

WELCOME TO OUR

MBUST Insights

Contributors of this Newsletter Issue:

Dr. Anupama Shrestha, Dr. Rameshwar Rai, Dr. Bhushan Shrestha, Dr. Sudip Pandey, Dr. Sabin Basi, MBUST students

OWSD Nepal Chapter AGM

Participation at Women Scientists' Meet

BY Dr. Anupama Shrestha

Plant Protection Biological Control Research Center (PPBCR)



The Women Scientists' Meet, organized by the Organization of Women Scientists in Nepal (OWSN) and the Organization for Women in Science for the Developing World (OWSD) – Nepal Chapter, brought together over 100 women scientists on January 26 at Nepal Academy of Science and Technology. Dr. Shrestha participated on the event on behalf of Madan Bhandari University of Science and Technology. The event was inaugurated with registration, followed by speeches from key figures in the scientific and academic community. The Chief Guest, Honorable Minister Bidhya Bhattarai, Minister of Education, Science and Technology, praised the women for their contributions to the nation's economic growth and committed to advocating for a women-friendly work environment. She further assured that childcare facilities, including kindergartens and daycare, would be prioritized in future budgets. In addition to the Chief Guest's address, Dr. Dilip Shubbha, Vice Chancellor of NAST, announced NAST's support for additional programs aimed at promoting women in science. Dr. Rabindra Dhakal, Secretary of NAST, shared that plans to build a daycare facility at NAST, in collaboration with NARC and ICIMOD, were underway for the coming year.

The event featured a technical session led by Dr. Sushmita Dhakal. Professor Bijaya Pant, the keynote speaker, discussed the challenges women face in STEM and highlighted ways to foster an environment conducive to their success. Drawing on her own experience as both a mother and researcher, she emphasized the need for child-friendly spaces in universities and research institutions. She also mentioned that Tribhuvan University had passed a gender policy and was building a child-friendly library to support women in academia. She underscored the capabilities of women scientists, noting that many women have historically made invaluable contributions to science. The event underscored the importance of increasing the participation of women in science and highlighted the need for institutional and governmental support. Data from global sources like UNESCO shows that women make up 33.3% of researchers, though this number varies by region and field. In Nepal, women are notably underrepresented in STEM fields, though progress has been made, especially in agriculture, health, and environmental sciences. The event also discussed the barriers women face, including societal norms, limited resources, and gender bias in the workplace.

Overall, the Women Scientists' Meet highlighted the progress and challenges faced by women in science in Nepal, and the need for continuous efforts to create an inclusive, supportive environment for future generations of women scientists.

GATC Lab

EMBRACING INNOVATIONS FOR ORGANIC SOLUTIONS

By Birendra Mahara

The Genomics and Tissue Culture Laboratory (GATC Lab) is on the path of development and progress in research activities. With the entry of the new batch of students, GATC Lab undertakes projects with the support from the University Grants Commission Collaborative Research and Innovation Grant (UGC-CRIG) and the Central Department of Biotechnology, Tribhuvan University, intending to solve and manage the problem of blast pathogens organically. These projects will explore sustainable and environmentally friendly methods to control, manage, and combat blast fungus in Nepal in Jumli Marsi rice and millets.

On November 22, MBUST proudly welcomed its second batch of students. Out of 10 students eager to embark on their academic journeys in the second batch, GATC Lab will supervise two students, guiding their research and innovations. The focus of their thesis will be on two crops: Jumli Marsi rice and millet. The innovative projects are being undertaken by Master of Applied Sciences Birendra Mahara and Pawan Kathayat, respectively, in the GATC Lab, which will be remarkable findings in the field of plant pathology and biotechnology in Nepal. The selection of Jumli rice and millet as a study subject is due to their indigenous nature and potential to cope with climate change. Millets are climate-smart crops. They will meet the nutritional needs of future populations, minimize environmental impacts, and solve famine and hunger shortly. They possess attributes that remarkably identify them as perfectly suitable for sustainable agriculture.

The GATC Laboratory is in the initial and formative stage of its establishment. It has a focused mission to develop innovative solutions to complex agricultural problems by applying advanced laboratory techniques and cutting-edge technology. The lab will have horizontal laminar airflow to create a clean and sterile workspace that helps to maintain air quality and minimize contaminations, a distilled water-making plant for supplying water requirements for various experiments, a cooling centrifuge for separating components of mixtures at different speeds with stable temperature, gel electrophoresis for separating and analyzing DNA, RNA and proteins, and other necessary working equipment and gadgets. The procurement for these instruments is already done, and receiving these items is in process. The laboratory is now working on the acquisition of advanced equipment like enzyme-linked immunosorbent assay (ELISA) systems, real-time PCR machines for precise nucleic acid amplification, electroporation devices to facilitate the introduction of substances into cells, and cutting-edge sequencing technology to enable detailed genomic analysis.



Photos by Birendra Mahara and GATC Lab Instagram page

The unwavering support, assistance, and ease from the university empower the lab's efforts to swiftly procure the required equipment and machinery rapidly and on time. This commitment from the university is driving the lab to become a center of excellence in agriculture research and innovation.

What's Happening With Kiwi Fruit?

EXPERIENCING QUALITY THROUGH SCIENCE AND RESEARCH

By Ankita Nepal, Sushil Rai, and Dr.Rameshwor Rai

Student Sushil Rai and Ankita Nepal, with the guidance of Dr.Sabina Shrestha and PI Dr.Rameshwor Rai, are exploring the different areas and methods to enhance kiwifruit production, quality storage, and post-harvest management. The research is focused on how different Cultivars of kiwifruit with compost techniques used: vermicompost, poultry manure, and compost manure affect the harvest time, postharvest storage, and condition(fruit quality, taste, and nutrient content) . The research is also focused on identifying and examining impact of freeze-drying,oven drying and moisture content.



Kiwi harvest at MBUST Orchid

Harvesting and first quality check

To Identify the fruit size affected by the compost applied in kiwifruit cultivars each fruit size was measured by using an vernier caliper and then recorded whereas a digital weighing balance was used to record the weight of fruit. The harvest was done carefully without causing damage.

The measurement of each fruit is important to study the effect of compost on quality. Similarly, the harvested fruits were stored along with bananas to observe how the storage, and temperature affect the ripening as well as quality of kiwifruit.

Moisture Content

After measuring the physical quality the moisture content of fresh kiwifruit samples was weighed and then dried using oven drying and freeze-drying. In the oven drying method, each fruit was cut into slices initial weight was measured using a weighing balance then dried in the oven until the constant weight to identify moisture content.

Freeze drying was also used to preserve nutrient content and quality drying under low pressure and temperature. The study tested two compost types: poultry manure and vermicompost on cultivar Hayward and Alison kiwi varieties.

After 24 hours the freeze-dried fruit was powdered and stored in the container and will be analyzed using Gas Chromatography.



Oven drying and freeze drying of kiwifruit cultivar by students

Organoleptic test with facilities, staff, and students



Organoleptic taste by MBUST family



After harvesting, the team conducted a sensory evaluation of the kiwifruits to assess the taste, texture, aroma, and overall quality of the fruit. Therefore with the presence of

MBUST family, the organoleptic test was conducted after 7 days of harvest when the fruits were ripening to evaluate the effect of storage and manure applied in cultivar.Later the result was evaluated.

