MADAN BHANDARI UNIVERSITY OF SCIENCE AND TECHNOLOGY

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WELCOME TO

MBUST Insights

Quick Stories

Meet our new faculty members
Dr. Sujan Dawadi,
Dr. Jhashanath Adhikari Subin, and
Dr. Punit Bhattachan

Detailed stories in this newsletter issue

Meet Our New Faculty Members

Strengthening Organic Agriculture at MBUST

-By Dr. Sujan Dawadi

Madan Bhandari University of Science and Technology (MBUST) is pleased to welcome Dr. Sujan Dawadi to the Organic Agriculture Program. His appointment marks an important step in strengthening the university's commitment to sustainable, resilient, and biodiversity-based agricultural systems in Nepal.

Dr. Sujan Dawadi
Asst. Professor, Organic Agriculture Program

Research Experience

Dr. Dawadi has worked extensively in:

- Insect ecology and population dynamics
- Sustainable pest management systems
- Field and greenhouse experimental research
- Community-based agricultural outreach

Academic Background

- PhD in Entomology, Purdue University, USA
- MS in Entomology, Tennessee State University, USA
- BS in Agricultural Sciences, IAAS, Tribhuvan University, Nepal

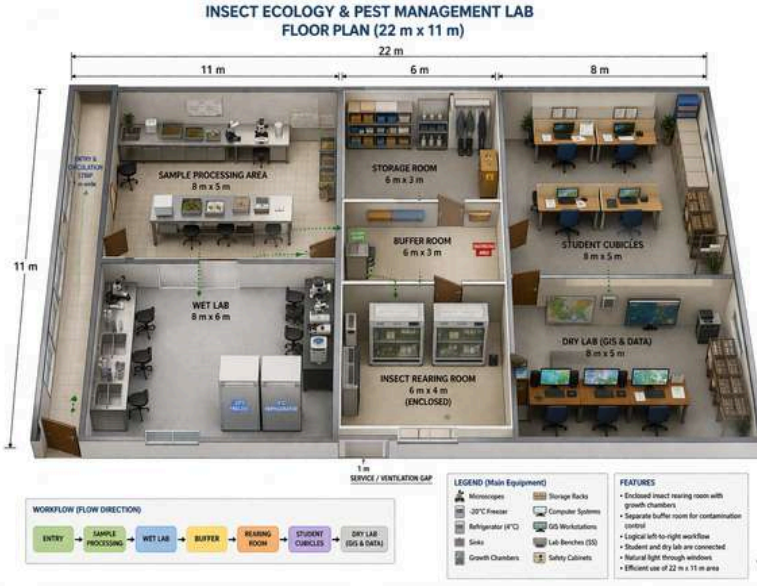

Fig 1: The potential lab layout and equipment under the IEPM lab

Key Research Focus Areas of the IEPM Lab:

- Insect herbivore ecology and population dynamics
- Natural enemy conservation and biological control
- Trophic interactions and plant-insect relationships
- Biodiversity-based IPM
- Climate-resilient organic farming systems

Research Philosophy

The IEPM Lab follows a clear ecological principle:

Pest Management ≠ Pest Eradication

Instead, the focus is on maintaining insect populations below economic thresholds while preserving ecological balance and functional biodiversity in agroecosystems.

Why Insect Ecology?

Insect ecology underpins pest regulation in organic systems with limited synthetic inputs. Understanding population dynamics, trophic interactions, and host–plant relationships helps develop ecologically based IPM strategies.

IEPM lab
INSECT ECOLOGY & PEST MANAGEMENT LABORATORY

Meet Our New Faculty Members

Pioneering Computational Chemistry at MBUST

-By Dr. Jhashanath Adhikari Subin

Introduction

There are different aspects of chemical science, ranging from synthesis, analytical, instrumental, biochemical, and theoretical to materials (organic, inorganic, biological, and nuclear), and many more. Among these, computational chemistry is a distinct area that involves the mathematical formulation of problems and the characterization of various systems using modern computing devices. It is primarily considered multidisciplinary due to the diverse subjects studied and the procedures applied. The major objectives are to model materials at the molecular level and to predict their physicochemical properties to design novel functional materials.

