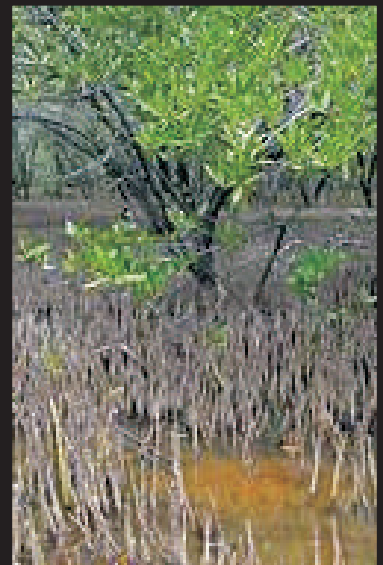


PLANTÆ VOLUME-IX



DEPARTMENT OF BOTANY
ST. XAVIERS COLLEGE
MAPUSA GOA
DECEMBER, 2020



**ST. FRANCIS XAVIER
PATRON SAINT OF THE COLLEGE**

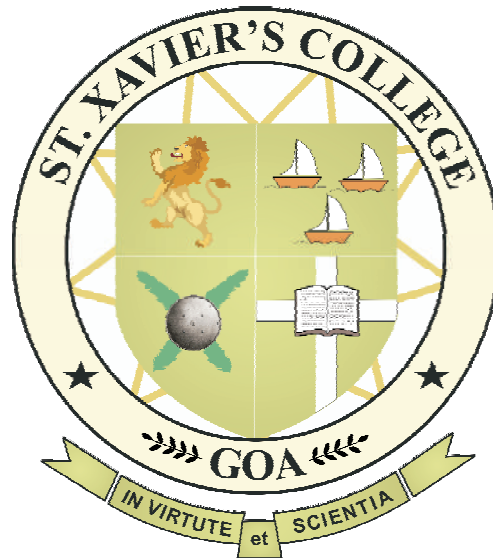


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St. Xavier's College

Mapusa – Goa



PLANTAE

Department of Botany
Newsletter

Volume IX
2019-2020

PLANTAE

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DEPARTMENT OF BOTANY

Vision

*Integral and Personal growth of students, inculcating in them,
the attitude that Nature is ours to use, not to abuse.*

Mission

*To protect and conserve Nature for a better tomorrow
and provide advisory and consultancy services.*



FROM THE EDITOR'S DESK

The Department of Botany is delighted to release the IX volume of its newsletter 'Plantae'.

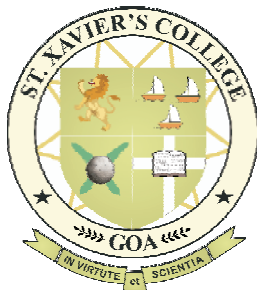
The United Nations has declared **2020 as the International Year of Plant Health (IYPH)** a momentous opportunity to celebrate the benefits of healthy plants. By protecting plant health we are protecting the benefits plants provide to all of us... to wildlife, the environment and our economy.

This newsletter comprises of interesting, informative articles concerning health of plants.

Besides articles, it also includes the reports of our departmental activities held during the academic year 2019-2020.

I sincerely thank all the contributors of this newsletter.

Dr. Maria A. D'Souza



PRINCIPAL MESSAGE

I am glad to announce the release of the IXth Newsletter 'PLANTAE' by the Department of Botany, of St. Xavier's College, Mapusa Goa.

This newsletter is a proof that the faculty and students have actively participated in various curriculum related activities outside the classroom during the academic year 2019-2020.

I take this opportunity to congratulate the Department, the teaching and non-teaching faculty, students and all those associated in bringing forth this new edition of the newsletter a forum that help them share their innovative ideas and skills.

I express my warm Greetings and Congratulations to the Editorial Team under the guidance of Dr. Maria A. D'Souza.

God Bless All Your Future Departmental Endeavours.

Prof. Blanche Mascarenhas
Principal
St. Xavier`s College. Mapusa–Goa



ADMINISTRATOR MESSAGE

I would like to start this short message quoting the Holy Father, Pope Francis: “Ecology studies the relationship between living organism and the environment in which they develop. This necessarily entails reflection and debate about the conditions required for the life and survival of the society and the honesty needed to question certain models of development and consumption. It cannot be emphasized enough how everything is interconnected.” (Encyclical letter 'Laudato Si' para 138) and in Psalm 24.1, the Psalmist says: “The earth is the Lord's and the fullness thereof, the world and those who dwell therein.”

Man is not the owner of God's creation, but a tenant. But when he presumes to be the owner, then he also begins to destroy the earth with deadly consequences. Sadly, this is a reality of our life. At the same time, it is heartening that today many countries are seriously working towards a better global environment following the Paris Agreement and prodded by such organizations like, Germanwatch, New Climate Institute (Germany) and the Climate Action Network (CAN) International.

I am happy that our students are too contributing their mite towards the protection of the environment through their newsletter 'Plantae' by disseminating knowledge about the plants and their importance. Hope that this message of the importance of the plants in our life and for the world environment catches on and everyone is motivated not only to save the trees but also plant more so that the whole creation can breathe easy.

Congratulations to the students and to the Principal, Head of the Department and the Faculty for guiding the students through various ways as reflected in this magazine.

God bless everyone.

Fr. Antonio F. Salema

Administrator

St. Xavier's College, Mapusa-Goa

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The International Year of Plant Health-2020

Plants have the unique ability of producing their own food through a process called photosynthesis. In this process, plants are able to produce macromolecules such as carbohydrates that cannot be produced by animals or humans and are consumed as food. Plants also provide fresh air. They play a critical role in achieving sustainable and competitive agriculture and forestry, protection of biodiversity and ecosystems. Therefore, keeping plants healthy is not only important – it is absolutely vital.

The achievement of healthy plants is challenging for several reasons. For one, trade and movement of goods and people, the introduction, spread and establishment of plant pests and diseases. In fact, the Food and Agriculture Organization estimated that up to forty percent of food crops are lost due to plant pests and diseases annually. This impacts the food supply of millions of people and damages agriculture. Furthermore, climate change and intensification in agricultural and forest management practices have led to the emergence of new pests and diseases, and existing ones are likely to become more severe. Adding to these challenges, people have turned to pesticides to secure yield in plant production. In doing so, there are mounting concerns over the effects of plant protection products on the environment, non-target organisms and human health.

