ISSN:2961-5380

JUNE 2025 | VOLUME VI

MAGAZINE



COVER STORY

Strobilanthes medahinnensis nilanthi

A new endemic

Nelu (Strobilanthes) species was first spotted in 2015 from Medahinna,

Sripadaya by botanist Mrs .R. M. R. Nilanthi

Rajapakse who is the Chief Editor of WILDLANKA,

Department of Wildlife Conservation,

Sri Lanka.







Botanical Society Department of Botany, Faculty of Science, University of Ruhuna, 81000, Matara, Sri Lanka





DEDICATION

We respectfully dedicate this volume to Professors Nimal and Savitri Gunatilleke, Professors Emeriti of the University of Peradeniya, in recognition of their exceptional contributions to the fields of Botany, forest ecology, biodiversity conservation, and ecological restoration in Sri Lanka and beyond.

Professor Gunatilleke's distinguished academic career, including his pioneering research on the Sinharaja Rainforest and his leadership in field-based ecological education. set a benchmark in has environmental science and conservation. Together with his lifelong research partner and wife, Professor Savitri Gunatilleke, he has transformed how we study and safeguard biodiversity.



In recognition of their significant contributions to environmental conservation. Professor Gunatilleke and his wife (Savitri Gunatilleke) received UNESCO Sultan Qaboos Prize for Environmental Preservation in 2011. Their work has been acknowledged both locally and internationally, admired for their dedication to preserving Lanka's rich biodiversity. More they received recently, honour of having an orchid (Gastrodia gunatillekeorum (Gastrodieae. Epidendroideae, Orchidaceae) newly discovered in the Sinharaja forest named after them. This devotion honours their dedication unwavering nurturing both forests and minds. May their work continue to guide us toward a more sustainable and ecologically aware future.



Gastrodia gunatillekeorum



The University Botanical Society is a student organization dedicated to promoting and enhancing knowledge in the field of Botany. The society organizes a variety of activities, including projects, talks, and guest lectures, focusing on current developments in science and technology to foster active interest in Botany and related disciplines among university students.

One of the society's flagship initiatives is the PLANTA magazine, which was reintroduced in 2022 after a period of hiatus, featuring a fresh new look. Building on the success of our digital issue in 2022, we continue to embrace the unique advantages of digital reading. From an economic standpoint, publishing the magazine digitally remains a practical choice. Traditionally, the magazine has showcased articles, poems, drawings, and other creative works primarily contributed by students.

As the senior editor, I have maintained this tradition while also expanding the scope to include submissions from students, university staff, and professionals working in plant sciences. These changes aim to present readers with a wider range of perspectives and knowledge, fostering joy and opportunities for sharing expertise. This collective effort also helps identify students with diverse soft skills, allowing us to guide and develop their abilities further.

I sincerely thank everyone who contributed articles, poems, drawings, and more. Lastly, I am deeply grateful for the unwavering support, dedication, and commitment of the committee members, whose efforts were vital in making this issue a success.

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(Planta Magazine | Volume VI June 2025)





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BOTANICAL GARDENS IN SRILANKA

A Botanical Garden is a collection, cultivation and display of a wide range of plants labelled with their botanical names. Ex situ conservation involves conservation of plants and animals in artificial habitats, which are quite similar to the normal habitats of these organisms.





There are most famous botanical gardens in Sri Lanka. They are Hakgala botanical garden, Henarathgoda botanical garden, Mirijjawila botanical garden, Royal Botanic Gardens (Peradeniya), and Seethawaka wet zone botanical gardens.

Peradeniya Botanical Garden is the most attractive and the oldest garden in Sri Lanka. Founding year 1821 Placement 5.5 km West of Kandy in the Central Province Average Visitors per year 2 million Approximate number of plant species Over 10,000, including 4000 labelled species, a wide variety of orchids, medicinal plants, spices, and palm trees. One of the highlights of the garden is the Orchid House, which houses an impressive collection of orchids, some of which are endemic to Sri Lanka. The Spice Garden provides visitors with an opportunity to learn about the spices that have made Sri Lanka famous worldwide, such as cinnamon, pepper, and nutmeg. Peradeniya Botanical Garden is not just a tourist attraction but also a center for botanical research and conservation. It plays a vital role in the conservation of rare and endangered plant species. The garden also serves as an educational resource, offering guided tours and workshops to students and visitors interested in botany and horticulture. Peradeniya Botanical Garden is not just a tourist attraction but also a center for botanical research and conservation.



It plays a vital role in the conservation of rare and endangered plant species. The garden also serves as an educational resource, offering guided tours and workshops to students and visitors interested in botany and horticulture.

There are over 200 species of palms in the gardens. The most remarkable amongst these is the Double Coconut (*Lodoicea maldivica*) from the Seychelles. This palm produces the largest seed in the plant kingdom.

Hakgala Botanical Garden is also very famous because there are over 10,000 species of flora planted here, and during the spring season in Nuwara Eliya, thousands of visitors come to see the blooms here. The garden is famous for a number of species of Orchids and Roses. The garden has approximately 3,000 species of tropical and subtropical plants and a herbarium of about 500,000 preserved specimens.

Botanical Gardens are important because they play a crucial role in plant conservation, research, education, and public engagement with the natural world, helping to preserve endangered plant species, advance our understanding of plant life, and inspire appreciation for biodiversity, particularly through their collections of diverse plant species from around the world.

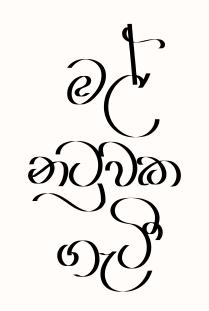


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written by Keshani Navodya Rodrigo (Faculty of Science, 2022 Batch)





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Written by Yashodha Weerasinghe Mapalagama (Faculty of Science, 2014 Botany Special Batch)



Salacia reticulata

(KOTHALA HIMBUTU)







Salacia reticulata (HIPPOCRATEACEAE) is a large ligneous climber or scandent shrub found by Sri Lanka, the Andaman Islands, and southern India. It is known as Kothala himbutu/Himbutu well in Sinhalese and is well-known among natives for its extensive use in diabetes treatment, a chronic condition impacting carbohydrate, protein, and fat metabolism due to insulin secretion deficiencies, with or without insulin resistance. It is also employed in remedies for various ailments, including asthma, amenorrhea, itching and other skin problems, gonorrhoea, haemorrhoids, swellings, and obesity. Key antidiabetic compounds within S. reticulata are recognized, such as salacinol and Review Article Peiris et al.; Asian Plant Res. 28 kotalanol (from both roots and stems), and mangiferin (root-derived). Additionally, the plant's roots contain diverse chemical constituents like 1,3-diketones, 26hydroxy-1,3-friedelanedione, 30-hydroxy-20(30) dihydroisoiguesterin, dulcitol, epicatechin, glycosidal tannins, hydroxyferruginol, iguesterin, kotalagenin 16lambertic acid, acetate, leucopelargonidin, phlobatannin, and triterpenes, collectively contributing to its therapeutic potential.

Salacia's antidiabetic effects are considered to stem primarily from its capacity to inhibit intestinal enzymes, specifically α-glucosidase and α-amylase, delaying glucose absorption and enhancing blood sugar control. Furthermore, the Salacia extracts have appeared to be very safe in vivo and in vitro experiments, and in human use. The purpose of the current study is to review the botanical, ethnomedicinal, phytochemical, and pharmacological data on Salacia reticulata while assessing the evidence of in vitro, animal, and human studies for its anti-inflammatory, antibacterial, anti-diabetic, antiobesity, antioxidant, and anti-hyperlipidemia effects. It is common practice in traditional medical systems like "Ayurveda" to treat diabetes mellitus with a variety of herbal preparations in Sri Lanka. In Sri Lanka and other Asian nations, S. reticulata is widely used as a diabetes treatment. The preparation is typically consumed as herbal tea (Kothala himbutu tea), or drinking water that has been stored overnight in mugs made from the plant's roots and stems.

