the field are carefully arranged and spread flat between thin sheets, known as flimsies and dried, usually in a plant press between blotters or absorbent paper.
- The specimens, which are then mounted on sheets of stiff white paper, are labelled with all essential data, such as date and place found, description of the plant, altitude, and special habitat conditions.
- The sheet is then placed in a protective case. As a precaution against insect attack, the pressed plant is frozen or poisoned, and the case disinfected.
- Certain groups of plants are soft, bulky, or otherwise not amenable to drying and mounting on sheets. For these plants, other methods of preparation and storage may be used.
- conifer cones and palm fronds may be stored in labelled boxes.
- Representative flowers or fruits may be pickled in formaldehyde to preserve their three-dimensional structure.
- Small specimens, such as mosses and lichen are often air-dried and packaged in small paper envelopes.
- The herbarium at the British Museum, which is especially rich in the earlier collections made in the eighteenth and early nineteenth centuries, contains the types of many species founded by the earlier workers in botany.
- It is also rich in types of Australian plants from the collections of Sir Joseph Banks and Robert Brown, and contains in addition many valuable modern collections.

COLLECTION MANAGEMENT

- Specimen sheets are stacked in groups by the species to which they belong and placed into a large lightweight folder that is labelled on the bottom edge.
- Locating a specimen filed in the herbarium requires knowing the nomenclature and classification used by the herbarium.
- Modern herbaria often maintain electronic databases of their collections.
- Many herbaria have initiatives to digitize specimens to produce a virtual herbarium.
- These records and images are made publicly accessible via the Internet when
- possible.

USES OF HERBARIUM

- Herbaria have long been essential for the study of plant taxonomy, the study of geographic distributions, and the stabilizing of nomenclature.
- Linnaeus's herbarium, which contains over 4,000 types, now belongs to the Linnean Society in England.
- Specimens housed in herbaria may be used to catalogue or identify the flora of an area.
- A large collection from a single area is used in writing a field guide or manual to aid in the identification of plants that grow there.
- Herbaria also preserve a historical record. change in vegetation over time.
- Specimens preserved in a herbarium can represent the only record of the plant's original distribution.
- Environmental scientists make use of such data to track changes in climate and human impact.
- Herbaria have also proven very useful as source of plant DNA for use in taxonomy and molecular systematics.
- Many kinds of scientists and naturalists use herbaria to preserve voucher specimens; representative samples of plants used in a particular study. They may also be a repository of viable seeds for rare species.

INSTITUTIONAL HERBARIA

- Muséum National d'Histoire Naturelle (P) (Paris, France)
- New York Botanical Garden (NY) (Bronx, New York, US)

- Komarov Botanical Institute (LE) (St. Petersburg, Russia)
- Royal Botanic Gardens (K) (Kew, England, UK).

MATERIALS REQUIRED:

1. Plant specimens (local flora)

2. Cutting tools (scissors, pruning shears)
3. Plant press or newspaper
4. Drying sheets or blotting paper
5. Cardboard sheets
6. Glue or adhesive
7. Field notebook
8. Digital camera or smartphone
9. Reference books or online resources for plant identification
10. Herbarium sheets or archival paper
11. Clear plastic sleeves
12. Labels and markers
13. Computer and printer for creating labels and documentation

METHODS OF PREPARATION OF THE HERBARIUM.

- Plant materials from Pteriodphyta, Gymnosperm and Angiosperms are normally preserved as dried and pressed specimens on herbarium sheets. Infect flowers and fruits should be taken while collecting Angiosperms, because without flowers and fruits identification of plants will be difficult. We visited our nearby habitat for the collection of species and we prepared a herbarium. The step which we did to prepare herbarium are listed below:

Collection and pressing of specimens.