Dr. Jhashanath Adhikari Subin
Assistant Professor, Forest Biomaterials Science and Engineering Program

MBUST, a new higher education institution, aims to develop consumer goods with economic impact. The Computational Chemistry Laboratory (Forest Biomaterials Science and Engineering Program) focuses on application-oriented research and scientific understanding of underlying phenomena. Facilities include GPU/CPU servers with power backup. Research interests cover various classes of materials, as shown in Figure 1.

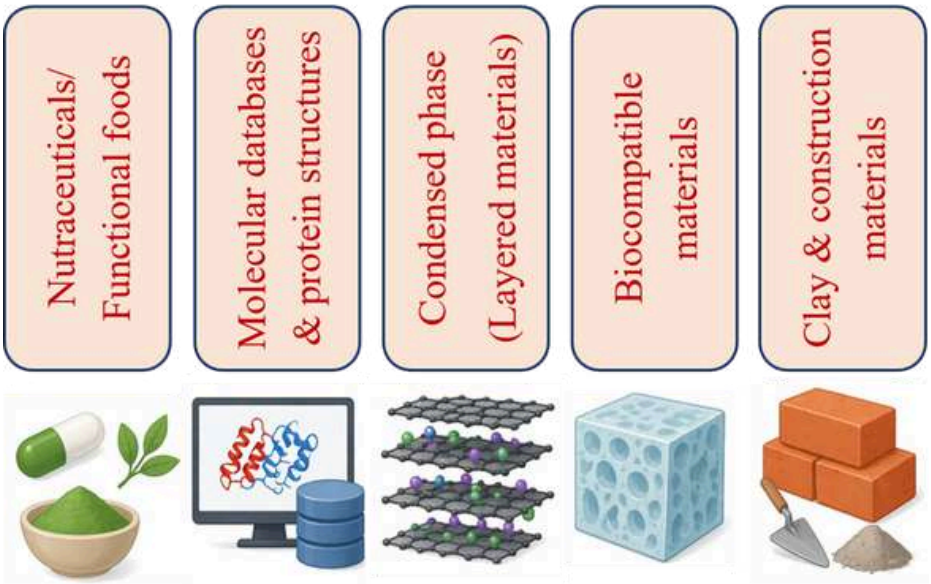

Fig 1: Various types of material systems included in the research

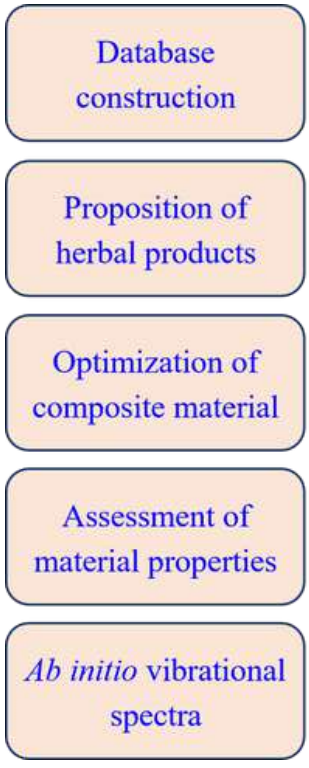

Fig 2: Different types of outcomes of research

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Materials, outcomes, and software

Research outcomes vary based on system and objectives. Figure 2 illustrates some key results. A continuously expanding molecular docking database is used for virtual screening to find potential therapeutic candidates. The proportion of constituents with optimal properties is being explored, and various material properties are studied. Using molecular dynamics to sample a solvatochromic dye's solvation sphere for vibrational spectra modeling is a challenging task. The adaptability of TD-DFT in quantum mechanics and its correlation with experimental results are also investigated.

There are multiple programs/codes employed for various types of problems in chemistry, biochemistry, and engineering. The commonly used ones are shown in Figure 3. Various data-processing and visualization programs for atomic-level geometry assessment are installed on the lab computers. These programs utilize different methods (classical molecular dynamics, self-consistent field cycles, etc.). Coming to a meaningful solution to an identified problem using the facilities stands as a prime theme of this laboratory.