Understanding these challenges, the European Parliament and the Council adopted Regulation (EU) 2016/2031 on protective measures against plant pests in October 2016. The new rules entered into force on 13th December of the same year, and aimed to modernize the plant health regime, enhance more effective measures for the protection of plants, ensure safe trade and mitigate the impacts of climate change on the health of crops and forests. In December 2018, the United Nations General Assembly adopted a resolution declaring 2020 as the International Year of Plant Health (IYPH). Its aim is to raise global awareness on how protecting plant health can help end hunger, reduce poverty, protect the environment and boost economic development.

According to Schlosser (1997) a plant can be regarded as healthy as long as its physiological performance, determined by its genetic potential and environmental conditions, is maintained. We all have a role to play in maintaining plant health.

Everyone needs to avoid taking plants and plant products with them when travelling across borders. Prevent the spread of pests by using only certified pest-free seeds and seedlings. Adopt environmentally friendly pest-management practices – including those based on biological approaches that do not kill pollinators and beneficial insects and organisms. Regularly monitor and report the occurrence of pests on our farms. Take advantage of modern digital technology, mobile apps and software to access information about how to prevent and manage plant pests and diseases and to report outbreaks. People in the transportation industries also need to make sure that ships, airplanes, trucks and trains don't carry plant pests and diseases into new areas.

Government can protect plant health in many ways, thus enhancing food security, protecting the environment and facilitating trade. Organizing and promoting public awareness campaigns on the importance of plant health and what everyone can do to protect plants. The Government can invest in plant protection organizations, research related to plant health, innovative practices and technologies ensure that they have adequate human and financial resources and provide incentives to private sector and farmers. The Government can strengthen monitoring and early warning systems to protect plants and plant health.

Hence we along with the Government can work together to promote and maintain plant health and in turn acquiring sustainable agriculture and forestry, protect our biodiversity and ecosystems.

Dr. Wendy Francisca Xavier Martins
Associate Professor

Source: <http://www.fao.org/plant-health-2020/take-action/en/>
<http://www.fao.org/plant-health-2020/about/en/>

TALKING TREES

Give us some sunshine, give us some water.
And we promise you will give oxygen and for others.
There flows breeze because earth have trees!
If we all die you'll be freezed,
We help you respire and you are making us expire.
Stop doing these unfair, rather you'll be no-where.

Vaishnavi L. Dhuri
F.Y.B.Sc.



OLD AGE PRACTICES TO PROTECT PLANTS

Domestication of plants and animals was probably the most significant event in the history of human kind. As a result of this important event, many breakthroughs such as the invention of soil conditioning tools and planting procedures came into existence. This was the turning point in the history of humans, as agriculture replaced hunting and food collection from the purview of human activity.

It is believed that the first organised agriculture developed in West Asia. After the beginning of agriculture, humans had to worry about the protection of plants. It began when humans attempted to understand ailments affecting crops. Bacteria, fungi, viruses, insects and nematodes must have affected plants for millennia.

Plants are the source of the air we breathe and most of the food we eat, yet how to keep them healthy is often ignored. This can have devastating results: the Food and Agriculture Organization of the United Nations estimates that up to 40 per cent of food crops are lost due to plant pests and diseases annually. This leaves millions of people without enough food to eat and seriously damages agriculture — the primary source of income for rural poor communities. For these and more reasons, 2020 has been named the International Year of Plant Health by the United Nations General Assembly.

As far as the Indian subcontinent is concerned, there are some valuable documents available which contain some information on man's efforts to protect his crops. The earliest references are found in the Vedas: Rigveda and Atharvaveda.

Protection/Treatment Practices

Kautilya's Arthashastra was probably the oldest document, which described the use of organic materials to control the crop disorders. Varahamihira mentioned the use of milk, ghee, and cow dung for dressing the seeds and smoking them by burning animal flesh or turmeric before sowing. Surpala mentioned various plant protection practices, some of which are as follows:

1. Sprinkling kunapa (liquid manure prepared from parts of carcasses) on trees suffering from imbalance of vata.
2. Fumigation (smoking) by burning animal fat, ghee, hemp, horse hair and cow's horn, also for vata.
3. Sprinkling a decoction made out of panchamula (roots of *Clerodendrum phlomidis*, *Aegle marmelos*, *Stereospermum suaveolens*, *Gmelina arborea* and *Oroxylum indicum*) for Kapha type of disorders.
4. Drenching tree base by decoction of milk, honey, licorice and *Madhuca indica* for pitta type of disorders.
5. Drenching tree base with decoction of triphala (dried fruits of *Terminalia chebula*), ghee and honey; also for pitta type of disorders.
6. Dressing tree wounds with a paste made from the barks of banyan and cluster fig trees, cow dung, honey, mustard, and ghee.
7. Applying paste of vidanga (*Embelia ribes*) and thick mud.

All the plant species mentioned above in these practices have biocidal properties. Honey, mustard and licorice also possess antimicrobial properties and cow dung mixed with urine also shows some medicinal properties. Even today, cow urine has been successfully used as a pesticide for growing Safed Musli (*Chlorophytum borivillanum*).

Use of cow dung for smearing the cuttings of fig before planting is mentioned in Dara Shikoh's documents. Some interesting practices are mentioned in a 19th century document from Rajasthan, which are described in brief as follows:

1. Use of foliar and soil applications of oil to trees to protect from frost and termites.
2. Sprinkling of curd (9L) mixed with asafoetida (112g) on trees to prevent powdery mildew.
3. Use of *Embelia ribes* mixed with curd every 10 days to protect canker of orange.

Milk and ghee have been used for centuries. Milk also has been used for controlling powdery mildews. Some other materials mentioned were animal fat, ash, brick powder, buffalo horn, cow horn, crab shells, fish meal, honey, horse hair, lotus mud, marrow etc. All these materials were recommended to control tree disorders. Some plant species like *Acorus calamus*, *Oroxylum indicum*, *Solanum indicum*, *Piper nigrum*, *Embelia ribes* etc. were also considered useful.

We should be proud of the fact that this knowledge base existed in India about 1000 years ago. There are many opportunities to research our past technologies in agriculture. The basic prerequisite is a genuine respect for the wisdom of our ancestors.

Source: Nene, Y.L. 2003. Crop Diseases Management Practices in Ancient, Medieval, and Pre-Modern India. Asian Agri-History 7(3):185-201.

