

BIO-RESOURCES BULLETIN

A QUATERLY NEWSLETTER

“In this festive season, may the harmony we share echo the harmony of nature, whose resources enrich our traditions and our future”

Message from the Editorial Team

It gives us immense pleasure to present Issue 1, Volume 3 of the BRDC Newsletter, a platform that continues to reflect the Centre's efforts, achievements, and ongoing commitment toward conserving, developing, and promoting the rich bio-resources of our region. This edition arrives at a special time of the year, a season filled with light, gratitude, and togetherness. As we step into the festive months, we hope this newsletter brings not only information and inspiration but also a sense of warmth and celebration. The stories, updates, and highlights featured here mirror the collective dedication of our teams, partners, communities, and stakeholders who continue to support the Centre's mission.

We extend our heartfelt appreciation to everyone who contributed their time, knowledge, and creativity to bring this issue to life. May this festive season enrich our spirits and strengthen our resolve to protect and promote the bio-resource wealth that sustains us all.

Warm wishes for a joyful and meaningful festive season!

Editorial Team,

Bio-Resources Development Centre (BRDC)



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Message from the Member Secretary



As we enter the festive season, a time marked by reflection, gratitude, and togetherness, it is heartening to acknowledge the deep and enduring bond between our cultural traditions and the natural resources that sustain them. The harmony we celebrate during these occasions mirrors the delicate balance of nature—an interconnected system that nurtures our livelihoods, enriches our heritage, and shapes our collective future.

The Bio-Resources Development Centre remains committed to conserving, valorizing, and sustainably utilizing our rich bioresources, particularly those rooted in indigenous knowledge and community stewardship. Each initiative undertaken during this quarter reinforces our resolve to integrate science, innovation, and tradition in a manner that safeguards biodiversity while enhancing socio-economic well-being.

This issue of the Bioresources Bulletin highlights our ongoing efforts, achievements, and collaborations aimed at strengthening sustainable bioresource management and promoting inclusive development. I extend my sincere appreciation to our researchers, field teams, community partners, and stakeholders whose dedication continues to drive meaningful impact.

May this festive season inspire renewed commitment to living in harmony with nature, ensuring that its gifts endure for generations to come.

Warm regards

Kum. Mitali Chandra, IAS

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BRDC Showcases Green Innovation at North East Science & Technology and Industrial Expo 2025

Shillong, October, 2025: The Bio-Resources Development Centre (BRDC) marked a significant presence at the North East Science & Technology and Industrial Expo 2025, held from 27th to 30th October at the North-Eastern Hill University. This esteemed event brought together innovators, researchers, and industry leaders across the region to celebrate advancements in science, technology, and industrial development.

BRDC demonstrated its commitment to sustainable progress by presenting cutting-edge bio-based technologies that emphasize environmental stewardship and resource efficiency. The team showcased a range of sustainable solutions designed around the unique bio-resources of Meghalaya, highlighting models that leverage local materials to foster green innovation.

Visitors to the BRDC stall experienced firsthand the centre's pioneering work in biotechnology, which not only advances scientific knowledge but also promotes eco-friendly industrial applications. The exhibition offered a remarkable opportunity for BRDC to connect with fellow innovators, explore collaborative ventures, and reinforce Meghalaya's role as a key player in the biotechnology landscape of the North East.

The centre expresses sincere gratitude to the event organizers for providing this vibrant platform to engage with the scientific community and industry stakeholders. BRDC remains dedicated to driving forward sustainable innovation, aligning with the vision of a greener, technology-powered future for the region.

