PLANT ANATOMY Lecture 28 - Seeds and Seedlings

I. Generalized seed structure
- A. Where the seed comes from
  - 1. Double fertilization
    - A. Fusion of egg and sperm (zygote)
    - B. Fusion of two polar nuclei with second sperm (endosperm)
- B. Parts of the seed
  - 1. Embryo (from zygote)
  - 2. Endosperm (may or may not be present in mature seed)
  - 3. Seed coat (from integuments)

II. Kinds of seeds
- A. Dicots - endosperm is partially or completely absorbed by the embryo by cotyledons
  - 1. Seed coat (external structure)
    - A. Hilum - place where seed was attached to plant
    - B. Micropyle - small opening in the integuments
  - 2. Embryo
    - A. Embryo axis
      - 1. Plumule (shoot apex, first foliage leaves, and epicotyl)
      - 2. Epicotyl (portion beneath leaves)
      - 3. Hypocotyl (portion beneath cotyledonary node)
    - B. Cotyledons
    - C. Radicle (primary root)
  - 3. Stored food and mineral reserves (in cotyledons and other tissues)
  - 4. Enzymes and hormones (found everywhere)
- B. Monocots - endosperm is a discrete, major structural seed unit
  - 1. Seed coat (external structure)
    - A. Pericarp - fruit wall developed from the ovary wall
    - B. Aleurone layer - protein-rich layer which encases the endosperm
  - 2. Embryo
    - A. Embryo axis
      - 1. Plumule (shoot apex, first foliage leaves, and epicotyl)
      - 2. Coleoptile - protective sheath around shoot apex
      - 3. Epicotyl and hypocotyl (as before)
    - B. Scutellum - one cotyledon
    - C. Radicle (primary root)
      - 1. Coleorhiza - protective sheath around root apex
  - 3. Stored food and mineral reserves (in starchy endosperm, cotyledons, and other tissues)
  - 4. Enzymes and hormones (found everywhere)

III. Germination
- A. Process - imbibition and absorption of water, hydration of tissues, absorption of oxygen, activation of enzymes and digestion, transport of nutrients to embryo axis, increase in respiration, cell division & growth, and embryo emergence
- B. Hormones - gibberellins (activate digestion), cytokinins (stimulate cell division), and auxins (cell enlargement)
- C. Epigeal emergence - elongation of the hypocotyl (cotyledons push above soil surface)
- D. Hypogeal emergence - elongation of the epicotyl (cotyledons remain below soil surface)