PLANTAE

VOLUME XII
2024 -25

DEPARTMENT OF BOTANY
ST. XAVIER'S COLLEGE
MAPUSA - GOA

Cover page: *Ginkgo biloba* – living fossil

St. Xavier's College

Mapusa- Goa

PLANTAE

Department of Botany

Volume XII

2024-25

FROM THE EDITOR'S DESK

Dear Readers,

It is both an honour and a delight to present this edition of the Newsletter Plantae, a vibrant compilation of insights and creativity from the students and faculty of the Department of Botany, St. Xavier's College, Mapusa.

This issue celebrates the curiosity and dedication of our botanical community. Each contribution reflects the intellectual passion that thrives in our department. Whether you are exploring the wonders of Goa's native flora, delving into ecological conservation, or simply sharing a botanical anecdote, your voices make this newsletter a true collective effort.

A heartfelt thank you to all the contributors—your enthusiasm fuels this platform. Special gratitude to our faculty for their guidance and unwavering support.

As you flip through these pages, I hope you find inspiration in the diversity of ideas here. Let's continue to nurture our shared love for Botany, one leaf (or page!) at a time.

Happy reading!

Warm regards,

Prof. Maria A. A. R. Fonseca

Department of Botany

PRINCIPAL'S MESSAGE

I extend my warmest greetings and best wishes to all the staff members and students of the Department of Botany, on the release of another issue of your departmental newsletter. It's heartening to see the dedication and passion with which you pursue your subject. Your commitment to exploring the wonders of plant life and contributing to our understanding of the natural world is commendable.

The Department of Botany plays a vital role in our institution, and I am confident that your collective efforts will continue to yield remarkable outcomes.

I congratulate the editorial team led by Prof Maria Fonseca on the release of this issue of Plantae, Volume –XII, and I wish you all the best in your future endeavours.

Best regards,

Ursula Barreto

Principal
St. Xavier's College, Mapusa-Goa

ADMINISTRATOR'S MESSAGE

On July 7th, 2025 the Roman Catholic Church marked the tenth anniversary of the release of the much acclaimed Encyclical letter 'Laudato Si' (Praise be to you). In this encyclical letter His Holiness, late Pope Francis, stressed on the need to take care of nature, which he calls 'our common home'. To mark this occasion, the Church "unveiled a significant liturgical innovation: new Mass prayers and biblical readings for a Holy Mass 'for care for creation'". (Ref. Renovacao, Aug 1-5, 2025).

The world today is no longer speaking about environmental issues and threats, but environmental crises caused by the lack of care for the creation. Creation is a sign of God's immense love for the mankind. In deep recognition of this God's bounty, we Indians celebrate feasts like Konnsachem Fest, Onam, Sankranti, Pongal, during the celebrations of the Ganesh Chaturthi a matolli is arranged, etc. During these celebrations, the first fruits, gathered from the recent harvesting, are placed before the Divine Majesty in gratitude and acknowledgement of His steadfast and unchanging love towards us.

It is in this light that we look at the release of this Magazine 'Plantae' by the Botany Department. This department is in a much better position to bring to our attention the great role that the environment plays in our life and our sustenance. When we destroy nature, we destroy 'our common home', our inheritance, and we destroy ourselves. The only way to come out of these crises is to go back to our roots, get our hands soiled and fight for the preservation of the nature. This does mean that we should give up jobs in different establishments, or refrain from seeking employment that will ensure a better future. Even though gainfully employed, we need to give time for God's creation around our homes, at our work places, in our villages through communal actions. The greenery will ensure a peaceful and serene life, and also aid our life styles.

I wish to congratulate the Botany Department, and especially the Editorial Board of 'Plantae" for bringing out this magazine with its focus on the environment.

God bless you all.

Fr Tony Salema
Administrator

Message from Head of Department…

With great joy, the Department of Botany releases its newsletter *Plantae* XII edition. The academic year 2024-2025 has been an exciting year full of learning, research initiatives and participation in various events for both the students and teachers.

Congratulation to our third year students, for their excellent results at the University and GU ART examinations. You have made us proud. A warm welcome to the students joined our college this academic year.

This issue of *Plantae* makes known the various achievements and activities carried out by our department. I appreciate and congratulate the editor of this issue Prof. Maria Fonseca for all her efforts to gather information and highlight the events and achievements of the department. I also thank the teachers and students who have contributed various articles.

I am grateful to each faculty member of our department for their commitment and dedication in their academic work and curricular activities. A special thanks to the teaching and non-teaching staff involved in the establishment of the medicinal and kitchen garden, composting of the laboratory organic waste and preparation of plates for the nomenclature of trees in the campus especially Mr. Edwin D'Sousa, HOD of Computer Science Department and Mr. Joaquim D' Sousa.