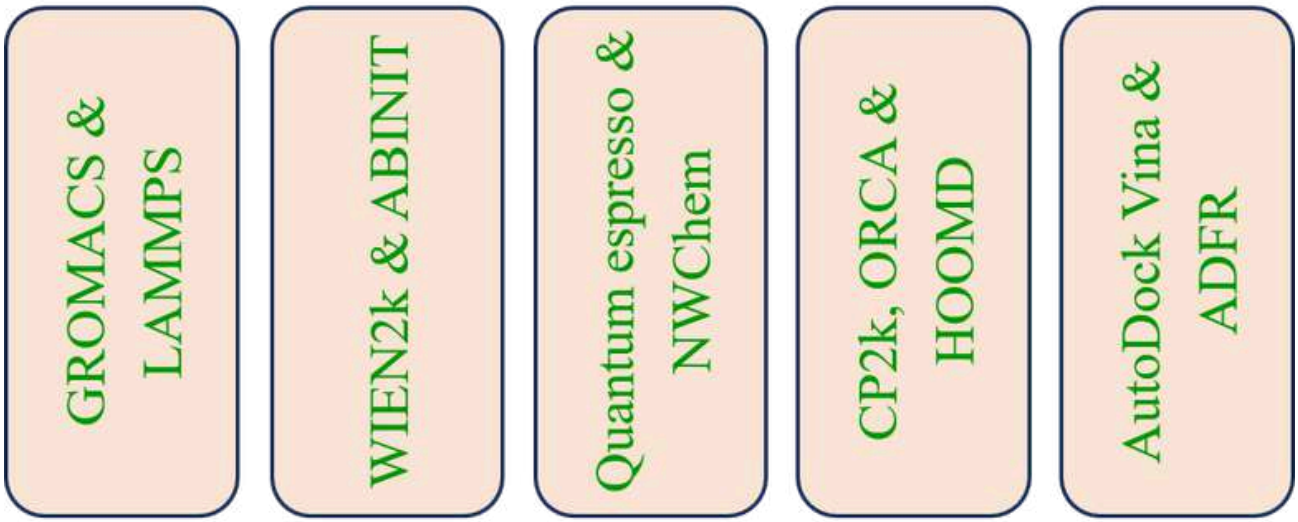


Fig 3: Programs/software used in the research

The results of calculations could be synergized with those obtained from experiments for more reliable inferences. The narrowing down of the sampling space to selected ones could make the starting points for further experimental assay easier to pursue with. The work would add to the body of knowledge in the relevant area and would be an initiation for material design and development.

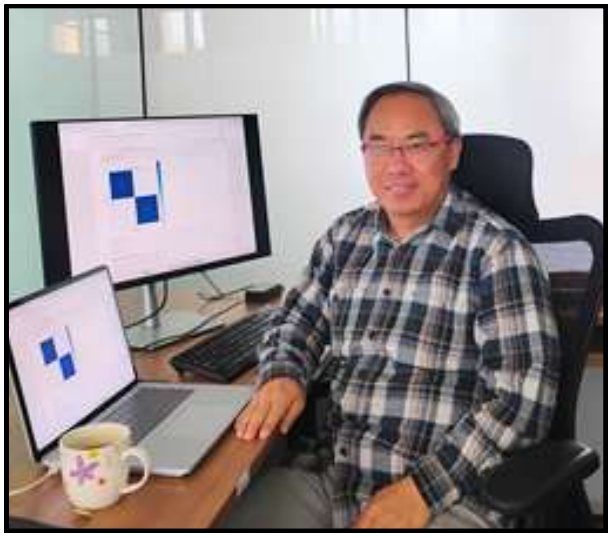
Meet Our New Faculty Members

Transforming Healthcare Through Biomedical Data Science

-By Dr. Punit Bhattachan

Data is ubiquitous, especially in biomedicine, and often large and complex. My lab studies various biomedical data to understand health and disease, using advanced computational methods to identify patterns and draw conclusions about clinical conditions. Our approach models disease, aiming to develop diagnostic kits and therapeutics. This requires expertise in programming, algorithms, AI, and data science. The lab is part of the Digital Technology Program at Madan Bhandari University of Science and Technology, Nepal.

