

WELCOME TO OUR

MBUST Insights

Contributors of this Newsletter Issue:

Dr. Sudip Pandey, Dr. Sarbesh Das Dangol, Dr. Anupama Shrestha, Dr. Bhushan Shrestha and MBUST students

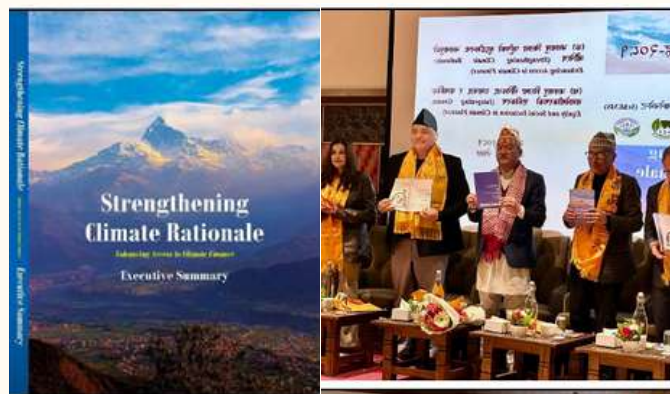
BOOK INAUGURATION

A keynote address by honorable minister

By Dr. Sudip Pandey

On 14 February 2025, the Book Opening Ceremony for Strengthening Climate Rationale: Enhancing Access to Climate Finance was successfully held at Basera Hotel, Babarmahal, Kathmandu. Prof. Sanjay Nath Khanal and Dr. Sudip Pandey from Madan Bhandari University of Science and Technology contributed chapters on Climate Rationale and Guidance for Project Development for the Green Climate Fund, respectively.

The event was graced by Honorable Minister Ain Bahadur Shahi Thakuri, from the Ministry of Forests and Environment, who inaugurated the book and emphasized the critical role of climate finance and gender inclusion in advancing research activities. The program highlighted the importance of academic contributions in addressing climate challenges. Distinguished scholars and experts engaged in discussions on sustainable solutions, reinforcing the significance of knowledge-sharing in tackling global climate issues.



Book inauguration event Climate Finance & Gender Inclusion in Development. The event was graced by Honorable Minister Ain Bahadur Shahi Thakuri, from the Ministry of Forests and Environment

New MBUST Insights Guidelines In Effect

MAINTAINING GOOD PUBLICATION PRACTICES

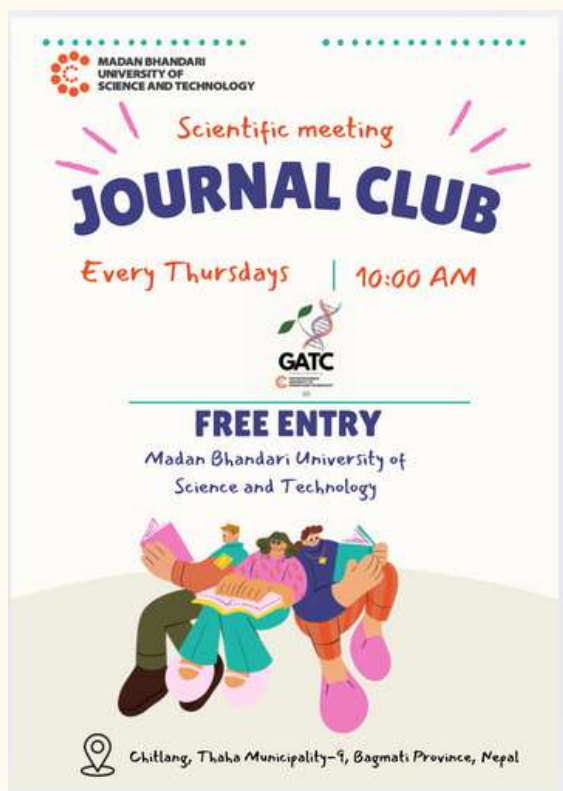
By Dr. Sarbesh Das Dangol

Our monthly newsletter, "MBUST Insights," is now published from this issue (February 2025) under the new guideline, which is in effect from February 5, 2025. The goal of the newsletter is to maintain the highest level of ethical standards to comply with academic integrity and credibility. Moreover, the newsletter guideline also aims to prepare the news contents in a specific format to ensure consistency in newsletter outlook, the format to submit the articles and the ways to submit the contents to ensure author consent and veracity. The new guideline can be found in this newsletter issue pages **18-21**.

Journal Club Meetings at MBUST

STAYING UPDATED WITH THE LATEST SCIENTIFIC ARTICLES

By Dr. Sarbesh Das Dangol



Free entry to journal club meetings (Left).
GATC Lab is on Instagram and X (Right)

Madan Bhandari University of Science and Technology (MBUST) has initiated journal club meetings for our students, researchers, and faculty members since November 2024. The attendees enjoy reading the latest scientific developments and presenting them in PowerPoint slides. This has developed the literature searching and reading habits as well as scientific comprehension and the public speaking skills of the students. To this date, twelve journal club meetings have been accomplished. Dr. Sarbesh Das Dangol, the principal investigator at Genomics and Tissue Culture Laboratory (GATC Lab), is currently leading the event. Joining the Journal Club is free. So next time when you visit MBUST in Chitlang, do come to attend our journal club meetings every Thursdays at 10 AM. Follow GATC lab on Instagram and X for updates.



MBUST Cares

SUPPORTING MENTAL WELLBEING OF ALL RESEARCHERS

By Dr. Sarbesh Das Dangol



Feeling Stressed About Your Thesis or Studies? You're Not Alone! We have all been there.

Dealing with academic stress can be tough, but support is available! If you're struggling with your thesis, coursework, or any academic-related concerns, we encourage you to reach out for counseling.

Services Offered

- Individual Counseling
- Anxiety Management
- Depression Support

Contact

- Dr. Anupama Shrestha
9841353335
- Dr. Sarbesh Das Dangol
9861035015



Every student has unique talent and value, and behind every great scientist, there's a student who worked hard to get there. Postgraduate studies and thesis work can be tough, but you're not alone. We've all faced those challenging moments, and it's okay to reach out and share your stress. Your mental health matters, and together, we rise. Remember, it's okay to take a break – we're in this together, growing and supporting one another every step of the way.

Feel free to contact your supervisor(s) in case of academic counseling and support. Dr. Anupama Shrestha and Dr. Sarbesh Das Dangol can be reached out for individual counseling, anxiety management, and depression support.

Guest Lecture by Dr. James Canham

UNLOCKING POST-GENOMIC POTENTIAL: TACKLING A THREAT TO GLOBAL WHEAT PRODUCTION

By Choodamani Joshi

Dr. Anupama Shrestha, Assistant professor at MBUST, organized a guest lecture by Dr. James Canham, a postdoctoral scientist, for the MAS students of organic agriculture at MBUST. The lecture aim to provide a holistic understanding about the genomic potential and its application to tackle the various problems in crop production. Dr. Canham's was the perfect speaker to address the importance of genomics in addressing global agricultural concerns because of his work with GetGenome, a non-profit organization, and his knowledge of molecular plant-pest interactions.