I express my gratitude to the Administrator Fr. Antony Salema and Principal Ms. Ursula Barreto for all their support and guidance.

Dr. Wendy Francisca Xavier Martins

Associate Professor
Head of Department of Botany

DEPARTMENT OF BOTANY

Vision:

Integral and personal growth of young students, inculcating in them, the attitude that Mother

Nature is ours to use, not to abuse.

Mission

To Protect and Conserve Mother Nature for better tomorrow and provide advisory and

consultancy services.

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Tree Shyness: Nature's Social Distancing

Long before humans practiced social distancing, trees had already perfected the art. High above the forest floor, some species grow in a way that leaves delicate gaps between their branches, creating a mesmerizing patchwork of sky and leaves. This phenomenon, known as crown shyness, has puzzled and fascinated scientists for over a century.

When you gaze up at the canopy in certain forests, you might notice narrow channels of light separating the treetops, as if the trees are carefully avoiding contact. This striking behaviour is most common among trees of the same species—such as black mangroves, eucalyptus, and Japanese larch—but can also occur between different kinds of trees.

So why do trees keep their distance? Just like humans, they may do it for health and survival. One theory suggests that crown shyness helps trees avoid damage from wind. When storms or even gentle breezes sway their branches, trees that grow too close risk colliding, leading to broken limbs or abrasions. By maintaining a small buffer zone, they reduce the risk of injury.

But wind isn't the only factor. In dense forests, sunlight is a precious resource, and trees compete fiercely for it. Crown shyness could be a clever adaptation to maximize light exposure, ensuring each tree gets enough energy for photosynthesis. The gaps allow sunlight to filter down to lower branches and even the forest floor, benefiting not just the trees themselves but also the plants and animals below.

There's also evidence that this spacing helps trees stay healthy by limiting the spread of pests and diseases. Just as humans avoid close contact to reduce infection, trees may keep their branches apart to stop leaf-eating insects or harmful fungi from jumping from one tree to another.

Beyond survival, crown shyness creates a breathtaking visual effect—a natural lattice of leaves and sky that seems almost intentional. Whether it's for protection, better sunlight, or disease control, this phenomenon reminds us that trees, in their own quiet way, are brilliant at adapting to their environment.

Next time you walk through a forest, look up. You might just catch a glimpse of nature's original social distancers, standing tall—but not too close.

Maria A.A.R. Fonseca
Professor

"Weeds are flowers too, once you get to know them." — A. A. Milne

Green Innovation: PLANT BASED BIOPLASTICS

Conventional plastic made from petroleum has been a vital part of our life. However, disposal of these nondegradable petroleum-derived plastic has threatened our ecosystem and this environmental impact has driven the search for sustainable alternatives. Bioplastics, derived from renewable plant sources offer a promising solution to the plastic pollution crisis. Bioplastics are a diverse family of materials defined by two key properties: being bio-based (made from renewable resources like corn, sugarcane, potato or cellulose, Cotton, Algae, Bamboo) and/or being biodegradable (capable of breaking down into natural substances by microorganisms). It is a common misconception that all bioplastics are both bio-based and biodegradable. Key Types of Bioplastics are PLA (Polylactic Acid): Derived from fermented plant starch, such as corn, cassava, or sugarcane. PHA (Polyhydroxyalkanoates): Produced by microbial fermentation of sugars and lipids. Starch Blends: Composed of thermoplastic starch mixed with other biodegradable polymers. Cellulose-Based Plastics: Made from cellulose, a major component of plant cell walls.

Plant-based plastics are often biodegradable, generally considered safe for use but their safety depends on the specific chemicals and manufacturing processes involved. They can degrade within 3-6 months under industrial composting conditions. Bioplastics offer several environmental and sustainability benefits compared to conventional petroleum-based plastics such as reduced Carbon Footprint, biodegradability and compostability, Reduced fossil fuel consumption, reducing greenhouse gas emissions, minimizing plastic waste, utilizing renewable resources, and supporting a circular economy. Hence are being used in a wide range of sectors from packaging to consumer goods, Agriculture and Medical Applications

Despite their advantages, bioplastics face several challenges that must be addressed to

realize their full potential such as feedstock Availability and Competition, higher Production and material Costs, Performance and Compatibility, Lack of infrastructure, Public Awareness and Acceptance. Despite the challenges, continued research, innovation, and collaboration are driving the advancement of bioplastics, enhancing their properties and expanding their applications. The future of bioplastics lies in continued research, innovation, and collaboration to overcome challenges and maximize their sustainability benefits. Integrating bioplastics into a circular economy and supportive policies will drive their development and adoption. Consumers can support the use of bioplastics by choosing products made from bioplastics, participating in recycling and composting programs, and advocating for policies that promote sustainable materials.