Biomedical, Medical, and Clinical data are widely available in global databases, often deposited by research labs and major medical centers. The lab aims to perform data mining using these databases, conducting impactful research with various software and ML/AI tools to give students practical research experience. Medical data science is challenging but rewarding, especially for directly improving patient care. In Nepal, with its difficult terrain, limited medical access, and fewer doctors, the lab focuses on projects to improve rural healthcare and plans to develop ML/AI-driven healthcare applications for remote areas.



Dr. Punit Bhattachan
Assistant Professor, Digital Technology Program

Education:

- PhD, Ocean University of China, China.
- MS, University of Bergen, Norway.
- BS, Pokhara University, Nepal.

Current research themes of the lab:

- Data analysis of omics data derived from cancer patients using ML/AI tools.
- Medical imaging model development from liver cancer data for automatic diagnosis.

Data Science in Biomedical field.

Image credit: Canva

Digital technology students interested in participating in my lab for their thesis work are invited to contact me to discuss. Also, students with their own project ideas that align with my lab's research theme are welcome to contact me with a brief proposal outline.

Tradition Meets Agri-Tech

Highlights from the 2026 Regional Conference in Lumbini

-By Dr. Ritu Raj Lamsal

Dr. Ritu Raj Lamsal, PhD, FIE, Member IEEE, and Asst. Professor of Digital Technology at MBUST, spoke at the Regional Conference on Deep Regenerative Agriculture, April 6–8, 2026, at Lumbini Buddhist University, Nepal. The event, titled "Deep Regenerative Agriculture: Beyond Sustainability," drew over 250 participants from Nepal, India, Bhutan, Myanmar, and other Himalayan nations, including farmers, researchers, policymakers, and scholars. It defined deep regenerative agriculture as a strategy reconnecting people, culture, and nature to foster resilient systems and preserve soil, water, air, and genetic resources (SWAG). The preamble highlighted that while conventional agriculture increased productivity, it also caused soil degradation, biodiversity loss, weakened socio-cultural ties, and increased climate vulnerability, calling for transformative change.

Dr. Lamsal presented a paper on "A Conceptual Framework for Digitally Augmented Agroecology" during a session on innovation. The framework suggests digital tools like apps, GIS, AI, and IoT can document and scale indigenous practices without disrupting culture. It highlights digital knowledge banks, community data ownership, and offline interfaces for marginalized farmers.

The conference ended with a Regional Declaration recognizing agriculture's broader role in supporting food, health, biodiversity, culture, livelihoods, and community well-being. Key actions include blending indigenous knowledge with science, strengthening seed systems, establishing a Himalayan Seed Vault, supporting native resources, and expanding agroecology. A notable outcome was advocating for Kalaneemak rice as "Buddha Rice" with GI tagging, to boost local and global markets.

Advancing Agriculture Through Biotechnology

Key Highlights: NBA 2026

-By Dr. Anupama Shrestha

At the Nepal Biotechnology Association (NBA) National Conference 2026, held on April 10–11 at Tribhuvan University, Kirtipur, researchers and academics gathered under the theme "Trends of Biotechnology in Nepal: Research, Innovation and Impacts."

Among the research presentations, Dr. Anupama Shrestha and Dr. Bhushan Shrestha from the Organic Agriculture, Institute of Applied Sciences, Madan Bhandari University of Science and Technology (MBUST) delivered a presentation titled: "Madan Bhandari University of Science and Technology: A Beacon of Hope in Enhancing Sustainable Agriculture Through Biotechnology."

Their presentation highlighted the role of MBUST in advancing biotechnology-driven sustainable agriculture, emphasizing research integration, innovation, and practical applications for Nepal's agricultural future.