Apart from its anti-diabetic potential, the plant is widely used to treat other diseases and conditions. The root decoction is used to treat asthma, amenorrhea, itching, thirst, and swellings. The roots and stems of this herbal plant were used for thousands of years for the treatment of rheumatism, gonorrhoea, skin diseases, obesity, and haemorrhoids. It is also consumed as a food supplement for the prevention of obesity and diabetes in many countries, including Japan and the USA. Traditional practitioners have been observed to have developed a system whereby identifying the plants' most useful components for various healthcare applications and continue to use them without the support of conventional clinical trials. The composition of the numerous chemical components isolated from Salacia species varies according to the species, the plant parts under study, and the plants' geographic origins. Salacinol and kotalanol in the roots, stems, leaves, and fruits of S. reticulata, S. oblonga, and S.chinensis, for instance. In comparison to other plant sections and the other two species, the roots of S. reticulata contained most of these compounds. Neokotalanol was determined to be the predominant component in samples from Thailand, while salacinol was discovered to be the predominant component in samples from Sri Lanka and India. The effectiveness of aqueous S. reticulata extracts in controlling the metabolization of carbohydrates has been assessed in a number of human clinical studies. Shimoda et al.'s one of the first clinical inv\estigations on the hypoglycaemic properties of an aqueous extract of S.reticulata demonstrated the extract's potency in lowering postprandial hyperglycaemia. Kajimoto et al. discovered that S. reticulata extracts significantly lowered blood glucose levels in comparison to the control group in a double-blind, placebocontrolled study with borderline type 2 diabetics. Using a liver injury model induced by oxidative stress, the liver protective properties of methanol and hot water extracts of S. reticulata roots and stems were investigated. Here, a mouse model treated with Carbon tetrachloride (CCl4) was used as the study group. They were treated with the extracts (400 mg/kg) which markedly decreased the rise in liver markers ALT and AST. Additionally, these extracts resulted in the reduction of TBA-RS production, a marker of elevated hepatic lipid peroxidation caused by exposure to CCl4. The findings imply that the hepatoprotective properties of S. reticulata are related to the antioxidant activity of the main phenolic compounds.







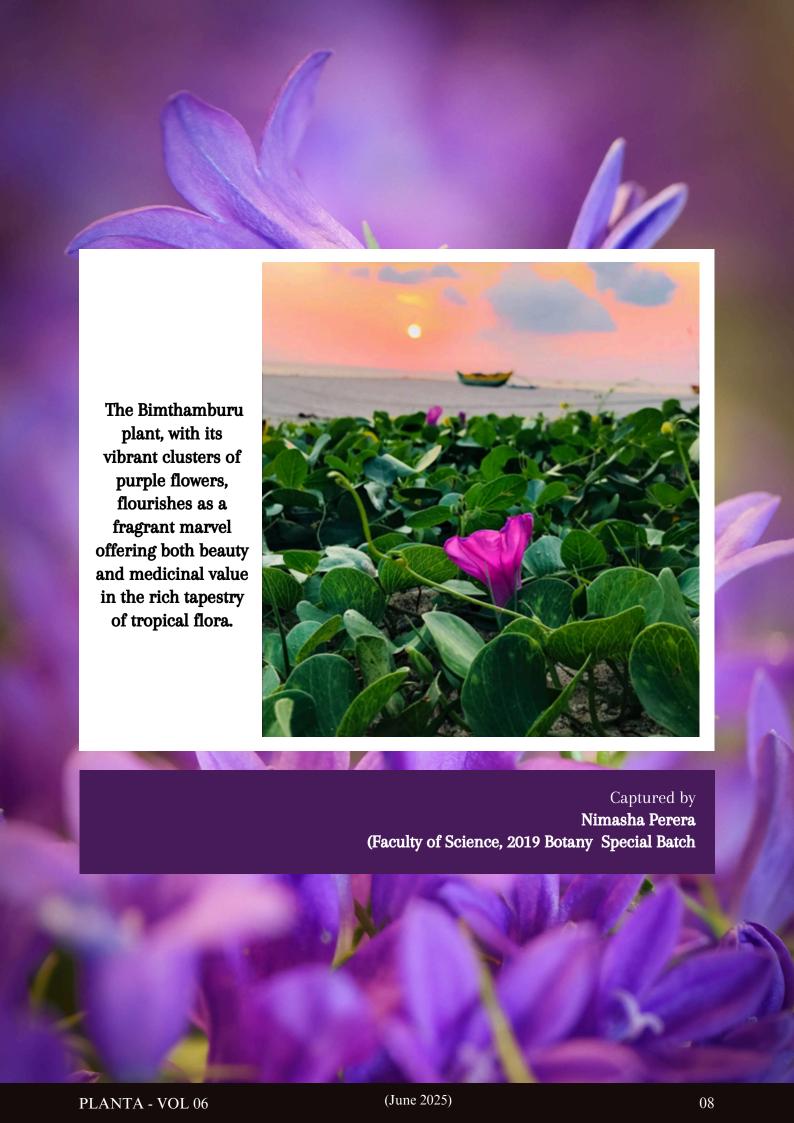
Salacia reticulata has been used to treat diabetes and obesity. Today, research using this valuable plant has shown that it has a variety of medicinal effects, including anti-inflammatory, antibacterial, anti-hyperlipidaemic, antioxidant, and many more. It has been discovered to be abundant in essential phytochemicals and secondary metabolites, which aid in the display of a variety of therapeutic effects. therefore.

S. reticulata can be referred to as a promising herbal plant that can treat a variety of human illnesses and disorders as no significant adverse effects were reported from the toxicological studies conducted on this plant. However, In the future, it will be necessary to conduct carefully planned studies on both human and animal subjects, specifically addressing the long-term effects and safety of S. reticulata treatment, as well as studies involving a larger number of human subjects.

Reference

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Written by Imesha Madushani (Faculty of Science, 2022 Batch)



DANCE WITH ROBOROSIA

In the garden where shadows dance
A bloom unfolds in mystic trance
Roborosia, with petals spun
Whispers secrets, kissed by sun....

Violet veils in twilight's glow

Curling softly, secrets flow

Each delicate thread that wraps the air

A forgotten tale, a secret prayer....

Roots dive deep in timeless earth
Cradling dreams, rebirthing worth
Its scent is magic, sweet and wild
Like a child's laughter, untamed, beguiled...

Oh, Roborosia, mystic bloom
You turn the night to soft perfume
A flower born of starry dust
In you, we place our dream-bound trust....

Let your petals fall like rain

And ease the heart's eternal pain

With every breath, with every sigh

Roborosia, we'll never say goodbye.....

Written by Dilani Malshani Weerasinghe (Faculty of Science, 2019 Chemistry Special Batch)







In the emerald heart of tropical rainforests, where sunlight dances on dewdrops and shadows play among ancient trees, the *Nepenthes* regions are both predator artists. These carnivorous plants, often called "tropical pitcher plants" are far more than mere hunters. It has a most unusual leaf that first looks like a normal leaf, then develops a tendril at its tip, and finally the tip of the tendril develops an amazing pitcher, painted in hues of ruby red, sunlit gold and emerald green, designed to dazzle insects and small animals. It gleams like polished metal enticing visitors with a glistening coat of nectar.

But beneath this beauty lies a deadly secret. Tiny insects drawn by the promise of sweetness, unknowingly tread into the trap . These lose their grip on the slippery edges and tumble into the pitcher's depths. Inside the pitcher's wall are lined with waxy, downward-pointing hairs, making escape impossible. At the bottom a pool of digestive enzymes awaits, breaking down the prey into nutrients. This macabre banquet sustains the plant, compensating for the lack of nutrients in its natural habitat.

Beyond their role as hunters, Nepenthes are guardians of their ecosystems. Their pitchers become sanctuaries for countless creatures: tiny frogs find refuge in their hollow interiors, Frogs lay their eggs in the liquid, where the tadpoles develop in safety while insects and microbes create miniature worlds within the fluid. Spiders weave delicate webs within the chamber, catching smaller prey that wander in.







