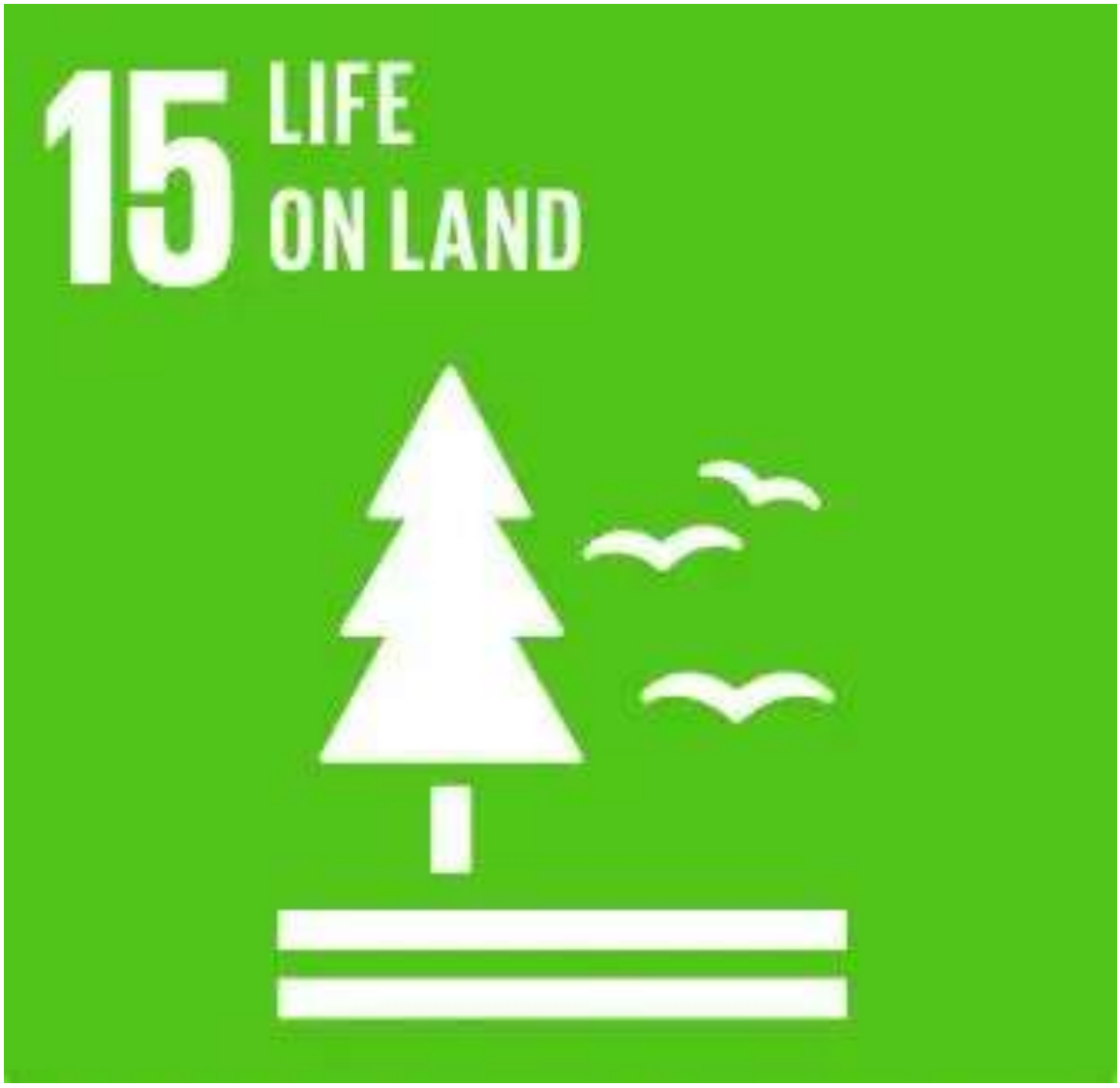
Karunya INSTITUTE OF TECHNOLOGY AND SCIENCES
(Declared as Deemed to be University under Sec.3 of the UGC Act, 1956)
MoE, UGC & AICTE Approved
NAAC A++ Accredited

SDG 15 Life on Land



Forests and natural resources are the integral factors in combating climate change, protecting biodiversity and the habitations of indigenous population. At a global level, deforestation and desertification which are caused by anthropogenic activities and climate change pose major threat to sustainable livelihood. Karunya Institute of Technology and Sciences (KITS) is located in a sprawling campus of 720 acres at the foothills of Siruvani in Western Ghats, which is a UNESCO declared biodiversity hot spot. Concerted efforts are being taken to maintain the serenity of nature and its wealth by maintaining a green campus.

15.1 Research on Land Ecosystems

Extensive research programmes are conducted to solve the problems identified in the localities near KITS with a mission to conserve and preserve the biodiversity. As a result, 36 research publications emanated during the year 2023 and 2024.

Sl.No	Title	Authors	Year	Scopus Source title	Citations
1	Laccase: A potential biocatalyst for pollutant degradation	Dong, C.-D.| Tiwari, A.| Anisha, G.S.| Chen, C.-W.| Singh, A.| Haldar, D.| Patel, A.K.| Singhania, R.R.	2023	Environmental Pollution	60

2	Advancement in algal bioremediation for organic, inorganic, and emerging pollutants	Dubey, S.| Chen, C.-W.| Haldar, D.| Tambat, V.S.| Kumar, P.| Tiwari, A.| Singhania, R.R.| Dong, C.-D.| Patel, A.K.	2023	Environmental Pollution	48
3	Structural diversity, functional versatility and applications in industrial, environmental and biomedical sciences of polysaccharides and its derivatives – A review	Elango, B.| Shirley, C.P.| Okram, G.S.| Ramesh, T.| Seralathan, K.-K.| Mathanmohun, M.	2023	International Journal of Biological Macromolecules	17
4	Revitalization of small millets for nutritional and food security by advanced genetics and genomics approaches	Lydia Pramitha, J.| Ganesan, J.| Francis, N.| Rajasekharan, R.| Thinakaran, J.	2023	Frontiers in Genetics	10
5	Solar Energy Forecasting Using Machine Learning and Deep Learning Techniques	Rajasundrapandiyanleebanon, T.| Kumaresan, K.| Murugan, S.| Subathra, M.S.P.| Sivakumar, M.	2023	Archives of Computational Methods in Engineering	9
6	Biotechnological interventions for improving the seed longevity in cereal crops: progress and prospects	Choudhary, P.| Pramitha, L.| Aggarwal, P.R.| Rana, S.| Vetriventhan, M.| Muthamilarasan, M.	2023	Critical Reviews in Biotechnology	7
7	Advances in Algomics technology: Application in wastewater treatment and biofuel production	Kadri, M.S.| Singhania, R.R.| Haldar, D.| Patel, A.K.| Bhatia, S.K.| Saratale, G.| Parameswaran, B.| Chang, J.-S.	2023	Bioresource Technology	6
8	Evaluating groundwater contamination: An examination of a municipal solid waste dump yard in southern India's Manchester City	Ringle Raja, S.| Kanagaraj, B.| Eunice, S.	2023	Resources, Conservation and Recycling Advances	6
9	Enhanced Bioremediation of arsenic-contaminated groundwater using bacterial biosorption, sequestration, and phytoremediation techniques	Thathapudi, J.J.| Shepherd, R.| Levin Anbu, G.| David Paul Raj, R.S.| Somu, P.| Jobin, J.	2023	Emerging Technologies in Applied and Environmental Microbiology: Developments in Applied Microbiology and Biotechnology	4
10	Microalgae and nano-cellulose composite produced via a co-	Tseng, Y.-S.| Patel, A.K.| Haldar, D.| Chen,	2023	Bioresource Technology	1

