



Plant Growth Regulator:
Gibberellic Acid

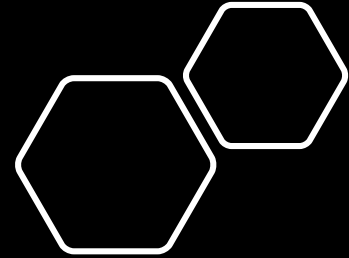
Submitted by: DR. Monica
Singh Chauhan (Guest
Lecturer)

Paper Name: Plant
physiology and metabolism

Class: B.Sc.(Life Science)
Sem: 4

DDU College (Department
Of Botany), New Delhi

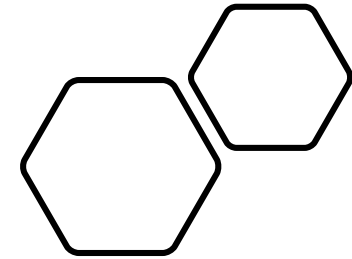
Functions of Gibberellins



- **Stem elongation**
- **Seed germination and Seedling growth**
- **Breaking of seed dormancy**
- **Promotes bolting & flowering – long day/cold requirement**
- **Flowering and sex expression**

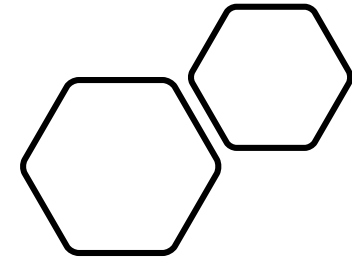
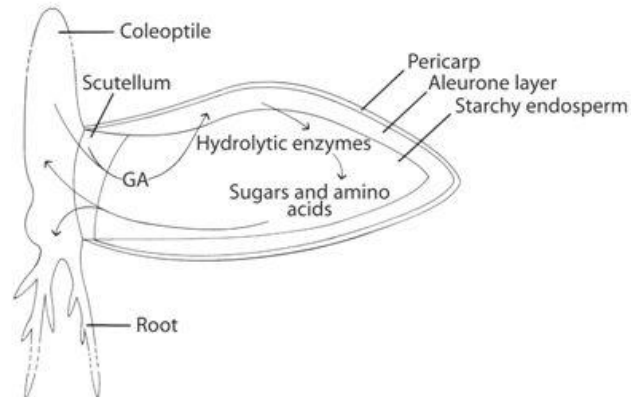
Physiological Roles of Gibberellins

- Seed Germination-Barley de novo amylase synthesis (Varner 1964)
- When applied externally, they can reverse the effect of certain dwarfing mutations
- Studies with such mutants have shown that although the application of mall gibberellins can cause this effect, they have to be converted to a particular form (gibberellin A1) before they can have any biological effect.
- Gibberellins can substitute for the dormancy breaking treatments (cold or light) in certain seeds like lettuce tobacco and wild oats.
- Gibberellins promotes in germination and radicle growth in malting barley seeds.
- External application of gibberellins can promote development of seedless fruits (parthenocarpy) in some species (e.g. Currants, apples cucumbers)
- Flower induction
- Control of sex expression
- Delays Senescence

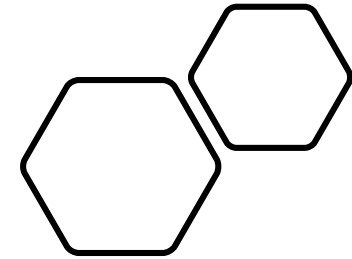


Bioassay of Gibberellins

- Three bioassays for gibberellins
 - i) Lettuce hypocotyl elongation bioassay
 - ii) The dwarf rice leaf sheath bioassay
 - iii) Barley aleurone layer α -amylase bioassay
- Assays i and ii depend on growth responses
- Assay iii is based on induction of enzyme production and secretion by GA



- B. **Gibberellins** (gibberellic acid) are produced in stem and root apical meristems, in seed embryos, and in young leaves.
 - 1. Gibberellins stimulate stem growth. They induce stem cell elongation, cell division, and control enzyme release.
 - 2. Gibberellins produced in the embryo during the germination of cereal seeds moves to the **aleurone layer**, the outer layer of the endosperm, activating the synthesis of enzymes.
 - 3. Seventy different gibberellins have been discovered to exist. A plant species will respond to only certain types of gibberellin.