Dr. James canham completed his PhD in molecular plant-pest interactions at the John Innes Centre. He is currently a postdoctoral scientist and has played a key role in the creation of GetGenom, a project that aims to empower scientists by giving everyone access to genomics education and technology. His work emphasizes on reducing obstacles to scientific growth, boosting the effect of early-career scientists research, and speeding up their studies. Dr. Canham is a strong supporter of open science and transformative technologies that benefit society as a whole.

Dr. Canham began by defining the genomics as the study of an organism's complete set of DNA, including genes, their functions, interactions, and variations. He highlighted the importance of genomics in understanding and addressing challenges in agriculture, particularly in crop improvement and disease management. He introduced GetGenome, a non-profit organization that frees researchers from the technical complexities of sequencing so they may concentrate on genome analysis. The organization follows a bottom-up workflow, which includes: free sequencing of samples, provision of data and training through workshops, promotion of open-access publication of findings, and building a global community for knowledge sharing and local initiatives. GetGenome has sequenced 135 genomes and created 95 NCBI Biosample IDs, promoting open-access genomics and global scientific collaboration. Dr. Canham highlighted that GetGenome strongly supports open science, thinking that publically financed research should be freely accessible to the public without charge and scientists should be free to share their funding for the sake of everyone.

Dr. Canham discussed about the field pathogenomics where workflow starting from field sample collection and RNA extraction, followed by RNA-seq-based transcriptome sequencing, de novo assembly, and SNP analysis, ultimately enabling phylogenomics and population analysis of pathogens. This approach enables researchers to study pathogen evolution and develop strategies for disease management.

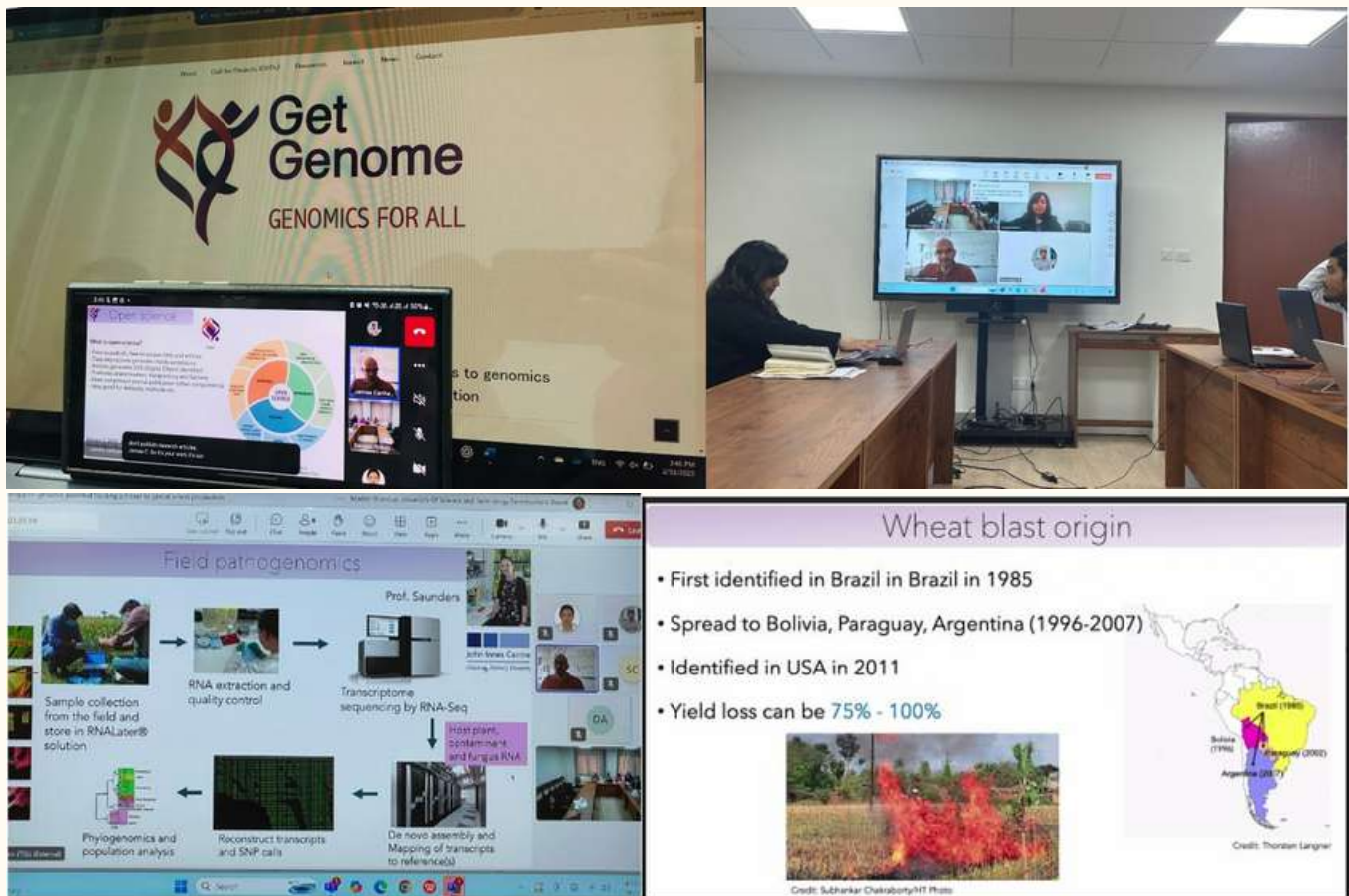
Dr. Canham provided an in-depth analysis of wheat blast disease, which poses a significant threat to world wheat production. The blast disease of wheat was first reported in Brazil in 1985 and caused yield losses up to 100% in susceptible wheat cultivars. The emergence of wheat blast in Bangladesh shows the importance of post-genomic research in addressing such dangers. He describes about the importance of post genomics in determining the genes that causes resistance, monitoring the evolution of pathogens, supporting focused breeding initiatives, facilitating the early identification of illness, and forecasting outbreaks caused by Climate Change.

Dr. Canham provides an overview of the world's largest and most advanced crop pathogen surveillance system, the Wheat Disease Early Warning Advisory System (DEWAS), that is capable of preventing disease outbreaks from novel pathogen strains that threaten wheat productivity in food-vulnerable areas. By using comprehensive genomic data and advanced biotechnological tools, researchers are developing wheat varieties that are more resilient to diseases and environmental challenges, thereby contributing to global food security.

