Optional Course

Physiology and Molecular Biology of Stress (LS633A)

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S. No	Topic	No. of lectures	Faculty
1	Environmental stresses: Introduction, definition, significance, types, stress - as perceived by plants. Physiological responses of plants under stressful conditions	2	AP
2	Plants response towards abiotic stress factors, including water deficit/drought, salinity, high and low temperatures, role of osmotic adjustments towards stress tolerance.	8	AP
3	Various methods and techniques to analyze the effect of stresses on plant growth and physiology	2	AP
4	Understanding signalosome under stress conditions: Perception, transduction and response trigger, induction of specific gene expression, stress proteins, convergence and divergence of signaling pathways, ABA as stress hormone.	4	AP
5	How to isolate the gene of interest for genetic engineering of plants for improved stress tolerance: Molecular approach, Physiological approach, mutant approach, contrasting genotypes approach.	3	AP
6	Production of novel plant genotypes with improved tolerance towards abiotic stresses: raising of stress tolerant genotypes through genetic engineering.	3	AP
7	Responses of plants towards biotic factors: plant defense system, genetic basis, understanding of R genes, systemic plant defense responses.	3	AN
8	Program cell death in plants- development and stress induced cell death, genetic and hormonal regulation, apoptosis and autophagy in stress responses	2	AN
9	Control of plant pests and pathogens by genetic engineering: insect, nematodes, virus, bacteria and fungus resistant plants	3	AP

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Suggested Readings:

- **Plant Responses to Abiotic Stress**: Hirt and Shinozaki: (Online) Springer
- **Plant Responses to environmental stress**: Smallwood et al BIOS Scientific Publishers
- **Biochemistry and molecular biology of plants:** Buchanan et al 2000, American Society of Plant Biologists, USA
- **Plant, Genes and Crop Biotechnology,** Maarten J. Chrispeels & David E. Sadava, 2002, American Society of Plant Biologists, USA
- **Handbook of Plant and Crop Physiology:** Pessarakli et al 2002, Marcel Dekker Inc. USA
- **Plant Ecophysiology:** Prasad MNV 1997, John Wiley & Sons, Inc, USA
- **Transgenic plants: Galun E and Breiman A** 1997 World scientific Publishing company

**Additional study materials, Review and Research Papers will be provided during class hours