There are 91 listed species of *Nepenthes*. The diversity of *Nepenthes* species in a masterpiece of evolution. From the towering *Nepenthes rajah*, whose grand pitchers can hold small mammals, to the petite and charming *Nepenthes ampullaria*, which feeds on fallen leaves rather than prey, each species tells a unique story. *Nepenthes lowii* have formed an alliance with animals. This species produces nectar that attracts Tree Shrews, which leave dropping in return-an unconventional but effective source of nutrients. Such adaptations highlight the infinite creativity of evolution of plants. Today many *Nepenthes* species are endangered, their habitats shrinking as rainforests are cleared for agriculture and development.

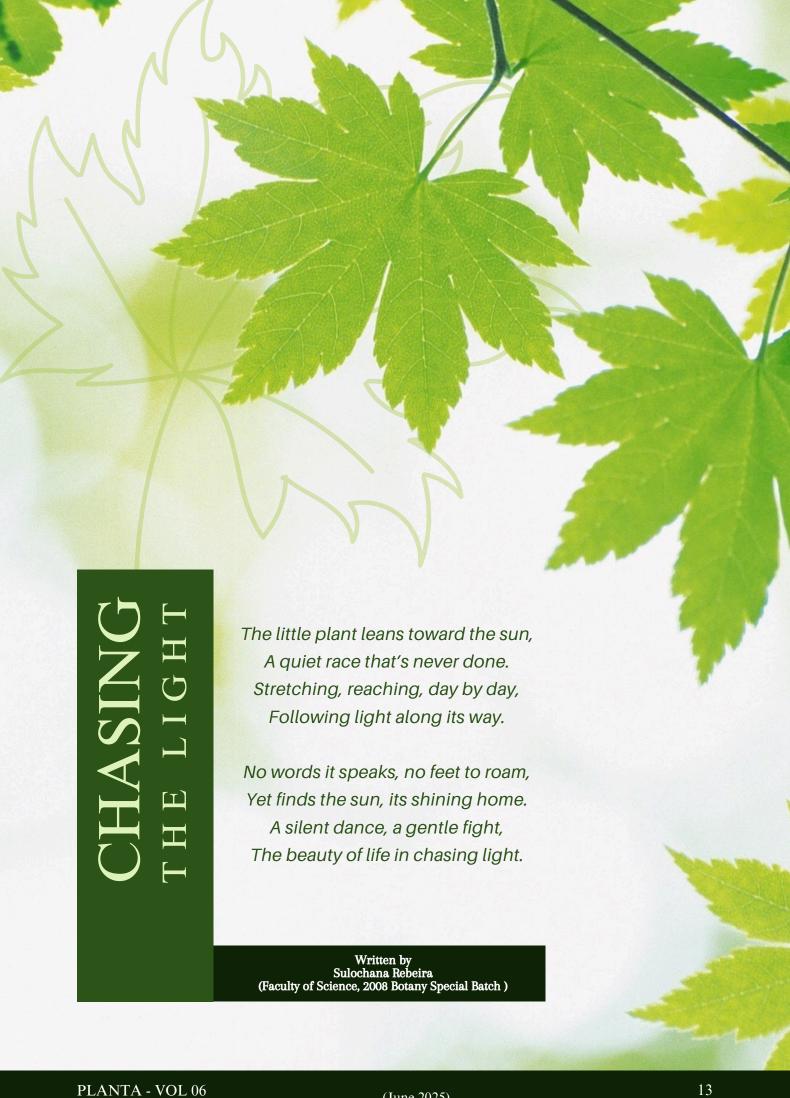
Preserving the *Nepenthes* is not just an act of conservation. It is a commitment to protecting the delicate balance of ecosystems that depend on them.

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Moran, J. A., & Clarke, C. M. (2010).

The carnivorous syndrome in Nepenthes pitcher plants: Current state of knowledge and potential future directions. Plant Signaling & Behavior, 5(6), 644-648.

Written by Dineshika Karunarathna (Faculty of Science, 2022 Batch)





The world's loneliest tree

Imagine you are alone in a middle of a dessert for 300 years and fighting with world hardest climatic conditions. One tree in the world did it. This tree called Ténéré Tree.

A solitary acacia (*Vachellia tortilis subsp. raddiana*) that was once considered the most isolated tree on Earth.It Was located in a landmark on caravan routes through the Ténéré region of the Sahara Desert in northeast Niger. This was the only tree found in 400 Km radius in the region.

The Tree of Ténéré was the last of a group of trees that grew when the desert was less parched than it is today. The tree had stood alone for decades. During the winter of 1938–1939 a well was dug near the tree and it was found that the roots of the tree reached the water table 33–36 meters below the surface.

Vachellia tortilis is an umbrella like canopied tree native to Africa mostly found in Sahara region and Somalia, like in dry condition. This tree contain small 4 and 10 pair of pinnate each with up to 15 pairs of leaflets. It has a dry harsh trunk to survive in dry condition.

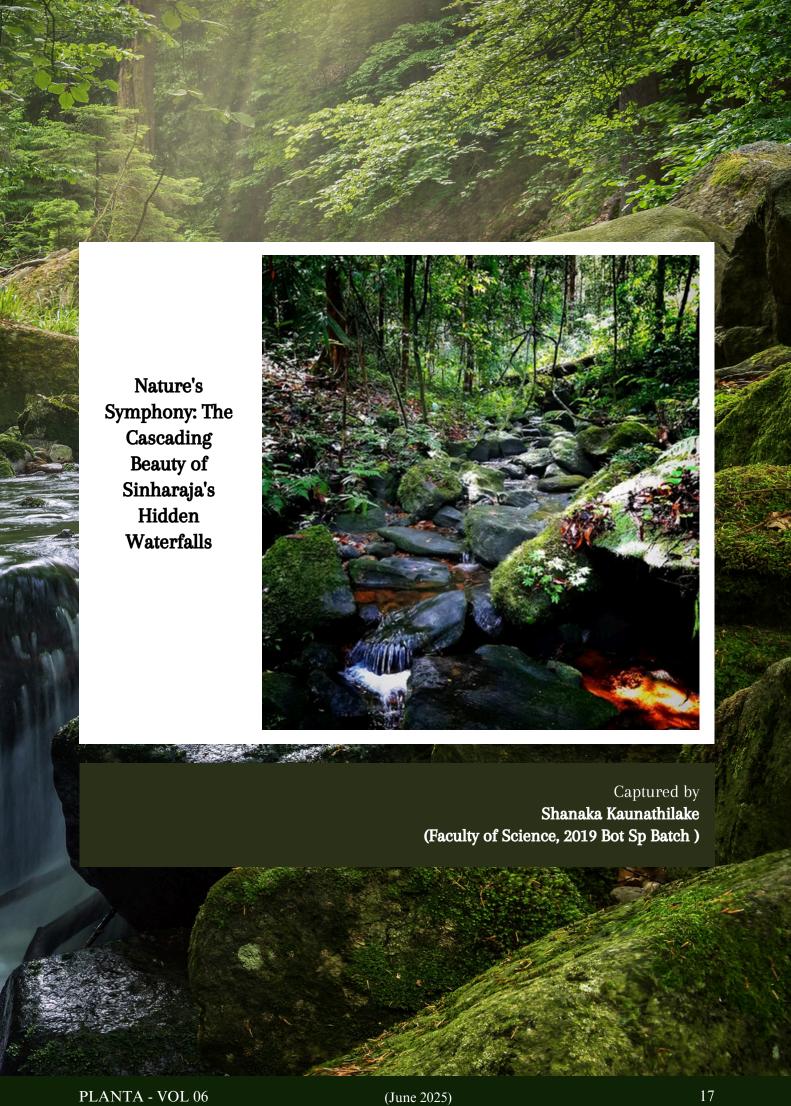
The saddest part is The Tree of Ténéré was knocked down by a Libyan truck driver, reportedly drunk on 8 th November ,1973. Before, this tree was green and with flowers; now it is a colourless thorn tree and naked. I cannot recognize it. It had two very distinct trunks. Now there is only one, with a stump on the side, slashed, rather than cut a metre from the soil. How it was described by an eyewitness.

One of the great natural wonders was destroyed by mankind. Today remaining parts are installed in Niger museum and a memorial in the location. This tree tells us How much hard the condition still you can stand and survive alone.