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Dr. James Canham's lecture provided valuable insights into the significance of post-genomics in addressing global agricultural challenges. The lecture was highly informative and inspiring for the MAS students of Organic Agriculture, providing students with a deeper understanding of the application of genomics in sustainable agriculture.



Knowing Mushroom Disease

WET BUBBLE DISEASE

By Choodamani Joshi and Dr. Anupama Shrestha

Introduction: Wet Bubble disease

Wet bubble disease is a serious fungal disease that affects the commercially grown mushrooms. This disease deforms the mushroom fruiting bodies and results in water-soaked lesions, making the crop unsellable. The disease spreads quickly under ideal climatic conditions such as high humidity and poor hygiene in mushroom farms. *Mycogone perniciosa* is the causal agent, a fungal pathogen that grows best in warm and humid conditions. Its cottony, white mycelium might be confused with other fungal growths. The fungus spread through contaminated substrates, airborne or waterborne spores, and inadequate sanitation practices in farms.

Symptoms

- Deformed Mushrooms: The most noticeable sign is abnormal mushroom development, in which the caps enlarge, break, or change shape.
- Cap Spotting: One indicator of infection is spotting on the caps of affected mushrooms.
- Water-soaked Lesions: Soft blister-like lesions that release a sticky, amber-colored liquid are developed in affected mushrooms.
- Malformation and Decay: Infected mushrooms may appear short, stunted and decay after sometimes due to excessive moisture accumulation.

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How to manage?

- Maintain the cultivation area clean and hygienic.
- Use the properly sterilized substrate and disease-free spawn.
- Maintain the humidity at ideal levels (below 85%) and ensure the proper air circulation.
- Do not overwater to reduce excess moisture accumulation.
- Disinfectants the tools, trays, and surface at regular intervals.
- To stop the spread of spores, remove and destroy the contaminated mushrooms immediately.
- To get rid of fungus spores, properly pasteurize compost and casing material at 60-70 °C.
- Use beneficial microbes to suppress *Mycogone perniciosa* growth.
- Introduce bacterial biocontrol agents like *Bacillus subtilis* to inhibit fungal proliferation.



Photo credit: https://www.researchgate.net/figure/Wet-bubble-disease-of-mushroom_fig3_364126900

Exploring Challenges and Innovations

KING OYSTER MUSHROOM FARMING

By Saugat RC, Suraj Chaudhary, Atmaz Kumar Shrestha, Nitesh Khatiwada and
Dr. Bhushan Shrestha

A significant meeting was held at Ares Mushroom Farm (AMF) in Chundevi of Thankot, Kathmandu on February 16, 2025. The session brought together key stakeholders, including President, Vice President and Director of MBUST, scientist from National Plant Pathology Research Center of Nepal Agricultural Research Council (NARC), Khumaltar, Faculty members from Institute of Engineering (IOE), Pulchowk, Research Director and Executive Director from Nepal Bioscience Research Laboratory (NBRL), and Faculty members and research students from Organic Agriculture Program and Digital Technology Program of MBUST. Moderated by the MBUST President, the discussion aimed at understanding technical challenges faced by AMF in cultivating King Oyster mushroom.

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Mr. Om Krishna Shrestha, owner of AMF, initiated discussion by highlighting lack of engineers specializing in mushroom farm design, emphasizing rising costs of wood substrates, which have doubled in two years. He described the process, including manual filtering of wood dust and use of a conveyor belt for substrate preparation. The packaging area was another focal point, where he detailed his nutrient blending machine and the use of a small-pore filter to improve efficiency. He also elaborated on the double-door autoclave system that sterilizes 4000 packets at a time, alongside a smaller autoclave used for grain sterilization.

During the site visit, Mr. Shrestha shared insights into his innovative approach for incubation and refrigeration. He explained that his refrigeration room can store up to 12,000 packets. His incubation chamber, capable of holding 40,000 packets, remains underutilized due to limited market. The incubation process, lasting 40–45 days at 24–28 °C, benefits from the farm's naturally cool environment, eliminating the need for air conditioning.

A crucial topic of discussion was contamination control. Mr. Shrestha described his partnership with JICA, which led to a 95–99% reduction in pathogens in autoclaving. However, contamination remains a major issue, particularly due to the small-scale production model, where each farm worker is assigned multiple tasks, increasing the risk. He also expressed need for improved room treatment techniques and considered alternative sterilization methods. He informed that despite the production capacity of 2000 kg per day, AMF has reduced production to 50 kg per day due to market barriers. The economic challenges of dried mushroom production were also raised, with dried leftover mushrooms from Kalimati Vegetable and Fruits Market selling @ NPR 700 per kg compared to Freshly dried mushrooms @ NPR 1000 per kg, making sales difficult.

Experts from various fields provided recommendations to address these challenges. Mr. Basistha Acharya from NARC suggested setting up a dedicated inoculation chamber and exploring fumigation, drying, and canning alternatives. Faculty member from IOE highlighted need for automation, improved packaging RPM, and temperature regulation. Mr. Arun Lama from NBRL pointed out that human intervention remains the primary source of contamination and stressed the need to study nutritional loss during substrate preparation.

The session concluded with a call for industry-academia collaboration. Vice President of MBUST Padma Sunder Joshi emphasized that while challenges in mushroom farming persist, they are not insurmountable if addressed strategically.

The meeting underscored the urgent need for collaborative efforts to address these issues and strengthen Nepal's mushroom farming sector. Stakeholders were encouraged to work together to overcome technical limitations, improve efficiency, and promote sustainable mushroom cultivation practices.



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Guest Lecture on Biological Control

BY DR. SAMUDRA LAL JOSHI

*By Saugat R.C., Atmaz Shrestha, Suraj Chaudhary, Nitesh Khatiwada, Prabin B.C.,
Sabnam Subedi, Choodamani Joshi and Dr. Bhushan Shrestha*

Course: Biological Control (OA-EL-570)

Audience: PhD and Master students of OA Program and FBM Program, researchers

Date: 10 and 11 February 2025

Speaker: Dr. Samudra Lal Joshi, Former Principal Scientist, National Entomology Research Centre, Nepal Agricultural Research Council (NARC), Khumaltar

Venue: Meeting Hall, Center for Energy Studies (CES), Institute of Engineering, Pulchowk

As part of "Biological Control (OA-EL-570)" course, Dr. Samudra Lal Joshi delivered a two-day guest lecture (6 hrs) on importance and application of biological control in pest management. The lecture covered various aspects of using natural enemies to regulate pest populations, with a special focus on economic insects and mites affecting mushrooms.

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Day 1, Dr. Joshi introduced biological control as a key component of Integrated Pest Management (IPM), defining it as the use of parasites, predators, and pathogens to manage pest populations. He explained three main approaches – classical, which involves importation of biological control agents; conservation, which focuses on maintaining and enhancing existing natural enemies and augmentation, where natural enemies are mass-released for pest suppression. He also discussed biotic and abiotic factors influencing natural control, historical pest control methods, and importance of preserving beneficial insects like the Asian weaver ant, which Nepali farmers often destroy despite its role in citrus tree protection. The session concluded with insights into the scope of biological control in reducing pollution, improving agricultural sustainability, and introducing new pest management techniques.