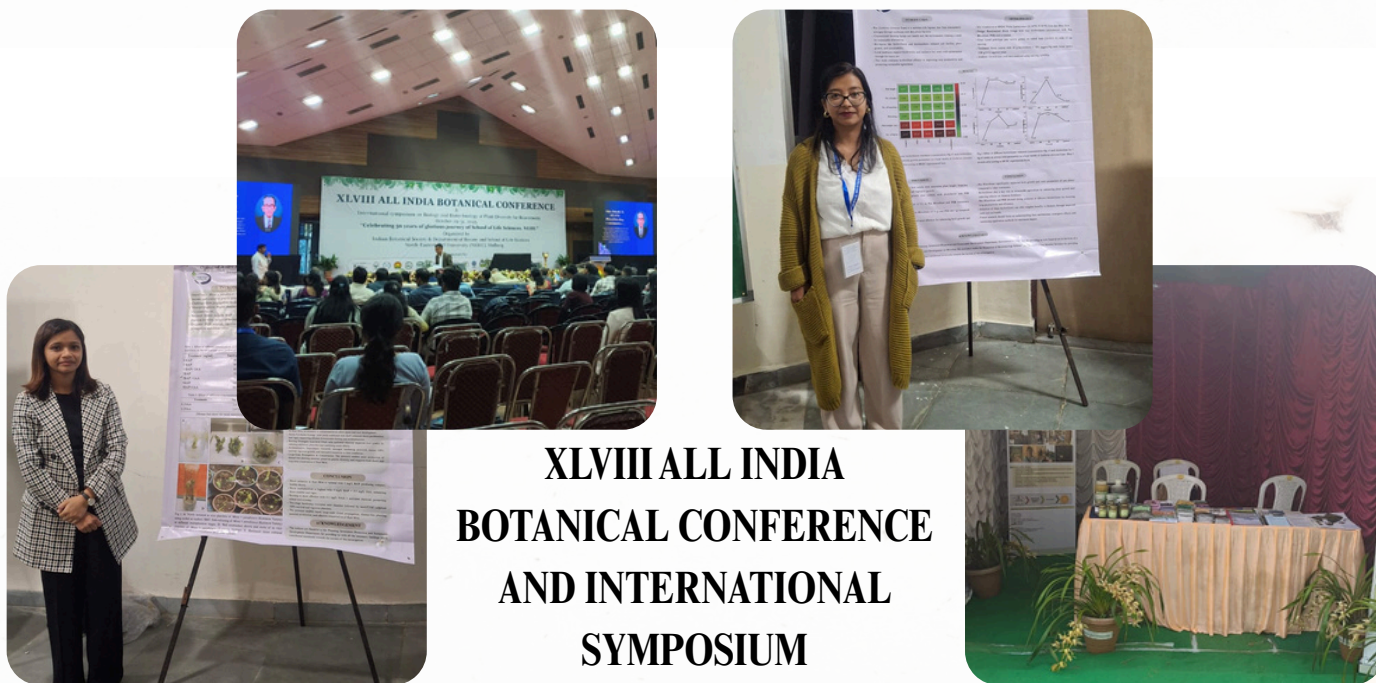


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BRDC'S ACADEMIC PARTICIPATION



XLVIII ALL INDIA BOTANICAL CONFERENCE AND INTERNATIONAL SYMPOSIUM

Shillong, October, 2025: The Bio-Resources Development Centre (BRDC), Shillong made a notable presence at the XLVIII All India Botanical Conference of the Indian Botanical Society and the accompanying International Symposium on “Biology & Biotechnology of Plant Diversity for Bioeconomy”, hosted by North-Eastern Hill University (NEHU), Shillong, bringing together experts to explore the future of plant diversity research and bioeconomy. BRDC's participation was highlighted through a vibrant exhibition stall, which drew enthusiastic engagement from researchers, academicians, and students alike. The stall showcased BRDC's ongoing research programmes, bio-innovation initiatives, and efforts towards sustainable utilization of bio-resources, reflecting the Centre's commitment to strengthening the bioeconomy through science-led solutions.

Adding to this academic engagement, members of the BRDC team presented two scientific posters during the technical sessions, sharing recent findings in the areas of plant biotechnology and conservation. These presentations generated meaningful discussions and provided opportunities for knowledge exchange with experts from across the country and abroad.

The conference served as a valuable platform for networking, collaboration, and idea-sharing, reinforcing the role of botanical sciences and biotechnology in addressing contemporary environmental and economic challenges.

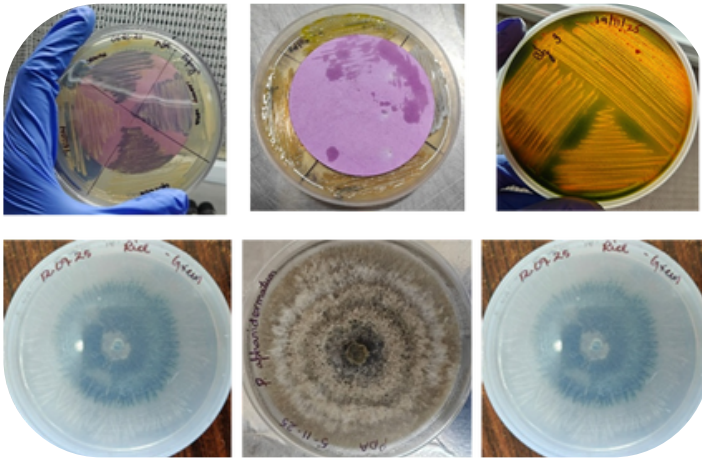
BRDC gratefully acknowledges NEHU, Shillong, for the invitation and for successfully organizing a stimulating and well-coordinated event. Participation in such national and international forums continues to strengthen BRDC's vision of advancing biotechnology for a sustainable and greener future.

