Bot-Sp-18 PLANT PHYSIOLOGY AND CLIMATE CHANGE Credit hours: 3 (2+1)

THEORY:

Introduction of the Course:

The course is organized to provide an adequate knowledge about plant physiology and climate change. Plant physiology is the study of plant function and behavior, encompassing all the dynamic processes of growth, metabolism, reproduction, defense, and communication that account for plants being alive. Climate change alters species interactions via direct effects on plant antagonists and mutualists and via changes in plant traits that influence the dynamics of these interactions. Global change is a topic of great concern today. Change includes increasing temperatures, decreasing rainfall, rising atmospheric carbon dioxide levels, degrading soils, excess of nutrients, salt, heavy metals or man-made chemicals. Change can mean altered presence of herbivores, pests and pathogens, or competition with aggressive weeds.

Course Objectives:

The course is designed:

1. To provide an adequate knowledge about basic concepts of plant physiology and climate change.
2. To give an insight knowledge of plant physiology and climate change, their evolutionary and ecological response

Contents:

1. **Plants and Global Change:**
   1.1 Effects of Rising Atmospheric Concentrations of Carbon Dioxide on Plants
   1.2 Potential impact of climate change on nutrient availability
   1.3 Ozone exposure response on Crop Productivity
2. **Physiological Traits for Improving Heat Tolerance in Crops:**
3. **Climate Change:**
   3.1 Resetting Plant-Insect Interactions
   3.2 Climate change and multitrophic level species interactions
   3.3 Waterproofing Crops
   3.4 Effective Flooding Survival Strategies
   3.5 Molecular and Physiological Analysis of Drought Stress in response to environmental change
   3.6 Evolutionary and ecological responses to anthropogenic climate change
   3.7 Microorganisms and ocean global change
   3.8 Prevalence of polyploidy in cold climates

Practicals:

1. To determine the activity of Antioxidant enzymes.
2. To investigate cold-induced physiological responses in plants.
3. To study heat induced physiological responses in plants.
4. To determine the Oxygen radical absorbance capacity of stressed tissues.
5. To determine Ferric reducing antioxidant power of stressed tissues.

Teaching-learning Strategies:

1. Lectures
2. Group Discussion
3. Laboratory work
4. Seminar/ Workshop

Learning Outcome:

1. Students are expected to get familiarized with the morphological and systematic knowledge about different plant groups.
2. They will be able to describe, apply and integrate the basic concepts of Cell Biology including Genetics and Evolution, Biochemistry, Physiology as well as Structure and Functions of different Organelles.
3. This will enable them qualify for basic to moderate level jobs involving knowledge of plants and their environment.
4. The obtained knowledge shall also enable the students to enter into various entrepreneurial activities involving general introduction to Botany.

Assessment Strategies:

1. Lecture Based Examination (Objective and Subjective)
2. Assignments
3. Class discussion
4. Quiz
5. Tests

Recommended Readings:

1. Baxter, B. (2014) Plant acclimation and adaptation to cold environments, in Temperature and Plant Development (eds K. a. Franklin and P. a. Wigge), John Wiley & Sons, Inc, Oxford. doi: 10.1002/9781118308240.ch2.
2. Morison, J. I. L. and Morecroft, M. D. (2008). *Plant Growth and Climate Change.*Wiley-Blackwell.232pp. ISBN: 978-1-405-13192-6

3. Redden, R., Yadav, S. S. Maxted, N., Dulloo, M. E., Guarino, L. and Smith, P. (2015). *Crop Wild Relatives and Climate Change*.John Wiley & Sons. 400pp.
4. Rozema, J., Aerts, R. and Hans Cornelissen (2007). *Plants and Climate Change.*Springer. ISBN 978-1-4020-4443-4.

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