Day 2, Dr. Joshi focused on biological control of mushroom pests. He discussed use of microbial insecticides, including Nuclear Polyhedrosis Virus (NPV) and *Purpureocillium lilacinum* (syn. *Paecilomyces lilacinus*), as well as field application of parasitoids and predators such as *Trichogramma chilonis* (egg parasitoid) and green lacewing (*Chrysoperla carnea*). He highlighted challenges in Nepal's adoption of biological control due to a lack of research facilities, storage systems, and scientific advancements. The session also covered history of biological control importation in Nepal, including introduction of lady beetles from Thailand and woolly aphid parasitoids from France.

Furthermore, Dr. Joshi addressed risks and benefits of biological control. While it offers eco-friendly pest management, reduces pesticide dependency, and preserves biodiversity, it can also pose risks such as allergic reactions in humans, interspecies competition, and disturbances in native ecosystems. He shared success stories from around the world, including classical biological control of cottony cushion scale in California using *Rodolia cardinalis* (*Vedalia beetle*).

The lecture concluded with an engaging Q&A session, where participants explored economic threshold of pest control and the need for further research on natural enemies of mushroom pests. Dr. Joshi encouraged young researchers to delve into this area, emphasizing that if harmful pests exist, their natural enemies must also exist—waiting to be discovered.

This insightful session provided students with a deeper understanding of sustainable pest management and highlighted the future potential of biological control in Nepal's agricultural sector.

Summary of the lecture

Field application of microbial insecticides, including Nuclear Polyhedrosis Virus (NPV) and nelindrihyde (nil)/I and their degradation under sunlight.

Introduction of *Purpureocillium lilacinum*, a fungal biological control agent.

Field application of parasitoids and predators, focusing on *Trichogramma chilonis* (egg parasitoid), which is not yet used in Nepal due to storage and research limitations. Discussed green lacewing (*Chrysoperla carnea*) and its effectiveness.

Process of importing biological control agents into Nepal, mentioning past efforts such as:

- Woolly aphid parasitoid *Aphelinus mali* from France (1978) against apple woolly aphid
- FAO's 1984 warning about the invasive leucaena psyllid damaging fodder crops.

Available biopesticides in Nepal, including *Bacillus amyloliquefaciens*, *Bacillus thuringiensis*, *Metarhizium anisopliae*, *Heterorhabditis indica* and NPV, and certification process for biopesticide suppliers.

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Differentiation between biopesticides and chemical pesticides, mentioning that some farmers use chili powder for localized pest control. Discussed environmental modification methods, such as using male-specific fruit fly traps.

Introduced demolting hormones and protein baits, explaining their role in pest control. Noted the recent invasion of *Bactrocera minax* in Nepal from China via Bhutan, Sikkim, and Darjeeling. Since biological control agents for this pest do not exist in Nepal, protein baits are currently used.

Benefits and risks of biological control, highlighting:

- Benefits: Biodiversity protection, economic benefits (e.g., cassava mealy bug control in Africa), reduction of pesticide use.
- Risks: Possible plant health issues, opportunistic phytophagous behavior, interspecies competition, human allergic reactions, and environmental concerns such as disruptions to native species and ecosystem functions.

Risks of biological control, including competition among species and genetic modifications affecting native organisms.

Approaches to biological control: classical, conservation, and augmentation, including importation, quarantine, host specificity studies, and field release.

Evaluation of biological control efficiency and provided a historical case study on citrus industry protection through the introduction of *Rodolia cardinalis* (Vedalia beetle) in California. *Rodolia cardinalis* and the augmentation method, emphasizing importance of observation as a key skill for researchers. Introduced inoculation (small releases) and inundation (mass releases) methods.

Discussion on conservation of biological control, advocating for:

- Discouraging monoculture
- Using selective pesticides to protect natural enemies
- Enhancing biodiversity through habitat management (e.g., beetle banks, cover crops, and crop residue management)

Data showing that strip-harvested fields contain four times more natural enemies than conventional fields. Explained how messaging plants enhance natural enemy populations by releasing volatiles that attract beneficial insects.

On-field image of a beetle bank and reiterated that every natural enemy has a corresponding pest.

Opened Q&A session, where participant Shyam Sundar Halwai asked about natural enemies of mushroom pests. Dr. Joshi responded that no definitive natural enemies have been identified yet, emphasizing the need for further research. Discussed the economic threshold concept, highlighting that biological control does not apply economic thresholds like chemical control but instead follows inoculative and inundative methods.

Dr. Bhushan Shrestha presented his findings on common insects and mites affecting mushrooms, sharing images of different mushroom flies and highlighting Dr. Joshi's insights. The session concluded with Dr. Joshi expressing thanks to all participants, encouraging further research in mushroom pest biological control.

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Lecture on Mycorrhizae

BY DR. GEETA SHRESTHA VAIDYA

*By Saugat R.C., Suraj Chaudhary, Atmaz Shrestha, Nitesh Khatiwada, Srijana Dangi,
Prabin B.C., Choodamani Joshi and Dr. Bhushan Shrestha*

Dr. Bhushan Shrestha welcomed Dr. Geeta Shrestha Vaidya to MBUST on February 4, 2025, marking the beginning of an insightful guest lecture. Dr. Vaidya commenced her session with a general introduction to mycorrhizae, highlighting their non-pathogenic nature and their widespread presence in 95% of plants, with only 4-5% being ectomycorrhizal. She recounted how she initiated mycorrhizal studies in Nepal in 1991 at NAST (formerly RONAST) but faced financial constraints that hindered further research on ectomycorrhizal fungi. She shared her experience of undergoing a rigorous one-hour interview for a grant from the International Foundation of Science of Sweden. Dr. Buddhi Ratna Khadgi later supported her in mushroom collection.

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Dr. Vaidya explained symbiotic nature of mycorrhizae, describing the bidirectional movement of nutrients—where carbon flows to the fungus while inorganic nutrients are supplied to the plant. She emphasized that mycorrhizae align with the principle "Prevention is better than cure," as they enhance disease resistance, improve nutrient and water uptake, eliminate harmful soil microbes, and increase frost and cold tolerance. She then introduced seven types of mycorrhizal interactions, with endomycorrhizae being the most common, and discussed her research on endomycorrhizal activity using invasive plants. She distinguished between Vesicular Arbuscular Mycorrhizae (VAM) and Arbuscular Mycorrhizae (AM), noting that not all endomycorrhizal fungi form vesicles.