Exploring Sustainable Bamboo Treatment Process

INNOVATIONS IN BAMBOO TREATMENT AT GREEN BAMBOO CREATION, HETAUDA

By Binita Silwal and Nawaraj Pandey

On 17th January 2025, we Forest Biomaterials master's students visited the bamboo treatment site of "**Green Bamboo Creation**" in Hetauda with an aim to explore the bamboo treatment process, methodologies, challenges, and future opportunities with a focus on sustainability and market potential. This trip was accompanied by Dr. Saurabha Bhattarai and Dr. Kishor Timsina who provided thoughtful and insightful mentorship which enriched our learning experience. This visit provided valuable insights into the bamboo treatment process and its importance in enhancing the durability and usability of bamboo products. The chemical treatment method employed at Green Bamboo Creation (GBC), including soaking and boiling with Boric acid and Borax. These methods significantly extend lifespan of Bamboo and its products from months to decades, making them resistant to fungal decay and environmental degradation.

However, there was lack of awareness about alternative eco-friendly treatment methods and absence of advanced testing of mechanical and fungal resistance. This highlights opportunities for us to research in bio-bases treatments and sustainable practices, which could potentially pave the way for innovations in bamboo based housing and other large scale applications.

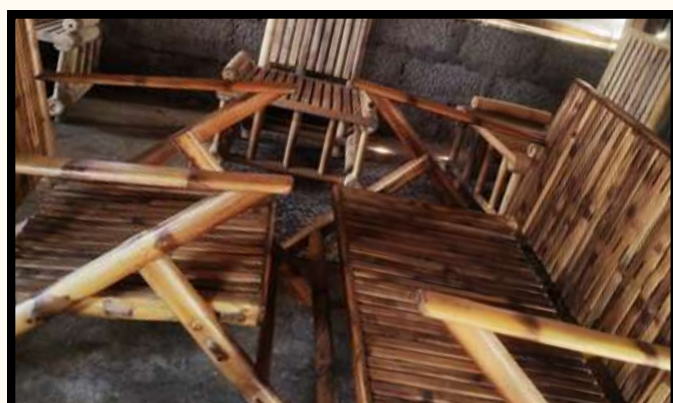
Overall, this visit deepens our understanding on harvesting, treatment, production emphasizing inclusiveness, sustainability and value chain development. This gave us idea to explore in depth research in bamboo treatment methods, focusing on bio-based resources as an alternative of chemical treatment. Additionally, this visit inspired ideas for further research into bio-based treatment methods and development of small-scale experimental set up at MBUST for treatment as well as to test treated bamboos for mechanical, chemical, environmental, and fungal resistance.



FBM Team with production officer at GBC



Gathering insight on bamboo processing and its productive items



Furniture like chair and sofa manufacture from treated bamboo



Glimpse of visit to GBC Factory at Hetauda

A Visit to Indreni Mushroom Farm (IMF)

A MUSHROOM LAB IN CHITLANG

By Saugat R.C., Srijana Dangi, Choodamani Joshi, Nitesh Khatiwada, Prabin B.C., Sabnam Subedi, Ankita Nepal, Birendra Mahara, Pawan Kathayat and Atmaz Shrestha

January 5, 2025, Sunday:

Mushroom Lab and Plant Pathology Lab of MBUST arranged a trip to Indreni Mushroom Farm (IMF) in Chitlang, Nepal. The team included Atmaz Shrestha, Sabnam Subedi, Ankita Nepal, Birendra Mahara, Choodamani Joshi, Nitesh Khatiwada, Pawan Kathayat, Prabin B.C., Saugat R.C., Srijana Dangi, Pradip Jimba, and Laxman Khadka, led by Bhashkar Aryal, a technical staff of IMF. The visit aimed to comprehend mushroom development, production, and distribution processes of the IMF, to identify diseases and issues encountered by the farm and gather disease samples for analysis at MBUST's Pathology lab.

Indreni Mushroom Farm, established in 2071 BS, is a pioneer in high-tech mushroom farming in Nepal, focusing on commercial cultivation of white button mushroom (*Agaricus bisporus*, Dalle Chyau). Covering 19 ropanis of land, the farm manages 11 incubation chambers (Rs. 35-35 lakh for each chamber), yielding an average of 400 kilograms of mushrooms each day. Mushroom is mainly supplied to Kathmandu, where around 7,000 kilograms are consumed each month. IMF employs sophisticated techniques such as composting, spawn generation, incubation, and regulated distribution. To enhance mushroom quality, the farm changed from soil casing to cocopeat, resulting in improved shape, size, and overall growth. Mushrooms are priced at an average of 300 NPR for each kilogram.



Interviewing and Taking Notes

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The farm utilizes an aerobic composting technique that incorporates these ingredients and steps. The components consist of 100 kg of straw, 80% poultry waste, 1.5% urea, 1% ammonium sulfate, 5% wheat bran, and 10% gypsum. The procedure includes raising the compost temperature to 75–80°C to speed up decomposition. To guarantee adequate aeration and uphold aerobic conditions, four successive turnings are performed, each separated by one day.



Composting Process



Some Glimpses of the visit

The farm encounters various diseases, such as wet bubbles (Mycogone), bacterial blotch (the most prevalent), mummy disease, and green, and yellow molds. Disease management strategies include pH regulation for fungal infections, chlorine bleaching for bacterial infections, and the application of Bavistin and Kawaj for disinfection. Nevertheless, the IMF faces obstacles like recurring power shortages, holdups in raw material delivery, inadequate road infrastructure, and mite invasions. The composting procedure, lasting 21 days, demands careful supervision to guarantee quality output. To avoid disease transmission, IMF employs plastic bags for large-scale production in place of conventional beds.

According to Nabin Maharjan, Director and Technical Officer at IMF, the farm plans to establish Nepal's largest mushroom production facility in Hetauda to reduce the high cost of hilly infrastructure. Additionally, they aim to develop the Chitlang facility as an agro-tourism destination. The visit offered valuable perspectives on Nepal's expanding mushroom cultivation sector, showcasing the IMF's progress in production methods and disease control. The difficulties they encounter highlight the necessity for enhanced infrastructure and better resource accessibility. Samples of diseases gathered during the visit will be examined at MBUST's pathology lab to aid ongoing research and advancements in mushroom cultivation.

The knowledge gained during this visit will significantly contribute to enhancing students' practical understanding of mushroom farming and disease control. A heartfelt thank you to Dr. Bhushan Shrestha and the MBUST faculty for enabling the visit.

Guest Lecture by Dr. Mahesh Kumar Adhikari

MINUTE OF THE LECTURE

By Saugat R.C. and Dr. Bhushan Shrestha

Arranged and Coordinated by: Dr. Bhushan Shrestha

Attended By: PhD and Master Students of the Organic Agriculture Program and Forest Biomaterials Program of MBUST and local individuals from Chitlang

Venue: Seminar Hall, MBUST, Chitlang

Date: January 10, 2025 Friday

Time: 12-2 pm

Introduction:

The session began with a brief introduction to the topic of the lecture, titled "Pauranik Tatha Baigyanik Dristikon ma Chyau". Dr. Mahesh Kumar Adhikari explained the cultural and scientific perspectives of mushrooms, delving into their significance in mythology and modern science.

Mushroom Diversity:

Dr. Adhikari discussed four unique species of mushrooms presented in his introductory slide. Each species showcased the diverse nature of fungi and highlighted their distinguishing characteristics.

Differentiating Mushrooms and Fungi:

He elaborated on the distinction between mushrooms and fungi, emphasizing that while all mushrooms are fungi, not all fungi are mushrooms. Key terms like mycelium and septate were explained, alongside their role in categorizing different mushroom groups.

