

&gt;&gt;&gt;A QUATERLY NEWSLETTER&lt;&lt;&lt;

# BIO-RESOURCES BULLETIN

Thriving towards excellence in R&amp;D

## BIO-RESOURCES DEVELOPMENT CENTRE

### ABOUT US



Bio Resources Development Centre is a registered institution under the Meghalaya Society Registration Act XII of 1983 under the Planning, Investment Promotion and Sustainable Development Dept. Govt. of Meghalaya. It became operational during the year 2003. The registered office of the BRDC is located at 5 ½ Mile, Upper Shillong. The mandate of the Centre is **“Availing biotechnological opportunities and appropriating/ customizing such technologies into meaningful knowledge resources to conserve and sustainably use biological resources for promoting multiple livelihoods and local green economy”**

BRDC as an R&D Institution is promoting sustainable green technologies to the farming communities through training and capacity building to the farmers across the State of Meghalaya, promote indigenous system of Medicine through value addition of herbal medicines, documentation of Traditional Knowledge and practices in the state and promote conservation of indigenous orchids, horticultural and agricultural crops through tissue culture techniques. Other programmes include R&D and production of biofertilisers to ensure availability of bio-inputs for various agricultural and horticultural crops, Seed saving initiative for food security is being carried out for indigenous/ local/ heirloom seeds. These programmes and initiatives have made many transformative impacts on various stakeholders of the State.

The Centre is also the state organic certifying agency and it is the authorized Regional Council for PGS-India Certification programme under the Ministry of Agriculture and Farmers' Welfare, Government of India.

# EDITORIAL NOTE

Dear Readers,

It is with great pride and anticipation that we present to you the inaugural edition of the Bio-Resources Bulletin, the official quarterly publication of the Bio-Resources Development Centre (BRDC), Government of Meghalaya.

This bulletin represents a new chapter in our ongoing endeavour to create a vibrant knowledge ecosystem around the sustainable development of bio-resources in the region. Rooted in the unique ecological and cultural richness of Meghalaya, BRDC has always believed in the power of science, innovation, and community partnership to shape a future that is both environmentally resilient and economically inclusive.

The Bio-Resources Bulletin seeks to be more than a record of institutional activities. It is envisioned as a thoughtful platform-one that reflects the dynamic interplay between research and practice, tradition and modernity, policy and people. Through this publication, we aim to share not just progress, but perspective, not just outcomes, but aspirations.

Each issue will bring to the fore curated stories from the lab, the field, and the community-spotlighting innovations in biotechnology, organic practices, conservation, indigenous knowledge, and rural livelihood enhancement. We will highlight emerging trends, national and international collaborations, and the small yet significant breakthroughs that shape the narrative of sustainable development in the North Eastern region.

As you turn these pages, we invite you to reflect on the journeys behind the headlines — of farmers reclaiming traditional crops through tissue culture, of youth being trained in frontier bio-techniques, and of remote communities becoming custodians of biodiversity through informed stewardship.

The launch of this bulletin is also a celebration — of partnerships nurtured, goals pursued, and visions shared. We extend our heartfelt thanks to the many scientists, field teams, community leaders, and collaborators whose commitment makes this work meaningful.

We hope that the Bio-Resources Bulletin informs, inspires, and invites you to engage — not just as a reader, but as a fellow traveller on the path toward a more sustainable and equitable bioeconomy.

Warm regards,

The Editorial Team

Bio-Resources Bulletin

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## Community-led Conservation: Seed Saving Training and Monitoring Held Across Meghalaya

[Shillong, June, 2025] – In a significant stride towards promoting sustainable agriculture and community resilience, a “Capacity Building Programme on Seed Saving and Storage Methods” was recently conducted for farmers and beneficiaries across the state. The initiative, spearheaded by the Bio-Resources Development Centre (BRDC), aimed at enhancing food security and rural livelihoods by equipping farmers with essential knowledge on seed preservation practices.