	culturing strategy for ammonia removal from the aqueous phase	C.-W.| Dong, C.-D.| Singhania, R.R.			
11	Managing Human-Elephant Cohabitation: Strategies for Mitigating Conflict and Encouraging Coexistence	Pratap, C.B.| D'Souza, A.| Athulya Velt, V.H.| Princess I, L.| Ashwini, V.V.H.| Joice, P.	2023	E3S Web of Conferences	1
12	Image-Based Bird Species Identification Using Machine Learning	Persia Abishal, B.| Juliet, S.	2023	2023 9th International Conference on Advanced Computing and Communication Systems, ICACCS 2023	1
13	Swertia chirayita (Roxb. ex Flem.): Chirayata/Chiretta	Mazumder, M.A.R.| Jubayer, M.F.| Ansari, M.J.| Ranganathan, T.V.	2023	Immunity Boosting Medicinal Plants of the Western Himalayas	1
14	Rugose spiralling whitefly, Aleurodicus rugioperculatus Martin infested host plant volatiles elicit a host locating behavior of aphelinid parasitoid, Encarsia guadeloupae Viggiani (Hymenoptera: Aphelinidae)	Kolanthasamy, E.| Nelson, J.| Pandi, A.| Palaniappan, D.K.	2023	Biochemical Systematics and Ecology	0
15	Foxtail Orchid (Rhynchostylis retusa): Anti-Diabetic Properties, Biodiversity, and Propagation	Lhamo, P.| Kumar, A.| Mahanty, B.| Choudhury, B.	2023	Ancient and Traditional Foods, Plants, Herbs and Spices used in Diabetes	0
16	Biodegradation Assay of Heavy Metals and Dyes Decolorization in Textile Industrial Effluent using Laccase Isolated from Pleurotus ostreatus	Johnnie, D.A.| Issac, R.| Prabha, M.L.| Gomez, L.A.	2023	Journal of Pure and Applied Microbiology	0
17	Microbiota in sustainable degradation of organic waste and its utilisation in agricultural industry	Sinduja, M.| John, J.E.| Suganthi, R.| Ragul, S.| Balaganesh, B.| Mathiyarasi, K.| Kalpana, P.| Sathya, V.	2023	Microbiomes for the Management of Agricultural Sustainability	0
18	Plant-based biopolymers for	Harshan, K.| Rajan, A.P.| Kingsley, D.|	2023	Biopolymers: Environmental Applications	0

	wastewater pollutants mitigation	Sheikh, R.A.| Aashmi, J.| Rajan, A.P.			
19	Convolutional Neural Networks for Early Detection of Forest Fires	Singh, J.| Shilpa Aarthi, M.| Idikkula, A.S.	2023	2nd International Conference on Automation, Computing and Renewable Systems, ICACRS 2023 - Proceedings	0
20	A Study on AI-ML-Driven optimizing energy distribution and sustainable agriculture for environmental conservation	Glady, J.B.P.| D'Souza, S.M.| Priya, A.P.| Amuthachenthiru, K.| Vikram, G.| Boopathi, S.	2024	Harnessing High-Performance Computing and AI for Environmental Sustainability	-
21	Navigating climate change in southern India: A study on dynamic dry-wet patterns and urgent policy interventions	Gautam, S.| Shany V, J.	2024	Geosystems and Geoenvironment	12
22	Bibliometric and Scientometric Assessment of the Environmental Impact and Sustainability of Open Cast Iron Ore Mining: A Comprehensive Analysis	Singh, V.V.| Gautam, S.	2024	Water, Air, and Soil Pollution	31
23	Plant-based biopolymers for wastewater pollutants mitigation	Harshan, K.| Rajan, A.P.| Kingsley, D.| Sheikh, R.A.| Aashmi, J.| Rajan, A.P.	2024	Physical Sciences Reviews	51
24	Spatial analysis and assessment of soil erosion in the southern Western Ghats region in India	B, A.| K.R, R.| R, S.R.| M, M.D.| K, R.	2024	Environmental Monitoring and Assessment	30
25	Metalloproteomics: Unraveling the Metal Binding Proteins of Diverse Metal-Resistant Bacteria	Jamunasri, N.| Iyer, A.| Prabha, M.L.| Issac, R.| Murugan, S.	2024	Asian Journal of Chemistry	86
26	Unveiling the Hydrological NDWI: Random Forest Analysis of Landsat Images - Siruvani Dam, India	Sam Navin, M.| Mithun, N.| Joel Richard, G.	2024	International Conference on Smart Systems for Applications in Electrical Sciences, ICSSES 2024	-

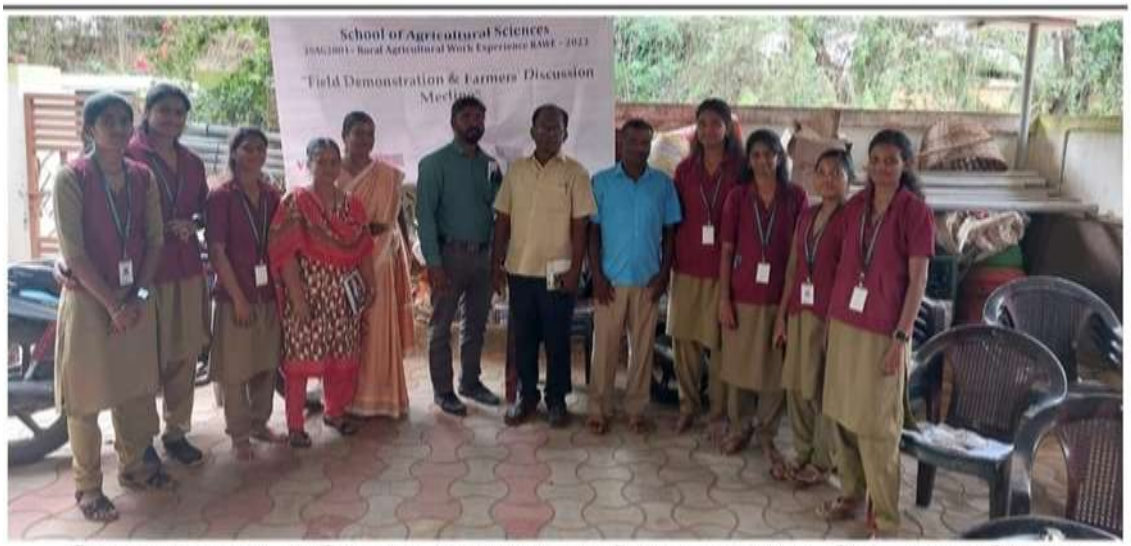
27	Assessment of Vegetative Cover Dynamics During Pre and Post Covid-19 Period Using Sentinel-2A Imageries in the Western Ghats, South India	Sathian, S.| Brema, J.	2024	Mapan - Journal of Metrology Society of India	47
28	Sustainable groundwater development using semi-supervised learning and community-led total forestry and pasture approach	S, U.M.| Alphy, A.| Deivasikamani, G.| Prakash, U.| Shadrach, F.D.| Kumar, M.A.| Manoj, S.	2024	Groundwater for Sustainable Development	6
29	Integrating the NDVI-Random Forest Classification for Vegetation Analysis - Yercaud Hills, India	Navin, M.S.| Aravind Sidharth, B.G.| Richard, G.J.	2024	2nd IEEE International Conference on Data Science and Information System, ICDSIS 2024	-
30	Recovery of Elements Using Green Plants for Potential Valorization of Waste Metals	Mamatha Bhanu, L.S.| Mitra, A.| Iyer, A.| Gupta, D.K.| Chatterjee, S.	2024	Valorization of Resources from Urban Mined Materials: World Scientific Series on Advances in Environmental Pollution Management - Volume 3	-
31	Investigation of Grey Wolf Algorithm for Solving Heterogeneous Unmanned Aerial Vehicle Task Assignment Problem	Bestus, P.M.J.| Issac, T.| Terence, J.S.| Subash, T.D.	2024	2024 International Conference on Advances in Modern Age Technologies for Health and Engineering Science, AMATHE 2024	-
32	Biocalcification-Based Stabilization of Cadmium-Enriched Phytoremediation Biomass Using Advenella sp. AV1	Shah, V.| Mahanty, B.| Daverey, A.	2024	Water, Air, and Soil Pollution	31
33	Forest Wildfire Detection from Satellite Image Using Deep Learning	Elizaroshan, D.| Raj Kumar, J.S.	2024	2024 International Conference on Communication, Computing and Internet of Things, IC3IoT	-