Anatomy of Mushrooms:

Dr. Adhikari presented the various parts of a mushroom, including the cap, fruiting body, pseudorhiza, and fungal mycelium. Using visuals of "Bagale Chyau," he explained the significance of features such as annulus, gill color, and texture in identifying mushroom groups.

Classification of Mushrooms:

He discussed two primary groups, Ascomycotina and Basidiomycotina, sharing his personal experience of consuming 150 different types of mushrooms.

Literature on Mushrooms:

Dr. Adhikari recounted his journey in publishing a book on mushrooms. Initially written in English, he later translated it into Nepali, producing the renowned book "Nepal Ma Paayine Chyauharu".

Cultural and Mythological Importance:

He described the cultural significance of mushrooms in Hinduism, referencing the Mahabharata. He narrated the story of Britasur, a demon whose blood, spilled upon his death, is said to have led to the growth of mushrooms. This story explains why certain communities, such as Brahmins, avoid eating mushrooms.

Hindu Scriptures on Mushrooms:

Quoting various Hindu scriptures, Dr. Adhikari explored taboos regarding the consumption of mushrooms, garlic, onions, alcohol, and pork.

Edible and Medicinal Mushrooms:

He explained that 29 species of mushrooms are culturally significant, with 143 species recognized as edible. He highlighted the health benefits of certain species, such as white mushrooms, which are grown in controlled environments and considered safe.

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Common Mushroom Varieties:

Dr. Adhikari elaborated on popular mushrooms like button, Ganoderma, turkey tail, shiitake, oyster, chaga, and maitake, emphasizing their medicinal and economic value.

Historical Evolution of Fungi:

He shared insights on the origin of fungi, which date back 24-34 million years, as well as the cultural history of "magic mushrooms," which were identified around 6,000 years ago. He also detailed compounds like lentinan and lenthionine found in shiitake mushrooms, which have antibacterial, antiviral, and anti-inflammatory properties.

Health Benefits of Mushrooms:

He highlighted the wide-ranging health benefits of mushrooms, including their ability to improve immune responses and their use in managing chronic illnesses.

Experiences with Cordyceps Collection:

Dr. Adhikari recounted his struggles in collecting *Cordyceps sinensis* (Yarsagumba) and discussed its health benefits, including cholesterol control and its high market value. He also mentioned attempts to cultivate this species artificially.

Hallucinogenic Mushrooms:

He discussed hallucinogenic mushrooms found in Nepal, such as *Conocybe*, *Stropharia*, *Gymnopilus*, *Inocybe*, *Amanita*, *Coprinus*, and *Psilocybe*. He shared interesting facts, including the use of *Coprinus* to produce ink.

Medicinal Applications:

Dr. Adhikari noted that Nepal is home to 75 species of medicinal mushrooms. He shared his pioneering work in culturing *Claviceps purpurea*, whose extract is used to assist in childbirth.

Identification of Edible and Poisonous Mushrooms:

Dr. Adhikari provided tips for identifying edible mushrooms and warned about the ambiguity of existing tests. He emphasized caution when picking, storing, and consuming mushrooms.

Anecdotes on Mushroom Poisoning:

He narrated an incident involving mushroom poisoning on the security guards of Nepal's House of Representatives and provided first-aid tips, including inducing vomiting by drinking lime water.

Symptoms of Mushroom Poisoning:

He outlined symptoms such as swelling, choking, abdominal pain, hallucinations, and respiratory problems, stressing the importance of timely medical attention.

Status of Mycology in Nepal:

Despite their initial promise, Dr. Adhikari lamented the decline of active mycology societies in Nepal.

Poisonous Mushrooms in Newari Culture:

He described the traditional use of poisonous mushrooms in Newari festivals and shared examples such as *S. commune*, which is included in a dish called Panchagol.

Personal Collection of Mushroom Photographs:

Dr. Adhikari shared photographs of mushrooms he had clicked in 1967, which amazed the audience.

Unique Mushroom Species in Nepal:

He revealed that Nepal is home to five globally unique mushroom species, including *Russula kathmanduensis* and *Russula nepalensis*. Two fungi, *Puccinia adhikarii* and *Duillus adhikarii*, have been named after him.

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Historical Anecdotes on Mushroom Consumption:

Dr. Adhikari discussed Western civilization's mushroom consumption, mentioning Amanita caesarea and its association with Julius Caesar.

Soma and Sanskrit Texts:

He discussed his research on the word "Soma" used to describe mushrooms, analyzing Sanskrit texts to challenge existing interpretations.

Mushrooms in Cosmetics and Dye Making:

He explained how mushrooms are used in skincare products to combat aging and inflammation. He also mentioned dye-making techniques pioneered by artists like Miriam C. Rice.

Poetic Tribute:

He concluded by reciting his self-written poem, "*Ma Ta Chyau Bhayachu*", which metaphorically reflects his connection to mushrooms.

Conclusion:

Dr. Adhikari thanked the audience for their active participation and encouraged further studies and interest in mycology.



Dr. Mahesh Kumar Adhikari giving guest lecture

Glimpses of Dr. Mahesh Kumar Adhikari's Guest Lecture

"PAURANIK TATHA BAIGYANIK DRISTIKON MA CHYAU"

By Saugat R.C. and Bhushan Shrestha

January 10, 2025 Friday

MBUST hosted a captivating lecture by Dr. Mahesh Kumar Adhikari in the seminar hall, arranged by Dr. Bhushan Shrestha. Attended by PhD and MAS students of Organic Agriculture Program of MBUST and individuals from Chitlang village, the lecture explored the rich cultural and scientific dimensions of mushrooms.



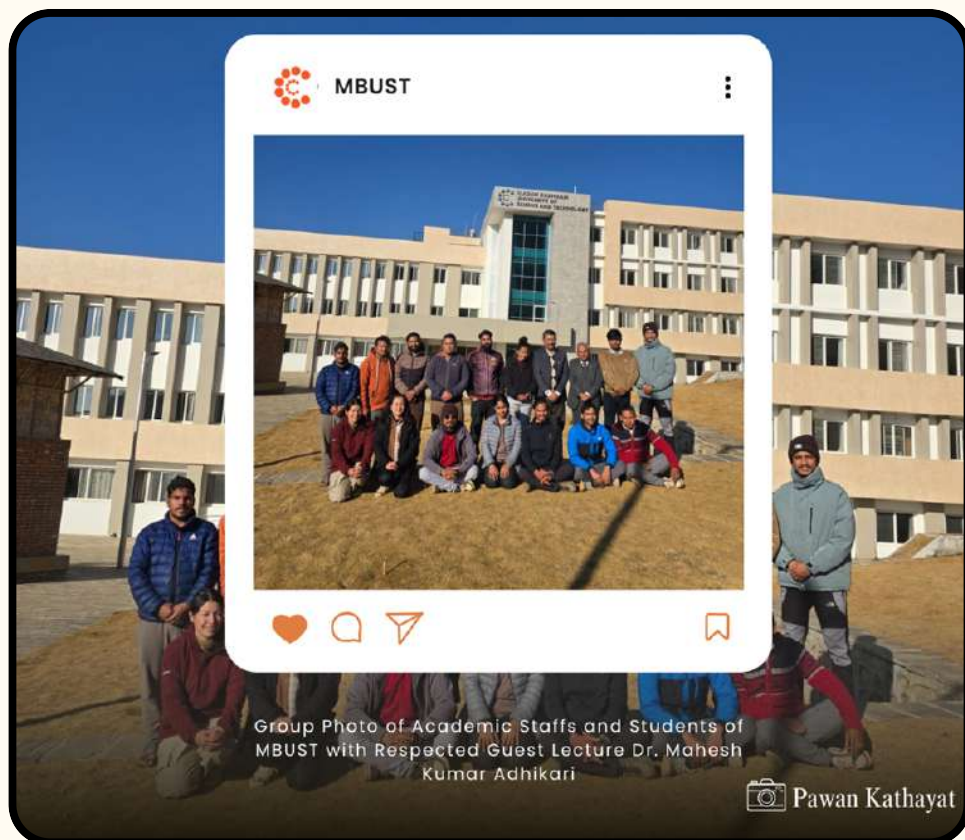
Dr. Mahesh Kumar Adhikari (Middle) with Dr. Bhushan Shrestha (in his Left), PhD Scholar Mr. Suraj Chaudhary (in his Right)

