

WELCOME TO OUR

MBUST Insights

Contributors of this Newsletter Issue:

Dr. Sarbesh Das Dangol, Dr. Rameshwar Rai, Dr. Sabin Basi, Dr. Anupama Shrestha, and students

Visits by UGC and NAST

Distinguished officials' visit to MBUST

By Dr. Sarbesh Das Dangol

Visit of Prof. Dr. Dev Raj Adhikari from UGC- Nepal

Prof. Dr. Dev Raj Adhikari, chairman of the University Grants Commission (UGC) Nepal, visited MBUST on April 11, 2025. The program coordinators introduced university programs, while faculty, students, and interns shared updates on their academic, laboratory activities, and research projects. Dr. Kirti Kusum Joshi moderated the session.



Glimpses of the visit of the UGC chair to MBUST. Photographs by MBUST Team

Prof. Dr. Adhikari appreciated MBUST's research efforts, noting that the activities exceeded his expectations. He also visited individual labs, interacting directly with the laboratory Principal Investigators, students, and interns, and commended their contributions to advancing research at the university.



The university team updated the distinguished guests of the scientific, administrative, and academic activities. Photographs by MBUST Team

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Visit of Prof. Dr. Dilip Subba and his team

Separately, MBUST welcomed a delegation from the Nepal Academy of Science and Technology (NAST) led by Vice Chancellor Prof. Dr. Dilip Subba, along with Dr. Rabindra Prasad Dhakal (Secretary) and Mr. Bhoj Raj Adhikari (Division Chief and Information Officer, Senior Promotion Officer). The trio visited individual laboratories and interacted with the researchers.

The program began with a university introduction by Vice President Padma Sunder Joshi, followed by a briefing on university programs by Dr. Kirti Kusum Joshi. Dr. Sarbesh Das Dangol and Ms. Shruti Subedi presented their recent NAST Young Scientist Grant on polymerase production and purification. The VC and the secretary called on the MBUST team to sign the memorandum of understanding and embark on collaborative works.



Glimpses of the visit of NAST delegates to MBUST.
Photographs by MBUST Team

Biotechnological Tools at GATC Lab

ONGOING PROJECTS UNDER DR. SARBESH DAS DANGOL

Shruti Subedi, Dibya Chhatkuli, and Samita Gharti Magar

Principal Investigator, Dr. Sarbesh Das Dangol, and his students, Ms. Shruti Subedi, Ms. Dibya Chhatkuli, Ms. Samita Gharti Magar, Mr. Birendra Mahara, Mr. Pawan Kathayat, Ms. Sandhiya Khatri, and Ms. Manisha Rawat, are leading the following research projects at the Genomics and Tissue Culture laboratory (GATC Lab).

"Vector confirmation for polymerase production"

To facilitate polymerase production *in vitro*, we initiated a project involving three plasmid vectors purchased from Addgene, each harboring genes responsible for polymerase synthesis. We are using different *E. coli* strains to produce these polymerases. To verify that the transformation of the plasmids into the bacterial cells was successful, we performed restriction digestion using specific restriction enzymes tailored to our plasmids' unique cut sites. The resulting DNA fragments were analyzed through gel electrophoresis, wherein distinct bands were visualized, indicating the presence of the expected DNA fragments. To further confirm our results, we utilized Benchling, a molecular biology software, to conduct a virtual digestion. This digital analysis allowed us to compare the actual bands observed on the gel with the theoretical outcomes predicted by Benchling, thereby ensuring the accuracy and success of our transformation process.

The project is funded by the Nepal Academy of Science and Technology (NAST), in collaboration with the Central Department of Biotechnology, Tribhuvan University (CDBT-TU).



The research team of GATC Lab

"Light colors and plant tissue culture"

Light is an essential factor that significantly influences the growth and development of plants. In this study, millet and rice are subjected to an experiment to assess how different light colors affect their growth. The plants were placed in controlled plant growth chambers, each illuminated with distinct light colors: red, green, blue, and white, as well as their paired combinations. This comprehensive approach will allow us to have a thorough understanding of how light colors can impact plant growth dynamics.

The project is funded by the Federal Ministry of Education, Science, and Technology, in collaboration with CDBT-TU and Nepal Plant Disease and Agro Associates Pvt. Ltd. (NPDA).

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“Detection of Blast pathogen”

Pyricularia oryzae is the causative agent of the blast disease in rice plants, which has significantly decreased the production of rice in Nepal. For the characterization of this fungal pathogen, specific primers were used for polymerase chain reaction (PCR) to identify the presence or absence of avirulence genes of this pathogen in our samples collected from the field. The optimization of the PCR using avirulence primers has already been performed. The virulence of the pathogen is being checked against various rice cultivars of Nepal.