				2024 - Proceedings	
34	Comprehensive phytochemical exploration of red, sweet and sour tamarind genotypes through GC-MS analysis	Amaravel, M.| Thankappan, S.| Binodh, A.K.| Singh, B.C.| Akshayasri| Krishnan, R.G.| Nagarajan, B.| Mayavel, A.	2024	Plant Science Today	75
35	Microbial immobilization as an adept bioremediation tool for dye degradation	Krishnan, S.K.| Subbiah, K.| Subramanian, K.| Kandasamy, S.	2024	Emerging Innovative Trends in the Application of Biological Processes for Industrial Wastewater Treatment	-
36	A study on the assessment of pollution and strategies for rejuvenation of Bharathapuzha river in Kerala, India	Anto, C.A.| Verghese, V.| Kurian, P.K.| Cyriac, M.G.| Archana, S.	2024	International Journal of Water	92

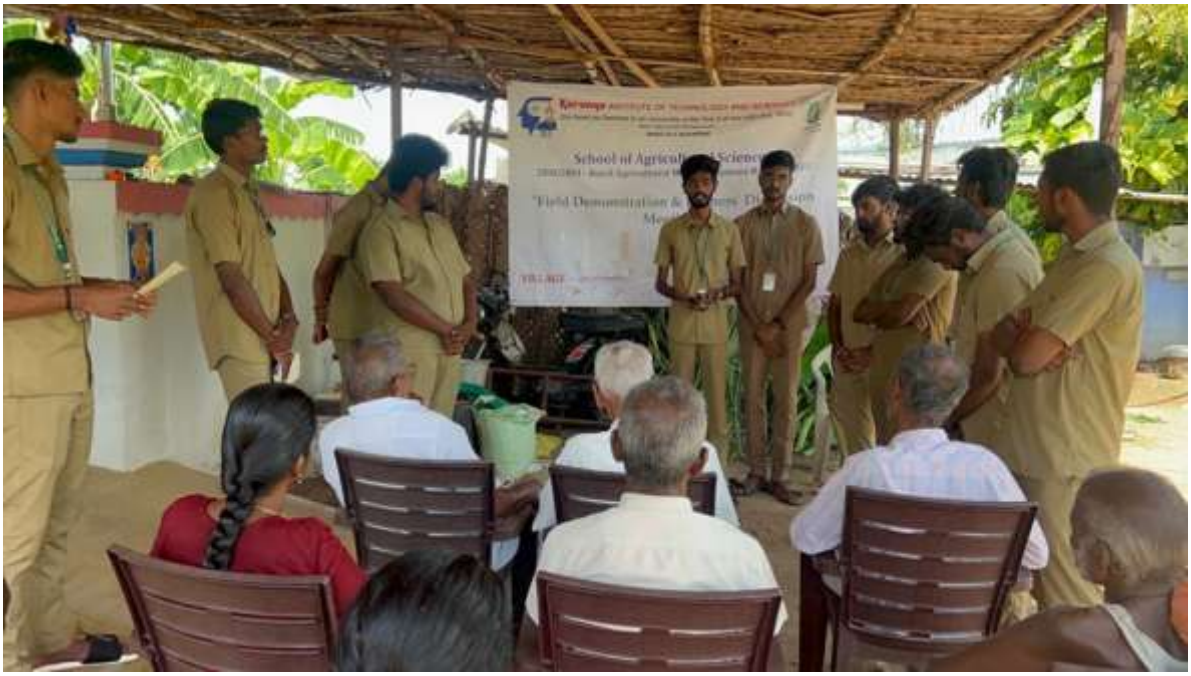
15.2 Supporting Land Ecosystems through Education

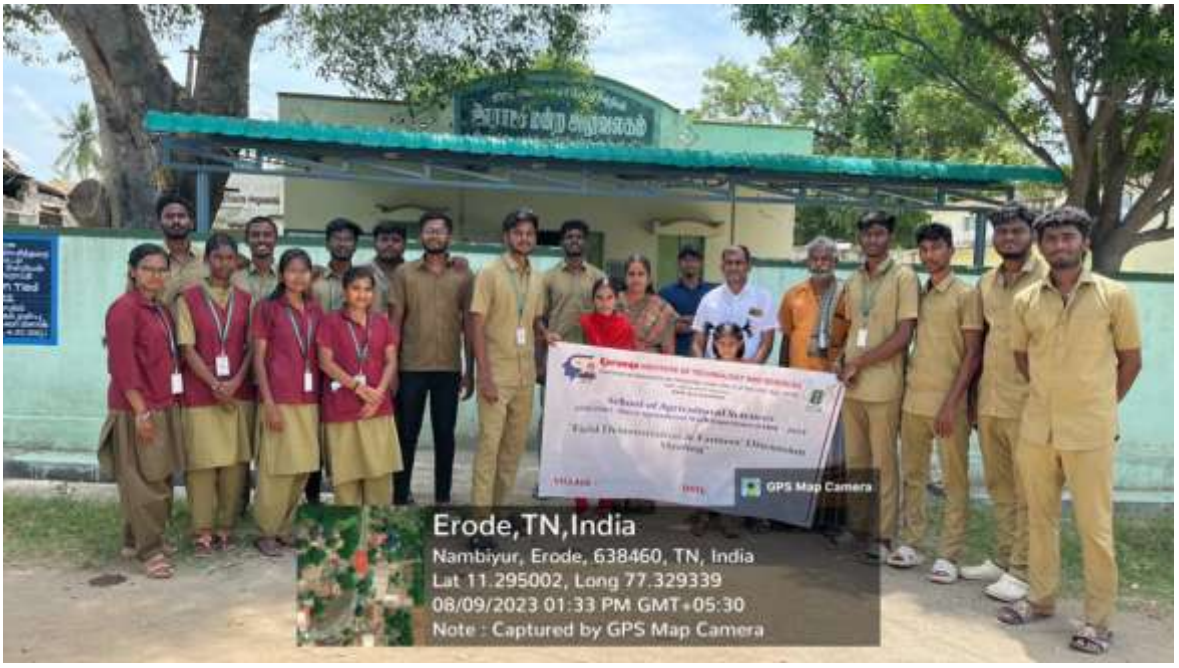
15.2.1 Events about sustainable use of land.

To achieve the Sustainable Development Goal on 'Life on Land', the curriculum was mapped to ensure that the course outcome complies with the expectation of the goal. The course on Rural Agricultural Work Experience (RAWE) with a weightage of 20 credits caters to SDG15 through the extended activities in villages and hamlets interspersed in southern India. Approximately 25 live demonstrations were conducted to 500 beneficiaries mostly on the farm-based technologies like organic input preparation, mushroom production and integrated disease and pest management etc. Besides exhibitions were organized on advanced technologies and product development such as hydroponics, vermicompost, solar cabinet dryer, plastic mulch, IoT based seed sowing machine, root feeding of coconut trees with micronutrients, preparation of agarbatti from waste flowers, Chrysoperla egg card for controlling soft bodied insect pests, IFS model, blue sticky trap, nutriseed pack, biofertilizers and bio-boosters that benefitted 809 farmers.



