



# Integral Institute of Agricultural Science & Technology (IIAST) Integral University, Lucknow

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## **A Guest lecture on “Genetic Engineering” on the occasion of World cotton day**

On 7<sup>th</sup> October 2019, our department had the honor of hosting Dr. A. K. Tripathi for a fascinating guest lecture on using genetic engineering approaches to modulate the microbiomes of crop plants. Dr. A. K. Tripathi, Associate Professor, Department of Seed Science and Technology, Banda University of Agriculture and Technology, Banda is a leading researcher in this cutting-edge field. The Guest Lecture commenced with the Welcome Address of Dr. Saba Siddiqui, Department of Agriculture followed by a lecture.

The lecture began by introducing the importance of plant-microbe interactions in agriculture. Dr. Tripathi explained how crops are associated with diverse microbial communities, including bacteria, fungi, and viruses, that can significantly impact plant health, productivity, and stress tolerance.

Traditional breeding methods have had limited success in optimizing these microbiomes for improved crop performance. However, recent advances in genetic engineering and synthetic biology are opening up new possibilities, which was the main focus of the lecture.

He discussed innovative strategies to genetically engineer plants to shape their microbiomes, including:

**Modifying Plant Signaling:** Introducing genes that modulate plant hormones or secondary metabolites to recruit and maintain beneficial microbes while excluding pathogens.

**Engineering Microbe-Recognizing Receptors:** Designing receptors that can selectively recognize and bind with specific microbes to facilitate mutually-beneficial symbioses.

**Expressing Anti-Microbial Genes:** Inserting genes that produce anti-microbial compounds or RNA interference to precisely control the microbial composition.

**Creating Engineered Microbe Traps:** Modifying root architecture and secretion profiles to create microenvironments favorable for colonization by chosen microbial inoculants.



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Several cutting-edge examples were provided, including engineering rice to establish nitrogen-fixing endophytes, tuning the rhizobiome of drought-tolerant grasses, and using CRISPR to control disease-causing pathogens.

He highlighted how this field could revolutionize sustainable agriculture by reducing chemical inputs, enhancing nutrient uptake, and boosting resilience to stresses. The potential to combine engineered microbiomes with other biotechnology applications like drought/pest resistance was also discussed.

Overall, it was an extremely insightful lecture that opened our eyes to the future of harnessing the plant microbiome via synthetic biology approaches. Students and faculty appreciated Dr. Tripathi sharing his valuable research and perspectives on this exciting frontier of agricultural innovation.

Overall, it was an excellent guest lecture that deepened our knowledge of agricultural waste management strategies and solutions. We hope to have Dr. A. K. Tripathi back in the future. Around 150 Undergraduate students of Agriculture attended the lecture, and all the queries put forward by the audience were categorically addressed by the expert. The audience found it very informative and quite relevant. The event was concluded with a vote of thanks. The program was actively supported by all the members of the Department.



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## Glimpse





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