The project is funded by the University Grants Commission (UGC) - Collaborative Research and Innovation Grant in collaboration with CDBT-TU, NPDA, and Bhaktapur Multiple Campus.

Simultaneously, the locally isolated *P. oryzae* gene sequencing has been performed. We are now developing a kit for the early detection of the pathogen using multiplex PCR.



GATC Lab team
Photographs by Pawan Kathayat

The project is funded by the Federal Ministry of Education, Science, and Technology, in collaboration with CDBT-TU and Nepal Plant Disease and Agro Associates Pvt. Ltd. (NPDA).

“As Long As I Live, I’ll Farm Organically”

A SUCCESS STORY OF CHANDRA PRAKASH ADHIKARI, FULABARI ORGANIC FARM

By Saugat R.C., Choodamani Joshi, Nitesh Khatiwada, Pawan Kathayat, Birendra Mahara, Ankita Nepal, Prabin B.C., Dr. Rameshwar Rai, Dr. Sabin Basi

Phoolbari, Bharatpur — Fulbari Organic Farm has been regarded not just as a piece of land, but as a living testament to Nepal’s organic farming movement. A life of farming was led by Mr. Chandra Prakash Adhikari. After the loss of his parents in 2030 B.S., an increased yield was sought through the use of chemical fertilizers and pesticides—an approach learned from formal education.

What led to the transformation toward “No chemicals”?

Although initial increases in yield were observed, by 2046 B.S., rampant pest infestations, soil compaction, and pesticide-resistant insects such as *Helicoverpa* were faced. A total crop failure was experienced when not a single tomato could be harvested from 1.5 Bigha of land. Frustration and desperation followed.

Demicon was used on tomatoes on the advice of Prof. Phanendra Neupane of Rampur Campus. However, its effectiveness was not observed. A larva was placed in a bottle of Demicon to demonstrate resistance—it emerged alive. No words were offered by the professor in response. In that silence, a decision was made: never again.

A return to natural farming methods was resolved. Guidance and knowledge regarding organic agriculture were received from students of “Batawaran Tatha Sarokar Samaj Nepal.” A seven-day training course was also undertaken at Drigha Krishi Sanstha Nepal, which laid the foundational understanding.

How was the transition to organic farming managed?

In the first two years, reduced yields and financial strain were encountered. Frequent arguments were faced between Mr. Adhikari and his spouse. However, by the third year, yields comparable to those of conventional farming were regained. The journey was challenging, but its worth was realized.

How were the economic risks tackled?

Income diversification was achieved by increasing the cattle herd. Kishan Kalyan Dudha Sahakari Sanstha, a dairy cooperative, was co-founded. The cow dung produced was found suitable for composting. Prangarik Krishi Sahakari Sanstha was also established to support farmers through shared tools and facilities, such as a free rice mill.

Community engagement was also led. What initiatives were taken?

In 2076 B.S., Jilla Prangarik Sangh Chitwan was founded to unify scattered organic farmers. Training programs were organized, shared resources were developed, and PGS Chitwan (a participatory guarantee system for organic certification) was introduced. Partnerships were later formed with Organic Valley and CEREX to export organic carrots and beets to Germany.

Given the labor intensity of organic farming, how was that challenge met?

Manual weeding alone required around 1,100 laborers for 4.5 Bigha of land. Still, commitment was upheld. While chemical farmers struggled with weed resistance and falling yields, stability was maintained at Fulbari. The effort was rewarded.

Did the results ever address criticisms?

Yes. In 2032 B.S., carrot seeds were brought from India merely out of personal preference. At that time, organic carrots were sold door-to-door on a bicycle, and ridicule was experienced. After witnessing the results, many of those critics had adopted similar practices five to six years later.

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What challenges are currently being faced by organic farmers?

Market access and certification costs have been major barriers. Limited buyers and expensive organic certification have forced many to abandon the approach. Out of 230 cooperative members, only 24 have remained fully organic. Nonetheless, efforts are being made to restore confidence and participation.

What serves as the motivation to continue?

A deep-rooted belief in organic farming has been maintained. During a meeting in Kathmandu, Prof. Neupane inquired if organic methods were still being practiced. A firm response was given: "As long as I live, I will continue organic farming." A book on biological pest control was later gifted by the professor, symbolizing validation and encouragement.



Meeting with Mr. Chandra Prakash Adhikari

What message is conveyed to aspiring organic farmers?

Patience is encouraged. The initial years may be difficult, but recovery and healing by nature are possible. Commitment, cooperation, and faith in the soil are advised. Organic farming is seen not merely as a method, but as a movement.

What does Fulbari Organic Farm signify?