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Microbial Bio-Inoculant



Shillong, December, 2025: A series of bacteriological, fungal, and biocontrol studies were conducted to support food safety and sustainable agriculture in Meghalaya. Fruits and vegetables from local farms were screened for foodborne pathogens using the HiDtect™ Universal Food Pathogen Identification Disc. Plant Growth-Promoting Rhizobacteria (PGPR), including Rhizobium isolates from bean root nodules and bacterial isolates from

potato and maize, were characterized for their biochemical traits and antifungal activity. Fungal isolates from soil and infected plants were identified through morphological and microscopic analysis, and the antagonistic potential of *Trichoderma viride* against *Fusarium oxysporum* was evaluated

Additionally, soil samples from different villages were collected for the isolation of entomopathogenic nematodes, supported by laboratory rearing of suitable insect hosts for their multiplication and pathogenicity assessment. This initiative strengthens research on biological pest management and underscores the potential of beneficial microbes and biocontrol agents as eco-friendly alternatives for enhancing crop health, reducing chemical inputs, and promoting sustainable and climate-resilient farming practices



In addition to the above research activities, the Bio-Inoculant Laboratory, BRDC successfully conducted a Student Internship Programme under the NEP-aligned semester curriculum for students from St. Joseph's College. The programme provided hands-on

training and practical exposure to laboratory techniques, microbial isolation and characterization, and applications of bio-inoculants in sustainable agriculture, thereby strengthening experiential learning and academic-research collaboration

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Tissue Culture Laboratory

Shillong, December, 2025: From a single explant to scalable solutions, the Tissue Culture Laboratory achieved successful initiation and multiplication of *Dendrobium Sonia*, alongside the effective initiation of local pineapple varieties. These accomplishments highlight the laboratory's expertise in in vitro propagation and its capacity to generate healthy, uniform, and disease-free planting material. The work strengthens large-scale cultivation prospects, supports conservation of valuable germplasm, and enhances commercial floriculture and horticulture, contributing to sustainable production and improved livelihood opportunities.



Building on these successes, the Tissue Culture Laboratory also achieved excellent acclimatization and hardening of high-value tissue-cultured plantlets, ensuring their survival and vigor under natural conditions. Notable successes include: *Ananas comosus* – Pineapple Spineless variety, *Cymbidium tracynum* – Elegant orchid variety, *Musa acuminata* – Grand Nain banana. These achievements underscore the lab's pivotal role in bridging in vitro propagation with field-ready, robust plantlets for sustainable horticulture and commercial cultivation.

Nurturing Green Innovations in Orchid Cultivation the team actively participated in a One-Day Training on Organic Cultivation of Various Orchid Species held on 4th December 2025 at the Fernando Institute for Inclusive Education, Nongdiengngan, Umsning, Ri Bhoi District. The training provided hands-on insights into organic cultivation practices, integrated nutrient management, and eco-friendly techniques for orchid production, further enhancing knowledge and skills for promoting sustainable and high-quality orchid cultivation.



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Seed Bank

Shillong, December, 2025: Bringing science closer to the field, a series of village-level field visits were undertaken to gain first-hand insights into local agricultural practices and cropping patterns. The visits enabled systematic land inspections and assessment of farm conditions, while also supporting the planning and establishment of community seed banks. Through direct interaction with farmers, these field engagements strengthened awareness of sustainable practices, encouraged informed decision-making, and contributed to the conservation and accessibility of quality seed resources at the grassroots level.



Additionally, the Seed Bank at BRDC facilitated a student internship programme under the NEP-aligned semester curriculum in collaboration with St. Joseph's College, providing students with hands-on experience in seed conservation, field-based activities, and sustainable agriculture practices.

Beyond these core investigations, an integrated assessment of diverse rice landraces was undertaken to document their morphological, chemotaxonomic, and nutritional attributes. Using standardized analytical protocols, key quality parameters—including protein, moisture, carbohydrate, fibre, total ash, and acid-insoluble ash content—were quantified, providing critical insights into nutritional quality and mineral composition. Seed health was rigorously evaluated through the detection and morphological identification of seed-borne fungal pathogens, while the antagonistic potential of *Trichoderma* isolates was assessed against pathogenic fungi, reinforcing their role in strengthening seed quality, disease suppression, and sustainable rice cultivation.