Dr. Adhikari shared fascinating insights into mushroom diversity, anatomy, and classification, discussing unique species such as *Russula kathmanduensis* and *Russula nepalensis*. He highlighted their cultural significance in Hindu mythology, including references to the Mahabharata, and addressed taboos around mushroom consumption. On the scientific front, he elaborated on medicinal properties, including antibacterial, antiviral, and anti-inflammatory compounds, and the economic potential of species like *Ganoderma* and *Cordyceps sinensis*.

Dr. Adhikari also touched on hallucinogenic mushrooms in Nepal, poisonous varieties in Newari culture, and the role of fungi in cosmetics and dye-making. His anecdotes, including mushroom poisoning incidents and their remedies, captivated the audience. The lecture concluded with a poetic tribute, "Ma Ta Chyau Bhayachu," reflecting his lifelong passion for mushrooms.

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This engaging session emphasized the importance of mycology in both academic and cultural contexts, inspiring students and attendees to delve deeper into the world of fungi.



Progress Report Presentation

PHD AND MASTER THESIS REVIEW OF ORGANIC AGRICULTURE PROGRAM OF MBUST

By Saugat R.C. and Bhushan Shrestha

The progress report presentation of MBUST PhD and Masters Students was held on January 15, 2025 Wednesday under the moderation of Prof. Sanjay Nath Khanal. The session commenced at 11:04 AM, with Sanjay Sir welcoming the participants and introducing the first presenter, Mr. Atmaz Kumar Shrestha. Mr. Shrestha presented his research progress, detailing completed tasks such as the literature review, preparation of the experimental design, and ongoing cytotoxicity tests using Zebra fish and the Brine Shrimp Lethality Assay (BSLA). He explained the extraction of different parts of Reishi mushroom (*Ganoderma lucidum*) and its analysis through Thin Layer Chromatography and GC-MS. Antibacterial activities were examined on four bacterial strains, with recommendations for future steps including LC-MS and molecular identification.

During the Q&A session, the President of MBUST Prof. Rajendra Dhoj Joshi suggested simplifying the slides, clarifying the medicinal properties of *G. lucidum*, and addressing ethical considerations for its biomolecule use. Dr. Kirti Kusum Joshi advised focusing on concise presentation and developing a mouse model, while Dr. Subin Adhikari suggested dry lab assessments and collaboration for equipment procurement. Dr. Bhushan Shrestha commended the progress and emphasized the need to enhance lab facilities.

The second presentation by Mr. Dhana Krishna Acharya, titled "Promotion of Organic Agriculture in Chitlang," began at 11:52 AM. Mr. Acharya outlined his work on the CSA model, its principles, and its history. He shared survey findings on producer challenges, market demand, and consumer interest, along with achievements like creating a CSA manual. Future work will focus on soil nutrient analysis and economic feasibility studies. Dr. KK Joshi and Dr. Sudip Pandey suggested framing the project within a research context and justifying sample sizes, while Dr. Sabin Basi clarified the integrated nature of the project. Dr. B. Shrestha expressed his support and wished for its success.



Glimpses of the session

Dr. KK Joshi recommended strengthening the research gap, Dr. B Shrestha emphasized addressing CFU value, correcting scientific notations, and exploring additional culture media, while Prof. SN Khanal suggested improving data presentation. The final presentation by Mr. Sushil Rai began at 1:23 PM. Mr. Rai discussed his research on Kiwifruit budding techniques in Nepal, explaining methodologies for grafting experiments and plans for greenhouse setups. The President suggested considering climatic factors affecting grafting success and assessing variety-specific impacts. Dr. S Basi advised preparing for budding failures, while Dr. Anupama Shrestha inquired about GC-MS analysis for aromatic biomolecules in kiwi. Prof. SN Khanal noted missing references and graph labels.

At 12:49 PM, Ms. Sabnam Subedi presented her research, "Biological Control of Clubroot Disease of Cauliflower" highlighting the severity of the problem in Chitlang and her progress in isolating pathogens, conducting dual culture assays, and planning further field experiments. The session concluded at 2:05 PM, with Prof. Khanal announcing that the remaining two PhD students' presentations will take place in the last week of January 2025. The presentations were marked by constructive feedback and valuable discussions, fostering further refinement of the ongoing research projects.

Guest Lecture by Dr. Buddhi Ratna Khadge

GUEST LECTURE AT MUSHROOM LAB

By Saugat R.C. and Bhushan Shrestha

Arranged By: Dr. Bhushan Shrestha

Attended By: PhD and Master Students of Organic Agriculture Program of MBUST

Venue: Seminar Hall, MBUST, Chitlang

Date: January 21, 2025 Tuesday

Time: 12-2 pm

- Dr. Bhushan Shrestha commenced the session with an introduction, expressing gratitude to Dr. Buddhi Ratna Khadge for taking time from his busy schedule to share his insights. Dr. Shrestha provided a brief background on the significance of mycorrhizal associations, setting a thoughtful tone for the lecture.
- Dr. Khadge began his presentation by sharing his academic background, revealing that his PhD research focused on the benefits of mycorrhizae in rice cultivation. His warm and humble manner immediately engaged the audience, creating a collaborative learning atmosphere.
- Introducing the term "mycorrhiza," coined by A.B. Frank, Dr. Khadge broke it down: Myco (fungus) and Rhiza (root). He explained it as a symbiotic relationship fundamental to nutrient exchange, a field gaining popularity in European research. He distinguished mycorrhizal fungi from Trichoderma, highlighting the unique role of hyphae in direct plant connections.
- The lecture transitioned into plant-fungal relationships, with Dr. Khadge elaborating on interactions like antagonism, parasitism, and endophytism. He highlighted the ecological versatility of mycorrhizae, including their ability to thrive in aquatic environments in the presence of soil, influence soil properties, and inhabit various plants.
- Dr. Khadge discussed the vital role of mycorrhizae in carbon and phosphorus exchange. He explained that soil phosphorus levels are typically low, but hyphal inflow of phosphorus into plant roots can be up to six times greater than uninfected roots. This ability allows plants to regulate their phosphorus content efficiently, showcasing the biological brilliance of this association.



Dr. Khadge explaining the Experiment Conducted on Maize: Impact of nitrogen supply, revealing notable results in mycorrhizal-infected roots.