More than a farm, it is regarded as a home, a personal journey, and a stance against chemicals. Visitors, students, and seekers are welcomed. Though small in scale, the farm has been presented as living evidence that organic farming is viable and enduring.

Visit Fulbari Organic Farm:

Located in Bharatpur-15, Phoolbari, Shreepur, Chitwan, the farm welcomes visitors, students, and curious minds eager to learn about sustainable agriculture in action.

Seed Health Matters

SIMPLEST WAY FOR SEED HEALTH TEST

By Sandhiya khatri and Manisha Rawat

The concept might be tiny but is powerful. This month our focus turned to check seed health as ensuring healthy seeds is the first step towards a successful harvest. The simple method can be useful for variety of seeds. It helps in maintaining crop quality, identifying seed-borne disease at an early stage and boosting agricultural productivity.



Mechanism of seed health testing

Topworking and Grafting

A RESEARCH IN KIWIFRUIT

By Sushil Rai, Ankita Nepal and Rameshwar Rai

What is Grafting and topworking?

Grafting and topworking are age-old horticultural practices used to enhance fruit production, improve plant vigor, and rejuvenate orchards. Grafting involves joining two plant parts — the scion and rootstock — to grow as a single plant, while topworking focuses on replacing the canopy of established trees with superior cultivars to improve orchard productivity without replanting.

In our latest initiative, we conducted topworking and grafting operations in the scenic village of Chitlang, Makwanpur, Nepal. Chitlang, renowned for its organic farming and picturesque landscape, offers an ideal environment for kiwifruit cultivation due to its moderate climate and fertile soils.

Topworking in Kiwifruit orchard

Topworking was performed in the established kiwifruit orchard at MBUST, Chitlang. Operations were carried out in four phases, starting from February 14, 2025, and repeated at two-week intervals (dates: February 14, February 28, March 14, and March 28, 2025). The focus was on four scion cultivars: Abbott, Bruno, Monty, and Allison utilizing three types of wrapping materials: parafilm, green tape and transparent plastic.



Topworking operation done by Sushil Rai, Dr. Rameshwar Rai and Pradip Zimba

Grafting in greenhouse nursery setting

Parallel to orchard topworking, controlled grafting experiments were conducted inside a greenhouse nursery. Grafting operations were carried out slightly earlier than the topworking dates: February 12, February 26, March 12, and March 26, 2025.

The same set of cultivars (Abbott, Bruno, Monty, and Allison) and wrapping materials (parafilm, transparent, green) were tested under greenhouse conditions but with additional factor: three grafting techniques which were Tongue grafting, Side grafting and Cleft grafting.

The rootstocks were imported from Boach, Dolakha and Scion were imported from Boach, Dolakha and Daman, Makwanpur.

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Observation and data collection

After the operation, the scions of both grafting and topworking were observed and monitored daily for sprouting, desiccation and damage. And after each grafting and topworking operation, we planned a 75-day healing and establishment period.

Now, data collection has begun, focusing on critical parameters like:

- Graft success rate (%)
- Dead grafts after sprouting (%)
- Survival rate (%)
- Average sprout length
- Average sprout diameter
- Number of leaves

This detailed and systematic approach will help us identify the most successful combinations of cultivar, technique, and wrapping material under both field and nursery conditions. We aim to strengthen kiwifruit production systems and provide valuable insights to the farming community of Chitlang and beyond.

Stay tuned for more updates as the data unfolds!



Kiwifruit grafted and planted inside green house nursery



Visit and interaction in Boach, Dolakha

One Structure, Many Solutions

THE FULBARI FARMING INNOVATION

By Saugat R.C.

At the heart of Fulbari Organic Farm lies an ingenious structure that embodies sustainability and innovation. Designed by Mr. Chandra Prakash Adhikari, this multi-functional system maximizes space, resources, and ecological harmony—protecting crops, livestock, and the environment alike.

1. Vermicomposting: Nature's Recycling System

Location: Central raised platform

Purpose: Earthworms transform organic waste (like cow dung and kitchen scraps) into nutrient-rich vermicompost.

Why It Matters:

- Produces premium organic fertilizer.
- Boosts soil fertility naturally.
- Turns farm waste into a valuable resource.



Vermicomposting

2. The Water Body: A Hub of Activity

Location: Surrounds the composting structure

Multi-Purpose Benefits:

- Moisture Control: Keeps humidity ideal for earthworms and plants.
- Natural Barrier: Blocks rodents, snakes, and pests.
- Fish Farming: Adds a source of food and income through aquaculture.

3. Protective Netting: A Shield Against Pests

Location: Covers the composting bed

Key Advantages:

- Keeps insects and pests out.
- Maintains a clean, undisturbed composting environment.
- Deters birds and small animals.