கோவை மாவட்டம் தொண்டாமுத்தூர் ஒன்றியம் மாதம்பட்டி கிராமஊராட்சி மன்ற அலுவலகத்தில் காருண்யா பல்கலைக்கழகத்தில் நான்காம் ஆண்டு வேளாண்மை துறை பயிலும் மாணவிகள் காளான் வளர்ப்பு மாதிரி சேகரிப்பு விதை நேர்த்தி இயற்கை மூலம்கால்நடை குடல் புழு நீக்கம் மற்றும் வாழை கண் நேர்த்தி பற்றி செயல்முறை விளக்கம் அளித்தனர் மேலும் இத்துடன் விவசாயிகள் கலந்துரையாடல் மற்றும் வேளாண்மை கண்காட்சியும் நடைபெற்றது இதில் ஊராட்சி மன்ற தலைவர்திரு முத்துராஜா அவர்கள் மற்றும் VAOதிருமதி தனலட்சுமி ஊரக வளர்ச்சித் துறை அலுவலர் திரு சிவபாலன் காருண்யா கல்லூரி பேராசிரியர் திரு பிலிப் ஸ்ரீதர் மற்றும் துணை பேராசிரியர்கள் மதுமிதா , ஷெலிமேரி கோசி தனுஷா FPo,ஊர் பொதுமக்கள் மற்றும் விவசாய பொதுமக்கள் கலந்து கொண்டார்கள்

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S. No	Nature of the Programme	Date of the Event	Place	Photographs with Description
1	Soil Health Card issued to farmers all over Tamil Nadu and Kerala through ELP	April 15-30, 2024	Tamil Nadu and Kerala	Soil fertility status was analysed and based on that, recommendations were given to farmers

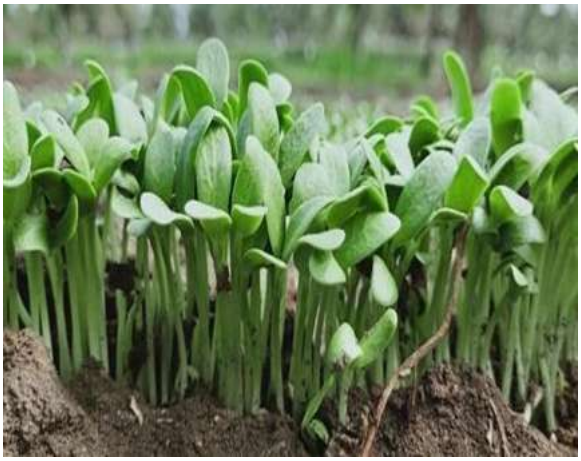
2	Vermicompost Training Programme through ELP	25.03.2023	Siruvani Tribal Settlement	 The vermicompost training was given to the tribal village farmers in Siruvani tribal settlement region and totally 25 farmers were benefited

Furthermore, the Experiential Learning Programme (20 credits) provide students an excellent opportunity to develop entrepreneurial skills through hands-on experience, confidence in their ability to design and execute enterprises and projects leading to a sustainable livelihood. Through eleven modules, 341 students were trained to initiate their own entrepreneurial activities.

15.2.2 Sustainably farmed food on campus.

The campus produces sustainable farmed food on campus by growing organic greens in 0.75 acres. Greens such as amaranthus, coriander and spinach are cultivated using the organic input such as cowdung, cow urine, vermi-compost, panchagavya, dasagavya, and 3G extract. Azolla is also cultivated in the coconut farm to enrich soil and to be used as poultry feed. Besides two units of biocontrol agents production, biofertilizer production, vemicomposting units, and mushroom cultivation contribute to SDG 15 through efficient recycling of farm waste.

Students' Involvement in Organic Greens Production Plot

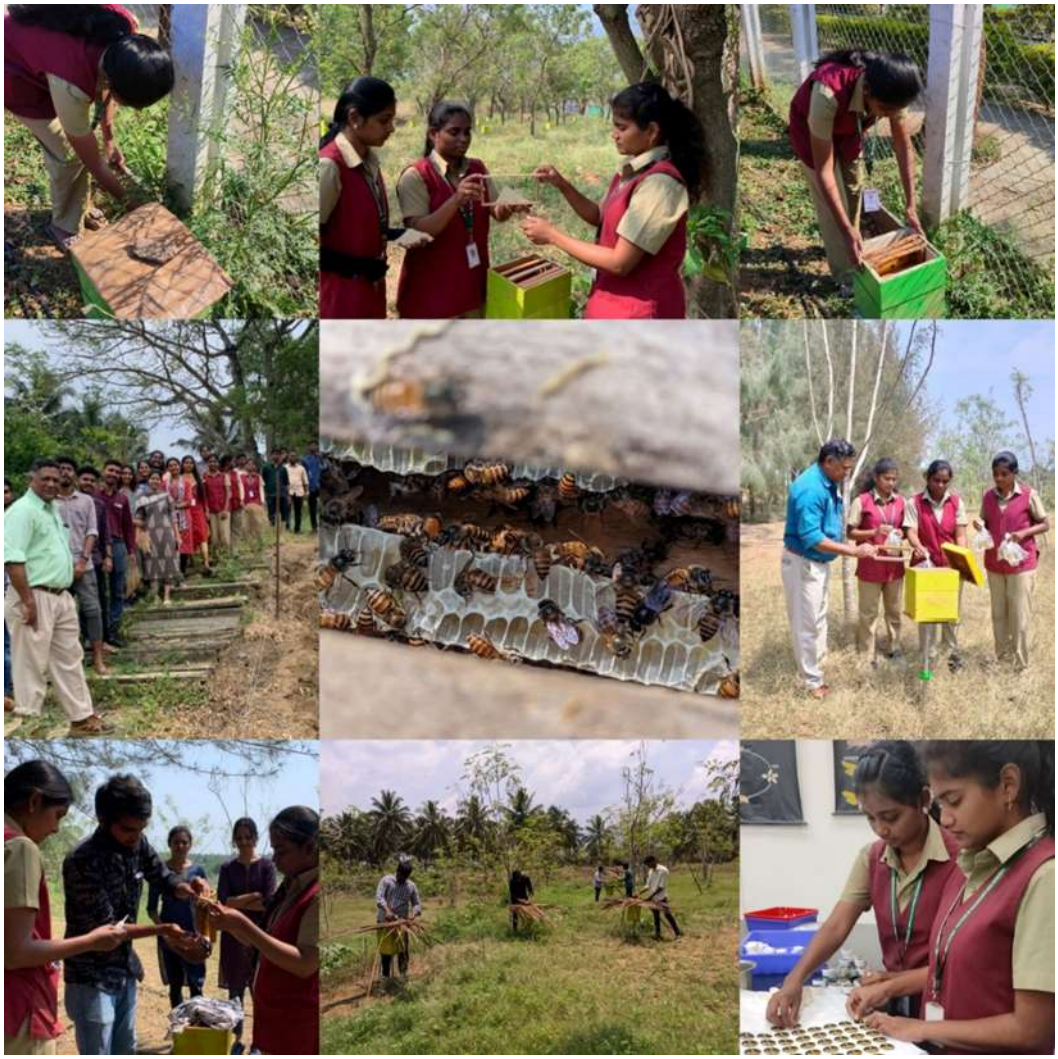
Mushroom Production

Mushroom Production Technology, a vital branch of Plant Pathology, focuses on the scientific cultivation of edible and medicinal mushrooms. This field plays a significant role in food security, nutritional enhancement, sustainable waste recycling, and rural employment.
The ELP, Mushroom Production Technology equips students with the necessary technical knowledge and hands-on skills in mushroom cultivation, ensuring employability, entrepreneurial readiness, and professional competence.

Bee Keeping and Honey Extraction

In the ELP, Beekeeping, students are introduced to the scientific management of bee colonies, including the identification of bee species (Apis cerana indica, Apis mellifera), hive structure, seasonal colony management, pest and disease control, and pollination benefits. Field demonstrations focus on the installation of bee boxes, feeding management, queen rearing, and the maintenance of healthy hives under diverse agro-climatic conditions. Participants learn to record hive productivity and assess floral resources essential for nectar and pollen foraging.

