INTERNATIONAL CONFERENCE ON LIFE SCIENCES

Current Research, Innovations, and Future Perspectives

ICLS 2025

Abstract Book

SUST

17-18TH OCTOBER, 2025

THEMATIC AREAS:

- Biochemistry & Molecular Biology
- Animal Science, Fisheries & Livestock
- Plant, Agriculture & Food Biotechnology
- Bioinformatics & Computational Biology
- Medical, Pharmaceutical & Nano-Biotechnology
- Microbial, Environmental & Industrial Biotechnology

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SHAHJALAL UNIVERSITY OF SCIENCE AND TECHNOLOGY, SYLHET

Invited Speaker-3

ME1011: Development of Fungal Biopesticides for Smart and Sustainable Pest Management in Bangladesh

Mohamamd Tofazzal Hossain Howlader
Insect Biotechnology and Biopesticide Laboratory, Department of Entomology, Bangladesh Agricultural University, Mymensingh, Bangladesh

Pest management is a vital aspect for ensuring food security and agricultural sustainability is necessary through smart way to address the challenges developed due excessive uses of chemical insecticides. The development of biopesticides offer a promising innovative solution for sustainable and smart pest management. The biopesticides developed based on entomopathogenic fungi (EPF), are known as mycoinsecticide are one of the important key regulatory factors in pest insect populations. Unfortunately, no microbial bio-pesticide has been developed in Bangladesh so far nor any EPFs potential for insect pest management characterized from the Bangladesh ecosystems. In these situations, a total of eighty-six (86) entomopathogenic fungi have been isolated and based on morphological and molecular methods, 17 isolates were identified as Beauveria bassiana, 2 isolates as Metarhizium anisopliae, one isolate as Lecanicillium saksenae, 17 isolates as Purpureocillium lilacinum as major EPFs. The conidial bioassay against Aphis craccivora - a representative of sucking pests using native B. bassiana and Metarhizium sp. strains exhibited higher efficacy in causing mortality comparing to the commercial B. bassiana GHA strain. The aphid mortality ranges for the isolates were found from 68.65 to 94.01% after six days of treatments. Among the isolates, B. bassiana (BDBbKh2-2) demonstrated the significantly highest mortality (94.01%) followed by BDBbD5 and BDBbD5F3 which caused a mortality of 86.78% and 85.58%, respectively. Thus, the B. bassiana (BDBbKh2-2) showed almost 1.5 times more virulent than that of the commercial strain suggesting this strain could serve as a promising entomopathogenic fungus for biopesticide development for the management of bean aphid. We have assessed several low-cost growth media for the development and commercialization of biopesticides for smart pest management and economic opportunities. Harnessing locally sourced entomopathogenic fungi (EPFs) offers Bangladesh an opportunity to reduce dependence on chemical pesticides, strengthen crop protection, and foster new business opportunities in the biopesticide sector.

Plant, Agriculture, and Food (PAF) Biotechnology

Invited Speaker-1

PAF032: Effects of Postharvest Treatments on the Quality Attributes of Guava (*Psidium guajava* L.)

Sanjida Akter[1], Md. Abdul Mannan[1], Shamim Ahmed Kamal Uddin Khan[2], and Md. Yamin Kabir[1,*]

[1]Agrotechnology Discipline, Khulna University, Khulna 9208, Bangladesh; [2]Faculty of Agriculture, Khulna Agricultural University, Khulna 9200, Bangladesh

Although guava is a dense, nutrient-rich fruit, it has a short shelf life because of its climacteric nature. This study evaluates the effects of postharvest treatments, including hot water treatment (HWT), calcium chloride ($CaCl_2$), chitosan, and perforated polyethylene bag (PPB), on the physicochemical changes and shelf life of guava. The experiment followed a Completely Randomized Design comprising twelve treatment combinations, including HWT, $CaCl_2$ (1% and 2%), chitosan (0.1% and 0.3%), PPB, HWT + PPB, $CaCl_2$ 1% + PPB, $CaCl_2$ 2% + PPB, chitosan 0.1% + PPB, chitosan 0.3% + PPB, and an untreated control, with three replications. The treatment, chitosan 0.3% + PPB, resulted in the minimum weight loss (11.33%), while $CaCl_2$ 1% + PPB resulted in the highest total soluble solids (12.35°Brix).Though $CaCl_2$ 2%+ PPB demonstrated extended shelf life (11.67 days), increased firmness (score 2) of guava, chitosan 0.3% + PPB significantly reduced disease incidence (23.33%) and disease severity (25%), minimal color change (score 1.67), and retained the highest vitamin C (34.63 mg/100g) compared to the control. The chitosan 0.3% + PPB also resulted in better colorimeter values (L*, a*, b*, C*, and h°) than other treatments. Moreover, the shelf life of guavas was extended by 12.83 days with the application of chitosan 0.3% + PPB, whereas the control had the lowest shelf life (5.82 days). Overall, the treatment, chitosan 0.3% + PPB, better preserved the postharvest quality and shelf life of guava. Therefore, 0.3% chitosan + PPB can be considered for postharvest management of guava.

Invited Speaker-2

MEI130: From Lab to Field: A Comprehensive Approach to Enhance Jute Retting with a Novel Microbial Formulation

Mohammad Riazul Islam

Molecular Biology Laboratory, Dept. of Biochemistry and Molecular Biology, Faculty of Biological Sciences, University of Dhaka, Dhaka 1000

Jute is one of the most important bast fibers, yet its traditional retting process—submerging harvested plants in water to allow microbial degradation of pectin and hemicellulose—is slow, water-intensive, and often produces inconsistent fiber quality, especially during dry seasons when water is scarce. To address these limitations, we developed and validated a bacterial consortia-based retting strategy that advances from laboratory proof-of-concept to field-scale application. Initially, bacterial strains with strong pectinolytic and hemicellulolytic activities were isolated from retting water, enzymatically characterized, and combined into seven different consortia. Molecular identification revealed that key bacterial strains belonged to the genus *Bacillus*. Laboratory-scale retting experiments under controlled conditions demonstrated that consortia C-4 significantly reduced retting duration to 10 days, nearly 50% faster than traditional methods. Fibers from consortium C-4 exhibited the highest tensile strength (801.00 ± 26.28 MPa), a 67.92% improvement over control fibers. X-ray diffraction (XRD) analysis showed that C-4 had the highest crystallinity index (65.99%) among all other consortia and control. To enable field-scale application, a freeze-dried formulation of the best-performing consortium (C-4) was developed. The freeze-dried formulation retained high cell viability, maintaining 2.4×10^{11} CFU/g after 90 days of storage, demonstrating excellent shelf-stability and suitability for farmer-level application. Field