Dr. Vaidya continued with examples of endomycorrhizae and, moved on to ectomycorrhizae (ECM), explaining their presence in willow and eucalyptus trees, where both ecto- and endomycorrhizae coexist. She highlighted how ECM increase soil porosity, enhance aeration and water retention, and prevent soil erosion due to their glue-like spore structure. She discussed the structural functions of mycorrhizae in soil, emphasizing their role as conduits for nutrient exchange and stating that AM fungi are ubiquitous, regardless of soil type. She then described a pot experiment comparing mycorrhizal and non-mycorrhizal plants.

She outlined benefits of mycorrhizae, including their role in resisting weed invasion, reducing transplant shock, and protecting against soil-borne pathogens. She then introduced macrofungi and discussed "Bhutke Chyau," a subterranean mushroom whose fruiting body formation is influenced by lightning, primarily found in Nepal's Terai region. She detailed the collection, processing, and documentation of ECM fungi, emphasizing steps such as recording site details, examining and drawing fresh specimens, cleaning soil debris, photographing growth stages, making spore prints, and properly drying and storing specimens. She also showcased mushrooms she had preserved in 1991.

She explained that 99% of mushrooms are edible, while only 1% are poisonous. She highlighted the essential role of pine trees in mycorrhizal growth and illustrated examples of ECM fungi, including puffballs, coral fungi, truffles, and *Agaricus* species (Aandra Chyau). She pointed out that *Shorea robusta* (Sal tree) in eastern Nepal remains largely unexplored in terms of mycorrhizal diversity. She described how chemical reactions, odor, and taste can help identify ECM fungi and used schematic diagrams to explain the structural differences between ecto- and endo-mycorrhizae, emphasizing their role in protecting host plants from drought stress.

Dr. Vaidya introduced different types of ectomycorrhizal roots and discussed the estimated 6,000–10,000 species of fungi. She explained how EM fungi absorb heavy metals, making them environmentally beneficial. This led to a discussion on whether ectomycorrhizal mushroom consumption has been studied for its effects on human health. She discussed edible ectomycorrhizal mushrooms such as Matsutake and their potential to decompose organic compounds. She outlined various methods for isolating ectomycorrhizal fungi, including soil serial dilution agar plates, the Warcup soil plate technique, syringe inoculation, immersion tube methods, screened immersion plates, hyphal isolation, soil sieving, floatation, and other approaches.

Finally, Dr. Vaidya concluded the session by announcing that the next two sessions would involve hands-on isolation of ECM, followed by a discussion on their antimicrobial activity. She also noted that MMN media is well-suited for mushroom cultivation.

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GLIMPSES

Awareness Program--Plastic & Pesticide Waste CAUSES, EFFECTS, AND PROBABLE SOLUTIONS

*By Saugat R.C., Nawaraj Pandey, Nilkantha Regmi, Dhana Krishna Acharya,
Birendra Mahara, Choodamani Joshi, Pawan Kathayat, Prabin B.C. and Sabnam Subedi*

On 6 Feb 2025, the Awareness Program on Plastic and Pesticide Waste was conducted with the participation of students from classes 6, 9, and 12 of Swachanda Bhairab Secondary School. The initiative was introduced by Mr. Manoj Regmi, Chairman of Bicharithok Tol Sudhar Samiti, who proposed the idea to MBUST students. They agreed to provide technical support, while Mr. Regmi assured the provision of gloves and dustbins for plastic waste collection within the school boundary. The venue was coordinated by Mr. Sanjiv Nepal, Vice Principal of the school, who ensured that students were well-informed about the program. At MBUST, the concept paper was submitted to Dr. Kriti Kusum Joshi and received support from Dr. Bhushan Shrestha and Dr. Sudip Pandey, with Prof. Rajendra Dhoj Joshi ultimately approving it. Several student representatives from MBUST played an active role in the event.

Introductory Video

The session began with a video presentation, credited to the National Science Foundation News YouTube Channel. The voiceover was provided by Mr. Dhana Krishna Acharya, a research student in MAS in Organic Agriculture, and the audio editing was handled by Saugat R.C., another research student from the same program. The video provided an overview of the impact of microplastics waste on human health and the environment. The video provided an insightful overview of microplastics pollution, setting the stage for deeper discussions throughout the program. After the video presentation, the students were asked if they are familiar with the word microplastic or not? They replied "No" in unison which shows the importance of this program.

First Activity: Understanding Pesticides

The first interactive session, presented by Mr. Nabaraj Pandey, a student of MAS in Forest Biomaterials at MBUST, focused on the definition and classification of pesticides. Pesticides are chemical substances used to eliminate pests, including insects, bacteria, viruses, fungi, weeds, and rodents. The session covered the difference between pesticides and medicines, highlighting how pesticides are meant to destroy harmful organisms, while medicines are designed to cure or aid living organisms. A study conducted in May 2022 across ten agrovet centers revealed that 279 different pesticides were available in Nepal, with 62% imported from India, 18% from China, and 20% from other countries.

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The discussion also included toxicity labeling of pesticides in Nepal, where red-labeled pesticides indicate the highest toxicity, followed by yellow, blue, and green. The session emphasized the harmful effects of pesticide exposure, which can lead to health issues, environmental contamination, and biodiversity loss. Mr. Pandey elaborated on pesticide toxicity, the concept of biomagnification, and the long-term environmental risks associated with excessive pesticide use. He encourages participants to make sure their parents or guardians are using pesticides in a proper manner.

Second Activity: Microplastics and Sustainable Infrastructure

The second session, led by Er. Nilkantha Regmi, a student of MAS in Sustainable Resilient Infrastructure at MBUST, addressed the growing issue of microplastic waste. He explained that microplastics originate from industrial waste, consumer products, and plastic degradation, accumulating in soil, water, and air, and posing significant threats to ecosystems.

The session explored sustainable solutions, particularly the use of microplastic-infused construction materials, such as plastic-based concrete, bricks, and asphalt roads. This innovative approach aligns with circular economy principles, reducing waste while enhancing the durability of construction materials. Real-world examples from India, the Netherlands, and Indonesia were presented, showcasing successful applications of plastic waste in road construction and infrastructure projects.

Third Activity: Waste Segregation & Best Practices

In the third session, Mr. Saugat R.C. conducted an awareness session on waste segregation and its importance. He explained the different colored dustbins designated for specific types of waste, ensuring effective waste management. He highlighted Japan's school cleaning culture, where students take responsibility for maintaining cleanliness in their schools, promoting discipline and environmental responsibility. The session also recognized the students of Swachanda Bhairab Secondary School for their proactive efforts in waste collection before the program, led by Mr. Manoj Regmi.

Fourth Activity: Awareness Quiz

A quiz competition, moderated by Mr. Birendra Mahara, a research student in MAS in Organic Agriculture at MBUST, engaged students in an interactive learning experience. The quiz included questions related to pesticides, plastic pollution, and waste management, reinforcing key takeaways from the sessions.

