

PLANT PHYSIOLOGY Lecture 28 - Environmental Physiology

- I. Plant physiology and ecology in relation to environmental physiology**
 - A. Plant physiology - study of plant function**
 - B. Plant ecology - study of plants in relation to other species and the environment**
 - C. Plant environmental physiology - study of plant function in relation to the environment**
- II. What is the environment?**
 - A. "Environment" includes circumstances, objects, or conditions by which one is surrounded**
 - B. "Operational environment" is the complex of climatic, edaphic (soil), and biotic factors that affect an organism's form and survival**
 - C. John Muir's "Holistic Concept:" everything in the universe interacts with everything else**
- III. Principles of plant response to environment**
 - A. Saturation, and cardinal points**
 - B. Generalized curve**
 - C. Phenomena demonstrating this curve**
 - 1. Enzyme action, photosynthesis, respiration, mineral nutrition, hormonal regulation, growth and development**
 - D. Limiting factors to growth and development imposed by environment**
 - 1. Climate**
 - 2. Water**
 - 3. Mineral nutrition**
 - 4. Damage by disease and insects**
 - 5. Competition by weeds**
 - 6. CO₂ competition (especially in greenhouse)**
- IV. Types of plant responses to environment**
 - A. Direct - as environment changes, plant response changes immediately (ex. photosynthesis and light level)**
 - B. Triggered - environmental factor crosses a threshold (delayed response) (ex. germination and low temperature)**
 - C. Modulated - plant response determined by level of environmental factor (ex. phototropism, gravitropism)**
 - D. Homeostasis - maintenance of internal environment (ex. internal temperature, pH, and hormone levels)**
 - E. Conditioning effects - gradual changes as imposed by environment (winterhardiness, drought resistance)**
 - F. Carryover effects - effects carried over to later generations (ex. inbreeding, other genetic factors)**
- V. Plant responses to radiant energy**
 - A. Photosynthesis and leaf development**
 - B. Seed germination and spring bud break**
 - C. Etiolation syndrome**
 - D. Stem elongation and apical dominance**
 - E. Stem and leaf orientation**
 - F. Circadian leaf movements**
 - G. Reproduction and storage organs**
- VI. Allelochemicals and Herbivory**