Understanding plant-based plastics is crucial for a sustainable future. By embracing bioplastics and integrating them into a circular economy, we can reduce plastic pollution, conserve resources, move toward a more sustainable and resilient planet. Let's embrace these innovative solutions for a greener tomorrow. Embrace the future – choose plant-based plastic.

Dr. Maria A. D'Souza
Assistant Professor

Riddles About Plants to Sprout Smiles

1. **Riddle:** Covered in spikes, I store my drink, surviving deserts quicker than you think. What am I?

2. **Riddle:** Tiny spheres in clusters hang, sweet and juicy, a summer bang. What am I?

3. **Riddle:** Crisp and leafy, tossed in bowls, adding crunch to healthy goals. What am I?

4. **Riddle:** Turning faces toward the sun, golden petals one by one. What am I?

5. **Riddle:** Needles green and cones that fall, evergreen through winter's call. What am I?

6. **Riddle**: Rings inside reveal my age, standing tall on nature's stage. What am I?

7. **Riddle**: Red berries with leaves so sharp, festive favourite at Christmas harp. What am I?

8. **Riddle**: Strong aroma, layered bulb, Italian dishes love my pulp. What am I?

Answers

1. A cactus, 2. Grapes, 3. Lettuce, 4. Sunflower, 5. Pine tree, 6. Tree trunk, 7. Holly, 8. Garlic

Department of Botany Events Report

1. Hands-on Training Workshop on Vermicomposting

The Department of Botany conducted an interactive workshop on vermicomposting, on 30th August 2024, attended by 44 participants from various disciplines. The session focused on converting organic waste into nutrient-rich manure using earthworms, emphasizing sustainable soil health improvement. Participants engaged in hands-on training, learning bed preparation, waste layering, and maintenance techniques for optimal vermicompost production. The workshop successfully promoted eco-friendly agricultural practices among students by Mr. Mohan Tendulkar. The session was coordinated by Dr. Seema D. Fernandes

2. Herbarium Techniques Training Workshop

Under the DBT Star College Scheme, a specialized training session on herbarium techniques was organized in the botany laboratory for 13 participants, on 31st August, 2024. The resource person Dr. Harshala Shetgaokar demonstrated plant specimen collection, pressing, drying, and mounting methods. Students actively practiced these techniques, gaining skills

essential for botanical research and conservation. The session reinforced the department's commitment to preserving plant biodiversity through its well-equipped herbarium, named after Rev. Fr. Joseph Pallithanam (S.J.)

3- World Coconut Day Celebration

The department celebrated 'World Coconut Day' on 18th September, 2024 under the DBT Star College scheme. On this occasion, a lecture by Dr. V. Arunachalam was delivered on "Coconut for Circular Economy, building partnerships: Sharing Experiences and Coconut management Practices." After the talk a short documentary titled 'Coco Film' was shown to the audience. A well-presented dance "*Kotteo Fuggdeo*" was also performed by the students. Various competitions like poster competition titled '*Coconut Tree- A Gift to Humanity'*, '*Coco Art'*- Wealth out of Waste' and culinary contests *'Cocolicious Food'* saw enthusiastic participation. Student-run stalls showcasing coconut-based dishes added a festive touch, fostering awareness about coconut's ecological and economic value. The program was coordinated by Dr. Wendy Martins.

4. Yoga Session for Holistic Well-being

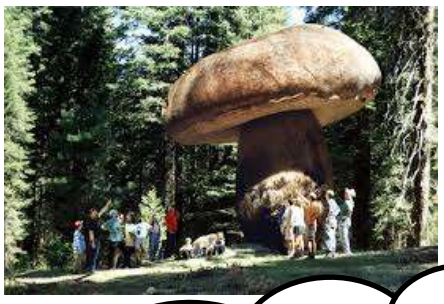
In collaboration with the Health & Wellness Club, the department organized a rejuvenating yoga session, on 1st October, 2024. Dr. Zuleika Antao, the resource person, guided students and faculty through asanas and mindfulness practices, emphasizing yoga's role in physical and mental health. The session was met with keen interest, with participants appreciating the blend of traditional knowledge and practical application. The programme was coordinated by Prof. Maria Fonseca & Ms. Gema Athaide.