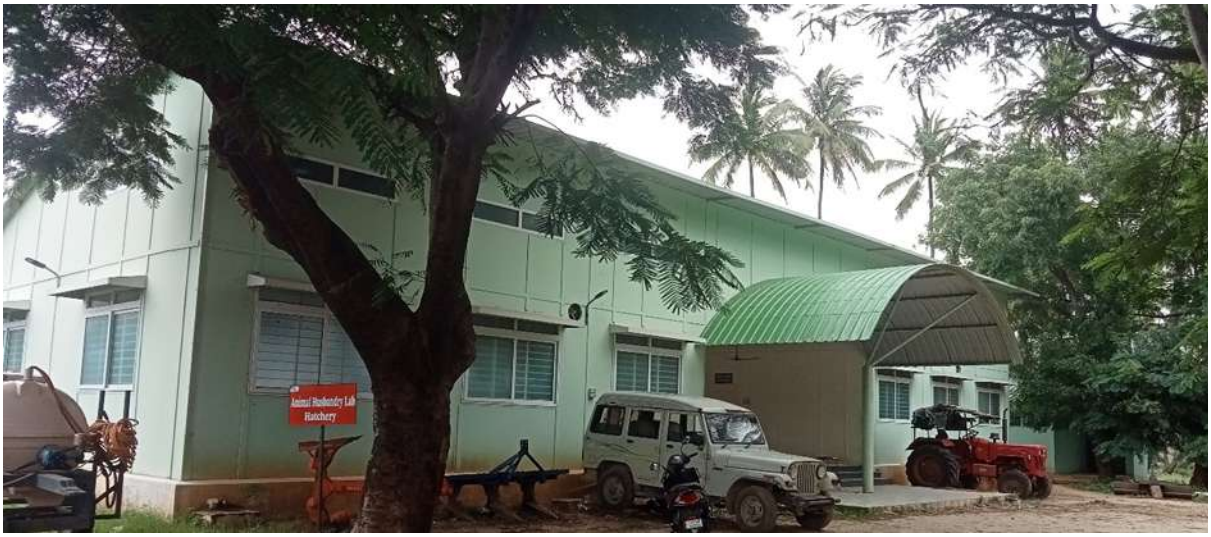
A major component of the program involves honey extraction and processing, where students gain practical exposure to using honey extractors, filtration, moisture determination, and hygienic packaging for market readiness. Emphasis is placed on quality assurance, branding, and the economic feasibility of small-scale honey enterprises. The program also highlights the ecological significance of bees in crop pollination and biodiversity conservation, aligning with SDG 15 (Life on Land).

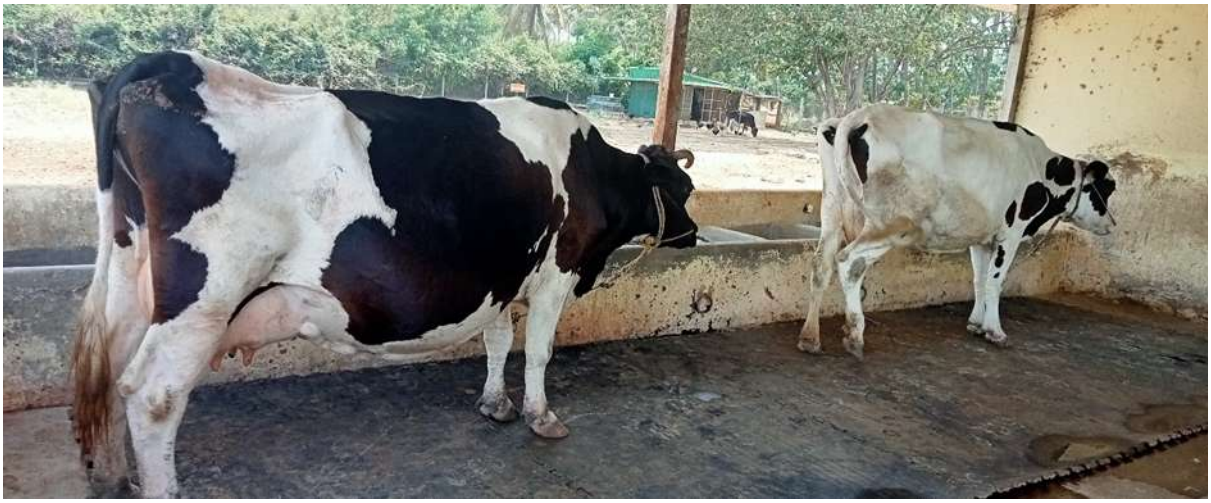


15.2.3 Maintain and extend current ecosystems' biodiversity

Veterinary Clinic

The faculty member of the Division of Animal Sciences is an approved practitioners as per the Veterinary Council of India. Actions are being initiated to establish a veterinary hospital to cater to the needs of the rural community. The Veterinary professionals conduct awareness programmes on livestock management in the neighboring villages and hamlets. Apart from this KITS has an animal husbandry unit hosting an ox, 9 cows, 2 calves 30 goats, 4 goat kids along with 20 ducks, 20 hens, 7 guinea fowls and 1 turkey.





The Hatchery Unit

Two Hatchery Units, one attached to the farm and the other attached to the veterinary lab are in the north instructional farm. Each incubator (YESAM Incubator) has an incubation capacity of 120 eggs and is fully automated. Both duck and chick eggs are used in the hatchery.

This is strictly for academic purpose and has not been put on a commercial scale.,

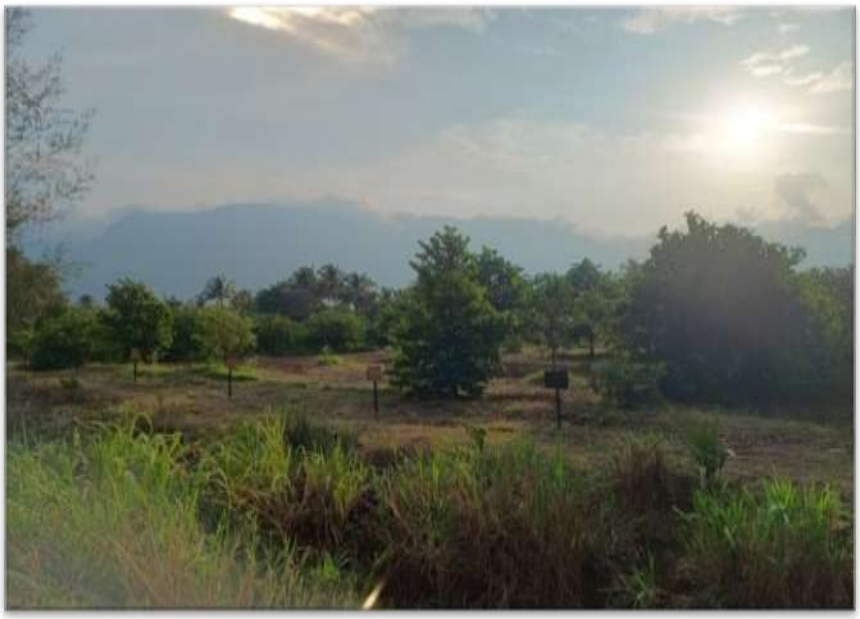
15.2.4 Educational programmes on ecosystems

The instructional farm spanning over 329 acres includes a North farm of 129 acres and a South farm of 200 acres (150 acres for field crops and 50 acres under agro- forestry). A state of art polyhouse, green house, mist chamber, B class centralized meteorological observatory, veterinary unit and field classrooms are in the north farm. A butterfly garden, medicinal garden and rose garden spread over two acres are used for live demonstrations. A large expanse of land is also available for the cultivation of a variety of field and horticultural crops. Separate blocks of mango, banana, sapota, grapes, guava, dragon fruit, moringa, curry leaf and various underutilized and under exploited fruits for instructional purposes are being maintained. Coconut based intercropping, mixed cropping and mixed farming models are also being practiced.