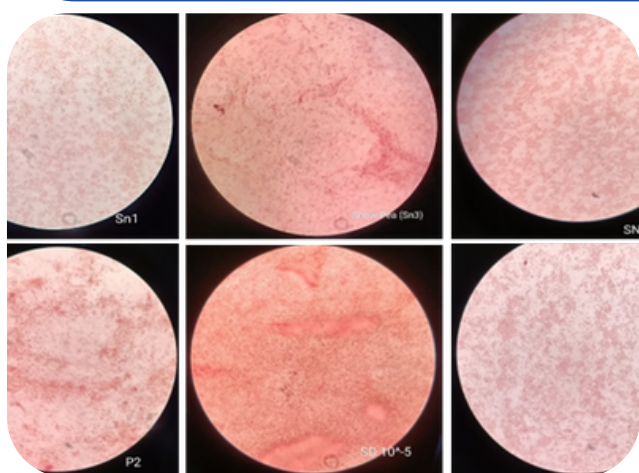
The programme featured interactive training sessions, practical demonstrations, and hands-on workshops, enabling participants to learn effective for seed saving, treatment, drying, and storage. Emphasizing both indigenous and scientific methods, the training empowered farmers to conserve quality seeds, reduce dependency on commercial seed systems, and protect local agrobiodiversity.

As part of ongoing efforts to strengthen community-based seed systems and promote sustainable agricultural practices, a field visit was undertaken to the existing Community Seed Banks at Khweng (Bhoirymbong, Ri Bhoi District) and Cham Cham (East Jaintia Hills District) for monitoring and evaluation purposes.

Community seed banks are the backbone of traditional farming systems and play a critical role in preserving indigenous seed varieties, through regular monitoring and technical support, we aim to ensure these seed banks remain functional, farmer-managed, and climate-resilient.



## From Microbes to Minds: Scientific Breakthroughs and Student Exposure in Biofertilizer Research



[Shillong, June, 2025] – The Bio-resource Development Centre (BRDC) is currently undertaking physiological characterisation of Rhizobial isolates as part of its ongoing efforts toward the development of efficient and eco-friendly biofertilizers to promote sustainable agriculture and reduce chemical dependency. In a parallel effort to promote experiential learning, students from Christ College and St. Anthony’s College visited BRDC for an exposure and knowledge exchange programme. The visit provided students with an opportunity to witness real-time lab and field research, including microbiological techniques, culture handling, and biofertilizer production processes.



The exposure visit was designed to bridge academic knowledge with applied science, engaging students in live research settings not only strengthens their understanding but also inspires the next generation of agri-biotech professionals.



## From Roots to Remedies: Advancing Traditional Medicine in the Himalayan Region



[Shillong, June, 2025]: In a significant step toward preserving and promoting indigenous healthcare knowledge, a documentation study on traditional medicine was successfully conducted in the West Jaintia Hills District. The initiative focused on capturing detailed insights into the region's rich heritage of healing practices, passed down through generations. The study utilized structured questionnaires to gather in-depth information from traditional healers. It recorded critical aspects of indigenous healthcare, including healer profiles, treatment methods, medicinal plant usage and cultivation, preparation techniques, dosage formulations, modes of administration, and even reported side effects of traditional remedies.

In a move to conserve and systematically document the region's valuable ethnobotanical resources, a team of researchers conducted a medicinal plant collection drive in South West Garo Hills District for herbarium preparation and scientific identification. The activity involved the careful collection of medicinal plant specimens used in traditional healing practices. Each sample was appropriately poisoned and dried using standard herbarium protocols to ensure long-term preservation. The dried specimens were then mounted on herbarium sheets and catalogued for future reference, education, and research.

As part of an ongoing effort to preserve indigenous healthcare knowledge and support scientific validation, a focused medicinal plant collection drive was conducted in the West Jaintia Hills District. The collection was undertaken based on leads provided by previously documented traditional medicinal healers, ensuring authenticity and cultural accuracy in plant use.

## State-of-the-Art Quality Control and Analytical Laboratory (QCAL)

[Shillong, June, 2025]: One of the major enabling steps in promoting sustainable agriculture and enhancing farmers' incomes is envisioned to be achieved through establishment of the Quality Control and Analytical Laboratory (QCAL) at the BRDC Experimental Farm, Laitmynsaw, Upper Shillong funded by the Meghalaya Basin Management Agency (MBMA). This state-of-the-art facility will be dedicated to supporting the organic certification of agricultural products in the region and ensuring the safety and quality of produce through comprehensive testing.

Spread across 5767.445 square feet, the laboratory will be equipped with advanced sections for proximate, high-end, microbiological and molecular biology testing. It is designed to analyze a wide range of parameters, including nutritional content, pesticide residues, heavy metals, and chemical contaminants in soil, water, fruits, and spices.

The target beneficiaries of the laboratory include exporters, farmers under Participatory Guarantee System (PGS) and National Programme for Organic Production (NPOP), and local agri-entrepreneurs. By providing accurate testing and certification services, QCAL aims to help farmers command better prices for their produce and access premium markets.