These events underscore the Department of Botany's dedication to academic excellence, environmental stewardship, and holistic development. From sustainable agriculture (vermicomposting) to biodiversity conservation (herbarium techniques) and wellness (yoga), the initiatives align with the department's mission to "protect and conserve nature for a better tomorrow"

Eight Wild, Wacky and Wonderful Facts About the World of *FUN*gi

While the animal and plant kingdoms are well known, fungi are often overlooked – but the world of fungi is fascinating! And they're all around us. A network of fungi runs through the earth in every continent and can even be found in our seas.

1. *The largest organism on the Earth is fungus!*



The Humungous Fungus- a single *Armillaria* organism, is approximately **931 square hectares!** The fungus is measured including its network of mycelium that run underground, so much of

The Giant Puffball *Calvatia gigantea* produces large, round fruiting bodies that can be seen

2. *Fungi and humans share a distant ancestor!*

Fungi is a kingdom all of its own, so we don't want to mistake it for being a plant or animal.

While you might expect that these interesting organisms are more closely related to plants – the opposite is true

Fungi share a common ancestor with the animal kingdom, which includes humans, dating back around 1 billion years

3. *Fungi can be found all around your kitchen!*

Did you know that bread, beer, wine and some cheeses all include types of fungi?

Yeast- *Saccharomyces cerevisiae*, used in brewing and making bread.

There are **more than 2,000 species of edible fungi**.

4. *Fungi are friends not (just) food!*

Penicillin, the first antibiotic, was derived from *Penicillium* mould. Other fungi produce compounds that are used to treat diseases like cancer, high cholesterol and even organ transplant rejection

Fungal enzymes are also used in the processing and production paper, leather, cotton and biofuels.

Since many fungi have anti-inflammatory and antioxidant properties, they are used in skincare products

5. *Fungi are helping our planet – in more ways*

Essential for the nutrient cycles of the planet- act as natural

Only group of organisms that can break down plant cell walls.

Mycoremediation
A process that uses fungi
To break down substances that causes pollution.
Fungi are used to create filters to clean water.
Aspergillus tubingensis can break down plastics!

6. *There are fungi that can glow in the dark!*

More than 70 types of fungi can glow in the dark.

Sulphur Tuft *Hypholoma fasciculare,* Jack-O'Lantern Mushroom *Omphalotus olearius,* and Little Ping-Pong Bats *Panellus pusillus are some examples.*

7. *Fungi store carbon!*

Not only plants, even fungi has the ability to store carbon.

Fungi help break down organic material, using the carbon recycled by plants, and store this carbon as mycelium.

Scientists estimate that **fungi could be storing up to 13.12 billion metric tons of carbon annually!**

8. *Fungi come in all shapes and sizes!*

Jelly Ear Fungus, *Auricularia auricula* – looks and feels, almost completely like a human ear!

The Dead Man's Fingers *Xylaria polymorpha*!. The fruiting bodies looiks like hand poking up out of the soil.

The Bird's Nest Fungus *Crucibulum laeve* – it's fruiting body almost perfectly resembles a tiny bird's nest filled with eggs!

Ms. Patricia A. Fernandes

Laboratory Assistant

Departmental News

Guest Lectures

Innovative Sustainable Technologies (07 Mar 2025)

- Speaker: **Mr. Ganesh Chari** (MD & Founder, Neshaju Envirotech Pvt. Ltd.)
- Highlighted sustainable technological applications in Life Sciences.
- Attended by **64 students & faculty**.
- Coordinated by **Dr. Maria A. D'Souza**.

Alumni Series

Botany Beyond Books – The Science that Shapes Our Future (13 Mar 2025)

- Speaker: **Dr. Aditi Naik** (Asst. Prof., Goa University).
- Focused on botany's role in a green future.
- Attended by **62 students & 7 faculty**.
- Organized by **Dr. Suraksha Dongrekar**.

Innovative Sustainable Technologies

Botany Beyond Books – The Science that Shapes Our Future

Certificate Course & Training

- **Certificate Course on Microfungi Collection & Identification** (22–26 Nov 2024) 30-hour course with **21 participants**, organized by **Dr. Maria D'Souza**.

- **Algal Collection and Preservation Workshop** (27–28 Jan 2025)

  Hands-on training at Anjuna Coast for **25 students**, led by **Prof. Maria Fonseca**.

Microfungi Collection & Identification

Algal collection

Field Trips

❖ **Tanshikar Farm, Netravali** (10th October,2024)

T.Y.B.Sc. Students explored the flora on the way to farm and got familiarized with economically important plants. Organised by Dr. Harshala Shetgaokar.

