National Institute of Technology Rourkela

Progress Seminar

Seminar Title	: Molecular dissection of plant-microbe interaction for sustainable implication in enhancing chromium stress and reciprocal rice blast tolerance
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Venue	: LS Seminar Hall
Date and Time	: 23 Jan 2025 (4:30 PM)
Abstract	: Twenty percent of the world's dietary energy comes from rice -the main staple meal for seventeen Asian countries. Abiotic and biotic variables are confronted as challenges that affect rice yield. Anthropogenic activities and rapid industrialization have produced massive levels of harmful Cr^{6+}, which stay in the soil for extended periods and decrease rice yield. Blast disease is another significant barrier to rice production, which risks world food security. *Exiguobacterium indicum* OMCW-10, a Cr^{6+} resistant bacterial strain inoculant, was thus chosen to delineate if it can shield rice against abiotic and biotic stress. In Cr^{6+} contaminated soil, this bacterial strain reduced 88.94% of Cr^{6+} within 50 days and demonstrated resistance to 1800 ppm of hexavalent chromium (Cr^{6+}) toxicity. SEM-EDX, ATR-FTIR, XRD, and XPS studies revealed Cr^{6+} detoxification and bioaccumulation by this bacterial strain. *Magnaporthae oryzae*, the rice blast pathogen, is inhibited in its spore and mycelial growth in the primed rice by the bioactive antifungal compounds released from this bacterial strain and were identified by GC-MS analysis. It was found that 28&ndash30 days of seed and root-primed Swarna rice cultivar with 10^8 CFU/mL of *E. indicum* OMCW-10 enhanced the expression of SA-mediated defense genes like *OsNPR1* and *OsWRKY45*, provides early and faster resistance against *M. oryzae* pathogen by decreased cellular damage, ROS generation, and blast symptoms, and limiting the invasive mycelia formation in Swarna upon *M. oryzae* spore infection. Thus, we propose that a bio-primed Swarna cultivar with *E. indicum* OMCW-10 reduces rice blast severity. At the same time, this eco-friendly bacterial strain can also be a synergistic substitute for Cr^{6+} bioremediation in polluted soil