According to Sh. Thomas Iangjuh (Jr. Scientist and Lab Head), "The Facility will not only cater to the testing requirements for Organic certification and marketing in compliance to the required standards but also in supporting testing and capacity building to Academic and Non-academic Institutions."

The lab features some of the most advanced instruments in the region, such as the HPLC, LC-MS/MS, GC-MS/MS, UPLC-MS and the ICP-MS, among others, enabling highly precise and reliable analyses.

The QCAL is strategically positioned to play a vital role in Meghalaya's agricultural development by improving product quality, supporting organic certification, and boosting the economic potential of rural communities.





## Strengthening IVCS for Organic Growth in Meghalaya

[Shillong, June, 2025]. The Bio-Resources Development Centre (BRDC), in collaboration with Meghalaya Basin Management Agency (MBMA), successfully conducted a series of programmes aimed at promoting organic agriculture among Integrated Village Cooperative Societies (IVCS) across Meghalaya.

An Awareness Programme on Meghalaya Organics was held at Diengkynthong, East Khasi Hills District, for members of Khrang IVCS, Riad Mawshuit IVCS, and Mawlyndiar IVCS on the 10th, 14th, and 16th of April 2025. The programme provided valuable insights into the principles and benefits of organic farming under the Meghalaya Organics initiative, equipping farmers with knowledge to adopt sustainable practices.



Extending the initiative to the western region, Awareness cum Documentation Programmes on Meghalaya Organics were also conducted in the West Garo Hills and East Garo Hills Districts. Held on the 28th and 29th of May 2025 at Prime Hub (Tura) and DRDA Hall Williamnagar respectively, these sessions engaged members of Jangrapara, Chichang, Gabil Rongmil, Gabil Daringka, and Jamge IVCS, highlighting local organic practices and gathering documentation for future planning.



To complement the awareness programme, a Training Programme on Preparation of Bio-Inputs was organized at the BRDC Farm in Laitmynsaw, East Khasi Hills District, on the 11th, 15th, and 17th of April 2025. During this training, participants learned hands-on methods to prepare various organic inputs, including non-soil compost, vermi compost, NADEP compost, Berkley hot compost, organic growth promoters, bio-pesticides, and fish meal extract.



## MEGHALAYA STATE ORGANIC CERTIFICATION BODY (MSOCB) SECURES ACCREDITATION UNDER NPOP



[Shillong, June, 2025] – The Meghalaya State Organic Certification Body (MSOCB) has achieved a significant milestone by obtaining accreditation as a Certification Body for third-party certification under the National Programme for Organic Production (NPOP). This accreditation was granted by the Agricultural and Processed Food Products Export Development Authority (APEDA), under the Ministry of Commerce and Industry, Government of India.

The accreditation, awarded via letter no. ORG-2023-24-000111/0998 dated October 4, 2024, and bearing Accreditation Number NPOP/NAB/0050, enables MSOCB to certify organic operators in alignment with national standards and protocols set by the NPOP.

As part of the accreditation process, MSOCB successfully conducted verification and external audits for 19 organic operators who were previously under the purview of the Sikkim State Organic Certification Agency (SSOCA). These operators have now been officially registered under MSOCB. The organization is currently in the process of onboarding and registering additional operators to expand its certification services.



## Traditional Knowledge Revival: A Statewide Documentation Initiative

[Shillong, June, 2025] – In a significant step toward preserving and promoting indigenous cultural heritage, a comprehensive documentation project has been successfully carried out, aiming to preserve the rich cultural heritage and indigenous wisdom of the state. The initiative recorded traditional knowledge from 433 traditional healers and knowledge holders across 28 blocks in eight districts of Meghalaya.

The documentation covered various domains, including traditional medicine, agriculture (such as apiculture and traditional cultivation methods), veterinary practices, handloom, handicrafts, fisheries, and traditional foods. This effort reflects a commitment to safeguarding and recognizing the value of local knowledge systems that have been passed down through generations.

In East Khasi Hills alone, 69 knowledge holders across nine blocks were documented. Other districts included South-West Khasi Hills with 39 knowledge holders, Eastern-West Khasi Hills with 54, East Jaintia Hills with 45, North Garo Hills with 58, South Garo Hills with 45, East Garo Hills with 59, and South-West Garo Hills with 52 knowledge holders.