Some of the quiz questions included:

- What are pesticides used for?
- How does plastic waste affect the environment?
- What is microplastic, and how does it impact human health?
- In which country has plastic road construction been successfully implemented?

The quiz helped students recall and apply the knowledge gained throughout the program.

Fifth Activity: Waste Collection

The final activity involved a waste collection drive, where students actively participated in collecting plastic waste within the school premises. With gloves and dustbins provided by the organizers, students contributed to a cleaner and more sustainable school environment. This hands-on activity reinforced the importance of collective action in environmental conservation.

The awareness program successfully instilled a sense of environmental responsibility among students, encouraging them to adopt sustainable practices in their daily lives. Moving forward, the school aims to implement a plastic-free policy, introduce training sessions on eco-friendly farming and composting, and initiate community-driven waste reduction programs through Eco-Club. These efforts will ensure that the knowledge gained from the program translates into tangible environmental benefits.

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This program demonstrated the power of education, collaboration, and action in addressing environmental challenges. We extend our heartfelt gratitude to all participants, speakers, and supporters who contributed to making this event a success. With continued efforts, we can collectively work towards a cleaner, healthier, and more sustainable future.



Advancing Bioeconomy

INSIGHTS INTO BIOMASS UTILIZATION & BIO-REFINING

By Dr. Sudip Pandey

On February 10, 2025, Prof. Bishnu Acharya from Saskatoon University, Canada delivered an engaging lecture at MBUST on biomass utilization with a focus on bio-refining. His session covered key aspects of bio-refineries, their types, and the challenges associated with their implementation.

During the talk, Prof. Acharya shared insights from his research on utilizing macroalgae—an environmental pollutant along the Canadian coast. His team successfully extracted valuable compounds from the algae using a cost-effective supercritical resource extraction method. He also highlighted the discovery that biochar derived from algae contains high sulfate concentrations, making it a promising bio-stimulant for agricultural applications.

The research eventually led to the formation of CanXtract Innovation Inc, a startup dedicated to sustainable resource utilization. Prof. Acharya's lecture not only provided valuable knowledge but also inspired students and faculty to view challenges as opportunities. He emphasized the importance of value addition in research, encouraging future innovators to explore sustainable solutions for environmental issues.



Bridging Nations Through Bioprocess Innovation

A TALK ON BIOREMEDIATION & BIOSYNTHESIS AT MBUST

By Dr. Sudip Pandey

MBUST hosted an insightful talk by Dr. Nabin Aryal, Associate Professor at the University of South-Eastern Norway (USN), on "Bioprocesses for Bioremediation and Biosynthesis: Bridging Norway and Nepal." on Thursday 25 February 2025. The session highlighted cutting-edge advancements in environmental biotechnology and the role of biofilms, anaerobic digestion, and biomass valorization in promoting sustainability.

Dr. Aryal emphasized the importance of bioprocesses in environmental remediation, detailing how nitrifying, denitrifying, and electroactive biofilms contribute to wastewater treatment and carbon capture. He also discussed biomass utilization in a circular economy, explaining how residual agricultural and forestry waste can be transformed into valuable bioresources through anaerobic digestion and gasification. The production of biomethane and synthesis gas from organic waste was also explored as a sustainable alternative to fossil fuels.

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A key takeaway from the talk was the collaborative potential between Nepal and Norway in research and academic exchange. His discussion encouraged young researchers to explore bio-based solutions for environmental challenges, aligning with global sustainability goals. The event served as a platform for fostering interdisciplinary dialogue and strengthening international cooperation. MBUST looks forward to expanding such collaborations to drive innovation in bioprocess engineering and environmental sustainability.



Exploring Innovations in Bamboo

INSIGHTS FROM PRE-EVENT

By Binita Silwal

A team from the Forest Biomaterials Science and Engineering program (Dr. Saurabha Bhattarai and Dr. Kishor Timsina) along with one PhD student Mukesh Maharjan and one master's student Binita Silwal of MBUST attended the 1st National Bamboo Conference pre-event 2081 held on 6th February 2025 in Himalaya Hotel, Lalitpur organized by Diktal Rupakot Majhuwagadhi Municipality, Forest research, and training center (FRTC), Ministry of Tourism, Forest and Environment (MOTEF) and Green Bamboo Creation (GBC). This conference aimed to raise awareness, mobilize resources to promote bamboo cultivation and promote bamboo species and bamboo-based products as a key economic resource. The conference featured three key sessions: Grow with Bamboo, Build with Bamboo, and Let's Talk Bamboo. In each session, national experts from relevant fields delivered presentations, followed by panel discussions that explored topics ranging from bamboo plantations and construction to the challenges within the industry.

Finally, there were interactive sessions with policymakers and entrepreneurs on promoting bamboo as a sustainable future and key aspects that need to be addressed. Additionally, Dr. Kishor Timsina presented valuable insights in the second session on bamboo as a structural material and highlighted there is a need to research building codes for bamboo when using it as the construction industry. This pre-event also paved the way for the 1st National Bamboo Conference 2081 which will held in Khotang, Diktal.



Forest biomaterials team Mukesh Shrestha, Binita Silwal and Dr. Saurabha Bhattarai during conference



Dr. Kishor Timsina giving Presentation on Bamboo as sustainable materials

Unlocking Nepal's Product Potential

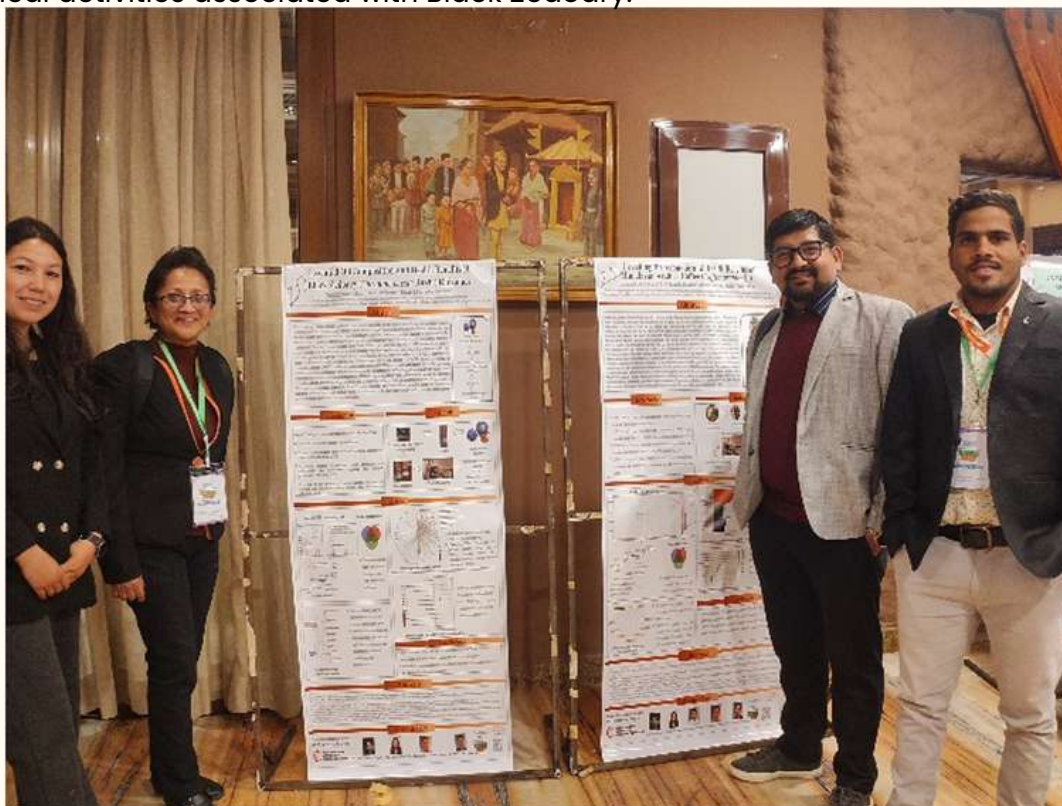
EXPLORING WITH GC-MS/MS AND NETWORK PHARMACOLOGY