Ms. Smruti Pathak
Assistant Professor



MANGROVES



In this contemporary world, with increase in pollution, change in migratory patterns and rise in human population ecosystems are in danger. Human beings are dependent on the ecosystem for their physical and economic welfare. The biotic components (such as plants, animals, microbes) and abiotic components (such as weather, sun, soil, climate and atmosphere) are interdependent and interact as a system forming an ecosystem. Mangrove ecosystems are found in deltas,

deltic lagoons, lagoons or estuaries. Each one of us must have come across the word “mangroves”. But do we really know what are mangroves and the various benefits they provide us?

Mangroves are facultative halophytes which are woody in nature. They require brackish water for survival and have unique adaptations to stand against the harsh conditions of the coastal environment. There are 2 types of mangroves: True Mangroves and Mangrove Associates. True mangroves are considered to be true halophytes showing a high degree of salt tolerance, whereas, Mangrove associates are glycophytes with certain salt tolerance. These are further categorized into Red mangroves *Rhizophora mangle*, Black mangroves *Avicennia germinans* and White mangroves *Laguncularia racemosa* also known as the “Walking Tree”. They provide shelter for various endangered species and host many species of fish, crabs, oysters, clams, prawns and mullets.

They are a source of food as well as medicinal resources. *Acanthus illicifolius* contains bioactive compounds used as antiseptics. The extracts from the leaves are used for dressing wounds. The roots and stem of *Derris heterophylla* contain a weak poison for narcotizing fishes. Leaves extracts of *Brugueira gymnorhiza* are effective in reducing cholesterol. The spine of the Ray fish assists in child delivery. The whale shark is the largest fish which cures liver and lung cancer. Squids which are rich in amino acids cure blood vessel diseases. Tuna fish is rich in omega 3 which aids in brain development and increases the life span.

Mangroves area source of forestry resources such as timber which could be used for building and firewood as fuel. They protect the shorelines from damaging storms, tides and cyclones. They also help to prevent erosion by stabilizing sediments. They are highly productive areas and prevent the development of acid sulphate soil. They reduce the greenhouse effect as they are known to remove the carbon dioxide from the atmosphere and have the capability to accumulate and store carbon in large quantities in the soil.

However, over the year's mangrove forests are being depleted at an alarming rate due to human activities. Almost all over the globe, mangrove forests are being cut down for construction of roads, commercial industries, hotels, residential areas etc. Most importantly, the practice of shrimp aquaculture has resulted in a loss of 50% of the world's mangroves. In countries like Ecuador, Thailand and Vietnam, there has been 50% destruction. With 33800 hectares lost due to shrimp aquaculture in the Philippines. Few countries such as Australia and the United States have protected it.

Similarly, India been exposed to mangrove depletion to some extent. Almost 40% mangrove forests have been lost between 1975 and 1981 i.e. 7000 hectares. Sunderbans has one of

the world's largest mangrove ecosystems used for agriculture. Andaman and Nicobar Islands has lost 22400 hectares between 1987 and 1997. Mumbai which consisted of 7 islands of mangrove forests was cleared for the construction of bridges, houses, infrastructure and airports. Goa has also been affected. The area in Panjim near Pato has been destroyed in order to build up government and private offices. Mangroves are cleared along the Panjim-Bambolim strip for the construction of roads. In Mandovi and Zuari river, there are dominant species such as *Avicennia* and sparsely occurring species such as *Sonneratia alba*.

Mangroves are vital for ecological balance but the extent at which mangrove forests are being cut down, people with livelihoods such as fishing losing their jobs, air pollution resulting in health hazards, water pollution killing aquatic animals, emission of carbon in the atmosphere and several other devastating consequences. It is important to give back to Mother Earth, what we have received from her. It is vital to stand up as activists for the protection of our mangrove forests despite not being encouraged to go into this field.

Joencia Mercy De Souza
F.Y.BA GE Botany



Love a Cactus

Not everyone likes me
I proclaim my living
With a bleeding touch

I live in a desert
I am least attractive
Dull, prickly and plain

Without any care upon the sand
With water saved in my spiny stem
I take care of myself

Poets have abandoned my desert
And gone back to beautiful garden
Only camels remain here and
Merchants trample my flowers to dust

I am made of thorns but
still managing to grow flowers
I am a **Cactus**
Won't you take me home?



Ms. Nicole Fonseca
F.Y. B. Sc.

The Beauty of God's Design



Human lungs and Tree branch with leaves Tree stump and human fingerprint
Courtesy: www.lauraknapikbohn.com

I love these pictures of leaves and lungs; the tree trunk and human fingerprint so much so that it has fascinated me to such an extent that I've decided to share with you all.

The tree of life concept is pretty simple and straightforward. It is a visual metaphor in which a tree represents your life and the various elements that make it up—past, present, and future. The true meaning of life is to plant trees under whose shade you do not expect to sit. Philosophers and poets have made fine use of the tree as a topic and analogy over the ages. In 1914 Joyce Kilmer wrote a lovely poem, of which I present the opening and closing lines:

*I think that I shall never see
A poem lovely as a tree ...
.....
... Poems are written by fools like me,
But only God can make a tree.*

This is all wonderful in its own right, but what has always fascinated me is the similarity between the physical make-up of trees and the anatomical structure of human lungs: both are composed of a central trunk or trachea, which divides into increasingly smaller branches, before terminating in effector structures that are ideally suited to gas exchange across their surfaces (leaves or alveoli). This conservation of a structural pattern or motif across nature is not unique, and highlights the underlying connectivity between apparently disparate organisms from entirely different realms. The deceptively simple exchange of oxygen for carbon dioxide in the alveoli represents one of the most powerful physiological processes in our bodies, and without this exchange we would die within minutes; similarly, trees provide us with this oxygen and utilize our carbon dioxide waste in order to do so. The beautiful flow and synchronicity of this inter-relationship goes completely unnoticed for the most part, but it is the foundation of all existence

and deserves our recognition and appreciation... for gas exchange! The leaves of a tree act the same as bronchioles from the respiratory system. The leaves just like bronchioles absorb oxygen and release carbon dioxide. So, this article focuses on gas exchange in the lungs, but also touches on their structural similarity to trees, and how design and function are conserved across nature.

As the United Nations has declared 2020 as the International Year of Plant Health (IYPH), understanding your plants health status isn't the easiest thing to do. Sure, you can use the “eye test”, and a number of foliar contact and direct measurement techniques. It's important to understand that every aspect of the tree analogy is really just a teaching tool. Don't get to caught up in the way that branches and trunks literally behave. But, the trunk cannot bear fruit without the rest of the tree. In honour of trees and those who plant, maintain, study, protect, renew and make art about trees, this article will shed some light and you may find yourself identifying locating and growing more trees.