## Empowering Farmers Through Orchid Cultivation: A BRDC BioNEST Initiative



[Shillong, June, 2025] – The Bio-Resources Development Centre (BRDC) is making significant strides in horticultural development within Meghalaya, with a strong focus on orchid cultivation. These efforts were highlighted during the recent National Science Day Celebration 2025 held in Tura. BRDC actively participated in the National Science Day event, showcasing advancements in horticultural practices. As part of the expansion plan for the BioNEST Dendrobium Project, BRDC has identified 40 beneficiaries from various districts across the state to support orchid cultivation. This initiative aims to bolster local agricultural practices and empower communities through sustainable bio-resource utilization.

In line with the project's expansion, site inspections have been conducted in areas such as West Khasi Hills and Patharkhmah, Meghalaya, to facilitate further development and implementation. These ongoing efforts underscore BRDC's commitment to promoting scientific research and its practical application for the benefit of the state's residents.

## Revolutionizing Potato Farming: Off-Season ARC Plugs and Mini-Tubers for Enhanced Yields in Meghalaya

[Shillong, June, 2025] – The Bio-Resources Development Centre (BRDC) announced a significant breakthrough in potato cultivation, successfully enabling off-season production through the innovative use of Advanced Rooted Cuttings (ARC) plugs and G0 mini-tubers. The Centre's recent efforts culminated in the distribution of ARC plugs, produced during the traditional off-season, to local farmers. Among the first beneficiaries was Mr. Spingwell Kharmarsha, a successful farmer from West Khasi Hills, who received the plugs in April 2025.







In parallel, extensive field trials have been rigorously conducted at the Centre's experimental farm to assess the performance and adaptability of both the ARC plugs and G0 mini-tubers. These trials have yielded promising results, demonstrating the viability of cultivating high-quality mini-tubers in protected environments such as poly houses. Varieties like 'Phan Shidieng', 'Phan Syntiew', 'Phan Saw', and 'Phan Imdieng' have shown excellent growth and tuberization, indicating strong potential for widespread adoption.

## “PGS-India Progress Report: Sustainable Organic Farming Flourishes in Meghalaya”

[Shillong, June, 2025] — The Bio-Resources Development Centre (BRDC), functioning as a Regional Council under the Participatory Guarantee System (PGS-India), has recorded remarkable achievements in advancing organic agriculture across Meghalaya during the period from 1st March to 31st May 2025.

A total of 278.78 hectares of farmland was brought under organic certification, with 127 Local Groups (LGs) involving 1,932 farmers successfully registered under the PGS-India framework. These efforts spanned key projects such as the Sustainable Land Management (SLM-KfW) initiative and PM-DevINE, with more groups expected to come on board in the coming months.

In its drive for scientific rigor, 15 soil tests were conducted to ensure soil health and adherence to organic standards. field inspections were undertaken in 36 villages, alongside document signing sessions for 59 LGs from 34 villages. To build grassroots capacity, BRDC conducted awareness programs in 11 villages and training sessions for 35 LGs from 22 different communities.

Marking a milestone in certification, six PGS Green 1 Scope Certificates were issued, significantly enhancing market opportunities for organic farmers in the region.

BRDC also made a strong presence on the national stage. One Meghalaya farmer was honored as a Champion Farmer at the National Seminar-cum-Exhibition on Organic Farming organized by NCONF in Ghaziabad (18–19 March 2025). The Centre was further recognized with the Best Stall Award, underscoring its leadership and innovation in organic agriculture.

Looking ahead, BRDC reaffirms its commitment to expanding organic certification throughout Meghalaya, empowering farmers through training and exposure, and reinforcing market linkages to make Meghalaya a national model for sustainable agriculture.



## Centre’s Tissue culture initiatives



[Shillong, June, 2025]: They aim to conserve the rich biodiversity of indigenous orchid species through sustainable biotechnological interventions; safeguard endangered orchids by developing efficient mass-propagation protocols to support environmental restoration and relieve pressure on wild populations; and produce disease-free, high-quality planting materials of commercially important horticultural and medicinal crops—including banana (*Musa* spp.), pineapple (MD2 spineless and spine varieties), and Lakadong turmeric (*Curcuma longa*)—for distribution to the farming community.



# GLOBAL SCIENCE ROUND-UP: TRENDS, DISCOVERIES, AND DEVELOPMENTS

## *Ginger Compound Disrupts Cancer Cell Metabolism by Blocking Fat Synthesis*

**Natural molecule from kencur ginger impairs tumor growth by targeting energy production pathways**

Date: June 10, 2025

Source: Osaka Metropolitan University

Researchers from Osaka Metropolitan University have unveiled a promising natural strategy to combat cancer: a compound derived from kencur—a variety of ginger—has been found to inhibit tumor cell growth by disrupting their metabolic machinery.