Written by Tharindu Supun Gunasekera (Faculty of Science, 2022 Batch)



A PEACEFUL VISION I want to be free and at peace Without any sense of time passing It's an amazing creation Protects lives of, who think It's lifeless, but it's actually alive Cold water, cool breezes, feel in me Occasional dewdrops, the greens catch the eye The sweetest sensation, stepping on the ground Reminds me again and again The keeper of the world On this race path, no visible finish No seeing above calm In Your life race, if need a break Nature can be the resting place Written by Jithmi Devindi (Faculty of Science, 2022 Batch) PLANTA - VOL 06 16



SRI LANKAN WILD RICE

Sri Lanka, a nation known for its breathtaking landscapes, rich cultural heritage, and diverse ecosystems, harbors a hidden agricultural gem: wild rice species. These ancient and resilient varieties of rice have been overshadowed by their domesticated counterparts, but their value, both ecologically and economically, has yet to be fully realized. In this article, we delve into the wild rice varieties of Sri Lanka and their ecological significance and explore how these forgotten treasures could be the key to revitalizing local economies, preserving biodiversity, and meeting global agricultural needs.

The Enigmatic Wild Rice Species of Sri Lanka

While most people associate rice with well-known varieties like **Samba** or **Nadu**, Sri Lanka is also home to a selection of wild rice species, many of which grow in the island's wetlands, marshes, and forests. Some key wild rice species found in Sri Lanka include



This hardy wild rice grows in marshy areas and is known for its adaptability to difficult growing conditions. It thrives in flooded areas, where traditional rice strains would struggle. *Oryza nivara* is a symbol of resilience, growing without the need for extensive chemical inputs.



Considered one of the ancestors of modern rice, this species is prized for its resistance to pests and diseases. Farmers could potentially harness its genetic traits to develop more resilient rice strains that can endure the shifting challenges of climate change.



While not as commonly known, Oryza punctata is another valuable wild rice species and it thrives in the wild and plays an important role in the ecosystems where it resides, contributing to the maintenance of local biodiversity.

Ecological Benefits: More than Just a Crop

Wild rice species do more than just grow in nature; they play an essential role in maintaining the ecological balance of Sri Lanka's wetlands and floodplains.

- Biodiversity Hotspots: The habitats where wild rice grows are teeming with life.
- Water Filtration: Wild rice grows in wetlands, which naturally filter and purify water. Their roots help trap pollutants and sediments, contributing to the cleanliness of water systems.
- Soil Health: The deep root systems of wild rice species prevent soil erosion, enhance soil fertility, and contribute to better water retention.

Economic Potential: From Forgotten Crop to Economic Powerhouse

While wild rice species in Sri Lanka are largely underutilized, their potential to impact the economy is vast.

- 1. Climate-Resilient Agriculture: Wild rice varieties are naturally more resistant to diseases, pests, and adverse climatic conditions than their domesticated cousins and can help safeguard rice yields
- Organic and Specialty Markets: Wild rice, with its minimal need for chemical inputs and its natural hardiness, could cater to these markets.
- 3. Revitalizing Rural Economies: The cultivation of wild rice could become a valuable source of income, especially for smallholder farmers who lack access to high-yielding, commercial rice varieties.
- 4. Agro-Tourism and Cultural Promotion: Visitors can learn about traditional farming methods, biodiversity conservation, and the vital role rice plays in Sri Lankan culture.
- 5. Value-Added Products: Rice flour, rice cakes, or even rice-based beverages. These products, marketed as organic or heritage food.

Challenges: The Path to a Wild Rice Revolution

Despite the immense potential, several challenges stand in the way of wild rice's economic impact in Sri Lanka.

- Limited Research and Knowledge: There is a need for comprehensive studies on the agronomy, pest resistance, and growth patterns of these species to make them viable for large-scale cultivation.
- Habitat Loss: Wetlands, marshes, and other natural habitats where wild rice thrives are increasingly threatened by urbanization and industrial agriculture.
- Market Development: There is currently limited market access for wild rice products, both locally and internationally.

A Vision for the Future: Wild Rice as a Pillar of Sustainable Development

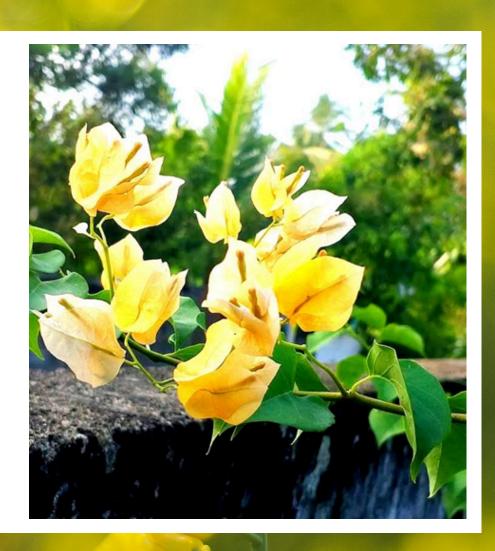
If Sri Lanka embraces the cultivation and conservation of its wild rice varieties, it could turn a forgotten treasure into a cornerstone of both ecological balance and economic prosperity. The path forward requires investment in research, education, and infrastructure, but the payoff could be substantial. From bolstering food security to enhancing the livelihoods of rural communities, wild rice may hold the key to a brighter, more sustainable future for Sri Lanka's agriculture and economy. Sri Lanka's wild rice species are more than just a relic of the past—they are a glimpse into the future of sustainable agriculture. By protecting, promoting, and investing in these resilient plants, the nation can cultivate a future where ecological integrity and economic vitality go hand in hand.

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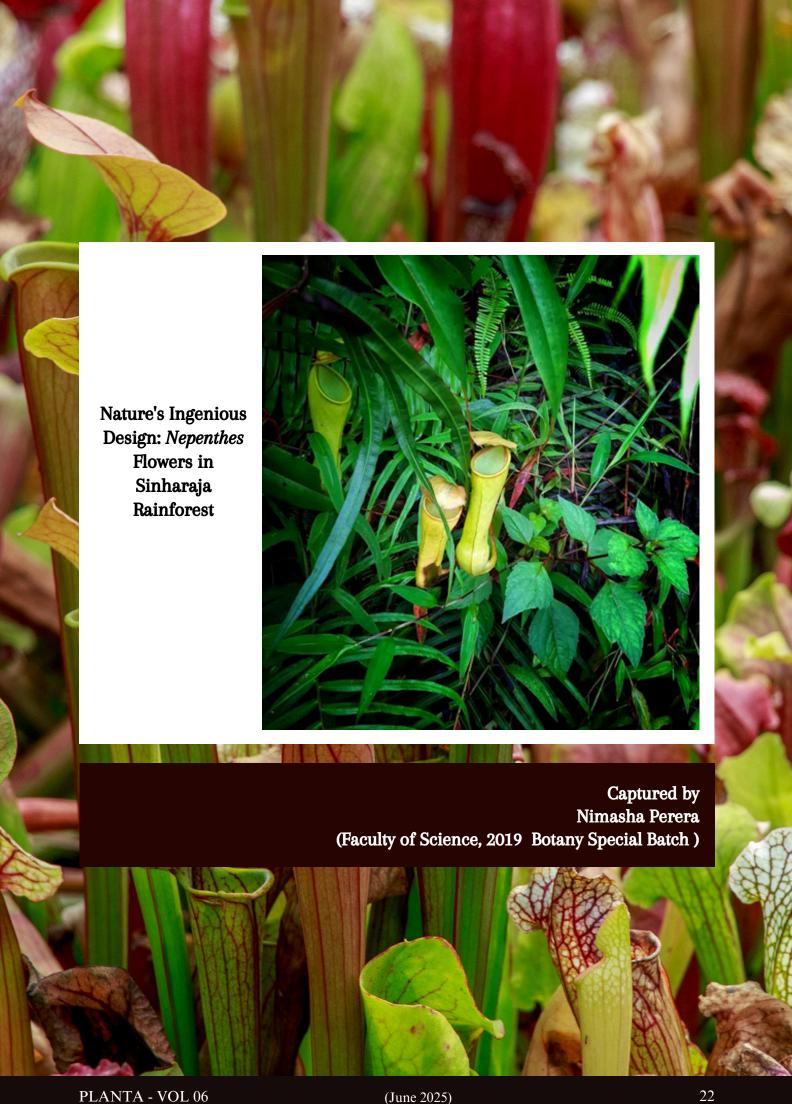
Written by Deshani Wathsala (Faculty of Science, 2019 Botany Special Batch)





Captured by Dinithi Nadeesha (Faculty of Science, 2021 Batch)





SRI LANKAN RUBBER INDUSTRY AND ITS BATTLE WITH RUBBER DISEASES

Sri Lanka's rubber industry, a pillar of the island's agricultural and economic heritage, plays a crucial role in the nation's prosperity. As one of the world's largest producers of natural rubber, Sri Lanka's rubber plantations have long been synonymous with the country's lush landscapes and thriving economy. However, this vital sector is facing increasing challenges, particularly due to rubber diseases that threaten to undermine its future growth and productivity. In this article, we explore the economic significance of the Sri Lankan rubber industry, the impact of rubber diseases, and the innovative efforts to safeguard its future.