Researchers at the NBA National Conference 2026

Beyond an Educational Tour

Dolakha | Kavreplanchock| Sindhupalchok

-By Dr. Sujan Dawadi

Purpose of the Tour

The educational tour undertaken by MBUST faculty and students to Dolakha, Kavreplanchok, and Sindhupalchok was designed as an immersive, experiential learning journey. The tour was not only to see and study agricultural and ecological systems but also to understand why we went, what we observed, and how we acted in real-world contexts.

The tour aimed to:

- Strengthen hands-on learning and bridge the gap between theory and practice.
- Provide students opportunities to observe and analyze real challenges in agriculture, research, infrastructure, and community development.
- Instill a sense of responsibility and problem-solving by engaging with unpredictable

Observations and Behaviors During the Tour

- During the tour, students and faculty observed local farming, extension networks, ecological patterns, and challenges in infrastructure, roads, and logistics in remote areas.
- They learned about community resilience and resource management. Participants' behavior was guided by curiosity, respect, collaboration, and ethical principles.
- Students showed patience with vehicle breakdowns, collaborated on solving problems like pushing vehicles, and promoted respect and teamwork with faculty.

> The tour highlighted that critical observation and immediate problem-solving are key skills for any researcher or practitioner. As emphasized by our VP, Prof. Dr. Dinesh Raj Bhuju, students demonstrated initiative, thought ahead, helped one another, and maintained composure even in the face of challenges.

(Continued from Page 8)

Learning Outside the Classroom

The tour reinforced that valuable learning extends beyond classrooms and laboratories:

- Students developed observation skills essential for research.
- Faculty witnessed students' ability to identify underlying mechanisms in nature and ask "why" questions, an essential component of scientific inquiry.
- Students gained practical problem-solving experience, balancing research rigor with adaptability in field situations.

> This experiential approach strengthens faculty-student relationships, breaks barriers often associated with hierarchical academic culture, and builds a foundation for a collaborative university culture.

Challenges and Opportunities in Research Facilities

During the tour, we visited research and extension stations with well-built facilities but insufficient staffing, preventing them from running the required programs effectively. This highlighted a critical opportunity for MBUST.

> MBUST should collaborate with existing research stations, enabling students and technicians to work on research problems over there. This saves time and costs while offering practical research experience.

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Opportunities for MBUST

By strategically leveraging these external facilities, MBUST can:

- Enhance practical education without investing in duplicate infrastructure.
- Strengthen research output and extension services by conducting programs in real problem areas.
- After coursework, MS programs for 6 months and PhD programs for 1 year at MBUST, we could allow students to relocate to these field sites, ensuring immersive and applied learning.

> This strategic approach aligns with MBUST's mission and creates opportunities for collaboration with local governments and research institutions.

Reflective Learning and Daily Synthesis

An important part of the tour was when our VP, Prof. Dr. Dinesh Raj Bhuju, encouraged students to summarize the day by sharing one interesting observation. Though it felt demanding at first, especially after a long day and dinner, it proved very impactful.

This reflective exercise:

- Encouraged students to observe more critically from the second day onward.
- Helped identify research areas based on real observations.
- Improved planning for subsequent days as students pre-discussed locations, observations, and time management.

> This simple yet structured reflection turned passive observation into active learning, reinforcing MBUST's emphasis on critical thinking and purposeful engagement in the field.

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Building Faculty-Student Collaboration

The tour fostered faculty-student interactions outside classrooms and labs, creating an environment where:

- Students and faculty share challenges and successes, building mutual trust.
- Barriers of formality dissolve, encouraging open discussions and mentoring.
- Fun and entertainment enhanced cohesion and strengthened professional bonds.

Students' ability to observe, analyze, and entertain while solving practical problems impressed faculty, highlighting MBUST's emerging culture of innovative, collaborative, and resilient learners.

Conclusion

This MBUST Insights report captures not only what the team saw during the March tour but also the why, how, and lessons learned. It demonstrates:

- Hands-on learning is a critical component of MBUST's academic philosophy.
- Field-based observation is a tool to develop critical thinking, problem-solving, and research skills.
- The importance of faculty-student collaboration in building a strong university culture.
- Strategic awareness of challenges and opportunities in research infrastructure, manpower, and program development.