By Nawaraj Pandey and Dr. Sabina Shrestha

Forest Biomaterials Science and Engineering team comprising Dr. Sabina Shrestha, Dr. Jhashanath Adhikari Subin, Dr. Saurabha Bhattarai, Mr. Nawaraj Pandey, and Ms. Binita Silwal, recently showcased their innovative research at the 3rd International Conference of the Biotechnology Society of Nepal (ICBSN 2025), held in Kathmandu on February 24-25, 2025. The presented posters entitled "Unveiling the Aromatic and Health Benefits of Himalayan Arabica Coffee (*Coffea arabica*)" and "Essential Oil Composition and Health Benefits of Black Zedoary (*Curcuma caesia*) Rhizomes" highlighted on use of GC-MS/MS and network pharmacology to reveal the quality and potential efficacy of Nepalese products.

Himalayan arabica coffee is rich in diterpene kahweol acetate and pregnenolone acetate and showed significant connections between these compounds and cancer-related pathways, including the PD-L1 expression and PD-1 checkpoint pathway, as well as central carbon metabolism in cancer.

Black Zedoary is rich in epicurzerenone and hydroxyvalerenic acid which are closely related to several biological processes such as oocyte maturation, PI3K-Akt signaling pathway for cell survival and Alzheimer's disease as well as antigen processing pathways IL-17 signaling pathway and Th17 cell differentiation. These findings suggest promising health benefits and biological activities associated with Black Zedoary.



Poster presentation at ICBSN25



Scan for detail



Scan for detail

Guidelines for MBUST Insights

CONTENT SUBMISSION GUIDELINES

By Editorial Team

MBUST Insights is the official monthly newsletter of Madan Bhandari University of Science and Technology (MBUST), designed to promote science diplomacy, communication, outreach, and academic discourse. It is a platform for university faculty, researchers, and students to share news, insights, achievements, and updates. MBUST Insights is a scientific news publication and must meet the highest standards of academic integrity and credibility. This guideline is effective from February 2025 (Issue 8), dated February 5, 2025.

Content Submission Guidelines

- News articles must be original, well-researched, and relevant to science, technology, innovation, and university activities. Research findings intended for journal publication should be shared with caution, ensuring they are not disclosed prematurely. However, key insights that are not part of formal publications may be included in the newsletter. Additionally, summaries of published research articles with citations and references may be shared to enhance public understanding and accessibility.
- Every author is solely responsible for their writing, and submissions must be free from misrepresentation, errors, and unreliable information.
- Plagiarism, including self-plagiarism, is not acceptable. Publication ethics is applicable.
- Content should be thoroughly checked for veracity by the respective contributing teams: Organic Agriculture Team, Forest Biomaterials and Engineering Team, Artificial Intelligence Team, Data Science Team, and Sustainable and Resilient Infrastructure Team.
- Any person who has not contributed to the writing should not be an author of an article. For example, a student should not include the PI as an author without the PI contributing to the article, and vice-versa. A student article reviewed by the PI does not qualify the PI to become an author. This applies to all other articles, PI, students, and individuals, to only list authors who have directly contributed to the news article.
- MBUST Insights does not accept AI authorship. However, authors can use AI tools with caution to improve their grammar and sentence structure for clarity.
- Any content published on MBUST Insights should be duly cited with references in future publications.
- The Principal Investigator (PI) of each lab is responsible for reviewing and approving their respective student submissions from their laboratory. Student submissions must be provided with a duly filled form by the student and signed by the respective PI of the lab.
- Each newsletter issue should feature at least one news article from a student of the respective lab. The respective PI or MBUST staff can write any number of articles as required.
- Ideally, each article must not exceed more than Two (2) pages. However, if required, the authors can request to publish more pages, which should be approved by the Section Editor or Editorial Team.
- Priority will be given to special news or priority issues that require publication within that month.
- Ideally, each issue shall have pages between 15-20. The addition of more pages can be approved by the Section Editor or the Editorial Team.
- All authors are required to submit their contents in a duly signed form provided in Appendix I and submitted to the "Section Editor".
- Submissions are accepted only from individuals formally affiliated with MBUST.
- The Section Editor and editorial team reserve the right to accept, edit, or reject submissions for clarity, coherence, and compliance with these guidelines.

(Continued on Page 18)

Publication format and requirements

Canva should be used to prepare the newsletter. Changes in format or the use of tools should be recommended and approved by the Editorial Team. All the pages will have the color code "#FFBF2" and the font color code must be "#000000" as applicable in Canva.

The guidelines can be changed from time to time as needed with recommendation and approval from the Editorial Team.

1. The publication format for the front page is given below:

a) The format is shown in Figure 1.

b) The top left corner of the newsletter should have the logo of the university.

c) The top right corner of the newsletter should have the contents in block letters, ISSN number in bold letters, with font "Poppins" and size 12 as indicated below.