The Backbone of Sri Lanka's Economy Rubber's Economic Contribution

The Sri Lankan rubber industry has deep historical roots. Introduced to the island in the late 19th century, rubber quickly became a key export crop, providing a steady income for the local population and contributing significantly to the economy. Today, Sri Lanka is the 6th largest producer of natural rubber globally and ranks 4th in rubber exports. With plantations sprawling across the country's central highlands, the industry has earned the nickname "the green gold" of Sri Lanka.

Rubber contributes around 0.6% of Sri Lanka's GDP, directly employing over 1 million people in the rubber plantations, smallholder farms, and the manufacturing sector. The industry's economic footprint extends beyond just employment—it drives industries like automotive manufacturing (primarily tire production), medical supplies (such as latex gloves), and numerous consumer goods. With rubber being a key export, Sri Lanka earns billions of dollars annually from rubber-related exports, making it one of the most important sectors for foreign exchange. Despite the challenges posed by global economic volatility and climate change, the Sri Lankan rubber industry remains a central cog in the economic machine, with continued growth prospects in international markets like China, India, and Europe.

The Silent Threat - Rubber Diseases

However, lurking in the shadows of Sri Lanka's rubber industry is a growing threat that could severely cripple its economic potential: rubber diseases. These maladies are caused by various pests, fungi, and bacteria, which not only harm the rubber trees themselves but also threaten to disrupt the delicate balance of the country's agricultural sector. Some of the most common diseases affecting rubber plantations in Sri Lanka include:





attacking

This fungal disease has proven

to be one of the most

devastating. First detected in

Sri Lanka in the 1960s, SALB

their

significantly reducing their

ability to produce latex. If left unchecked, the disease can result in severe defoliation, stunted growth, and ultimately the death of rubber trees.

leaves,

affects rubber trees



Caused by fungi such as Fomes lamaensis, this disease rots the roots of rubber trees, making them vulnerable to collapsing under the weight of the plant. It's a slow and insidious killer of plantations.



Caused by a bacteria, this disease affects the bark of rubber trees, resulting in lesions and tissue decay. Left untreated, it can stunt tree growth and reduce latex yield.

These diseases do not just harm the trees but also disrupt the supply chain of raw materials for industries that rely on rubber. The economic fallout from rubber diseases can be far-reaching, affecting thousands of workers, reducing export volumes, and even contributing to global rubber price volatility.

Economic Impact: A Multidimensional Crisis

The economic impact of rubber diseases in Sri Lanka is twofold. First, it affects the agriculture-based livelihoods of the millions who depend on rubber as their main source of income. Smallholder farmers, who account for approximately 70% of the rubber land in Sri Lanka, are particularly vulnerable to these diseases. When diseases spread, entire crops can be wiped out, forcing farmers into debt and poverty.

Second, the disease burden undermines the export revenue generated by rubber. The reduction in latex yield due to diseases means lower volumes for export, and as rubber is a significant contributor to foreign currency earnings, this translates into a ripple effect throughout the broader economy. In a highly competitive global market, any reduction in supply can drive prices higher and reduce Sri Lanka's competitive edge.

Moreover, as the rubber industry is intricately linked to the manufacturing sector (such as tire and glove production), the economic reverberations extend to industries that supply both domestic and international markets.

Innovative Solutions and Future Prospects

Sri Lanka's response to rubber diseases has been one of innovation and resilience. Researchers and agricultural experts have developed several strategies to mitigate the impact of these diseases, including,

- 1. Breeding Disease-Resistant Varieties: One of the most promising approaches is the development of rubber tree varieties that are resistant to common diseases. Advances in plant breeding have resulted in new rubber strains that show greater resistance to fungal infections and pests, offering a glimmer of hope for future rubber farmers.
- 2. Integrated Disease Management (IDM): This approach combines chemical treatments with biological controls, such as introducing beneficial organisms to combat pests and fungi. Regular monitoring and surveillance are also key to managing disease outbreaks before they become catastrophic.
- 3. Reforestation and Diversification: In response to the threat of diseases spreading across monoculture plantations, experts are encouraging agroforestry and intercropping. By diversifying the types of plants grown alongside rubber trees, farmers can reduce the spread of diseases and improve the resilience of rubber plantations.
- 4. Improved Farming Practices: Educating farmers on sustainable practices, such as proper drainage and the use of organic fertilizers, can help strengthen the rubber trees and minimize the risk of diseases.
- 5. International Collaboration: Sri Lanka has partnered with international research institutions to enhance rubber disease management strategies. Knowledge exchange programs with countries like Thailand and Indonesia—both major rubber producers—have proven to be beneficial in addressing common agricultural challenges.

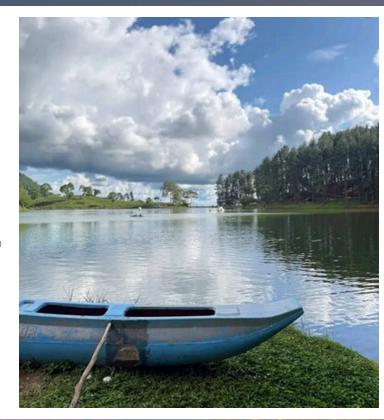
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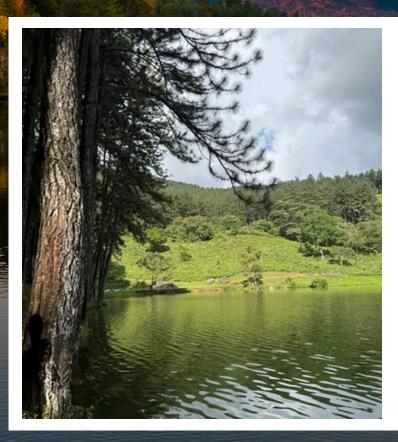