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- Diving into the types of mycorrhizae, Dr. Khadge identified key categories: vascular, ectomycorrhiza, ericoid, and orchidaceous. He detailed the structure of endomycorrhiza, highlighting its role as an obligate parasite and emphasizing that plants' dependency on mycorrhiza varies. For instance, Magnoloid roots are highly dependent, whereas Graminoid roots are less so. He also noted the unexplained absence of mycorrhizae in crops like cauliflower and cabbage, sparking ongoing research.
- Discussing legumes, Dr. Khadge detailed how mycorrhizae enhance nitrogen fixation by improving phosphorus supply. He shared insights from his doctoral thesis, which explored the interactions between mycorrhizae and plant pathogens, underlining their potential to improve crop resilience.
- The lecture shifted focus to forest ecology. Dr. Khadge described how most forest mushrooms are mycorrhizal and how pine trees, for example, fail to grow beyond 5 feet without mycorrhizae. He explained how CO₂ exchange via mycorrhiza supports shaded plants in dense forests. Anecdotes, like guiding a student's school project on mycorrhiza, added a relatable dimension. He also touched on the cultivation challenges of morel mushrooms and truffles, sharing that controlled nutrient inflow is crucial for their growth.
- Dr. Khadge explained the symbiotic support system between fungi and plants, emphasizing the absence of sexual spores in endomycorrhizae. He explored their role in biological control, including improving plant nutrition, competing with pathogenic microbes, and altering plants' physiological and biochemical responses.



Glimpses of the session

- Highlighting agricultural applications, Dr. Khadge underscored the importance of mycorrhizae in subsistence farming systems that rely on agroecological principles. However, he noted challenges such as the high inoculum quantities required for field crops and the uneven global distribution of phosphorus reserves, with most concentrated in Africa.
- Addressing research gaps, Dr. Khadge remarked that no effective fungicides have been developed for certain fungal diseases, presenting a significant opportunity for innovation. He described an experiment using split-root systems to evaluate the impact of nitrogen supply, revealing notable results in mycorrhizal-infected roots.
- Wrapping up, Dr. Khadge highlighted the lack of definitive evidence supporting endomycorrhizal applications, referencing recent meta-analyses. He proposed collaborative research with MBUST to develop a viable inoculum for mycorrhiza. Concluding with a resonant message, he emphasized, "Let us help each other," drawing inspiration from the mutualistic nature of mycorrhizal relationships.

Key Takeaways and Future Directions

Dr. Shrestha suggested making the presentation more technical, particularly focusing on fungal isolation techniques, to better engage researchers. Dr. Khadge responded by proposing hands-on practical sessions on mycorrhizal isolation and culture, emphasizing their value over theoretical content. The session concluded with plans to organize these practical workshops, promising exciting opportunities for students and researchers alike.

A Student's Perspective

DR. BUDDHI RATNA KHADGE'S GUEST LECTURE

By Saugat R.C., Master Student in Organic Agriculture

On January 21, 2025,

The Meeting Hall of Madan Bhandari University of Science and Technology (MBUST) buzzed with excitement as Organic Agriculture students assembled for an interesting guest lecture by Dr. Buddhi Ratna Khadge. As a Master's student, I was preparing to gain knowledge from a distinguished expert whose studies on mycorrhizal associations have influenced agricultural science. Dr. Bhushan Shrestha, the event's organizer, gracefully welcomed the session, recognizing Dr. Khadge's commitment to sharing his knowledge even with his busy schedule. This prepared the way for an exploration into the realm of mycorrhizae—a mutualistic connection between fungi and plant roots that is essential for nutrient transfer and plant wellbeing.

Dr. Khadge started by discussing the origins and importance of the term "mycorrhiza," which was introduced by A.B. Frank, and how it continues to be a significant area of research globally. As he explored the processes of nutrient exchange, especially phosphorus, it became evident how essential these relationships are for sustainable farming. He articulated that the hyphal influx of phosphorus is much greater than that in uninfected roots—a revelation that surprised us about nature's effectiveness. One of the most engaging aspects of the lecture was his exploration of the differing levels of reliance that plants have on mycorrhizae. For example, magnoloid roots rely heavily, while graminoid roots depend to a lesser extent. We also discovered that certain crops, such as cauliflower and cabbage, lack mycorrhizae, a phenomenon that is still under investigation by scientists.

Dr. Khadge's enthusiasm for forest ecology was evident as he explained the function of mycorrhizal partnerships in thick forests, ranging from aiding pine tree development to promoting CO₂ exchange between plants. His stories, like the one about mentoring a young student's project on mycorrhizae, personalized the lecture and encouraged us to seek deeper into this intriguing area. The session also addressed the challenges and opportunities within mycorrhizal research. We discovered the constraints in the artificial cultivation of mycorrhizae and the opportunity for advancement in creating efficient fungicides. Dr. Khadge also provided insights from his experiments, featuring a fascinating study on split-root systems that underscored the influence of mycorrhizae on nodulation.

Dr. Bhushan Shrestha requested Dr. Khadge put the technical aspects in his slides for the advantage of both researchers and students. Dr. Khadge, for his part, recommended adding practical hands-on sessions focused on fungal isolation and culture. This conversation thrilled us at the prospect of acquiring hands-on experience in an upcoming workshop.

The lecture ended with Dr. Khadge's significant message: "Let us support one another," a lesson drawn from the essence of mycorrhizal partnerships. As students, we exited the seminar hall feeling both informed and inspired to explore this field further, realizing that we, too, could play a role in advancing sustainable agricultural practices through research and creativity. This guest lecture was an incredibly valuable experience, and I eagerly anticipate more chances to learn from specialists like Dr. Khadge who motivate us to connect science with practice.



Nitesh Khatiwada

Glimpse of the session

Interaction Program on Identification of Areas of Collaboration

DEVELOPMENT AND EXPANSION OF NEPALI MUSHROOM INDUSTRY

By Saugat R.C., Suraj Chaudhary, Atmaz Shrestha, Nitesh Khatiwada, Srijana Dangi, and Prabin B.C.

Date: January 28, 2025

Time: 11:00 AM – 2:00 PM

Venue: Meeting Hall, MBUST

Facilitator/Moderator: Prof. Rajendra Dhoj Joshi, President, MBUST

Arranged and Coordinated by: Assoc. Prof. Dr. Bhushan Shrestha

The interaction program began with a trip to the mushroom lab, where mushroom cultivators and researchers from the Nepal Agricultural Research Center (NARC) interacted with PhD and Master students. Mr. Suraj Chaudhary, a PhD student, presented an overview of the various mushroom species in Chitlang, revealing that he had gathered more than 200 morphologically unique mushrooms, which greatly amazed the visitors. Similarly, Mr. Atmaz Shrestha, another PhD student, outlined his thesis research while describing different laboratory instruments, such as bio-incubators, biosafety cabinets, deep freezers and ultra-low deep freezers, and aquariums. This session provided participants with important information about the current research at MBUST and its real-world uses.

After the laboratory tour, attendees, including guests, students, and participants, convened in the seminar hall, where the session was moderated by President Prof. Rajendra Dhoj Joshi. He defined its aim: as recognizing obstacles in Nepal's mushroom industry and investigating research-driven solutions from MBUST researchers and NARC scientists. The ensuing discussions centered on opportunities for collaboration and tackling technical and financial challenges in mushroom research. President Joshi subsequently asked Asst. Prof. Dr. Anupama Shrestha to deliver welcome speech, where she greeted the participants, shared optimism for a fruitful session, and highlighted the economic advantages of mushroom farming along with the significance of collaboration between universities and industries.

President Joshi expanded on worries about corruption, institutional regulations, and the necessity for collaborative initiatives in research. The conversations focused on critical matters like technical obstacles, policy deficiencies, and the adaptation of Nepal's mushroom varieties to minimize imports and enhance local output. Other subjects discussed encompassed advanced farming methods, financial limitations in academia, and contrasts with global research organizations.