❖ **Joggers Park, Altinho, Panjim and Campal Panjim.** (16th October, 2024)

TY students learned about Economic and Medicinal plants.

Organised by Ms. Maria Beatriz.

❖ **Mr. Farmer Nursery, Guirim** (27 Febraury, 2025)

F.Y.B.Sc. students learnt nursery management and plant cultivation

Accompanied by Prof. Maria Fonseca, Ms Sabina Sales e Dias, Mr. Conceicao De Souza and Dr. James D'Souza.

- **Mr. Farmer Nursery, Guirim** (01st March, 2025)

  F.Y. B. Com students learnt nursery management and plant cultivation

  Accompanied by Dr Harshala Shetgaokar and Ms. Maria Beatriz De Souza.

- **Garça Branca Botanical Garden, Loutolim** (21 Mar 2025)

  FYBSc students studied plant adaptations. Organized by Dr. Wendy Xavier, Ms. Maria Beatriz De Souza

- **Tanshikar Farm, Netravali** (29 Mar 2025)

  S.Y.B.Sc. students explored agri-ecotourism, vanilla pollination, and apiculture.

  Guided by Dr. James D'Souza and Mr. Chinmay Tanshikar.

- **Zonal Agricultural Office** (16th and 17th October 2024)

  SY MC students, BA and BCom. learned the different techniques of propagating Plants Accompanied by Dr. Wendy Martins and Dr. Suraksha Dongrekar.

Research Initiatives

Publications:

- Published Paper in Spectrum, 2025 “Assessment of phytochemicals from some marine algae” Dr. Wendy F. X. Martins, Joslino J Fernandes, Juhi J. Kamat, Merlyn M. G. Fernandes, Pranay D. Arondekar, Suraj S. Dubey.

- Published paper in SPECTRUM, Interdisciplinary Research Journal, Research & Development Cell, St. Xavier’s College, Mapusa – Goa, Volume XVI October 2024, pp 16-25. on “Formulation and Evaluation of Herbal Lip balm and herbal Lotion” D. Bandodkar, S. Halankar, R. Gadekar, S. Revodkar, P. Chodankar, A. Fernandes, D. Fernandes, Sabina Sales e Dias* Department of Botany, St Xavier’s College, Mapusa – Goa.
- Publication in the Proceedings of National Seminar on biodiversity Conservation: Impact of Anthropogenic Activities Climate Change BIOSEM 2k24. Mahatma Gandhi Memorial College, department of Zoology and Botany, held on 15th and 16th March, 2024. Fidelis Bolmax Pereira and Maria Aninha Araujo Ricardo E Fonseca.

- Published paper in Proceedings of '2nd international Conference on Recent Innovations in Biological, Chemical and Clinical Sciences' Organised by Manipal University College Malaysia (MUCM), Melaka, Malaysia on 6th and 7th May,2025. 'Phytochemical and Antibacterial Properties of five anti cancerous Plants from Goa' – India. Maria Aninha Araujo Ricardo Fonseca* Jivajirao Desai, Kinosha Gonsalves, Mustafa Latifnavar, Shantanu Kumbhar, Tanvi Bala Rao. St. Xavier's College, Mapusa – Goa, India.

Presentation:

- Attended and presented a paper titled 'Leaf anatomy of genus *Glyphochloa* in relation to its taxonomy and ecology'. By Maria A. A. R. Fonseca at the XX International Botanical Congress (IBC 2024) held at IFEMA Convention Centre Madrid, July 21st to 27th 2024.

- Attended and Presented a paper titled Phytochemical Profiling and Bioactive Potential of Five Anticancer Medicinal Plants from Goa – India, By Maria A. A. R. Fonseca on 6th and 7th May, 2025 at Manipal University, Malaysia

- Dr. Seema D. Fernandes Assistant Professor Presented the Paper Poster Presentation titled "Arbuscular Mycorrhizal (AM) Fungal Diversity in *Lawsonia inermis* L. of South Goa, India" at the two-day National Conference on "Plant Sciences for a sustainable Future: Innovations and Challenges" held on 16th and 17th January 2025, organized by Botany Discipline, School of Biological Sciences and Biotechnology at Goa University.

Minor Research Project (2024–2026)

- "Biodiversity of Microfungi from Unusual Niches" by Dr. Maria D'Souza (Funded: ₹2.55L, Goa State Research Foundation).

Research Project Guide

- Soil Analysis Project – Collaboration with IGNOU Goa by Dr. Suraksha Dongrekar.