*We breathe in what trees breathe out & they breathe in what we breathe out.
Forever overwhelmed by the beauty of God's Design !!!*

Source: Trees, an analogy for life and living, By Carolyn Larson, 2009 Special to The Garden Island

Dr. Maria A. D'Souza
Assistant Professor

Baobab Tree, “Tree of Life”



Habit – Baobab tree

Adansonia is a genus of eight species of medium to large deciduous trees known as baobabs. Earlier they were classified within the family Bombacaceae and now placed in the Malvaceae. They are native to Madagascar. Trees have also been introduced to other regions such as Asia. Baobabs are long-lived deciduous, small to large trees with broad trunks and compact crowns.

It is hard not to notice the Baobab tree. It is unlike any other tree on the planet, with its oversized trunks and claw-like branches. It should come as no surprise that the odd-looking tree is native to Madagascar. After all, the island is home to weird creatures. Young trees usually have slender, tapering trunks, often with a swollen base. The trunk is made of fibrous wood arranged in concentric rings. Tree diameter fluctuates with rainfall so it is thought that water may be stored in the trunk. Baobab trees have two types of shoots – long, green vegetative ones, and stout, woody reproductive ones. The Baobab has adapted to its environment. It is a succulent, which means that during the rainy season it absorbs and stores water in its vast trunk, enabling it to produce a nutrient-dense fruit in the dry season when all around is dry and arid. This is how it became known as "The Tree of Life". The Baobab tree is as useful as it is unique.

The Baobab tree is also known as the "upside down tree", a name that originates from several myths. They are known as upside down trees because their branches look like roots. Flowers are born near the tips of reproductive shoots, in the axils of the leaves. There is usually only a single flower in an axil, but sometimes flowers occur in pairs. They are large, showy and strongly scented. They only open near dusk. Opening is rapid and movement of the flower parts is fast enough to be visible.

Most *Adansonia* species are pollinated by bats. Flowers may remain attached to the trees for several days, but the reproductive phase is very short, with pollen shed during the first night and stigmas shrivelled by the morning. They are among the most long-lived of vascular plants and have large flowers that are reproductive for a maximum of 15 hours. Its fruit is used as a medicine as it is a good source of vitamin C, potassium, carbohydrates, and phosphorus. Bats pollinate the Baobab trees. Bat populations are responsible for the pollination of the Baobab trees. The bats swarm the trees at night when the blossoms are in bloom, during the Southern Hemisphere's summer months of October, November, and December. The flowers of the Baobab tree are large and white. They open in the late afternoon and remain open all night, awaiting the bats. At first, the blossoms are sweet smelling, but as they age, they produce the smell of rotting meat.

The fruit of the baobab is one of their distinguishing features. The flowers open around dusk; opening so quickly that movement can be detected by the naked eye and are faded by the next morning. The fruits are large, oval to round and berry-like and hold kidney-shaped seeds in a dry, pulpy matrix.

The dried fruit powder of *Adonsonia digitata* baobab powder, contains about 11% water, 80% carbohydrates (50% fibre), and modest levels of various nutrients such as riboflavin, calcium, magnesium, potassium, iron and phytosterols with low levels of fats.

In Goa state only two species are recorded one in Quepem and other in Morjim. In Konkani it is called as “Gorakchinch”. Boabab tree is oldest known angiosperm tree, Carbon -14 dating places the age of specimen of African baobab tree in Nambia as 1275 years. Climate change is wiping out the Tree of life (scientific wonder), once capable of living for thousands of years, but now becoming endangered species. Yet this highly important species is threatened with extinction, due to climate change and anthropogenic pressure. Some species may not survive the next century.

Dr. James D'Souza
Assistant Professor

MANGROVE PLANT:

Avicennia marina (Forssk.) Vierh.

Mangrove ecosystem is one of the most fascinating, amazing and productive ecosystem ever known. This ecosystem has varieties of different species of flora and fauna which play a very important role and are of utmost importance. One such mangrove plant is *Avicennia marina*.



Habit - *Avicennia marina*



Salt crystals on leaf



Pneumatophores

This plant or the mangrove in general shows various adaptations which are important for their survival as they tolerate very stressful conditions like high temperature, high salinity, pH, flood conditions and low oxygen content. The leaves of *Avicennia marina* are arranged in such a manner that they are not exposed to sunlight to prevent water loss. The leaves are equipped with salt excreting glands which is a unique adaptation that helps in excreting salt crystals. It has pointed roots which emerge out of the ground which are referred to as pneumatophores. These roots have fine pores which help them for exchange of gases and often referred to as breathing roots. This adaptation is very important since mangroves ecosystem has low oxygen content.

When its fruits mature completely, it detaches from the parent plant and falls down. It gets carried away due to the water currents and once it comes in contact with the brackish water it starts germinating. Its germinating period is very slow and takes around 30-40 days.

It is commonly used by the local people due to its medicinal properties. The stem is used in making huts, houses as it is very hard and durable. Mangrove ecosystem provides a suitable habitat for many other microorganisms helps in crab breeding, fishes and thus considered as one of the most productive ecosystem.

Shivdutt Tulsidas Gupta
F.Y.B.Sc. GE Botany

Basella alba L.

Kingdom: Plantae
Order: Caryophyllales
Family: Basellaceae
Genus: *Basella*
Species: *alba*



Basella alba

Basella alba is an edible perennial vine and commonly known as Malabar spinach, vine spinach, Indian spinach and Ceylon spinach. In Goa, the vernacular name for this nutritious leafy vegetable is 'Valchi bhaji'/'Vauchi bhaji' in Konkani. It is native to the Indian subcontinent, Southeast Asia and New Guinea. It is widely used as a leaf vegetable in tropical Asia and Africa. It is naturalized in China, tropical Africa, Brazil, Belize, Colombia, the West Indies, Fiji and French Polynesia.

Description of the Plant

Basella alba is a soft-stemmed, fast-growing vine, reaching 10 metres in length. Its thick, semi-succulent, heart-shaped leaves have a mild flavour and mucilaginous texture. It is rich in vitamins A and C, iron and calcium. It also contains certain phenolic phytochemicals and it has antioxidant properties.

There are two varieties *i.e* is green and red. The stem of the *Basella alba* is green with green leaves and the stem of the cultivar *Basella alba* 'Rubra' is reddish-purple; the leaves form green and as the plant reaches maturity, older leaves will develop a purple pigment starting at the base of the leaf and work towards the end. The stem when crushed usually emits a strong scent.