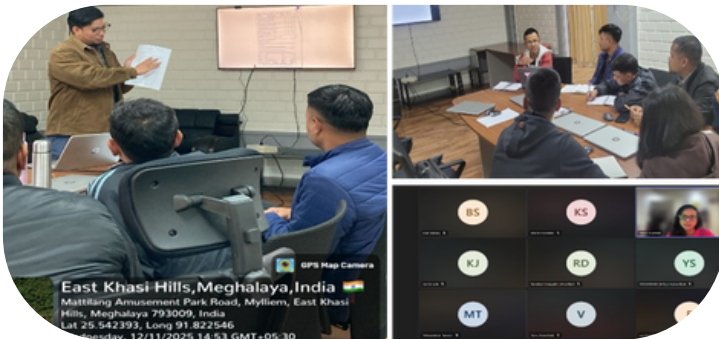


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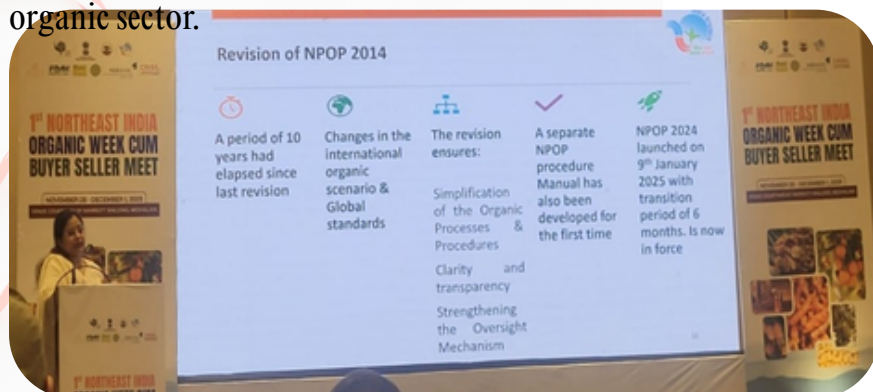
Meghalaya State Organic Certification Body (MSOCB)



Shillong, December, 2025: Empowering Organic Excellence in Agriculture, the team actively participated in a series of capacity-building trainings to strengthen knowledge on organic standards and certification processes. On 12th November 2025, training focused on NPOP standards and inspection procedures, providing

practical insights into compliance, documentation, and quality assurance. This was followed by a session on Verification of Farmers as per APEDA's advisory, emphasizing transparent and efficient verification protocols for organic producers. Further enhancing expertise, a detailed training was conducted on 15th November 2025 by Parthavi Organics Pvt. Ltd., covering NPOP Standards, Internal Control System (ICS), and Input Approval Requirements as outlined in the NPOP Eighth Edition. These initiatives equip participants with the skills and knowledge to ensure adherence to national and international organic standards, promoting sustainable farming practices and boosting credibility in the organic agriculture sector

Showcasing Organic Leadership, the team participated in the 1st Northeast India Organic Week APEDA Buyer-Seller Meet and the 4th IFOAM World Organic Youth Summit from 29th November to 1st December 2025, organized by MEGNOLIA, Govt. of Meghalaya, APEDA, and IFOAM Organics Asia. The events provided a platform for networking, knowledge exchange, and promoting sustainable organic practices while highlighting the region's potential in the global organic sector.



Championing Organic Standards and Compliance, APEDA organized an intensive hands-on training on NPOP Standards on 29th November 2025 at Courtyard Marriott, Shillong. Targeted at both Certification Bodies (CBs) and operators, the program offered practical guidance on

documentation, inspections, and regulatory adherence, equipping participants to implement organic standards effectively and strengthen quality assurance across the organic sector.

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Apical Root Cuttings (ARCs) Technology

Initiation Using G₀ Tubers of Variety *Phan Shidieng* Produced via ARC Plugs

Shillong October, 2025: Shillong: The Bio-Resources Development Centre (BRDC) has successfully initiated cultivation using G₀ tubers of the indigenous variety *Phan Shidieng*, produced through ARC plug technology. This initiative marks a significant step toward strengthening quality planting material production and promoting improved propagation practices for region-specific crop varieties.