Written by

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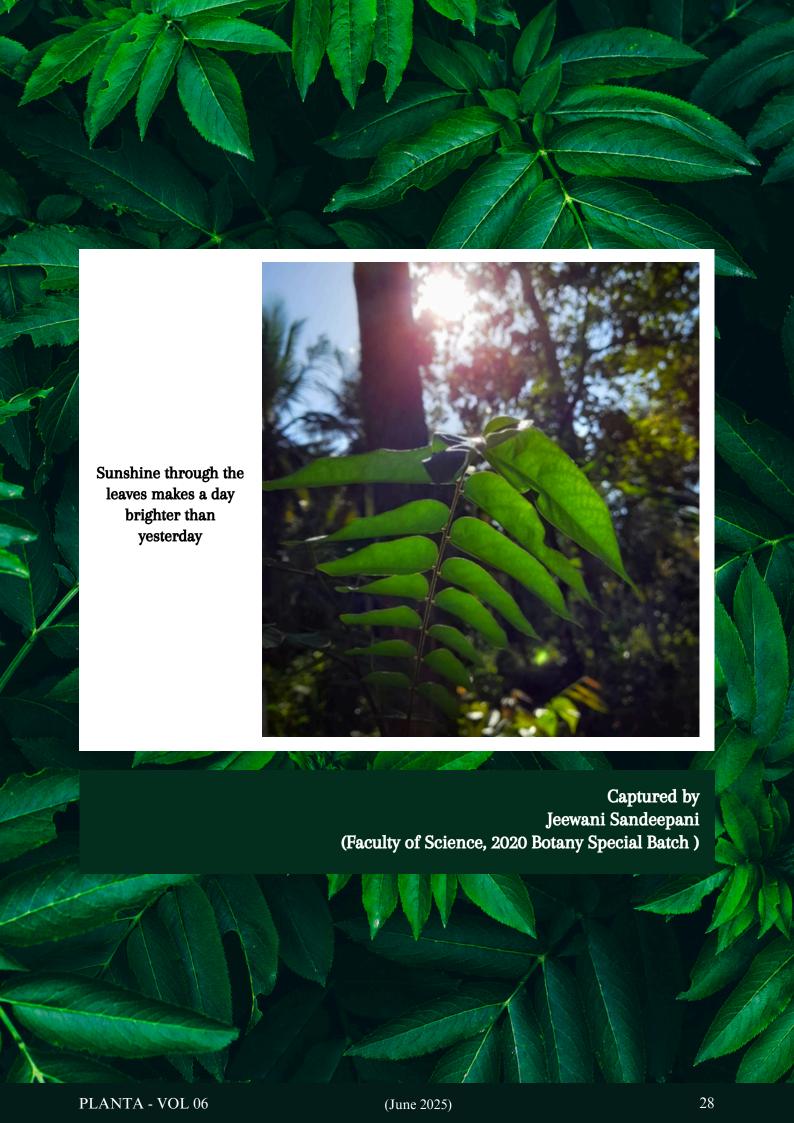
Evening at Sembuwaththa Lake side,Matale



Evening at Sembuwaththa Lake side, Matale.

Captured by Bimali Karunarathne Reading for M. Sc at the University of Bayreuth, Germany.







Nature is full of wonders. This story is based on one of that wonderful phenomena about plants. Although trees may appear like solitary individuals, the earth beneath our feet tells a different story. Trees communicate through chemical signals, rather than words. They play this game using a fungal network. The fungi provide the trees with nutrients and receive sugars in return. But, later scientists have found this connection runs far deeper than we had previously thought. By plugging into the fungal network, trees can share resources and information. Scientists called this network the wood wide web. As the world wide web connects the entire world, the wood wide web connection connects the whole forest. Fungal hyphae serve as a fiber optic cable but at a much lower speed.

The earliest evidence about wood wide web dates back 400 million years ago. Fossil evidence suggests that arbuscular mycorrhizal fungi formed symbiotic relationships with the roots of early land plants during the Devonian period. In 1885 German botanist Albert Bernard Frank first proposed the concept that plant roots and the fungi around them had been running together. With the progress of science, more things are revealed. Fungal and plant symbiotic relationships play a vital role in the evaluation of land plants and thrive. Plants are perfectly capable of distinguishing their roots from the roots of other species and even from the roots of related individuals This ability is achieved through a combination of biochemical, microbial, genetic, physical, and ecological mechanisms. There are two main groups of mycorrhizal fungi, arbuscular fungi, which penetrate the host's roots, and ectomycorrhizal fungi, which surround the tree's roots without penetrating them.

The question is why are trees such social beings? Why do they share food with other trees even though sometimes there is another species? The reason is the same as for human communities. Take a moment and think 'What is the driving force of human civilization? From African savannas to the species that control wood wide and even walk on the moon? We can cooperate efficiently. In contrast to plants, they also cooperate to get benefits. Like a win-win game. They care about each other like a family, like a friend's company.

- Enhanced survival through mutual support
- Interdependence in the ecosystem
- Protection against threats
- Long-term investment in stability
- Symbiotic relationships with other organisms
- Evolutionary perspective

In such a community, sick individuals are supported and nourished until they recover. In the next round, perhaps the supporting tree might be one of the three that need support. But the remarkable thing is that in such a community there are different membership levels. Some individual trees get more benefits than others when they get sick or in trouble. Scientists have examined that phenomenon using radioactive isotopes that label sugar molecules. Like our internet, the Wood Wide Web has its dark side. Some orchids hack the system to suck up sugars and nutrients from nearby trees. Some specific plants classified under Mycohoterotrops hack that system to steal nutrients from the Wood Wide Web. Like a kind of cybercrime.

And other species, like the black walnut (Juglans nigra) spread toxic chemicals called juglone to the soil that juglone can disrupt mycorrhizal fungi that form the connections between plants. This may reduce the network functionality and limit nutrient and signal exchange. That is an example of a strategy that uses plants to sabotage their rivals. Some sick or dying trees may dump their resources into the network, which healthier neighbors might then use. Plants also use fungi to send messages to their allice trees. If they're attacked, they can release chemical signals through the Wood Wide Web, which can warn their neighbors to raise their defenses before the actual attack begins. Old trees have more complex and waste connections than younger trees. Scientists try to record that connection and trace down what kind of thing they say. But older trees symbiotically connect with dozens of mycorrhizal fungi at the same time so that is incredibly complicated to trace.

The network acts as a forest Health Indicator. The state of the Wood Wide Web often reflects the overall health of the forest: more connection, more information. Think about a plant that is located inside an artificial pot. That is more prone to infectious diseases because of a lack of support from others. Poor offline plants. Invasive plants can exploit the wood wide web to their advantage, often disrupting native ecosystems by altering underground fungal networks. Some invasive plants such as Tree of Heaven (Ailanthus altissima) and Garlic Mustard (Alliaria petiolate) plant also disrupt the fungal network releasing chemicals that suppress native fungal networks, disadvantaging other plants that depend on these mutualistic fungi. That strategy is used to outcompete native plants.

In nature, all species are hardly interconnected to each other as we thought. One species affects its consequences and affects too many others. Large forests act as massive single organisms. The Wood Wide Web provides a new way to think about evolution, is that evolution guided by competition or cooperation? That opens the window to the evolutionary paradox. Trees have always been known to evolve by competing, not cooperating. Trees grow tall to capture more sunlight. The root wide spared to more efficient suck up of water and nutrients. The plant world is full of competition to survive. But that kind of phenomenon changes our perspective on nature.

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The rose lotus
(Nelumbo nucifera)
stands as a symbol of
purity and resilience,
its delicate pink
petals rising
untouched from
murky water.



Captured by Chamali Sandeepani (Faculty of Science, 2020 Botany Special Batch)

A PLACE WHERE QUALITY AGRICULTURE IS ENSURED IN SRI LANKA

(Seed Certification & Plant Protection Centre (SCPPC) - Gannoruwa)



Nestled in the scenic heart of Sri Lanka's Kandy District, the **Seed Certification & Plant Protection Centre** (**SCPPC**) **in Gannoruwa** stands as a vital pillar of the nation's agricultural sector. Serving both as a regulatory authority and a resource hub, this state-of-the-art facility plays a crucial role in maintaining the health and quality of the country's crops and plant products. Visitors to Gannoruwa's SCPPC can witness firsthand the sophisticated processes that protect Sri Lanka's agricultural legacy, as well as learn about the latest innovations in plant health and seed technology. The center also hosts research initiatives aimed at enhancing agricultural productivity and resilience, making it an integral part of the country's agricultural advancement. The SCPPC is not just a facility, but a guardian of Sri Lanka's rich farming heritage, ensuring that the nation's crops are robust, healthy, and ready to meet future challenges.

- 1. **Seed Certification**: SCPPC oversees the certification of seeds to ensure that only high-quality, disease-free, and genetically pure seeds are distributed to farmers. This service guarantees that crops grown from certified seeds are productive and resilient.
- 2. Plant Protection: The center offers expert advice and solutions on managing pests, diseases, and other threats to plant health. This includes research into effective pest control methods and guidance on the safe use of pesticides.
- 3. **Diagnostic Services**: SCPPC provides diagnostic services to identify plant diseases and pests, offering recommendations for effective treatment and management.
- 4. **Training and Awareness**: The center conducts workshops, training programs, and awareness campaigns to educate farmers on best practices for seed selection, pest management, and sustainable farming techniques.
- 5. Research and Development: Focused on innovation, SCPPC carries out research to improve seed varieties, plant protection methods, and agricultural practices. Their work ensures that Sri Lanka's agriculture remains competitive in a global market.
- 6. Regulation of Plant Import and Export: SCPPC also monitors and regulates the import and export of plant materials, ensuring compliance with international standards and protecting local agriculture from potential threats.