Requirements for the plant growth (Soil and climate)

The plant is native to tropical Asia. *Basella alba* grows well under full sunlight in hot, humid climates and in areas lower than 500 above sea level. Under low temperature it grows slowly resulting in low yields. It grows best in sandy loam soils rich in organic matter with pH ranging from 5.5 to 8.0. Flowering is induced during the short-day months of the year.

Uses of *Basella alba*

1. In the Western Ghats in Maharashtra, India, it is used to make vegetables. It is also known as daento or valchibhaji in Konkani. A common Mangalorean dish is "Valchibhaji and shrimp - curry". In Goa it is also relished in soups.

2. In the Philippines, the leaves of this vegetable are one of the main ingredients in an all-vegetable dish called utan that is served over rice. It is usually cooked with sardines, onions, garlic, and parsley.
3. In Mangalorean Tuluva cuisine, a coconut based gravy called gassi is paired with the Basella plant, making a delicacy called Basalegassi to be eaten with rice dumplings called pundi soaked overnight in the gravy or with red rice.
4. Some variations have tiny prawns, clams, horsegram or dried fish in the gravy as well.
5. Beary Muslims of coastal Karnataka prepare Basaledekunhipindi (small rice dumplings smeared in gravy prepared from Malabar spinach and dried tuna).
6. In Tamil it is called pasalakeerai.
7. In Bengali cuisine it is widely used both in a vegetable dish, cooked with red pumpkin, and in non-vegetarian dishes, cooked with the bones of the Ilish fish and may also be cooked with shrimps.
8. In Andhra Pradesh, a southern state in India, a curry of Basella and Yam is made popularly known as Kanda Bachali Koorra (yam and Basella curry). It's also used to make the snack item bachali koorra bajji.
9. In Odisha and West Bengal, it is used to make curries and saaga.
10. In Gujarat, fresh big and tender leaves are washed, dipped in besan mix and deep-fried to make crispy pakodas, popularly called "poi nabhajia".
11. The vegetable is used in Chinese cuisine. It has many names including flowing water vegetable. It is often used in stir-fries and soups.
12. In Vietnam, where it is called *môngtoi*, it is cooked with shrimp, crab meat, luffa and jute to make soup.
13. In Africa, the mucilaginous cooked shoots are most commonly used.
14. In china the red variety of *Basella alba* is used to make red dye.

References: https://en.wikipedia.org/wiki/Basella_alba

Dr. Seema D. Fernandes
Assistant Professor

PLANTS: SOURCE AND SAVIOUR OF HUMANS

There comes a proud shoot
Out of the brown cover
To grow into a huge success,
To satisfy the greed of humanity.

A home to the chirping
A nest to the flying
A business to that man
A source of food to this hum-animal.

Branches spread like a fearless bird
Crown still below the deep blue sky
O why o why o men
Can't humanity be a part of your proud life

The leaves swaying like an unfurled flag
To the direction of calmness and peace
Look up O men to that flag so high
Drop down your weapons and go embrace.

Firmly rooted in the ground to eternity
The soil it's grown and nurtured in
Then why O men do you forget the value and ethics.
You've been taught and showered with.

Glimmering with endless beauty
Millions of individuals live in harmony
Come on men let's keep aside our differences
And unite on the basis of humanity.



Jovita Rodrigues
F.Y.B. Sc. GE Botany



DEPARTMENTAL ACTIVITIES 2019-2020

‘KNOW YOUR PLANT’ 2019-2020

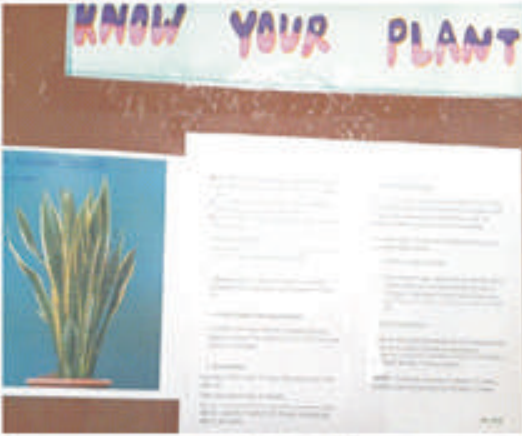
Departmental activity “Know Your Plant” was organised from December 2019 to March 2020. Dr. Seema D. Fernandes was the teacher in charge for the activity along with T.Y.B.Sc. Botany students coordinated the display of ten plants of medicinal, economical, ecological and commercial importance. The plant was displayed outside the department with the information and kept for a week for the other students and teachers who took a keen interest and was appreciated by all.

About ten plants were displayed in all which are listed below.

Sr. No.	Name of the Plant	Family	Common/Vernacular name	Name of the students displayed the plants
1.	<i>Sansevieria trifasciata</i> Prain	Asparagaceae	Snake plant, Mother-in-laws tongue	Mr. Shubham Barde
2.	<i>Aloe vera</i> (L.)Burm.f.	Liliaceae	Aloe, Katkuvor	Ms. Crisann Braganca
3.	<i>Ficus elastica</i> Roxb. ex Hornem.	Moraceae	Rabracho Vad	Ms. Bhavana Bichanna
4.	<i>Chlorophytum comosum</i> (Thunb.)Jacques	Asparagaceae	Spider plant, Ribbon plant	Ms. Lenora Vas
5.	<i>Basella alba</i> L.	Basellaceae	Indian spinach, Vauchi bhaji	Mr. Jolwyn Dias
6.	<i>Tradescantia zebrine</i> (Schinz) D.R.Hunt	Commelinaceae	Inch plant, Wandering Jew	Ms. Patricia Fernandes
7.	<i>Hydrangea</i> sp.	Hydrangeaceae	Hydrangea, pH plant	Ms. Nikita Gupta
8.	<i>Philodendron ceylon</i> Schott.	Araceae	Ceylon gold, Golden emerald	Ms. Saloni Naik
9.	<i>Cissus quadrangularis</i> L.	Vitaceae	Veld grape, Hadjod	Ms. Nita Kinlekar
10.	<i>Murraya koenigii</i> (L.)Sprengel	Rutaceae	Curry leaves Kar vel	Ms. Asmita Simepurushkar