Dr. Bhushan Shrestha subsequently shared information about MBUST's research initiatives. He thanked the guests and recognized those who couldn't be present. Emphasizing the possibility of industry partnership, he underscored research prospects in disease prevention and improvement of production. He urged industrialists to make the most of MBUST's research facilities to reach these goals.

Further discussions concentrated on utilizing the skills of Nepalese immigrants to tackle agricultural issues and enhance mushroom cultivation in Chitlang and Palung. The importance of maintaining generational knowledge in mushroom farming was highlighted, alongside research efforts and commitment to the discipline. Subjects like medicinal fungi, pest problems, pesticide application, and the identification and management of diseases were also examined.

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Additional speakers talked about the beginnings of mushrooms in Nepal, the contributions of NARC, and investments from the private sector. Mushroom entrepreneurs Dharmendra Maharjan and Om Krishna Shrestha discussed their joint experiences with Indreni Mushroom Farm, highlighting the significance of regulated environments for effective mushroom farming. Conversations addressed pest and disease control, current research initiatives, and methods for sustainable production.

Dr. Shreemat Shrestha, Principal Scientist and Chief of National Agricultural Engineering Research Centre of NARC, highlighted the resource deficiencies in Nepal's mushroom sector and commended the research efforts of MBUST. He talked about methods to avoid post-harvest losses, efficient drying methods, and changes in market prices. Issues in commercialization were emphasized due to a shortage of qualified technicians and adequate equipment. The significance of joint initiatives between NARC and MBUST in promoting research and industry growth was also emphasized.

The discussion then moved to difficulties in chyau (mushroom) farming, such as contamination problems at Balambu's initial advanced mushroom facility, bacterial infections, and green mold issues. Although Nepal is self-reliant in producing Kanye Chyau, it still relies on imports from abroad for Shiitake and Gobre mushrooms. Worries regarding mycelium development, equipment dependability, and post-harvest methods were major topics of conversation.

Om Krishna Shrestha discussed insights from the industry, tackling difficulties and the possible influence of political involvement in addressing these issues. Topics covered hybridization challenges, the finding of the pink oyster mushroom, and annual fluctuations in wild mushroom yield. Conversations also addressed the necessity for enhanced infrastructure, strategies for disease prevention, and alternative cultivation substances like Indrasarowar clay.



Representatives from MBUST delivering their speech

Different Guests delivered their speeches.

Following a short break, Naresh Jaiswal, mushroom entrepreneur, addressed the issues of composting, slim profit margins, and methods to improve production efficiency. He pointed out Korea's 30% reuse rate in mushroom farming, stressing that Nepal lacks similar technical options. He also emphasized the significance of setting up nutritional analysis and quality testing laboratories at universities and initiatives to reduce wet bubble disease and prolong shelf life through the use of evaporative cooling chambers.

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Dr. Raman Karki, Senior Scientist and Chief of National Food Research Centre of NARC, subsequently discussed storage issues, such as the blackening of harvested mushrooms caused by polyphenol oxidase and possible solutions. He highlighted the increasing need for mushroom-derived products like soups and powders, promoting advanced technologies in mushroom cultivation. Subash Panthi, equipment supplier, recounted his experiences with Israeli agricultural sectors, examining alternative greenhouse materials and misting systems for managing humidity. Furthermore, government funding for mushroom tunnel initiatives was analyzed.

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Lochan Gywali, member of Board of Trustees of MBUST, discussed mycorrhizal studies, soil improvement, Nepal's export opportunities, and innovations in Shiitake drying techniques. The session ended with a Q&A, and then Dr. Kirti Kusum Joshi, Director of Institute of Applied Sciences, MBUST, shared insights on the difficulties in production, the lack of technicians and research facilities, the expensive lab development, and the significance of controlled environments and locally obtained raw materials.



A Group Photo

Meeting Minute

NOTE OF MUSHROOM INTERACTION PROGRAM

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

Meeting Title:

"Discussion Program on Identifying Areas of Collaboration Between University and Entrepreneurs for the Development and Expansion of the Nepali Mushroom Industry"

Date of Meeting: January 28, 2025

Time: 1:00 AM to 2:00 PM.

Meeting Facilitator: Professor Rajendra Dhoj Joshi

Location: Madan Bhandari Science and Technology University, Chitlang.

Objectives:

- To review the current state, challenges, and ongoing efforts in the Nepali mushroom industry.
- To provide insights into the research being conducted at the university and its potential benefits for the Nepali mushroom industry.
- To identify areas of collaboration between the university and entrepreneurs for the development and expansion of the Nepali mushroom industry.

Attendees:

1. Rajendra Dhoj Joshi	21. Sabin Basi
2. Lochan Gyawali	22. Dhana Krishna Acharya
3. Om krishna Shrestha	23. Sabnam Subedi
4. Dharmendra Maharjan	24. Ankita Nepal
5. Suresh Maharjan	25. Nitesh khatiwada
6. Naresh Jaiswal	26. Ishwori Prasad Paudel
7. Subhash Panthi	27. Kishwor Timilsina
8. Shailendra Khatri	28. Rajib Subba
9. Roman Karki	29. Bhuwan Bhatarai
10. Sabina Shrestha	30. Utsab Bardewa
11. Sarbesh Das Dangol	31. Prabin Mishra
12. Anupama Shrestha	32. Ashmita Rai
13. Rabi Manandhar Sayami	33. Progress Jung Thapa
14. Kriti Kusum Joshi	34. Suman Khatri
15. Shreemat Shrestha	35. Saugat R.C
16. Atmaz Kumar Shrestha	36. Bishwo Joyti Chaudhary
17. Suraj Chaudhary	37. Image Acharya
18. Choodamani Joshi	38. Rupesh Aryal
19. Srijana Dangi	39. Prabin B.C
20. Pawan Kathayat	

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Key Discussion /Action Plan:

1. Challenges in Mushroom Cultivation & Production

a.Contamination Issues:

Mushroom farms, especially in Balambu, faced bacterial contamination, green mold, and sterilization problems.

b.Spawn & Substrate Limitations:

Nepal is self-sufficient in Kanye Chyau but lacks production of Shiitake and Gobre mushrooms.

c.Technological Gaps:

Limited availability of high-quality humidifiers, calibration tools, and sterilization equipment.

d.Wet Bubble Disease:

A major concern leading to farm closures, requiring up to 7 years for recovery.

Action Plan:

- 1.Establish contamination control research at MBUST.
- 2.Develop local spawn production techniques.
- 3.Research disease-resistant mushroom varieties.

2. Post-Harvest & Market Challenges

a.Lack of Storage & Processing Facilities:

No proper canning or drying technology is available in Nepal.

b.Short Shelf Life:

Mushrooms turn black quickly due to polyphenol oxidase activity.

c.Market Price Fluctuation:

Mushroom farmers struggle with pricing instability.

Action Plan:

1. Introduce evaporative cooling chambers and KMS 1% solution for preservation.
2. Develop post-harvest technology and training programs.
3. Strengthen export strategies and market linkages.

3. Infrastructure & Policy Needs

a. High costs of farm infrastructure and lack of subsidies.

b. Expensive growing media (e.g., cocopeat).

Action Plan:

Promote affordable farm designs and alternative growing media (Indrasarowar clay).
Advocate for government subsidies and grants for mushroom farming.

4. Education, Training & Research Development

a. Lack of skilled manpower and research opportunities.

b. No quality testing labs for spawn and mushroom analysis.

Action Plan:

1. Establish MBUST Mushroom Research & Training Center.
2. Set up a Quality Control Lab for spawn and mushroom testing.
3. Fund student-led research on hybridization and disease control.