4. Tiled Roof: Where Farming Goes Vertical

Structure: Sloped roof made of wood and tiles.

Dual Function:

- Trellis for Plants: Supports climbing crops like gourds and beans.
- Climate Control: Provides shade and maintains a cool, moist habitat for earthworms.

Sustainability in Action: A Closed-Loop Ecosystem

This design thrives on interdependence:

- Cow dung feeds the vermicomposting process.
- Vermicompost enriches surrounding crops and rooftop plants.
- Water sustains fish and earthworms alike.
- Plants regulate the microclimate and boost productivity.

Conclusion: A Blueprint for Organic Farming. Fulbari Organic Farm's integrated structure is a testament to ecological harmony. By merging composting, aquaculture, pest control, and vertical farming, it showcases how innovation can transform agriculture into a sustainable, closed-loop system.

Participation at National Conference and Exhibition 2025

CONFERENCE ON FOREST BIOMASS MANAGEMENT AND AGRICULTURE SUSTAINABILITY

By Choodamni Joshi and Dr. Anupama Shrestha

Dr. Bhushan Shrestha and Dr. Anupama Shrestha, along with Mr. Choodamani Joshi and Mr. Shisir Ghimire, attended the conference held on April 26–27, 2025, in Dumkibas, Nawalpur, Gandaki Province.

The two-day conference brought together over 200 participants, including academics, government officials, politicians, entrepreneurs, students, and community members. The main agenda focused on:

- The role of communities in managing forest fires.
- Utilizing forest biomass for bio-fertilizer production.

On the first day, several speakers presented on bio-fertilizers and sustainable forest management. A hands-on workshop on bio-fertilizer production was conducted, featuring a demonstration by the Binayi Community Forest User Group, which commercially produces bio-fertilizers.

- Dr. Bhushan Shrestha presented on "Wild Mushrooms of Chitlang," emphasizing how forests serve as critical habitats for mushrooms and why forest preservation is essential for maintaining biodiversity.
- Dr. Anupama Shrestha spoke on "Microbes to Miracles in Sustainable Agriculture in Nepal," highlighting the role of rhizobacteria in improving soil health, plant growth, and bio-fertilizer production.

The second day included a plenary session, panel discussions, and poster presentations, covering key topics such as:

- Community Roles in Forest Fire Mitigation
- "Biomass to Biofertilizer and Green Energy: Pathways to Soil and Environmental Restoration"
- "Gender and the Climate Crisis: Centering Women in Forest, Soil, and Sustainability Policies"
- During the panel discussion on gender and climate crisis, Dr. Anupama shared valuable insights on integrating women into forest, soil, research ecosystem and sustainability policies.

Students from MBUST participated in the poster presentation competition, with Ms. Sabnam Subedi and Mr. Choodamani Joshi securing first and second prizes, respectively.

The conference served as a highly impactful platform, uniting diverse stakeholders to discuss forest biomass management and agricultural sustainability in Nepal.



Glimpses of the conference

Special Events

MAKE SURE TO ATTEND THESE EVENTS

Designed by Dr. Sarbesh Das Dangol



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UNIVERSITY OF
SCIENCE AND TECHNOLOGY**



FIRST STEPS TOWARDS WORLD-CLASS INTERNATIONAL CONFERENCE

**2025 MAY 4
SUNDAY
7:30 AM - 6:30 PM**

Venue: Radisson Hotel, Lazimpath,
Kathmandu, Bagmati Province, Nepal

13TH JOURNAL CLUB MEETING

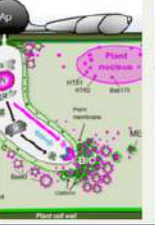
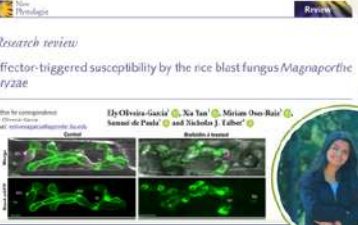





**April 24, 2025 (Thursday)
11:00 AM
Venue: GATC Lab, MBUST**

By: Samita Gharti Magar

14TH JOURNAL CLUB MEETING

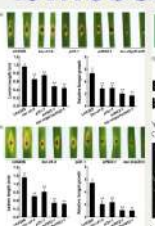





**May 1, 2025 (Thursday)
11:00 AM
Venue: GATC Lab, MBUST**

**By: Sandhiya Khatri and
Manisha Rawat**

15TH JOURNAL CLUB MEETING






**May 8, 2025 (Thursday)
11:00 AM
Venue: GATC Lab, MBUST**

By: Shruti Subedi

For all of these events, participants may opt for online participation upon prior request.

Editorial Team

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