Department of Botany Know Your Plant

KNOW YOUR PLANT



Sansevieria trifasciata
 Common Name: Snake plant, Mother-in-law's tongue
 Family: *Xanthoxycaceae*
 Origin: West Indies
 Growth Habit: Upright, clump-forming
 Leaves: Thick, sword-shaped, pointed tips, dark green with yellow-green longitudinal stripes
 Flowers: Small, white, tubular, arranged in a terminal raceme
 Uses: Ornamental indoor plant, air purifier
 Care: Well-draining soil, indirect light, drought tolerant




Aloe barbadensis
 Common Name: Aloe vera
 Family: *Xanthoxycaceae*
 Origin: Barbados
 Growth Habit: Upright, clump-forming
 Leaves: Thick, lanceolate, pointed tips, green with a clear gel inside
 Flowers: Small, yellow, tubular
 Uses: Medicinal, ornamental
 Care: Well-draining soil, indirect light, drought tolerant



Philodendron
 Common Name: Philodendron
 Family: *Marantaceae*
 Origin: Central America
 Growth Habit: Climbing or trailing
 Leaves: Large, heart-shaped, dark green
 Flowers: Small, white, tubular
 Uses: Ornamental indoor plant
 Care: Well-draining soil, indirect light, high humidity




Sansevieria
 Common Name: Snake plant
 Family: *Xanthoxycaceae*
 Origin: West Indies
 Growth Habit: Upright, clump-forming
 Leaves: Thick, sword-shaped, pointed tips, dark green with yellow-green longitudinal stripes
 Flowers: Small, white, tubular
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Dr. Seema D. Fernandes

CERTIFICATE COURSE 'CULTIVATION OF MUSHROOMS'

The students of F.Y.B.Sc. Botany were taught to cultivate mushrooms. The resource person was Ms. Sabina Sales e Dias and she was also assisted by Dr. Seema D. Fernandes. The entire class was divided into groups according to their practical batches and it was done on 19th September 2019 (43 students), 20th September 2019 (33 students) and 21st September 2019 (52 students) at 2.00 pm.

The inoculum (Spawn of Oyster mushroom) was procured earlier from Ella farm, Old Goa and the students had also prepared more spawn using jowar grains. They were first briefed on the technique of cultivation of Oyster mushroom (*Pleurotus sajorcaju*). The paddy straw was cut into pieces and soaked in hot water by the lab attendants. The students then filled the bags with the straw and the spawn. The bags were tied and kept for spawn running in the laboratory. After a week the students observed the bag and saw the growth of the mycelium. The bags were then opened and removed. It was watered everyday and kept for the growth of mushrooms. After a week small pinhead sized fruiting bodies were seen in various stages which then grew into large oyster shaped mushrooms. The report was compiled by Ms. Sabina Sales e Dias, Head of the Department of Botany.

Ms. Sabina Sales e Dias
Associate Professor
Head, Department of Botany



Course on Mushroom Cultivation

REPORT OF T.Y.B.SC. FIELD VISIT TO JOGGER'S PARK

As part of the curriculum of T.Y.B.Sc. paper BOD103: Economic and Medicinal Botany, a field trip was organized to Jogger's Park Altinho, Panjim on 4th October 2019 from 11:15 am to 1:00 pm. The total number of students were 12 accompanied by Ms. Emma Fernandes, Assistant Professor in Botany. The objective of this field trip was to identify and study medicinal uses of locally available plants. The students observed various medicinal plants and recorded them in their field note book.



Field visit of T.Y.B.Sc. Botany Students to Jogger's Park, Altinho

Ms. Emma Fernandes
Assistant Professor

REPORT OF T.Y.B.SC. FIELD VISIT TO CAMURLIM

On 10th October 2019 students of T.Y.B.Sc Botany along with teacher Dr. Harshala Gad visited Camurlim village hill. On the way up the hill we all walked through the forest vegetation to study morphological features of the following plants *Abelmoschus sp.*, *Abrus precatorius*, *Anarcadium occidentale*, *Arundinella tuberculata*, *Bridelia stipularis*, *Calycopteris floribunda*, *Carea arborea*, *Caryota urens*, *Cheilocostus speciosus*, *Clerodendrum myricoides*, *Corchorus olitorius*, *Eragrostis uniloides*, *Eriocaulon sp.*, *Gloriossa superba*, *Grewia sp.*, *Habenaria marginata*, *Hyptis sp.*, *Holarrhena pubescens*, *Indigofera sp.*, *Ixora coccinea*, *Mangifera indica*, *Microcus paniculata*, *Mimosops elengi*, *Senecio sp.*, *Smilax zeylanica*, *Smithia sp.*, *Stachytarpheta sp.*, *Strychnos nux-vomica*, *Syzygium cuminii*, *Tectona grandis*, *Xylia xylocarpa*, *Zanthoxylum rhetsa*, *Ziziphus mauritiana*, *Ziziphus rugosa*, *Ziziphus xylopyru*. The experience of walking though the vegetation and studying the plants in their natural habitat was enriching one for the students.



Field visit of T.Y.B.Sc. Botany Students to Camurlim.

Dr. Harshala Gad
Assistant Professor

CERTIFICATE COURSE ON 'HOMEMADE HERBAL PRODUCTS'

The Botany Department of St. Xavier's College organised a seven-day (30 hrs) certificate course on "Homemade Herbal Products". The convenor of the course was Ms. Sabina M. Sales e Dias, Head of the Department of Botany and was also the resource person along with Dr. Suraksha Dongrekar, the course coordinator. This course was designed for students to impart knowledge on the various uses of herbs. It is a practical course which offers hands on training on various techniques of preparing herbal soaps, making herbal teas, herbal oils, natural food colours, henna for hair and face packs from naturally available plant materials. Fourteen students from S.Y.B.Sc. registered for the course which was held from 9.00 a.m. to 1.30 p.m. and the course fee of Rs. 200 was charged.

On the first day *i.e.*, 1st November 2019 students were taught to make two types of soaps *i.e.* Orange and Lemon Zest soaps. A detailed power point presentation on "How to make Herbal Soaps at home" was conducted by Dr. Suraksha Dongrekar. Citrus fruits are rich source of vitamin C and antioxidants. When these ingredients are used in making soaps it help to moisturize the skin and also provides free radical fighting antioxidant vitamin C, which helps keep skin even-toned and helps boost the body's immune system. Orange zest, lemon zest and Lemon essential oil were added to melted soap base and poured into greased soap moulds. After solidifying it was removed from the mould.

On 2nd November 2019, another two types of soaps using Rose as main ingredient were prepared. Rose Ultra clear soap and De-tan Multani Mitti soap. This soap actually removes the tan and gives radiant glow to the skin.

