

Optional Course

PLANT PATHOGEN INTERACTION (LS631A)

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S. No.	Topics	Contact hours	Faculty
1.	Basics of plant-microbe interactions- Types of plant pathogens, mode of infection, and overview of plant immune responses.	2	AN
2.	Plant immune responses: Pattern-triggered immunity (PTI); effector-triggered susceptibility (ETS); effector-triggered immunity (ETI), innate and inducible immunity in plants, ROS metabolism & signaling, PR proteins, phytoalexins.	4	AN
3.	Biology of bacterial and fungal pathogens, pathogen effectors, bacterial and fungal effectors, secretion of effectors, and mechanism of suppression of host defense responses, effector targets, and mechanism of virulence in bacterial and fungal pathogens.	5	PKV
4.	Hormones and transcription regulation – salicylic acid, jasmonic acid, ethylene signaling, cross-talk of signaling pathways.	4	AN
5.	Systemic acquired resistance – mechanism, induction, genetic and epigenetic regulations.	3	AN
6.	RNA virus pathogenesis – basic steps of pathogenesis, entry and uncoating, viral genome expression, synthesis of mRNA, host factors regulating viral replication, transcription, intra- and inter-cellular movement, pathogenesis, and inhibition of host gene transcription by RNA viruses.	3	SC
7.	DNA virus pathogenesis – ss and ds DNA virus replication in permissive host; reprogramming of plant cell cycle controls, translational control of viral gene expression (ribosome shunting, leaky scanning), nucleocytoplasmic trafficking of viral genome, modulation of ubiquitylation and ubiquitylation-like pathways.	3	SC
8.	RNA silencing in virus infections – biology, mechanisms and applications. Small RNAs and processing pathways in plants (PTGS, TGS, and miRNA), RNA-directed DNA methylation, virus-encoded proteins as suppressors of gene silencing in plants, and VIGS vectors.	2	SC
9.	Host plant resistance against virus infection – resistance mechanisms to plant viruses (host vs non-host resistance), dominant vs recessive resistance, with appropriate examples	2	SC
10.	Strategies to control viral, bacterial, and fungal pathogens in crop plants, breeding and genomics-based strategies, genome editing for disease resistance, host-induced gene silencing, and introduction to biological controls.	2	PKV

Suggested readings:-

1. Teaching will be done based on the latest research articles/reviews on respective topics and will be provided to the students.
2. Matthews' Plant Virology – Roger Hull. (Academic Press).
3. Applied Plant Virology – DGA Walkey (Heinemann: London).
4. Plant pathogen interaction: Ed. N. Talbot, Kluwer Publication.
5. Biochemistry and Molecular Biology of Plants – Ed. Buchanan et al ASPB Publication
6. Plant Pathology, by G N Agrios, Academic Press