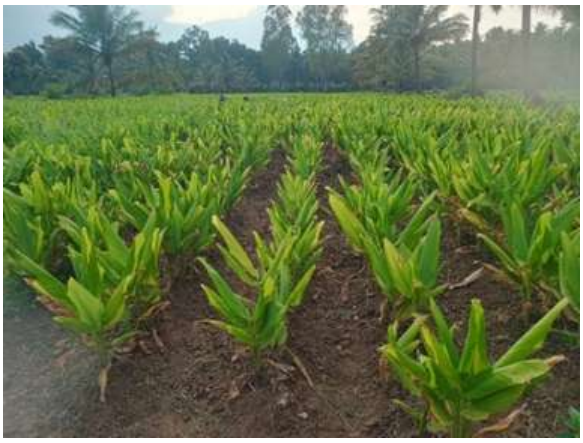
Intercropping: Coconut +Cocoa

Guava Instructional Farm

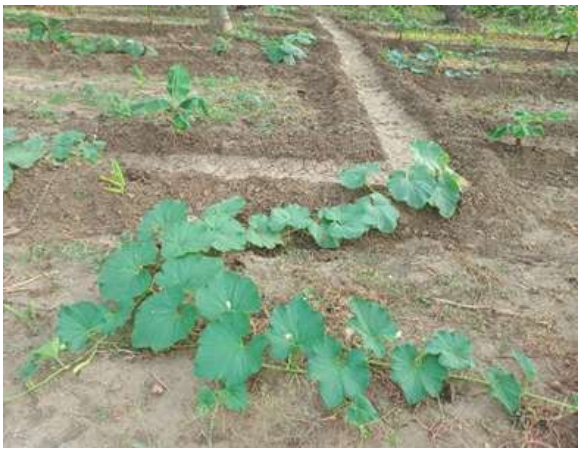
Grapes Instructional Farm



Fruits Demonstrational Orchard



Turmeric Block



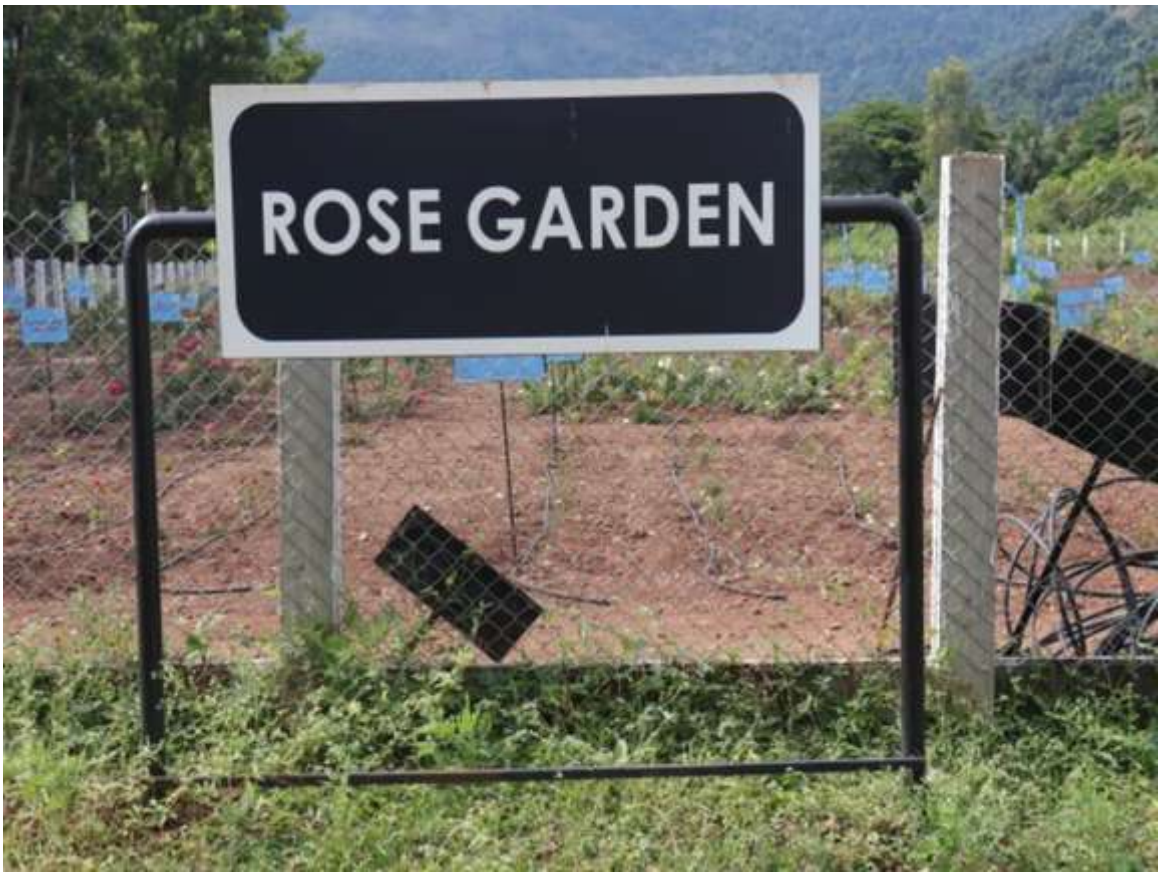
Cucurbit Block

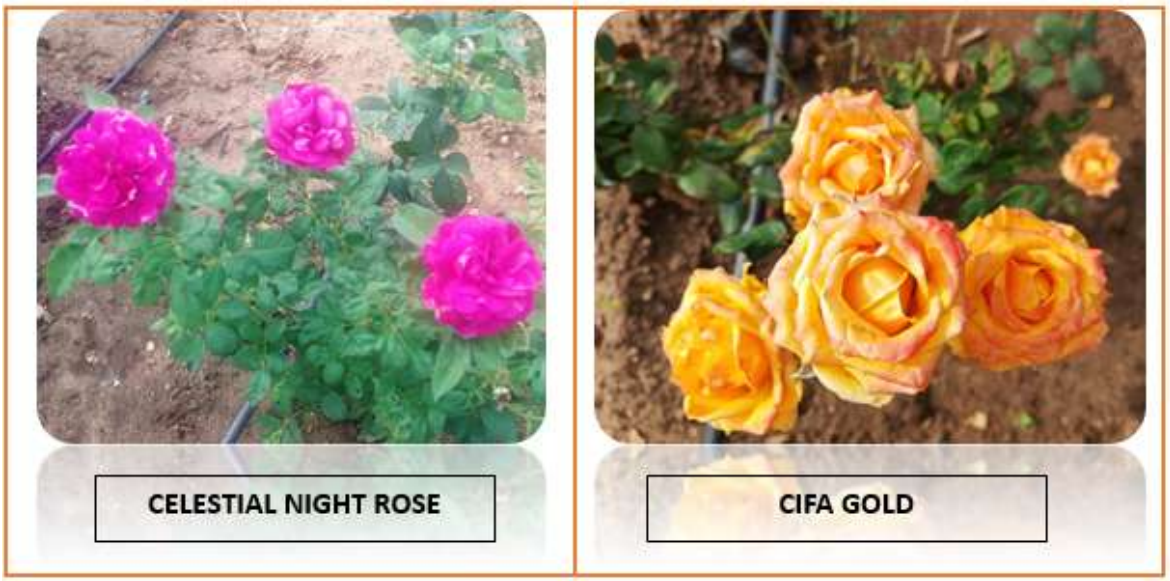
15.2.5 Sustainable management of land for agriculture and tourism (educational outreach)

KITS being situated in the lap of Western Ghats, is a habitat for diverse insects, birds (both resident and migratory), indigenous and exotic plant species including medicinal herbs, and a host of invertebrates and vertebrates. With an immense interest to conserve the biodiversity, considerable effort has been taken for afforestation, establishment of ornamental and herbal gardens, conservation of germplasm for indigenous millets and rice, creation of farm ponds, installation of polyhouse and greenhouse for protected cultivation and preservation of underutilized plant genetic resources.