By providing these essential services, the SCPPC helps enhance Sri Lanka's agricultural productivity, ensuring that farmers have access to the best resources for growing healthy and abundant crops.

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Written by Pasindu Thathsara Kodikara (Faculty of Science, 2023 Batch)



Scientific Name:
Lumnitzera littorea,
Rathamilla is a
critically
endangered plant
protected under
the flora and fauna
ordinance in Sri
Lanka.





This species has been recorded in the Madu River Sanctuary and Dedduwa Lagoon areas in Sri Lanka.

Captured by Udara Vishwa Gunathilaka Reading for M.Phil at the Department of Botany, University of Ruhuna



THE SILENT NATURE

In the silence of the morning light

Nature sleep no any fight...

No rush, no sound, just peaceful grace
The world pauses in this sacred space.....

The river hums a muted song
A lullaby, both deep and long...
Mountains stand in calm repose
Their peaks adorned with twilight's glow
The earth holds secrets, old and true....

No need for words, no need to speak
In nature's silence, all is meek....
A moment's peace, so pure, so deep
Where hearts can rest and spirits sleep....

Written by Udari Kaveesha Welikala (Faculty of Science, 2019 Zoology Special Batch)



SYSTEMATICS WITHOUT BORDERS

WHERE BOTANY MEETS BIG DATA



Plant systematics has transformed since Carl Linnaeus introduced his binomial nomenclature system in the 18th century. What began as a discipline primarily concerned with morphological classification based on visible plant structures has evolved into a multifaceted, technology-driven field operating at the intersection of biological and computational sciences. The taxonomic enterprises that once relied exclusively on meticulous observations of herbarium specimens now incorporate vast molecular datasets, sophisticated algorithms, and global collaborative networks.

This article examines a fundamental shift in plant systematics: its transformation into a data-intensive, globally interconnected science. As biodiversity faces unprecedented threats from habitat loss, climate change, and human activity, the science of classification has acquired new urgency and practical applications far beyond academic interest. The central question driving contemporary systematic botany has become: How is big data reshaping the way we classify, understand, and conserve plant diversity in the Anthropocene?

Digital shift in plant collections

The digitization of biological collections represents perhaps the most visible manifestation of systematics' digital revolution. Herbaria worldwide repositories containing an estimated 390 million specimens are undergoing massive digitization efforts, transforming physical specimens into searchable, analyzable digital assets. Projects like JSTOR Global Plants have digitized over 3 million type specimens, while institutions such as the Royal Botanic Gardens, Kew and the Smithsonian Institution have made significant portions of their collections freely accessible online.



Collecting specimens



Characterizing species



Assessing specific richness



Describing species



Obtaining ecological data







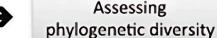
Obtaining morphological or molecular characters





Assessing functional diversity

Assessing





Building phylogenies

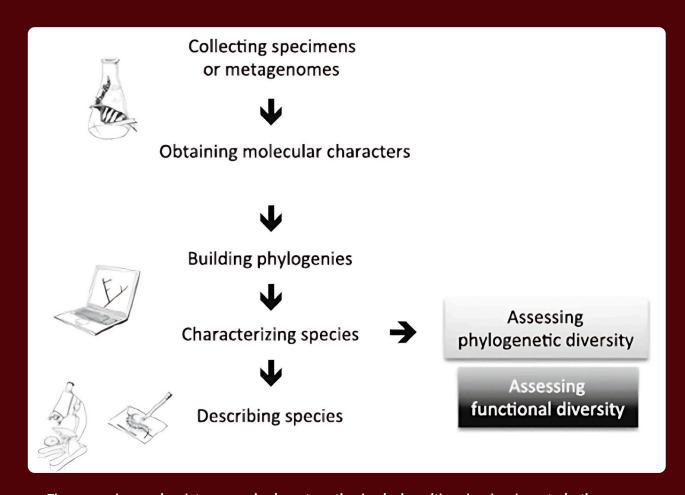


A digitalized herbarium sheet of Impatiens truncata from Royal Botanic Gardens, Kew under the accession number K000675627.



The traditional data processing in systematics begins with the sampling of specimens and the characterization and description of species. Specimens were then specifically sampled for phylogenetic characters, allowing for building phylogenetic trees and computing phylogenetic diversity. (In Phase With Modern Systematics and NGS Methods: The Tree First, Then the Species)

This digital transformation extends beyond images to encompass molecular data. DNA barcoding initiatives employ standardized genetic markers to identify plant species rapidly and reliably, with the International Barcode of Life (iBOL) database now containing sequences from hundreds of thousands of plant species. Meanwhile, genome sequencing projects have advanced from targeting model organisms to ambitiously sampling across the plant tree of life. The 10,000 Plant Genomes Project (10KP) aims to sequence representative species from every major clade of embryophytes, providing unprecedented insights into evolutionary relationships and genomic diversity.



The new and upcoming data processing in systematics, beginning with molecular characterization or even metagenomics, jointly allowing phylogenetic analysis and species characterization, and therefore computation of phylogenetic diversity. (In Phase With Modern Systematics and NGS Methods: The Tree First, Then the Species)

The Global Biodiversity Information Facility (GBIF) exemplifies the scale of this data revolution, currently hosting over 1.8 billion occurrence records across all taxonomic groups. For plants specifically, platforms like the Botanical Information and Ecology Network (BIEN) integrate distribution data with functional trait information and phylogenetic relationships, allowing researchers to analyze patterns across continental scales. Meanwhile, naturalist has mobilized millions of citizen scientists to document plant biodiversity, generating observational data at spatial and temporal scales previously unimaginable.

Digital data meets modern analytical tools

The exponential growth in biological data has necessitated equally sophisticated computational tools for analysis and interpretation. Modern phylogenetic inference, the reconstruction of evolutionary relationships among plant lineages, relies on complex statistical models implemented in software packages like RAxML, MrBayes, and BEAST, capable of processing datasets comprising thousands of species and millions of genetic characters. These analyses, once limited by computational constraints, now routinely employ high-performance computing clusters and cloud-based resources.

Artificial Intelligence (AI) and machine learning have emerged as transformative technologies in systematic botany. Deep learning algorithms trained on herbarium specimen images can now accurately identify plant species, rivalling expert taxonomists. The Herbarium 2019 Challenge demonstrated this capability, with convolutional neural networks achieving over 90% classification accuracy across 683 species. These technologies are especially valuable for identifying cryptic species morphologically similar but genetically distinct lineages that traditional taxonomy might overlook.

Beyond identification, AI approaches are being applied to predict functional traits from genomic data, infer phenotypic characteristics from molecular sequences, and even hypothesize novel taxonomic relationships. The integration of computer vision with plant morphometrics has automated processes like leaf venation analysis and pollen grain classification, previously labour-intensive aspects of plant systematics.

The complexity of modern phylogenomic datasets, often involving hundreds or thousands of loci across the genome, has driven innovations in computational approaches to tree inference. Coalescent-based methods like ASTRAL and SVDquartets address the challenges of incomplete lineage sorting, while Bayesian approaches implemented in RevBayes provide flexible frameworks for incorporating multiple data types and evolutionary models.

Contemporary systematics exemplifies science without borders, both disciplinary and geographical. Large-scale collaborative initiatives have become the norm, with projects like the Open Tree of Life synthesizing published phylogenetic data to construct comprehensive evolutionary trees spanning all domains of life. Similarly, the Plant Tree of Life (PTOL) project aims to resolve relationships across land plants through coordinated sampling and phylogenomic analysis.

These enterprises rely fundamentally on data sharing standards and infrastructure. The Taxonomic Databases Working Group (TDWG) has developed standards like Darwin Core and Access to Biological Collections Data (ABCD) that facilitate interoperability between biodiversity databases.



Meanwhile, repositories like GenBank, Dryad, and the Open Science Framework enable researchers to share molecular, morphological, and analytical datasets according to FAIR principles (Findable, Accessible, Interoperable, and Reusable).