On the third day *i.e.*, 3rd November 2019 the students were taught to prepare Natural Herbal Hair Oil by Dr. Suraksha Dongrekar. Ingredients that were used were Curry leaves, *Hibiscus* leaves (Red wild variety), *Hibiscus* flowers (Red wild variety), Tulsi leaves (Basil broader leaves), Neem leaves, Henna leaves, *Aloe vera* pulp along with juice of Bottle gourd, Lemon juice and Amla juice. Pure Coconut oil was used as the base.

On 4th November 2020 another type of oil called Onion hair oil, was prepared by the students. The method of preparation was given by Dr Suraksha Dongrekar.

On the fifth day *i.e.*, 5th November, 2019 Dr Suraksha Dongrekar started with a lecture session on face packs and scrubs. Two types of herbal face packs were prepared by the students. First one was *Aloe vera* pack for tan removal. In this ingredients used were fresh *Aloe vera* gel, lemon juice and rose water. The second face pack was Turmeric face pack for skin lightening. The ingredients used were gram flour (besan), turmeric powder and rose water.

The second session was continued by Ms. Sabina Sales e Dias. She explained about preparation of Henna for hair and gave a detailed explanation on the benefits of natural ingredients used rather than using synthetic hair colours. Two methods of preparation were taught to the students using dried Henna leaves, Beetroot juice, Amla, *Hibiscus*, Methi powder, Tea decoction and egg white.

On 6th November 2019 Ms. Sabina Sales e Dias gave a detailed power point presentation of making natural food colours from different kinds of vegetables like Beetroot, Carrot, Spinach leaves, red cabbage and powder of Bixa seeds. All together 8 different food colours were prepared green, yellow, orange, blue, purple, light pink and dark orange and magenta pink. These colours

can be used for cake icings and other sweet dishes and are safer than the synthetic food colours which are made from chemicals. The students enjoyed preparing the colours.

On the last day i.e., 8th November 2019, herbal teas were prepared. Detailed explanation of different type of teas such as herbal tea, Honey lemon Ginger tea, Turmeric tea, Ginger tea with spices and lemon basil iced tea was given by Ms. Sabina Sales e Dias. The benefits of all the ingredients like turmeric, basil, lemon grass etc. was also explained. Two different types of teas were prepared by the students, herbal tea and ginger tea with spices.

Participant feedback forms with a 10-point assessment criteria of the resource persons showing rating quality and point value from 4 to 1, representing 4-Excellent, 3-Good 2-Satisfactory and 1-not adequate respectively were duly filled by the participants. Unit 1 (Herbal soaps, herbal hair oils, herbal face packs and scrubs) conducted by Dr Suraksha Dongrekar and Unit 2 (Herbal teas, natural food colours, henna for hair) by Ms. Sabina Sales e Dias. 96% said it was excellent for both the resource persons.

The students gained a lot of knowledge and also appreciated and enjoyed the course very much.

Dr. Surakhsha Dongrekar
Assistant Professor



Course on Homemade Herbal products

'INTERNSHIP PROGRAMME' FOR S.Y.B.SC. STUDENTS'

An internship programme for the students of S.Y.B.Sc. (Botany) of St. Xavier's college, Mapusa was organised by the Head of the Botany Department Ms. Sabina M. Sales e Dias at Zonal Agricultural Office Dhuler, Mapusa. Eighteen students attended the same. The Zonal Agricultural Officer Mr R.S. Joshi chalked out a five day programme on Entrepreneurship Skill Development Internship along with the other Assistant Agricultural Officers from 18th November to 22nd November 2019 from 9:00 am to 12:00 pm.

On the first day, 18th November 2019 was the inaugural programme at 9:00 a.m. The Zonal Agriculture Officer, Mr. R.S. Joshi, welcomed the students and briefed them about the various aspects which will be dealt with. Ms. Sabina Sales e Dias, head department of Botany proposed the vote of thanks.

There was a pre-evaluation test at 9:30 am, followed by a lecture on 'Scope of Agriculture and Entrepreneurship in Agriculture' by Mr. Sohan Uskaikar, Assistant Agricultural Officer. The students were later taken around the farm by Mr. Gautam Asnodkar and Mrs. Ashweta Khanbal. The students saw the different types of fruit trees, spices, ornamental plants and some commonly propagated crops. Their medicinal and commercial importance was explained to the students.

On 19th November 2019, a presentation on the topic "Vegetable Cultivation" and their important facts were presented by Assistant Agricultural officer Mrs. Ashweta Khanbal. The talk enlightened the students on some simple yet crucial steps involved in cultivation of vegetables that are consumed on daily basis. Later there was a talk on pest and diseases which mainly affected the crops. Students were taught how to sow seeds and were given seed sowing trays that they filled with compost mixed with coco peat. They also sowed broccoli seeds in it.

On 20th November 2020, Mrs. Santoshi Achrekar, Assistant Agricultural Officer explained about the different varieties of cashews, mangoes and coconuts grown in Goa. She spoke about how these crops hold an important place in the Goan agricultural scenario and have to be protected against pests and other disease-causing organisms, thus preventing the loss of these important crops.

The students were then shown a presentation regarding the activities the department conducts for social welfare and for the purpose of spreading awareness among people. One of these activities includes the preparation of food products from locally sourced items like jackfruits, to make chips, jams, kheer etc. The session ended by the distribution of multipurpose waste decomposer bottles to the students.

On the 4th day i.e. 21st November 2020, Mrs. Pallavi Shetye, Assistant Agricultural Officer spoke on kitchen gardening. She explained the different ways of vegetable cultivation on a small scale. She also spoke how to cultivate vegetables in pots, in tetra-packs, boxes, coconut shell, broken mugs and glasses in a creative way as aesthetics or as décor for people staying in flats. Mrs. Shetye mentioned about procuring seeds by extracting them directly from fruits or vegetables or buying them from nurseries. After the end of the session, students had one to one interaction with Mrs. Pallavi Shetye which helped the students gain insight about her experiences and knowledge in the field of agriculture. The students were also shown how to prepare different types of grafts with mango saplings and avocado. Demonstration of air layering (Gootee) was done on guava plant.