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5. Industry Collaboration & Future Research Areas

- a. Strengthening partnerships between NARC, MBUST, and private growers.
- b. Research on high-value mushrooms (e.g., Shiitake, medicinal varieties).

Action Plan:

1. Foster industry-academia partnerships for research funding.
2. Conduct pilot projects on alternative substrates and liquid culture methods.

Minutes:

10:30 AM - 11:20 AM: The session began with a lab visit where attendees observed and discussed various mushroom cultivation processes. Researchers, industry professionals, and students actively engaged in conversations about innovative techniques, challenges, and opportunities in the field of mushroom farming.

11:22 AM - 11:25 AM: Professor Rajendra Dhoj Joshi introduced "Udhyog Dhanda," emphasizing its role in economic development. He discussed student engagement, the need for dedication in academia, and how universities should focus on producing output-oriented education to bridge the gap between theory and practical applications.

11:26 AM - 11:27 AM: The discussion shifted toward collaboration, rule formulation, and the necessity of providing platforms for students to engage in research and industry-relevant projects. Participants acknowledged the importance of a structured approach to encourage innovation.

11:28 AM - 11:29 AM: Technical and financial challenges in mushroom research were addressed, with attendees sharing their experiences and potential solutions. The discussion highlighted the need for funding and strategic policies to support research and development.

11:30 AM: A formal introduction of attendees took place, including researchers, mushroom growers, and industry representatives. This session facilitated networking and a better understanding of the diverse expertise present at the event.

11:39 AM: Dr. Anupama Shrestha delivered a welcome speech, emphasizing the economic benefits of mushroom cultivation. She highlighted the importance of university collaboration to enhance research and industry partnerships for sustainable mushroom production.

11:41 AM - 11:42 AM: Professor Rajendra Dhoj Joshi addressed corruption issues within university policies and emphasized the importance of collaborative approaches. He stressed the need for transparency and accountability in research and funding allocations.

11:43 AM: The discussion moved toward technical issues and policy gaps in the mushroom production-to-consumption chain. Participants acknowledged the need for better policies and support systems to streamline the industry.

11:44 AM - 11:45 AM: The domestication of Nepal's mushrooms was discussed as a strategy to reduce imports and enhance local production. Examples of genetic diversity and drought-resistant mushroom varieties were shared as potential solutions.

11:46 AM: Innovative approaches to mushroom cultivation were explored, with researchers presenting new methodologies and cultivation techniques to improve productivity and sustainability.

11:47 AM: The challenges of teaching students without proper funding were highlighted, along with a comparison of Nepalese universities with foreign institutions. The need for better educational infrastructure and investment in research was emphasized.

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11:48 AM: Dr. Bushman Shrestha delivered an introductory speech, greeting attendees and acknowledging the significance of the event in advancing mushroom research.

11:49 AM: The origin of mushrooms in Nepal was discussed, along with NARC's contributions and the role of private-sector investments. The conversation focused on how these entities could collaborate for better industry outcomes.

11:50 AM: Dharmendra Maharjan and Om Krishna Shrestha discussed their collaborative work with Indreni Mushroom Farm over the past 4-5 years. They highlighted key achievements and areas needing further development.

11:51 AM: The importance of controlled environments in successful mushroom farming was emphasized, along with the need for improved facilities and management techniques.

11:52 AM: Disease and pest management in mushrooms were discussed, with insights into university-led research efforts aimed at finding effective solutions.

11:53 AM: Continuous efforts in mushroom research were highlighted, focusing on ensuring sustainable production and innovation within the sector.

11:54 AM: The challenges faced by Nepali students in mushroom research were discussed, along with how MBUST could foster local research and education to bridge existing gaps.

11:55 AM: The potential contributions of Nepalese immigrants' expertise in solving local agricultural problems were explored. The discussion emphasized leveraging diaspora knowledge for industry growth.

11:56 AM: Opportunities for mushroom cultivation in Chitlang and Palung were identified, highlighting the region's potential for industry expansion.

11:57 AM: The importance of preserving generational knowledge in mushroom farming was discussed, ensuring that traditional expertise is passed down and integrated into modern practices.

11:58 AM: Contributions to mushroom research and the dedication of various researchers were acknowledged, reinforcing the importance of continuous innovation.

11:59 AM: Medicinal mushrooms were discussed, focusing on their benefits, key elements, pest issues, and the responsible use of pesticides.

12:00 PM: The identification of mushroom diseases and strategies for disease management were explored, with experts sharing their insights on effective prevention and control methods.

12:02 PM: Professor Rajendra Dhoj Joshi welcomed Dr. Shreemat Shrestha, setting the stage for further discussions on industry challenges.

12:03 PM - 12:04 PM: Dr. Shreemat Shrestha discussed resource gaps in the mushroom industry and praised MBUST for its research initiatives in addressing these challenges.

12:05 PM - 12:06 PM: Post-harvest loss prevention techniques, drying methods, and market price fluctuations were explored, with experts suggesting innovative solutions.

12:07 PM: Challenges in commercialization due to the lack of skilled technicians and proper facilities were highlighted as major barriers to industry growth.

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12:08 PM: The importance of mushroom commercialization and increasing its market potential was emphasized, with calls for greater investment and strategic planning.

12:09 PM: Collaboration between NARC and MBUST was discussed as a crucial step in fostering research and industry development.

12:10 PM: Professor Rajendra Dhoj Joshi discussed the loss of valuable skills from retired professionals and the need to utilize their expertise to benefit the industry.

12:11 PM - 12:12 PM: Dharmendra Maharjan discussed the challenges in chyau (mushroom) cultivation, particularly contamination issues in Balambu's first advanced mushroom house.

12:13 PM - 12:14 PM: Issues with NARC spawn, lack of sterilization, bacterial contamination, and green mold problems were explored, with potential solutions suggested.

12:15 PM - 12:16 PM: Nepal's self-sufficiency in Kanye Chyau was discussed, along with its reliance on foreign sources for Shiitake and Gobre mushrooms.

12:17 PM - 12:18 PM: The technological gap between Nepal and global standards was highlighted, comparing mushroom production in India and Nepal.

12:19 PM - 12:20 PM: Research on supplementation was emphasized as necessary to address the slow growth rate and contamination issues in Nepalese mushrooms.

12:21 PM - 12:23 PM: Issues with mycelium growth, humidifier quality, and the lack of calibrated equipment were discussed as barriers to optimal production.

12:24 PM - 12:25 PM: The lack of post-harvest technology, storage facilities, and canning systems was identified as a critical issue. The speech concluded with calls for further investment in these areas.

12:26 PM - 12:27 PM: Om Krishna Shrestha introduced himself and expressed concerns about industry challenges and the lack of actionable efforts to address them.

12:28 PM - 12:29 PM: The discussion on "Raja Chyau" (King Oyster) focused on university initiatives and the role of politics in shaping agricultural policies.

12:53 PM - 1:00 PM: Break time.

1:47 PM - 1:52 PM: Kiriti Kushum Joshi concluded the event with remarks on production challenges, lack of research facilities, high lab development costs, and the need for controlled environments and local raw materials.

Knowing Plant Disease

FUSARIUM WILT

By Dhana Krishna Acharya and Dr. Anupama Shrestha
Plant Protection Biological Control Research Center (PPBCR)

Introduction

Fusarium wilt is a soil-borne fungal disease. The disease affects a wide range of plants, including tomatoes, cucumbers, bananas, peas, chickpeas, and potatoes. The causal pathogen is *Fusarium oxysporum*. It causes 10–15% yield loss every year.

