

## Physiology and Molecular Biology of Stress (LS633A)

Amarjeet Singh\* (AJS), Ashish Nandi (AN), Ashwani Pareek# (AP)

| 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               | AJS     |
| 2     | Plants response towards abiotic stress factors, including water deficit/drought, salinity, high and low temperatures, role of osmotic adjustments towards stress tolerance.  | 8               | AJS     |
| 3     | Various methods and techniques to analyze the effect of stresses on plant growth and physiology  | 2               | AJS     |
| 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               | AJS     |
| 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               | AJS     |
| 6     | Production of novel plant genotypes with improved tolerance towards abiotic stresses: raising of stress tolerant genotypes through genetic engineering.  | 3               | AJS     |
| 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               | AJS     |

\* Coordinator; # On deputation

### 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:** Pessaraki 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