> By integrating these experiences, MBUST continues to pursue its mission of "Building a Prosperous Nepal," fostering a new generation of students who are not only capable researchers but also leaders and innovators committed to national development.

Queen of Spices

Large Cardamom Cultivation in Nepal

-By Mr. Anish Raj Dahal

Large cardamom (*Amomum subulatum*), a perennial herbaceous spice crop in the Zingiberaceae family, is widely known in Nepal as "Black Gold," "Brown Gold," or "Kholsa ko Sun" (Gold of the stream). It was first introduced to Nepal's Ilam district from Sikkim, India, in 1865, though commercial cultivation did not begin until the late 1950s. Systematic government development of the crop began in 1975 with the establishment of the Cardamom Development Center at Fikkal, Ilam. Today, Nepal is the world's top producer, accounting for approximately 68% of global production. Farmers in Nepal use several popular cultivars tailored to specific environments.

The eight common varieties include Ramsai, suited for above 1,500 meters, and Golsai, for below 1,300 meters. Saune is adaptable for 700-2,000 meters. Other varieties like Chibesai, Dambersai, Bharlange, Jirmale, and Seremna grow across different elevations. While cultivation has expanded to 51 districts, most production (97%) is in Nepal's Eastern Region, especially in Taplejung, Ilam, Sankhuwasabha, and Panchthar. In 2017/18, Nepal produced 6,849 tons of large cardamom from 17,004 hectares, with yields of 25–40 kg per ropani. The crop faces biotic threats like viral diseases Chirke (leaf mosaic) and Furke (stunting), and fungal issues such as rhizome rot and blights causing yield loss.

Fig 1: Large cardamom orchards

Common insect pests include the leaf caterpillar, shoot fly, stem borer, white grubs, aphids, and capsule borer. Large cardamom is an essential export crop supporting the eastern hills' economy. Nearly 99% is exported to India and re-exported to Pakistan, the Middle East, and beyond. It accounts for about 20% of household income in major districts and is highly profitable, with a benefit-cost ratio (BCR) of 1.70 to 3.06. According to Customs, the country exported 4,605 tons worth Rs 9.49 billion in the eight months ending mid-March 2026, a significant increase over the same period last year.

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Large cardamom thrives on marginal lands near mountain streams, making it ecologically valuable. It is a lucrative and socio-economically important crop for Nepal. However, the sector faces challenges like price fluctuations, reliance on the Indian market, and viral diseases. To ensure sustainability, priorities should include distributing disease-free tissue-culture saplings, modernizing drying methods beyond traditional bhattis, and strengthening direct international market links.

Fig 2: Large cardamom harvesting

Beyond the Lab

Balancing Research, Fitness, and Purpose during the City Run 2026

-By Mr. Birendra Mahara

Academic life often revolves around experiments, data, and deadlines, but a true researcher knows the importance of balance. Physical fitness and mental well-being are just as essential as intellectual growth. Embracing this spirit, participation in events beyond the laboratory becomes a meaningful extension of a researcher's journey. On Baisakh 12th, 2083 (April 25, 2026), the Nirnaya City Run 2026 brought together individuals from diverse backgrounds under the inspiring theme "Let's Run Against Drug Abuse." The 10 km run, stretching from Tinkune to Gongabu Bus Park in Kathmandu, was not just a race but a collective movement promoting health, awareness, and social responsibility. Representing MBUST, I participated in the 10 km category alongside my colleague, Mr. Saugat RC, and we both crossed the finish line to complete the 10 km marathon. Beyond timing and performance, the true achievement was the shared determination to stay active and contribute to a meaningful cause. The event served as a reminder that researchers are not confined to their desks or laboratories. We take responsibility, inspire healthier lifestyles, and engage with societal issues. Activities like these strengthen not only our bodies but also our sense of community and purpose. As we continue our academic pursuits, let this experience encourage us all to step outside our routines, stay active, and contribute to causes that matter. After all, a healthy researcher is more productive and impactful.

Glimpses after completing the race

Editorial Team

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