Unlike healthy cells that generate energy efficiently through oxygen-dependent pathways, cancer cells often rely on an alternative route to sustain rapid proliferation. The kencur-derived compound, ethyl p-methoxycinnamate, doesn't directly interfere with this backup energy system. Instead, it suppresses de novo fatty acid synthesis, a process cancer cells depend on for building cellular structures and supporting growth.

Interestingly, when fatty acid production is blocked, cancer cells respond by ramping up their alternative energy mechanisms even further—ultimately overwhelming their system and halting their growth. This indirect metabolic disruption reveals a previously underexplored vulnerability in tumor biology.

The findings not only deepen our understanding of cancer metabolism but also highlight the therapeutic potential of natural compounds in developing novel anti-cancer strategies. This research paves the way for future studies on plant-derived molecules as complementary tools in oncology.







## Climate-Critical Fungi Remain in the Dark, with 83% Unclassified

Date: June 15, 2025

Source: Society for the Protection of Underground Networks (SPUN)

A new study reveals that 83% of ectomycorrhizal fungi—a group vital to forest health and carbon storage—are known only through DNA, with no formal names or descriptions. These so-called “dark taxa” remain scientifically unclassified, making them invisible to conservation efforts.

These fungi form essential underground networks that support trees and help ecosystems capture and store carbon, playing a key role in fighting climate change. However, their greatest biodiversity lies in tropical and under-researched regions, where conservation funding is limited.

Scientists warn that without urgent DNA sequencing, taxonomy work, and global collaboration, we risk losing these critical fungi and their habitats before we even understand them

## Climate Crisis Threatens Future of Today's Youth

Date: May 7, 2025

Source: Vrije Universiteit Brussel

A recent study from Vrije Universiteit Brussel, published in *Nature*, warns that under current climate policies—leading to around 3.5 °C of warming by 2100—approximately 1.5 billion children aged 5–18 today will face unprecedented lifetime exposure to extreme events such as heatwaves, droughts, floods, wildfires, and crop failures

In stark contrast, limiting global warming to 1.5 °C (the Paris Agreement target) could shield about 654 million of these children from such extreme lifetime exposure.

The research highlights the uneven burden: children from lower socioeconomic backgrounds will suffer disproportionately, particularly under weaker climate commitments.

The authors conclude there is a pressing need for rapid and deep greenhouse-gas reductions to protect younger generations from a “new normal” of climate extremes.







### *Scientists find a new way to help plants fight diseases*

Date: May 30, 2025

Source: Rutgers University

Scientists have achieved a major breakthrough in crop protection after 30 years of research, uncovering the structure and regulation of a key plant enzyme—metacaspase 9. Utilizing advanced crystallography and computer modeling, the team revealed precisely how this protein can trigger controlled cell death in plants—a natural defense against pathogens.

By manipulating this enzyme, researchers are now developing tools that enhance crop resilience—either by boosting its activity to contain biotrophic infections (e.g. powdery mildew, rusts) or inhibiting it to prevent necrotrophs from exploiting the plant-triggered cell death mechanism

This discovery, underpinned by atomic-level insights from NSLS-II X-ray crystallography and molecular dynamic simulations, is already protected by a provisional U.S. patent. It promises a safer, more sustainable arsenal to protect major food crops from devastating diseases

### *Cotton Virus Circulated Undetected for Nearly Two Decades*

Date: May 29, 2025

Source: American Phytopathological Society

New research reveals that the cotton leafroll dwarf virus (CLRDV)—a major pathogen of cotton—was quietly present in U.S. cotton fields for nearly 20 years before its official identification. Formerly thought to be recently introduced, this virus was already infecting cotton in Mississippi as early as 2006, with further detections in Louisiana (2015) and California (2018).

First reported in 2017, CLRDV's historic presence calls for a reevaluation of its geographic spread and management strategies. The findings underscore the power of reanalyzing archived genetic data to identify emerging threats in agriculture.

In a 2023 follow-up, researchers confirmed the virus's presence in Southern California—marking the region's first confirmed case. This discovery not only reshapes our understanding of CLRDV's timeline, but also emphasizes the importance of improved virus surveillance to protect U.S. cotton production.