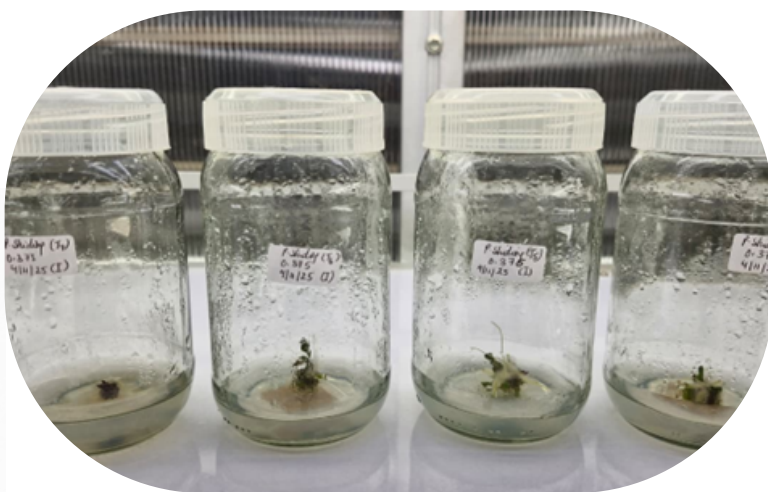


The initiation process involved the use of disease-free G₀ tubers generated through controlled ARC plug systems, ensuring uniformity, higher survival rates, and improved establishment. The activity was undertaken at the BRDC facility as part of its ongoing efforts to standardize advanced plant propagation techniques suitable for local agro-climatic conditions.

Officials at BRDC highlighted that the use of ARC plugs enables efficient multiplication of elite planting material while minimizing the risk of pathogen transmission.

The successful initiation of *Phan Shidieng* using this method is expected to support future scaling, farmer adoption, and conservation of valuable local varieties.

The initiative aligns with BRDC's mandate to promote sustainable bioresource management, enhance agricultural productivity, and facilitate the deployment of innovative biotechnological interventions for the benefit of farming communities across the region.



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Across Continents, One Curiosity: Science in Motion Worldwide

From Soil to Seed: CRISPR-Driven Wheat That Makes Its Own Fertilizer

Date: November 24, 2025 , University of California Davis:

Researchers at the University of California, Davis have developed CRISPR-enhanced wheat that helps soil bacteria generate natural fertilizer, paving the way for cleaner, cheaper, and more sustainable farming. By boosting the production of a naturally occurring plant compound, the engineered wheat encourages beneficial soil bacteria to form biofilms around its roots, enabling them to convert atmospheric nitrogen into plant-usable nutrients.

This breakthrough could significantly reduce reliance on synthetic nitrogen fertilizers, lowering input costs for farmers while minimizing environmental pollution caused by fertilizer runoff. In addition to supporting soil health, the innovation holds promise for improving crop productivity and resilience.

With its potential to deliver major economic savings and environmental benefits, this advance represents a transformative step toward self-sustaining, climate-smart agriculture on a global scale.



Tiny Root Change, Big Impact: A Step Toward Self-Fertilizing Crops

Date: December 9, 2025 , Aarhus University:

Researchers at Aarhus University have identified a tiny protein modification in plant roots that could transform how crops acquire nitrogen. By altering just two amino acids in a root receptor protein, scientists were able to shift the plant's response from rejecting nitrogen-fixing bacteria to supporting beneficial symbiosis.

Early results in barley indicate that cereal crops could one day be engineered to partner with nitrogen-fixing microbes, reducing reliance on synthetic fertilizers, lowering emissions, and supporting more sustainable agriculture. This molecular "switch" marks an important step toward the development of self-fertilizing crops with significant implications for global food security.



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The Deep Ocean Fixes Carbon in Unexpected Ways

December 10, 2025 | University of California, Santa Barbara

New research has revealed that carbon fixation in the deep ocean operates very differently from what scientists long believed. Contrary to the prevailing view that ammonia-oxidizing archaea are the primary drivers of carbon fixation in the ocean's dark depths, experimental evidence shows that other microbial groups—particularly heterotrophic microbes—play a much larger role than previously recognized. This finding challenges established models of deep-ocean carbon cycling and provides fresh insight into how the ocean regulates carbon storage and contributes to the stabilization of Earth's climate.



Soil Microbes Remember Drought—and Help Plants Survive

November 2, 2025 | University of Kansas

A new study shows that soil microbes can retain a “memory” of past droughts, influencing how plants grow and cope with water stress. Researchers found that these microbial legacies had a much stronger effect on native plant species than on crops such as corn, suggesting long-term co-evolution between native plants and their soil communities. Genetic analyses identified a key gene associated with drought tolerance, offering potential directions for biotechnology and crop improvement. The findings bridge ecology, genetics, and agriculture, revealing how belowground microbial history can shape plant resilience to climate extremes.