Student Achievements

- **Chlorofest 2025** (Dhempe College):
    - 1st Runner-Up overall; wins in Entry Parade, Theatrical Skit, Fashion Show, and Face Painting.
- **TYBSc Project Competition**:
    - Presented research on *Medicinal Anti-Cancer Plants* & *Phytochemicals in Marine Algae*.
- **Actizen Project Award**:
    - 2nd Runner-Up for *"Reclaiming Wells – A Path to Safe Water"* (Mentor: Dr. Seema Fernandes).

Green Initiatives

- **Composting**: Biowaste recycling (Dr. Wendy & non-teaching staff).
- **Kitchen Garden**: Promotes organic farming (Dr. Maria D'Souza & Dr. Suraksha).
- **Medicinal Garden**: 25+ species (Maintained by Prof. Maria Fonseca & Ms. Sabina Sales e Dias).
- **Campus Tree Naming**: Ongoing project (Dr. Wendy Martins).
- **Plant of the Week**: Medicinal/ecological insights by T.Y. B. Sc students (Dr. Seema Fernandes).
- **Indoor Plants:** Enhancing lab air quality and visual Appeal (Led by Ms. Maria Beatriz De Souza).

Department of Botany – Cultivating Knowledge, Nurturing Nature! 🌿

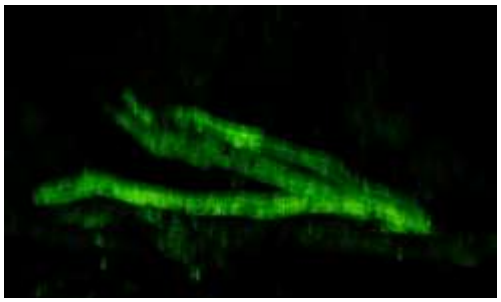
Glowing Fungus

With the arrival of monsoons and the lush greenery in the forests in Goa, mushrooms in various shapes, sizes, colours, and fascinating features like bioluminescence, make a brief but stunning appearance. While walking in the dense forests of the Mhadei Wildlife Sanctuary, the Mahavir Wildlife Sanctuary or the Mollem National Park at night, the mushrooms can be spotted by the faint bluish green or violet light they emit from their mycelium and fruiting bodies.

"I was very fascinated to see the fungus that glows in the dark. I saw the bases of wild trees and a rotten stump emitting a faint blue-green light, it was mesmerising." This species of bio-luminescent mushrooms is called *Mycena* and it produces a faint glow, like the glow worm. It particularly grows in the rainy season. In Goa, Mhadei and Mahavir wildlife sanctuaries have a good distribution of this species.

Scientists working on these mushrooms found that these fungi glow in the dark to attract spore-spreading bugs so that it can reproduce and colonise new food sources. "Bio-luminescence has been reported in approximately 50 species of fungi, what we find in Goa are *Mycena* species in the rainy season. Luminescence occurs at 21◦C to 27◦C, hence it is mostly found in tropical climates.

Bioluminescence is a chemical process that produces light almost identically to fireflies. The distinction is that fungi, in addition to luciferase, uses a special metabolic pathway. The chemical reaction that produces light in the glowing fungi uses luciferin, a luciferase enzyme, and molecular oxygen. Luciferin is catalyzed by the enzyme luciferase which is a biological catalyst accelerating and controlling the rate of chemical reaction in cells in the presence of oxygen. Fungi use a unique metabolic pathway with some extra enzymes in addition to luciferase. This reaction enables the fungus to emit green light in the visible light range of 520 to 530 nm. Bioluminescence may occur both in the mycelium and in the fruiting bodies.



Ms. Sabina M. Sales e Dias
Associate Professor

Plants Have a Mind?

The idea that plants might possess something akin to a "mind" has fascinated scientists, philosophers, and nature enthusiasts for centuries. While plants lack a brain, nerves, or consciousness in the way animals do, research has revealed that they are far from passive organisms. They sense, respond, and adapt to their environment in remarkably sophisticated ways. This has led to debates about whether plant behaviour can be compared to the workings of a mind.

Understanding the "Mind": In humans and animals, the mind is generally associated with:

- Conscious awareness
- Ability to process information
- Learning and memory
- Decision-making

For plants, the term "mind" cannot be used in the same literal sense, because they lack neurons and central nervous systems. However, the analogy arises from their ability to gather information, process it, and make adaptive choices.

Plant Sensory Perception: Plants have evolved complex sensory mechanisms that allow them to detect:

Light: Photoreceptors help them track the sun (phototropism).

