

GENERAL BOTANY Lecture 25 - 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) - think of it as the root/shoot junction
 - 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 (similar to dicots)
 - 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 (bean) - elongation of the hypocotyl (cotyledons push above soil surface)
 - D. Hypogeal emergence (grass) - elongation of the epicotyl (cotyledons remain below soil surface)