NEWSLETTER | **ISSN NO. 3059-9342 (Online)**

ISSUE 8 | FEBRUARY 2025

d) "WELCOME TO OUR" should be in block letters, with font "Alatsi" and size 10.9.

e) "MBUST Insights" should be written as indicated and should be in font "Canva Sans" with size: 50.8, and not in bold.

f) As indicated in the figure, "Contributors of this Newsletter Issue" should be in bold letters, with font "Poppins", and size 10.8. The name of the authors should be in italics, in font "Poppins", and size 9.8.

g) There shall be one straight line above "WELCOME TO OUR" and one straight line below the name of the authors.

h) The main headline of the article must be in bold and block letters, in font "Poppins" and size 34.7.

i) The subheading must be in the sentence case format: "Sample collection and problem analysis of rice and millet". The font should be "The Seasons", size 19, letters should not be in bold.

j) The name of the author should be written below the subheading on the right side, in font "Poppins", italicized and size 9.5.

k) The article should be written in font "Poppins", size 10.5, and not written in bold. However, the headings and subheadings in the text can be formatted as per the author's wish, or as found suitable by the Section Editor or the Editorial Team.

l) Page number should be written on the right bottom of each page as "Page 1", in font "Canva Sans", size 7.3, and should not be in bold.

m) In case there are two pages (or more), the first page of the article will have "(Continued on Page 22)" mentioned on the left bottom of the page, and the following page will have "(Continued from Page 5)". The "Continued from Page ..." shall be italicized, in font "Poppins" and size 10.5 mentioned on the top left of the page.

n) Pictures should be of high quality.

o) Picture caption should be in italics, not in bold letters, with font "Poppins", and size 6.7.

p) The alignment will be followed as per the September 2024 Issue 3 as much as applicable and can be modified as necessary.

2. The publication format for the second page through all other pages (except the last page) is given below:

a) The format is shown in Figure 2.

b) The main headline of the article must be in title case, not in bold, in font "The Seasons" and size 25.

c) The subheading must be in the block letters. The font should be "Poppins", in size 12.9, and the letters should not be in bold.

(Continued on Page 19)

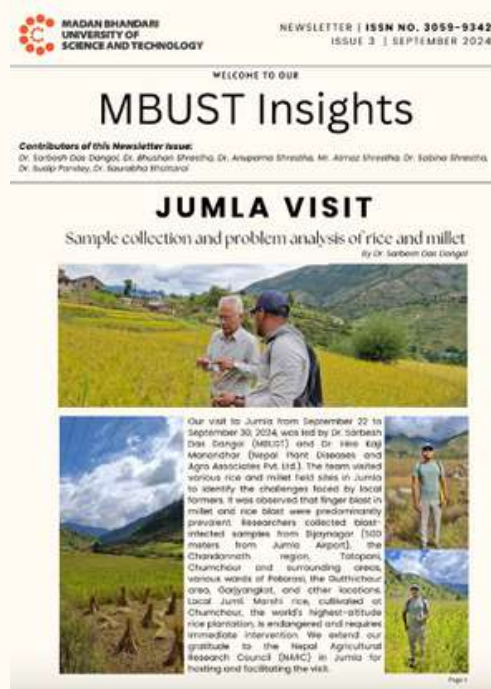


Figure 1: Format of the front page

- d) The name of the author should be written below the subheading on the right side, in font "Poppins", italicized, and size 9.5.
- e) The article should be written in font "Poppins", size 10.5, and not written in bold. However, the headings and subheadings in the text can be formatted as per the author's wish, or as found suitable by the Section Editor or the Editorial Team.
- f) The page number should be written on the right bottom of each page as "Page 1", in font "Canva Sans", size 7.3, and should not be in bold.
- g) In case there are two pages (or more), the first page of the article will have "(Continued on Page 22)" mentioned on the left bottom of the page, and the following page will have "(Continued from Page 5)". "Continued from Page ..." shall be italicized, in font "Poppins" and size 10.5, mentioned on the top left of the page.
- h) Pictures should be of high quality.
- i) Picture caption should be in italics, not in bold letters, with font "Poppins", and size 6.7.
- j) If two or more articles are to be published on the same page, a straight line can divide the articles.
- k) The alignment will be followed as per the September 2024 Issue 3 as much as applicable and can be modified as necessary.

3. The publication format for the last page is given below:

- a) The format of the last page is as shown in Figure 3.
- b) The editorial team will be mentioned on this page at the top inside a box. The editorial "Editorial Team" will be inside another box with color code "#BB8B64", all letters in bold, in font "TAN Meringue," and font size 19.
- c) Below the "Editorial team" will be the names of the current "Editor-in-chief", "Managing Editor", "Section Editor", "Copy Editor" and "contributing authors/photographers". The name of the positions shall be in bold, the name of individuals are not bolded, and the font shall be "Poppins" and size "10.5".
- d) Below the "Editorial Team" will be "Any Questions?" section (not boxed) written in bold, font "TAN Meringue", font size 19. Below "Any Questions?" will have e-mail, phone number(s), address and website of the university as shown in Figure 3.
- e) The last boxed section will request the reader to contribute to the endowment fund of the university as shown in Figure 3. "Support MBUST for a Prosperous and Just Nepal!"

will be bold, in font "Poppins" and size 10.5. As shown in Figure 3, the following sentences will be mentioned: "Join our campaign by donating to MBUST. Please enter your name, email, and mobile in the remarks section. Every Rupee or Dollar Counts! Your support makes a difference!". The sentences will not be written in bold, in font "Poppins" and size 10.5. Below these sentence will then be followed by the QR code details of the endowment fund of the university.

- a) Page number should be written on the right bottom of each page as "Page 1", in font "Canva Sans", size 7.3, and should not be in bold.
- b) The alignment will be followed as per the January 2025 Issue 7 as much as applicable and can be modified as necessary.



Figure 2: Format of page 2 through all other pages (except the last page)



Figure 3: Format of the last page

Appendix I

MBUST Insights – Article Submission Form

Author & Submission Details

- Full Name of the Submitter:
- Email:
- Phone Number:

Article Details

- Heading (About up to 5 Words):
- Subheading (About up to 10 Words):
- Name of Author(s):
- Content (Ideally, two pages should be included. However, the inclusion of more pages must be requested by the author to the section editor, and must be approved by the Section Editor or Editorial Team):

Images & Captions

(Attach high-quality images separately and provide captions below. Low-quality images will not be published. Authors will not be reached out by the editorial team to provide high-quality images separately.)

1. Image 1 Caption: _____
2. Image 2 Caption: _____
3. Image 3 Caption: _____

Approval & Verification (In case the submission is coming from students, interns, or researchers working under a PI)

- Signature of Principal Investigator (PI): _____
- PI's Name: _____
- Date of Submission: ____ / ____ / ____

Declaration

I, the undersigned, confirm that the submitted article is original, factually accurate, and follows the scientific and publication ethics. I have fully read and understood "Guidelines for MBUST Insights". I take full responsibility for its content and compliance with "Guidelines for MBUST Insights".

Submitter's Electronic Signature (Electronic or type your full name):

Date: ____ / ____ / ____

Note: Please E-mail your content to the Section Editor with the subject "Newsletter Content Submission (Your Name)" to: Dr. Sarbesh Das Dangol (sarbesh.das.dangol@mbust.edu.np). Please also cc: academicteam@mbust.edu.np.

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Please enter your name, email, and mobile in the remarks section.

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