- We collected the specimens and pressed the collected specimens. If the specimens is large then should be pressed in "V" or "N" manner.
- If leaves and flower are crowded on the stem, then flowers and leaves can be detached and pressed on sheet in their natural arrangement.
- Different herbaria use different methods for mounting plant specimens. The sections below outline the various methods used to preserve various kinds of specimens
    - Flowering plants

- Large fruits and seeds
- Conifers
- Bryophytes, lichens and fungi
- Algae

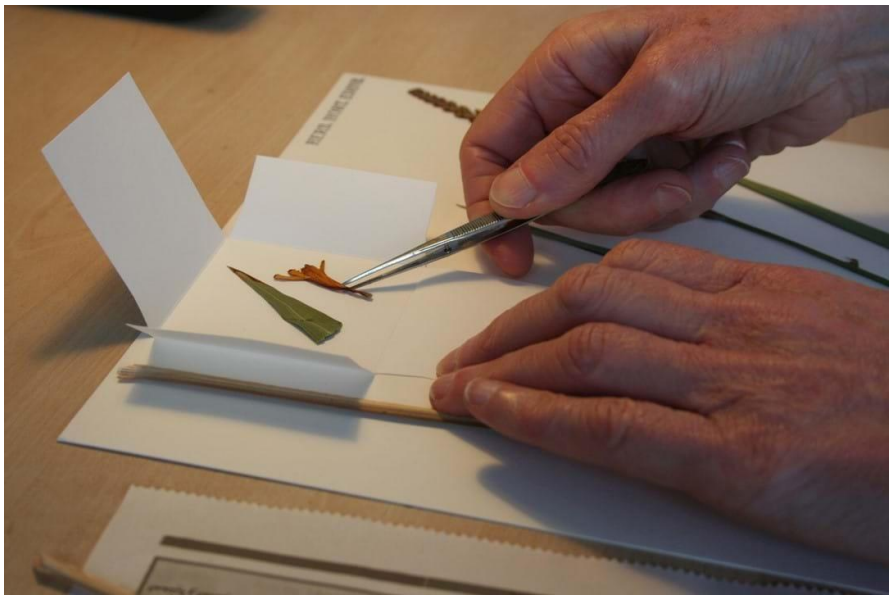
1. **Flowering plants**

- While preparing a herbarium; dried, pressed plants are glued, taped and stitched to supportive mounting boards, so they are robust enough to withstand repeated handling.
  The mounting board, label paper, capsules, tape and PVA adhesive are all archival quality. White polyester thread is used for stitching.

  THE BELOW IMAGES SHOW THE PROCESS OF MOUNTING SPECIMENTS:

ATTACHING LABEL TO HERBARIUM BOARD :

PLACING LOOSE MATERIAL IN A CAPSULE:



APPLYING GLUE TO THE MATERIAL:

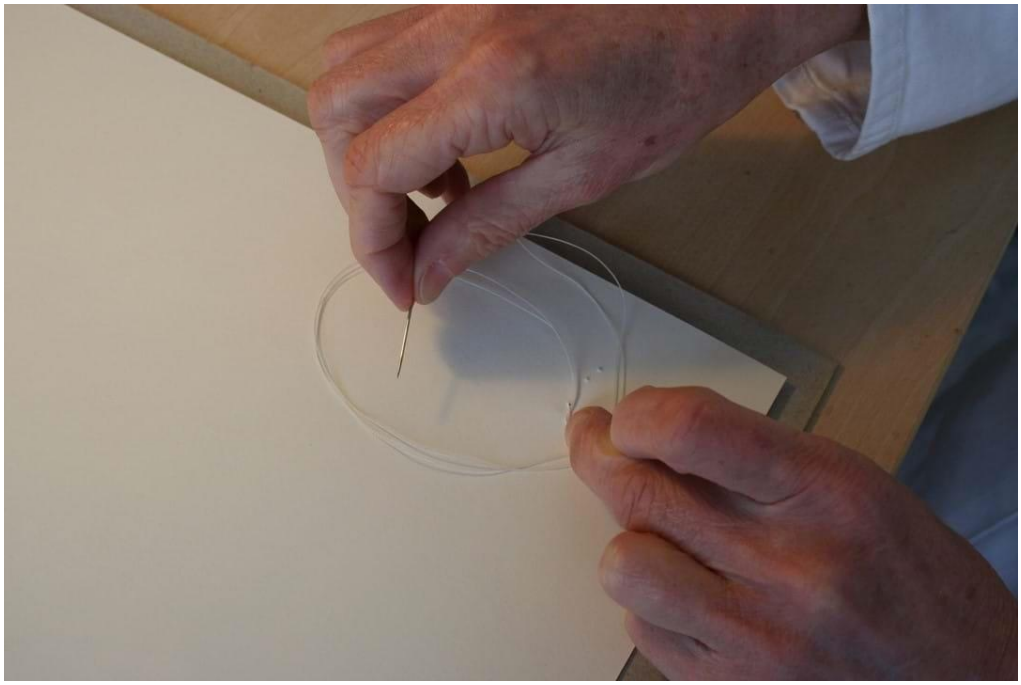
PLACING NON-STICK PAPER AND SOFT CARD OVER THE SPECIMEN

PLACING A SANDBAG ON TO THE MATERIAL TO WEIGH IT DOWN:

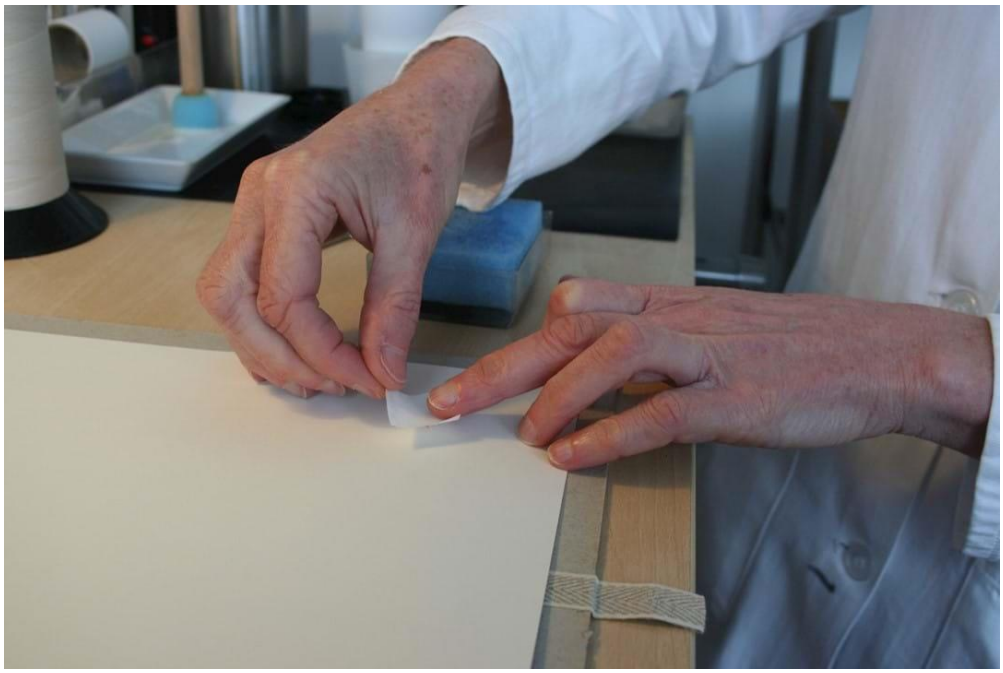
MAKING HOLES FOR STITCHING:

STITCHING THE SPECIMEN INTO POSITION:

TYING THE THREAD OFF ON THE BACK OF THE HERBARIUM BOARD:



THE KNOT IS COVERED TO PREVENT IT DAMAGING SPECIMENS BELOW:



WETTED TAPE IS APPLIED TO SUPPORT THE MATERIAL:

THE MOUNTER SIGNS AND DATES THE BACK OF THE SPECIMEN:

LARGE FRUITS AND SEEDS:

- If a plant has very bulky fruits or seeds we pack them in archival boxes for inclusion in the carpological collection.

- We can also preserve plant material in three-dimensional form in spirit preserved collection

CONIFERS

- Some conifer species (eg: Picea and Abies) quickly lose their needles when dry.
- To preserve them for mounting we soak them in alcohol … then immerse them in 50% aqueous glycerol.

BRYOPHYTES(MOSSES), LICHEN AND FUNGI

- We preserve small, friable plants like bryophytes, lichen and fungi by putting them in paper capsules mounted on herbarium sheets.

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