Citizen science has emerged as a powerful complement to institutional efforts. Beyond iNaturalist, platforms like Pl@ntNet and Plant.ID engage non-specialists in plant identification and documentation. The Notes from Nature project invites volunteers to transcribe herbarium specimen labels, accelerating the digitization process. This democratization of taxonomic practice has not only generated valuable data but has also strengthened public engagement with botanical science.

Open-source tools have similarly transformed analytical workflows. Software packages like QIIME 2 for microbiome analysis, BEAST for Bayesian evolutionary analysis, and the R programming language with its numerous phylogenetic packages researchers worldwide to implement sophisticated analyses regardless of institutional resources. Cloud-based platforms like CIPRES and provide computational resources Galaxy lacking local researchers high-performance computing capabilities, further levelling the playing field for systematic research.

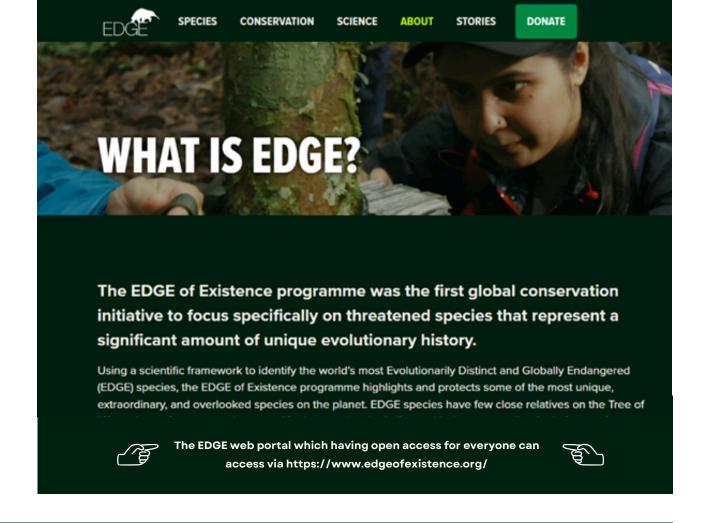
While classification remains fundamental systematics, big data approaches have expanded the discipline's applications far beyond traditional taxonomy. One prominent domain is ecological forecasting, where species distribution models incorporate phylogenetic information to predict range under climate change scenarios. understanding how evolutionary history constrains adaptation, these models provide more nuanced predictions than those based solely on environmental variables.

Agricultural innovation represents another frontier. Crop wild relative identification—locating wild species genetically related to cultivated plants has been accelerated through phylogenomic approaches, identifying potential sources of valuable traits for breeding programs. In a changing climate, these wild relatives may harbor genes crucial for developing drought-resistant, pest-resistant, or higher-yielding crop varieties.



Ecosystem restoration has similarly benefited from systematic insights. Phylogenetic community ecology examines how evolutionary relationships influence community assembly, helping restoration ecologists select species assemblages with complementary traits and ecological functions. Projects like the Millennium Seed Bank Partnership leverage systematic knowledge to prioritize conservation of plant genetic resources, safeguarding options for future restoration efforts.

Perhaps most fundamentally, systematic data underpins biodiversity conservation planning. The EDGE (Evolutionarily Distinct and Endangered) framework incorporates phylogenetic distinctiveness alongside extinction risk to identify species representing disproportionate amounts of unique evolutionary history. Applied to plants through the EDGE of Plants initiative, this approach has highlighted priority species for conservation that might be overlooked by traditional assessment methods.



Challenges

Despite remarkable progress, significant challenges remain in the era of data-intensive systematics. The "taxonomic impediment", a shortage of trained taxonomists relative to undescribed biodiversity, persists and may even be exacerbated by technological complexity. While AI shows promise for automating aspects of species identification, it cannot yet replace human expertise in detecting subtle morphological differences or integrating diverse lines of evidence for species delimitation.

Data biases present another formidable challenge. Geographic biases in collection effort have resulted in uneven representation across regions, with tropical areas despite their exceptional diversity, often underrepresented in databases relative to temperate regions. Similar taxonomic biases favor charismatic or economically important groups over others. These imbalances can propagate through analyses, leading to a skewed understanding of global biodiversity patterns.

Quality control issues multiply with data volume. As datasets grow and diversify, ensuring accuracy, provenance, and appropriate metadata becomes increasingly difficult. Systematic errors in large databases can propagate through derivative analyses, potentially leading to incorrect scientific conclusions or conservation priorities. The integration of legacy data collected before modern standardization efforts presents particular challenges for data harmonization. Perhaps most fundamentally, big data systematics requires cross-disciplinary literacy rarely encompassed within traditional training programs. Modern systematists must be conversant not only in plant morphology and evolution but also in bioinformatics, statistics, and computer science. This skills gap threatens to create a divide between data generators and data analysts, potentially fragmenting the discipline.

Embracing the journey ahead

Looking forward, several emerging approaches promise to address these challenges while further advancing systematic science. Pan-genomics, the study of the entire genomic content of a species or clade, including structural variants and the "dispensable genome" beyond the core conserved genes, will provide a more comprehensive understanding of plant diversity beyond simple phylogenetic relationships.

Cloud-based taxonomy platforms are evolving to integrate specimen data, molecular sequences, ecological information, and trait measurements within unified analytical frameworks. Projects like the Encyclopedia of Life move toward this vision by aggregating diverse data types for each species, while platforms like NEON (National Ecological Observatory Network) integrate genomic data with environmental monitoring.

The concept of "e-taxonomists", specialists who integrate traditional taxonomic expertise with computational proficiency, represents a promising model for training the next generation of systematists. Several initiatives, including the Planetary Biodiversity Inventories and the Dimensions of Biodiversity program, have emphasized integrated training alongside research objectives.

Perhaps most ambitious is the vision of systematic botany as a "global diagnostic network" for biodiversity, a worldwide infrastructure capable of rapidly identifying, classifying, and characterizing plant species while tracking changes in distribution and abundance. Such a network would combine fixed sensors, mobile applications, expert systems, and traditional expertise, operating as an early warning system for biodiversity threats while informing conservation responses.

Realizing this vision will require sustained investment in digital infrastructure, training programs, and global cooperation. Initiatives like the Alliance for Biodiversity Knowledge and the Biodiversity Information Standards organization are working to establish the necessary governance structures and technical standards, but increased financial support, particularly for developing nations home to much of Earth's plant diversity, remains essential.

Plant systematics has evolved from a specialized academic discipline focused on classification to a dataintensive global enterprise with applications across biology, conservation, agriculture, and ecology. This transformation reflects not only technological advancement but also a growing recognition of systematics' essential role in addressing planetary challenges. Understanding plant relationships has become inseparable from understanding ecological functions, predicting responses to environmental change, and developing sustainable management strategies.

As E.O. Wilson noted, "We should preserve every scrap of biodiversity as priceless while we learn to use it and come to understand what it means to humanity". Modern systematic botany provides both the tools to document this diversity and the frameworks to comprehend its significance. By integrating traditional taxonomic expertise with cutting-edge data science, the discipline navigates between deep-time evolutionary insights and urgent present-day applications.

In an era of unprecedented environmental change, systematic botany stands as a borderless science for a living planet, one where understanding the tree of life helps us safeguard its future. As the poet and naturalist Diane Ackerman observed, "The great affair, the love affair with life, is to live as variously as possible, to groom one's curiosity like a high-spirited thoroughbred, climb aboard, and gallop over the thick, sun-struck hills every day." Through the lens of modern systematics, we glimpse both the astonishing variety of plant life and our profound connection to its evolutionary tapestry.

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MOTHER NATURE

Mother nature's glory And her simple stories, My granny used to tell, Beside the village well. She would lead us to the mountains, High above the sky, freely flowing fountains. Among the clouds we would fly unscathed, Our imaginations, like fledglings newly hatched. But, gone are those days of carefree stories, Nature's heart soaked in worries. Man's relentless exploitations, Consume nature without hesitation. Nature bleeds red with rust, Her crown decorated with dust. Oh! hear the plea, every nation, Restore mother nature, and save every future generation.

By Vandana Sharma

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PLANTA

MACAZINE