Rose Garden

Rose garden was established with the aim to impart knowledge to the B.Sc (Hons) Agri students about the different types of roses, their cultivation and their utility in cut flower and perfume industries. The total area of the garden is 70 cents wherein seven kinds of roses namely Miniature, Floribunda, Hybrid Tea, Grandiflora, Polyantha, Climbing and Edward roses are raised for academic demonstrations.





COCONUT ICE

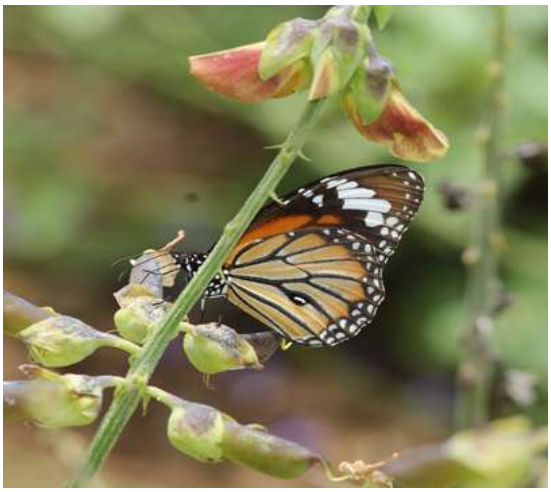
POLIANTHA

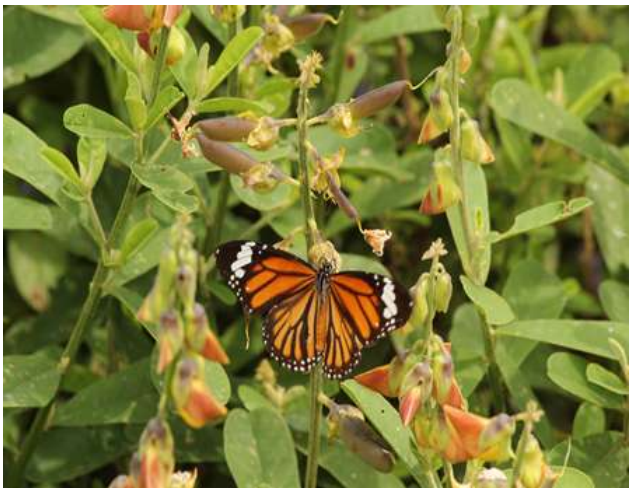
SCENTIMENTAL ROSE

TAJMAHAL ROSE

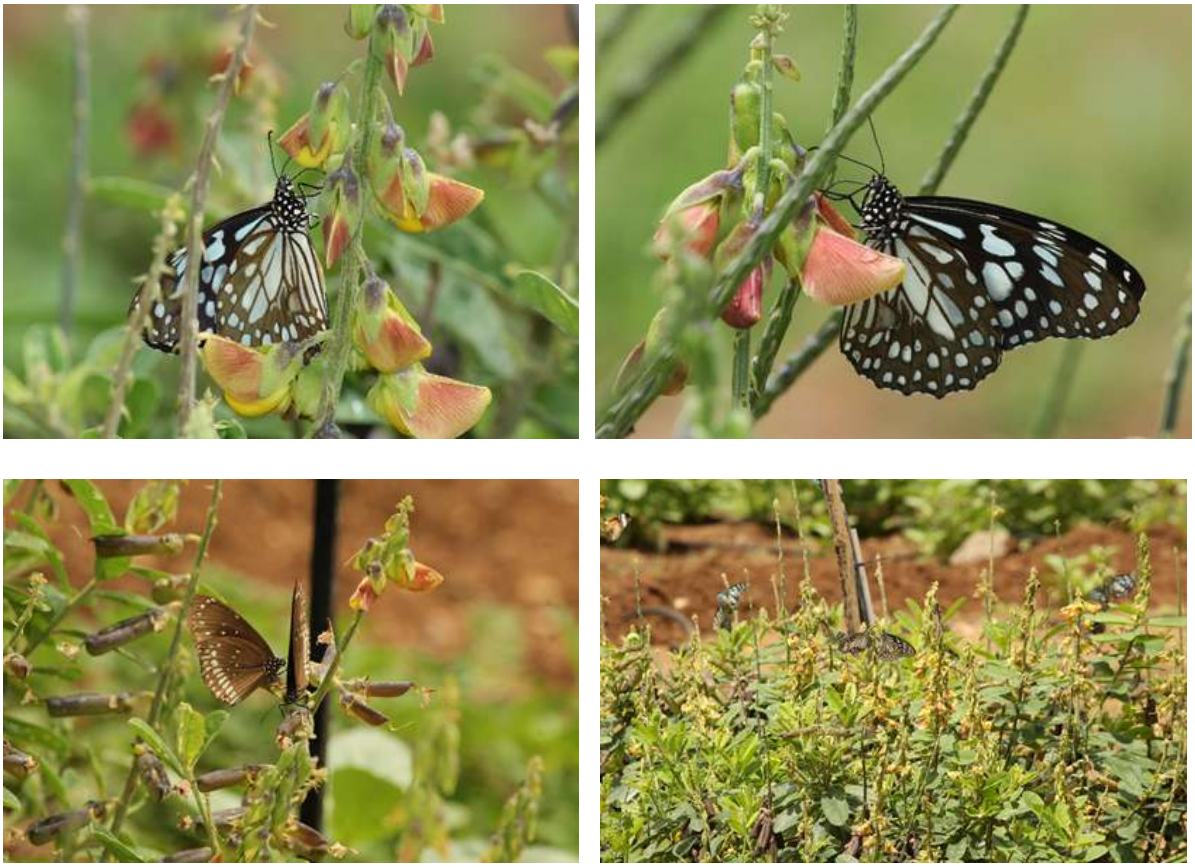
Butterfly Garden

In KITS Butterfly Garden, one can witness native butterflies hovering in the open landscape such as Nymphalidae, Papilionidae, Pieridae, Lycaenidae etc.





Danaus genutia



Euploea core

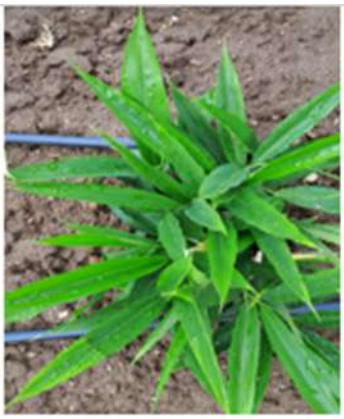
Medicinal Garden

Indigenous and Herbal medicine is one of the 25 technology missions of KITS. The medicinal garden spans across an area of 70 cents housing 15 tree species, 10 shrubs, 15 climbers and 40 annuals. The medicinal plants are broadly grouped into various categories such as anti-cancerous, anti-asthmatic, anti-analgesic, anti-inflammatory, anti-diabetic, skin care, insect bites, hair care, gastrointestinal disorders, liver and kidney functioning.