- **Gravity:** Statoliths in root tips help sense gravitational pull (gravitropism).
- **Touch:** Sensitive plants like *Mimosa pudica* fold their leaves when touched.
- **Chemicals:** Roots detect nutrients and toxins in the soil.
- **Vibrations:** Studies show some plants can respond to sound frequencies, such as the buzzing of pollinators.

Signalling and Communication: Plants communicate using:

- **Electrical signals:** Similar to nerve impulses, though slower.
- **Chemical signals:** Volatile organic compounds (VOCs) released to warn nearby plants of herbivores.
- **Mycorrhizal networks:** Underground fungal connections that share nutrients and information, sometimes referred to as the "Wood Wide Web."

Learning and Memory in Plants: Research by Monica Gagliano and others has shown that plants can exhibit learning-like behaviour. For instance, *Mimosa pudica* can "learn" to ignore harmless stimuli after repeated exposure a form of habituation. Even without a nervous system, plants store and use information to modify future responses.

Decision-Making without a Brain: Plants constantly "decide" how to allocate resources:

- Should they grow towards light or water?
- Should they flower early or wait for better conditions?
- Should they invest in defence or growth?

These choices are regulated by complex hormonal signalling networks, showing that plants can integrate multiple inputs and produce adaptive outcomes.

Do Plants Have Consciousness?

While plants display many "intelligent" behaviours, there is no scientific evidence that they possess consciousness or subjective experiences. Most scientists agree that plant behaviour is a result of biochemical and biophysical processes, not awareness in the human sense.

Ethical and Philosophical Implications: The study of plant intelligence raises questions about how we define life, mind, and sentience. It also challenges the human tendency to view plants as mere background to the animal world.

Conclusion: Plants do not have a "mind" as humans understand it, but they are dynamic, responsive organisms capable of complex behaviours. They sense their surroundings, communicate, adapt, and even exhibit forms of memory and learning. Understanding plant intelligence not only deepens our respect for the green world but also expands our definition of what it means to be alive.

Dr. Suraksha Dongrekar

Assistant Professor

WHISPERS OF A DYING LAND

Beneath the sky, the palms once swayed
In emerald robes, the hills played
The springs gushed, the fields danced
Birds and monkeys on it pranced.

But now axes hum where birds once sang
Concrete monstrosities on hills hang
The rivers cry, the springs run dry
Locals sigh while strangers buy

Oh, Goa! Jewel by the sea
Your roots are torn by towers tall
Resorts, villas and massive mall

Rise as one, let voices roar
Protect each tree, each shore
If we stay silent, if we wait
It's going to be too late

The time is now, the message clear
SAVE GOA`S LAND, WHILE IT IS STILL HERE.

Ms. Maria Beatriz De Souza
Associate Professor

INDOOR PLANT BASED ON YOUR ZODIAC SIGNS

Exploring the connection between zodiac signs and indoor plants is the idea to match plants with personality traits associated with each sign. This can be a fun way to introduce students and general public to botany, encouraging them to appreciate nature and personalize their living spaces. Growing an indoor plant based on your zodiac sign can be a fun way to personalize the space. Here is the list of plants that are said to resonate with each sign

Aries: is known for their energy and boldness, are often matched with the Snake Plant, a resilient and low-maintenance plant. Alternatively, the Bird of Paradise or Succulents are also suggested for their vibrant and strong presence.

Taurus: is associated with Venus and can find harmony with the Fiddle Leaf Fig, known for its lush foliage and calming presence. Lavender and Sage are also used for their connection to beauty and comfort.

Gemini: Adaptable and communicative nature, are well-suited to the Philodendron, a versatile plant that thrives in various conditions. Pothos or Air Plant are also good choices due to their adaptability and ability to thrive in different environments.

Cancer: Cancer, a sign associated with nurturing and emotional depth, can benefit from the calming influence of the Peace Lily, which purifies the air and creates a peaceful atmosphere. Prayer Plant is also recommended for its soothing qualities and beautiful, patterned leaves.

Leo: Bold and radiant personality, are often paired with the Rubber Tree, known for its striking appearance .

Virgo: Virgos, known for their attention to detail and practicality, can find harmony with the Kentia Palm or the Rubber Plant, both of which offer a touch of elegance and require careful attention.

Libra: Libras, seeking balance and harmony, are often matched with the Peace Lily, which promotes tranquility and aesthetic appeal.

Scorpio:- known for their intensity and mystery, can find resonance with the ZZ Plant(Zanzibar gem) a resilient and enigmatic plant that can thrive in various conditions,

Sagittarius: Sagittarians, with their adventurous spirit and love of the outdoors, can find a connection with the Monstera.