Symptoms

- The affected plants show a dropping of the leaves and a paler color than healthy ones.
- Adult plants show typical wilting, which may occur in the field up to the podding stage.
- Wilting is characterized by gradual, sometimes sudden, yellowing, withering, and drying of leaves followed by the drying of the entire plants.

How to manage?

Organic management strategies

Crop Rotation:

- A 4–5 year crop rotation has been found effective. Tobacco, Sorghum, millet, and vegetables are recommended as crop rotation.

Soil Solarization:

- The soil should be mulched using transparent polythene during the hottest months to kill the fungus in the upper soil layers. The basic process involved is heating the soil to 50 °C in the upper 30 cm.

Sanitization:

- Clean and sterilize tools, equipment, and containers to prevent spread of disease.

Biological control:

- Fluorescent *Pseudomonas* induces suppressiveness in soil, as they produce iron-acquiring compounds called siderophores.
- *Trichoderma asperellum* is also effective against the fusarium wilt disease.



Fusarium wilt in pepper (Akabare) (Left) and conidia of Fusarium (Right)

Hands-on experience using an Increment Borer in Chitlang community-Based Forest

A FASCINATING EXPERIENCE IN UNDERSTANDING TREE GROWTH, AGE, AND ENVIRONMENTAL HISTORY

By Binita Silwal, Nawaraj Pandey and Dr. Sudip Pandey

January 1, 2025:

Master's students of Forest Biomaterials gained hands-on experience using an increment borer as a part of their practical examination under the supervision of Dr. Sudip Pandey. They shared their experiences of extracting tree cores from trees in a community forest using a non-destructive method. The cores are used to analyze tree age, growth and ecological history.



Extracting softwood core

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"I had the unique opportunity to use an increment borer to study the age, growth and ecological pattern of Pine tree in an altitude of 1925m without damaging the trees.

Extracting core of trees was challenging as well as rewarding. Firstly, during the extraction process, I made sure to maintain proper balance. Once I was steady, I carefully drilled the borer into the pine tree until it reached the center. Then, with help of extractor, I carefully retrieved the core on my first attempt. Usually, retrieving the core is a challenging process. The core revealed the annual rings, showing the tree's growth and ecological pattern. This core is essential for understanding the forest's health and resilience, as well as how climate and ecological disturbances, such as droughts, fires and nutrient availability affect growth patterns over time.

In the end, using increment borer not only provided me with the practical experience but also deepened my understanding of the long-term ecological trends of trees. I felt rewarding knowing that this information could contribute to better forest management and conservation practices in the future."

Binita silwal
Master's in Forest Biomaterials

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"This was my first time extracting samples from both hardwood and softwood plants using a non-destructive method (increment borer). This method is fundamental for analyzing wood in various aspects, such as determining the age of the tree, understanding the plant's physiology, and studying the interaction of wood with the environment.

From this practical experience, I realized several crucial aspects that we had previously overlooked but are vital for further analysis. These include the positioning of the borer and extractor, as well as the amount of pressure applied during sample extraction.

I also had the opportunity to collect samples from both types of plants. The amount of force required for hardwood was significantly greater than that for softwood, as reflected in my facial expression in this figure."

Nawaraj Pandey
Master's in Forest Biomaterials

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Core of pine tree

Enhancing Policy and Decision-Making Through GNSS: Insights from the Workshop on Global Navigation Satellite System (GNSS)

GNSS FOR POLICY AND DECISION-MAKERS: WORKSHOP INSIGHTS

By Dr. Sudip Pandey

Dr. Sudip Pandey, a Forest Biomaterials Program faculty member, attended a three-day workshop on Global Navigation Satellite System (GNSS) for Policy and Decision Makers held from January 26–28, 2025, in Kathmandu. The workshop was jointly organized by the Center for Spatial Information Science (CSIS), The University of Tokyo, the International Committee on GNSS (ICG), and the Secretariat of the United Nations Office for Outer Space Affairs (UNOOSA). It was co-hosted by the Nepal Academy of Science and Technology (NAST), the Center for Space Science and Geomatics Studies (CSSGS) of the Western Regional Campus of IOE, and the Institute of Engineering (IOE), Tribhuvan University (TU). The workshop focused on enhancing the understanding of GNSS applications in governance, infrastructure development, and disaster management. It provided insights into how satellite-based positioning, navigation, and timing technologies can support national policies and decision-making processes across various sectors. Key discussions included the role of policymakers in regulating and integrating GNSS applications, its impact on agriculture, forestry, transportation, climate monitoring, and urban planning, and the importance of cross-sectoral collaboration.

The participants emphasized the need to establish an inter-governmental task force composed of relevant agencies, including the Ministry of Education, Science and Technology, the Ministry of Home Affairs, the Ministry of Defense, the Ministry of Industry, Commerce and Supplies, the Ministry of Physical Infrastructure and Transport, the Ministry of Information and Communication Technology, the Ministry of Tourism and Civil Aviation, and the Ministry of Agriculture. The task force would be responsible for capacity building in GNSS technologies and their applications, research and development, and data integration and management. Additionally, the workshop recognized the need for a robust policy and regulatory framework to support the effective use of GNSS technologies. It emphasized the importance of establishing regulations and standards in collaboration with international organizations and satellite agencies. On the final day, participants conducted a field visit, collecting real-time data and performing a preliminary analysis on particulate matter monitoring.



Participants engaging in discussions during the Workshop on Global Navigation Satellite System (GNSS) for Policy and Decision Makers, highlighting the role of GNSS in governance, infrastructure, and sustainable development.

Nepal's First CSA Initiative

STRENGTHENING PRODUCER-CONSUMER PARTNERSHIPS FOR SUSTAINABLE FARMING

By Dhana Krishna Acharya and Dr. Sabin Basi

Chitlang, December 4, 2024 – Nepal's first-ever Community-Supported Agriculture (CSA) initiative was launched by Madan Bhandari University of Science and Technology (MBUST), marking a historic milestone in the country's agricultural development. This flagship program aims to revolutionize sustainable farming by fostering direct partnerships between producers and consumers, promoting organic agriculture and ensuring food security.

Addressing the event, MBUST Vice President Mr. Padma Sundar Joshi emphasized the importance of trust in CSA, stating, "Shareholders are the seeds of CSA, and their trust and collaboration will help this model grow into a sustainable and impactful system."

The CSA model is built on mutual trust and shared responsibility, offering farmers a stable market and consumers access to fresh, organic produce. Dr. Sabin Basi and researcher Mr. Dhana Krishna Acharya led discussions on surplus production management, biological pest control, and certification.

Associate Professor Dr. Bhushan Shrestha highlighted MBUST's prior contributions to organic agriculture, including research on soil fertility, biological pest control, and introducing high-value crops like shiitake mushrooms. "Our years of groundwork have culminated in this flagship program, tailored to the needs of Nepal's farmers," he remarked.

Producers voiced their perspectives, contributing to the program's direction:

- Sudeep Kumar Gurung emphasized, "Crop grading and pricing based on market averages can ensure fairness and stability."
- Sudarshan Lamichhane proposed, "Collaborative farming models with shared labor and inputs will strengthen community ties."
- Din Raman Joshi stressed, "Direct consumer-producer contact is the best way to build trust and transparency in CSA."
- Pradip Jimba added, "Focusing on eco-friendly pest control methods like biological agents is vital for organic farming."

This inaugural CSA program not only positions MBUST as a pioneer in sustainable agriculture but also sets a precedent for similar initiatives across Nepal, paving the way for a transformative future in the country's agricultural landscape.



Members of CSA and the producers



First CSA producer meeting

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