Gymnema
Gymnema syllvestris
Asclepiadaceae
Anti-diabetic

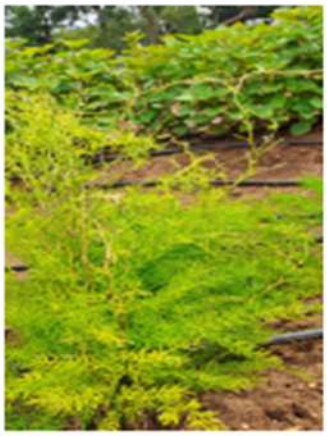
Acalypha indica

Hibiscus rosasinensis

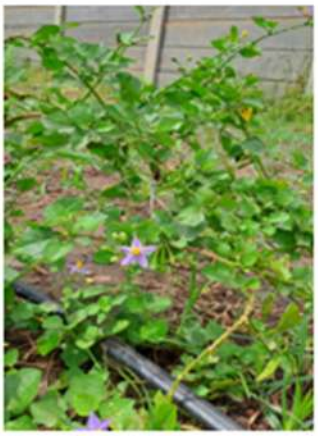


Alpinia galanga

Justicia adhatoda



Asparagus sp



Solanum trilobatum

Leucas aspera

Tinospora cardiophylla

Indigofera tinctoria

15.3 Supporting Land Ecosystems through Action

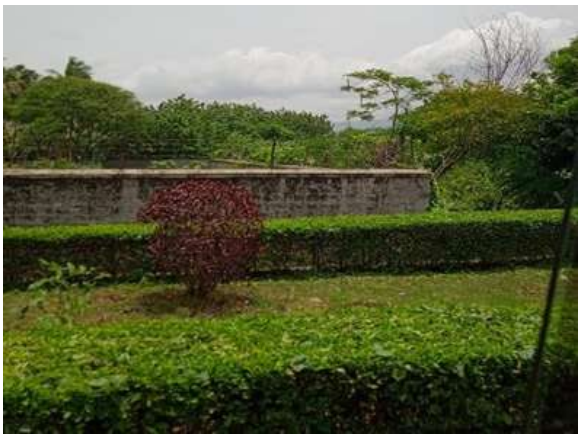
15.3.1 Sustainable use, conservation and restoration of land (policy)

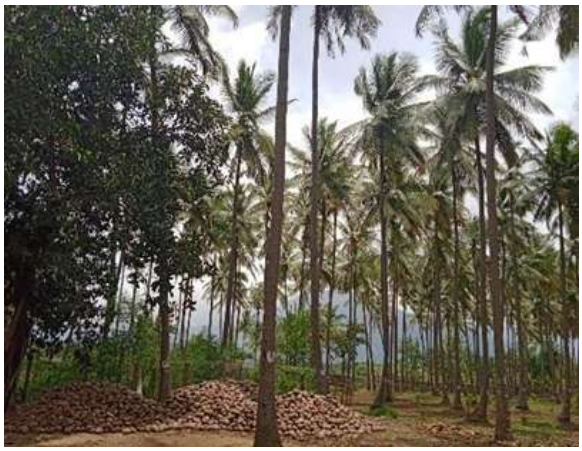
KITS is maintaining more than 75% of green cover area and open unutilized landfills zone after building construction as per the guidelines of World Green BuildingCouncil, Indian Green Building Council, Environmental Regulations and Compliances.

The policy regarding sustainable use, conservation, and restoration of land encompasses various measures, including the implementation of rainwater harvesting systems, designing landscapes, and controlling soil erosion. Additionally, it involves the operation of water irrigation, utilizing methods like drip and sprinkler irrigation. The professional execution of all these ecological plans on campus is entrusted to organizations such as eco clubs, nature clubs, associations, forums, SSL, NCC (National Cadet Corps), and the NSS (National Service Scheme).

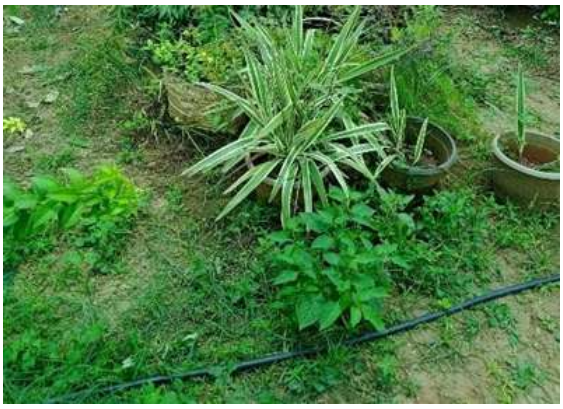
Sustainable Use and Land Restoration

Rainwater Harvesting System in KITS





Landscape Design and Soil Erosion Control



Germplasm Collection and Conservation of Little Millet (Panicum sumatrense)

CO 4 Samai
IS- Arched
PC- Intermediate

Paakulumkarunsamai
IS- Arched
PC- Compact

Chittansamai
IS- Diffused
PC- Open

Kolunthanasamai
IS- Diffused
PC- Open

Kothusamai
IS- Arched
PC- Intermediate

Kottatharasamai
IS- Diffused
PC- Open

ATL 1
IS- Diffused
PC- Open

Sirusamai
IS- Diffused
PC- Open

Vellaisamai
IS- Globose, elliptic
PC- Compact

Periyasamai
IS- Arched
PC- Compact

Jawadhu local samai
IS- Diffused
PC- Open

Perungolaisamai
IS- Arched
PC- Intermediate

Cultivation of Rare and Exotic Vegetables in Polyhouse

15.3.2 Monitoring IUCN and other conservation species (policies)

A Centre for Conservation and Management of Natural Resources was established in KITS during the year 2013. Within the KITS campus, most of the plant species, approximately 85%, are either wild or native. The remaining 15% comprise ornamental plants.

15.3.3 Local biodiversity included in planning and development

Notably, the campus hosts a significant number of plants that excel in producing oxygen and absorbing carbon dioxide. These plants possess a unique ability to generate oxygen during the night and contribute to air purification by removing various harmful gases from the atmosphere. Furthermore, the KITS campus is abundant with plants like the areca palm, which are highly efficient in oxygen production and carbon dioxide absorption. Other plant species include the Money plant, Neem tree, Tamarind tree, Ficus, Bamboo, Arjun tree, Magizhamboo, Marudhu, Maramalli, Nettilingam, Manja arali, Puvarasu and Pongam trees.

15.3.4. Alien Species Impact Reduction

In KITS, alien or invasive plant species are prevented from the first point itself to encourage the native biodiversity. No exotic plant species are permitted inside the campus premises without proper authentication and clearance from quarantine.

15.4 Land sensitive waste disposal

15.4.1 Water discharge guidelines and standards

KITs have installed adequate number of STPs in different locations inside the campus to treat the waste water as per the guidelines of Tamil Nadu Pollution Control Board. Three biogas plants are specifically designed to treat the wastewater from the toilets. This process results in the production of 114 kilograms of cooking gas daily, which is equivalent to the output of six standard commercial gas cylinders. the greywater originating from the kitchen facilities in the residences undergoes treatment in four separate Sewage Treatment Plants. The sludge that is derived from these STPs is repurposed as a form of organic fertilizer.

Biogas Plant in KITS

15.4.2 Policy on plastic waste reduction

KITS show keen interest to ban use of single -use plastics in the food court and shops inside the campus. The plastic materials are replaced by degradable paper cups, plates and carry bags. Plastic ban campaigns are being conducted to create awareness among the public and students to avoid plastics in daily affairs.

15.4.3 Policy on hazardous waste disposal

Wastes generated in and around KITS are handled in a scientific way to ensure an environment-friendly residential campus. Effective solid waste management practices are being implemented to make the campus ‘Zero Garbage Zone’. The biological, chemical and

recyclable wastes collected from the campus premises arising out of various activities, such as laboratory, research, farm operations, maintenance and cleaning operations at the University level are disposed-off safely following the Central and State Government guidelines for waste disposal.

Conclusion

In the three decades of service to higher education, KITS has made significant progression in teaching learning, research and consultancy, innovation and transfer of technology, community service and value education to its valuable stakeholders. Realizing the critical importance of healthy terrestrial ecosystems for biodiversity, climate regulation, human well-being, and sustainable development, KITS emphasizes the interaction of all forms of life on land. Also KITs management underscores the need for responsible stewardship of natural resources in the western foot hills which may lead to a green campus providing a sustainable environment to the stakeholders.