Dr. James D Souza

Assistant Professor

Whispers of the Monsoons: Seasonal Plants Behaviour

Every year, as the skies over goa darken and the first drops of monsoon rain kiss the red earth, something ancient stirs in the land. It is not just a change in the weather -it is a signal to the plants, a call to awaken, to bloom, to heal and to feel.

The monsoon in goa is not merely a season; it's a biological catalyst .plants that lay dormant during the dry months begin to burst into life. Species like *Rumadachay chad* (a native plant used for wound healing *Cassia tora and Centella asiatica* respond to the increased soil moisture, humidity and reduced temperature with rapid vegetation growth.

Some undergo what scientists call photoperiodic responses, reacting to the shortening days and nights. Others sprout from seed banks buried in the soil, triggered by rainwater. The burst of greenery after the first rains is not just accidental it's a strategic response to maximize reproduction and growth in a limited window.

In the villages of Goa, certain plants are used as seasonal indicators. "When the Tarota (a wild yam) climbs the mango tree, the rains will last long" and "When Shevra (Sesbania grandiflora) flowers, it is time to sow rice." Such sayings aren't superstition—they are observational science encoded in folklore. Plants, like people, prepare for the changing world around them, and locals have long used them to plan farming, fishing, and medicine.

Modern plant biology now confirms much of this traditional knowledge. Seed dormancy breakdown during monsoon is often due to a combination of microbial activity in wet soil and moisture softening the seed coat. Ethylene and gibberellin—plant hormones—spike in response to water availability, leading to germination or rapid stem elongation. Leaf shedding or renewal helps reduce water stress or maximize nutrient absorption when conditions are ideal. In this way, folk wisdom and botany intersect, offering mutual insights.

The monsoon in Goa is more than a weather event—it's a symphony of signals exchanged between sky, soil, and flora. To the trained eye and the attentive ear, plants reveal a calendar, a pharmacy, and a way of life. In bridging modern science and traditional knowledge, we don't just understand plants better—we understand our place in the living world more deeply.

Sakshi Harmalkar

T. Y. B. Sc Student

The Secret Life of Plants

In gardens green and forests deep,
Plants hold secrets they quietly keep.
They drink the rain, they chase the sun,
But that's not all the plants have done!

It gives us fruits, it cleans our air,
It offers shade and tender care.
The mimosa pudica is shy, you know-
One tiny touch, and whoosh! leaves go!

They chat through roots, they trap some flies,
They change their colours to surprise.
So next time you walk by a tree,
Remember—it's watching you and me!

Pranali Parab.
T. Y. B. Sc Student

PLANT SYNTHETIC BIOLOGY

Plant synthetic biology is an emerging field that applies engineering principles to plants, aiming to design and construct novel biological systems for various applications. It involves using standardized biological parts to reprogram plants, creating new phenotypic traits, enhanced yield, and the ability to produce specific natural products. This field has the potential to revolutionize agriculture, human health, and sustainability.

Plant synthetic biology borrows concepts from engineering, such as modularity, standardization, and abstraction, to design and build biological systems. It utilizes standardized biological parts (like genes, promoters, and regulatory elements) to build more complex systems.

Novel Traits and Pathways: This can lead to the creation of plants with new traits, such as increased nutrient content, resistance to pests or diseases, and the ability to produce valuable compounds

Agriculture: Plant synthetic biology can be used to improve crop yields, enhance nutritional value (e.g., biofortification), and develop climate-resilient crops.

Human Health: It can be used to produce pharmaceuticals and other valuable compounds in plants, potentially reducing the cost and increasing the accessibility of medicines.

Sustainability: It can contribute to more sustainable agriculture practices by reducing the need for pesticides and fertilizers, and by enabling the production of biofuels and other bio-based products.

Engineering Metabolic Pathways: Researchers are using synthetic biology to engineer plants to produce polyunsaturated fatty acids (PUFAs) like EPA and DHA, which are important for human health,

Creating New Materials: Plant synthetic biology can be used to engineer plants to produce new materials, such as biodegradable plastics, according to ScienceDirect.com.

Producing Bioproducts: Plants can be engineered to produce a wide range of bioproducts, including enzymes, antibodies, and other valuable chemicals.

Future Directions: Improved Predictability: One of the biggest challenges in plant synthetic biology is increasing the predictability of plant engineering.

Understanding Plant Systems: Further research is needed to fully understand the complex interactions of multicellular organisms at the molecular, cellular, and environmental levels. Public Perception: The public perception of GMOs and synthetic biology remains a challenge, and it is important to address these concerns as this field advances

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