The final day of the internship i.e., 22nd November 2020, was the valedictory function at 9:0 am. The students were asked to give their feedback regarding the internship program. Three students, Ms. Samruddhi Vaigankar, Ms. Saiely Shirvankar and Mr. Mohammed Akhil gave a positive review from what they learnt and were very happy with the internship programme. Certificates were distributed to all the students. Ms. Sabina also thanked all the staff at the Zonal Agricultural Office for imparting their knowledge on Agriculture to the students. Then the students were given a talk by a farmer, with his experiences of farming what it is really like to have a profession concerned with the agricultural sector.

There was a lecture from an Apiary expert, Mr. Melvin D'Souza on a practical session on honey bee keeping i.e., Apiculture at Home. He gave information regarding the species of bees that can be domesticated, the process of how the purest honey can be obtained and how an amateur can master the technique of beekeeping in Goa. It was a fruitful programme for five days and the students were enriched and also enjoyed the internship programme. The report was compiled by Ms. Sabina Sales e Dias.

Ms. Sabina Sales e Dias
Associate Professor &
Head, Department of Botany



S.Y.B.Sc. students at the Agriculture office, Dhuler, Mapusa.



S.Y.B.Sc. students with certificates

REPORT OF T.Y.B.SC. FIELD VISIT TO SIOLIM-MARNA LAKE

The Third Year B.Sc. students of department of Botany along with Ms. Smruti Pathak and Emma Fernandes visited Siolim–Marna Lake as a part of Ecology practical on 6th January 2020.

The main aim of the visit was to study local aquatic ecosystem and to study the hydrophyte diversity present there. The lake is situated in Chauddi Waddo of Siolim Marna region. It is a beautiful place and a huge ground for ecological study. We reached the place at 10 a.m. The students carefully observed the place to study the ecosystem. The plant categories observed were as follows:

Hydrophyte diversity:

- (i) **Submerged:** *Hydrilla* commonly called water thyme is a submersed perennial herb. The plant is rooted in the bed of the water body and has long stems that branch at the surface where growth becomes horizontal and forms dense mats.
- (ii) **Free-floating:** *Azolla* (mosquito fern, duckweed fern, fairy moss and water fern) is a genus of seven species of aquatic ferns in the family Salviniaceae. *Eichhornia crassipes* commonly called as “Water hyacinth” of family Pontederiaceae. It grows and spread rapidly in freshwater. It can withstand extremes of nutrient supply, pH level, temperature, and can even grow in toxic water. *Pistia stratiotes* commonly called as “water lettuce”. It is a perennial monocotyledonous aquatic plant present, either naturally or through human introduction, in nearly all tropical and subtropical fresh waterways. *Salvinia* is a floating aquatic fern that thrives in slow-moving, nutrient-rich, warm freshwater. A rapidly growing competitive plant, it is dispersed long distances within a water body and between water bodies via animals and contaminated equipment, boats or vehicles.
- (iii) **Rooted floating:** *Nymphaea* is a genus of hardy and tender aquatic plants in the family Nymphaeaceae. The genus has a cosmopolitan distribution.
- (iv) **Rooted Amphibious:** *Marsilea* is a genus of approximately 65 species of aquatic ferns of the family Marsileaceae. These small plants are of unusual appearance and do not resemble common ferns.

Ms. Smruti Pathak
Assistant Professor



Field visit of T.Y.B.Sc. Botany Students to Siolim-Marna Lake

'VISIT OF ARDEE SCHOOL STUDENTS TO BOTANY DEPARTMENT'

The students of Ardee School from classes 09th, 10th, 11th & 12th accompanied by three teachers visited the Department of Botany, St. Xavier's College on 18th February 2020. They were first shown the 'Know your Plant' which was displayed outside the laboratory and explained by Ms. Sabina Sales e Dias. The students then saw the collection of preserved specimens of plants and animals. They were then shown the tissue culture laboratory, laminar air flow and the *Rhizobium* culture was explained by Ms. Nikita Gupta from T.Y.B.Sc. A slide of *Spirogyra* was put under the microscope and was explained by Ms. Asmita Simepurushkar. Mr. Jolwyn Dias from T.Y.B.Sc. explained the demonstration of experiment on the rate of respiration to the students. The students were happy as they got a glimpse of the department.

Ms. Sabina Sales e Dias
Associate Professor &
Head, Department of Botany.



Students of Ardee School visiting Botany Department

‘PLANT UTSAV 2020’

The Department of Botany organized the 'Plant Utsav 2020' on 29th February 2020. Various events were held and coordinated by teachers. There was a Quiz competition, four teams two from first year and two from second year were selected after the preliminary round conducted earlier, it was coordinated by Dr. Seema Fernandes. Dr. Maria A D'Souza was in charge of 'Best out of plant waste' competition. Decorative items were made by the students. 'Medicinal Plant' Poster Competition was held in the college lobby organized by Dr. Harshala Gad. Medicinal plants along with poster giving detailed information about the plant were displayed. Some plants exhibited were *Azadirachta indica* (Neem), *Andrographis paniculata* (Kirayte), *Centella asiatica* (Brahmi), *Rauvolfia serpentina* (Indian snake root), *Murraya koenigi* (curry leaf) etc.

There was an exhibition and sale of 'Herbal Products' which included herbal soaps made from rose, orange and lemon zest, coffee soap scrub, herbal hair oils of Hibiscus and Onion made by SEC students of Botany along with Dr Suraksha Dongrekar. Herbal holi colours were made from beetroot, carrots, spinach etc by third year botany students. There was a talk in the college seminar hall for the first year, second year and third year botany students. The resource person was Dr. Pradip Sarmokadam, Member Secretary of Goa State Biodiversity Board. He was also one of the judges for the medicinal plant competition. Ms. Maria Beatriz De Souza introduced the resource person to the audience. Dr. Pradip Sarmokadam delivered an informative talk on "Biodiversity and Careers in Botany". He spoke on the importance and conservation of biodiversity of Goa and also made the students aware of the various varieties of rice, chillies, kokum, window pane oysters etc and other species of fauna found in Goa. He also highlighted the various threats that are faced to the rich biodiversity due to the environmental changes. Dr Pradip then spoke on the various jobs and career opportunities that are available to students of Botany. In his inspiring talk he urged the students to work hard to become successful botanist and particularly taxonomists as there are a few taxonomists especially for identification of plant species. He emphasized that botany students should have more of practical and field knowledge. There were queries especially from the third year students which he readily answered and also invited them to the biodiversity board where they can get more information. The talk ended with the declaration of prize winners of the competition and vote of thanks delivered by Ms. Sabina Sales e Dias.

Ms. Sabina Sales e Dias
Associate Professor &
Head, Department of Botany



Plant Utsav 2020