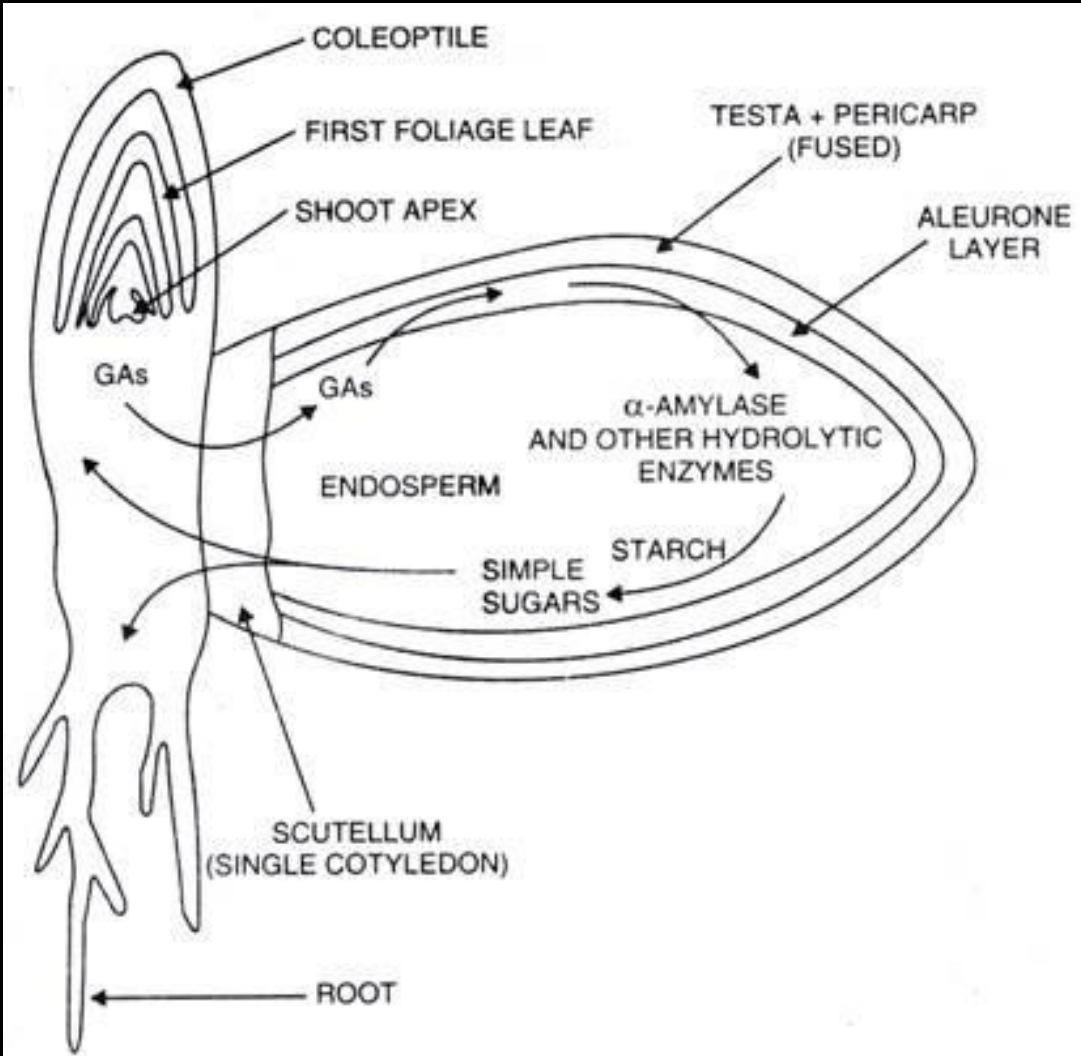
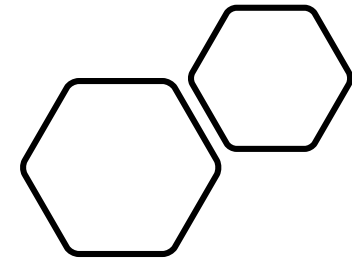
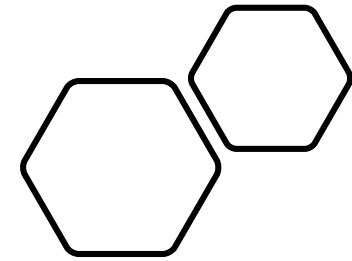
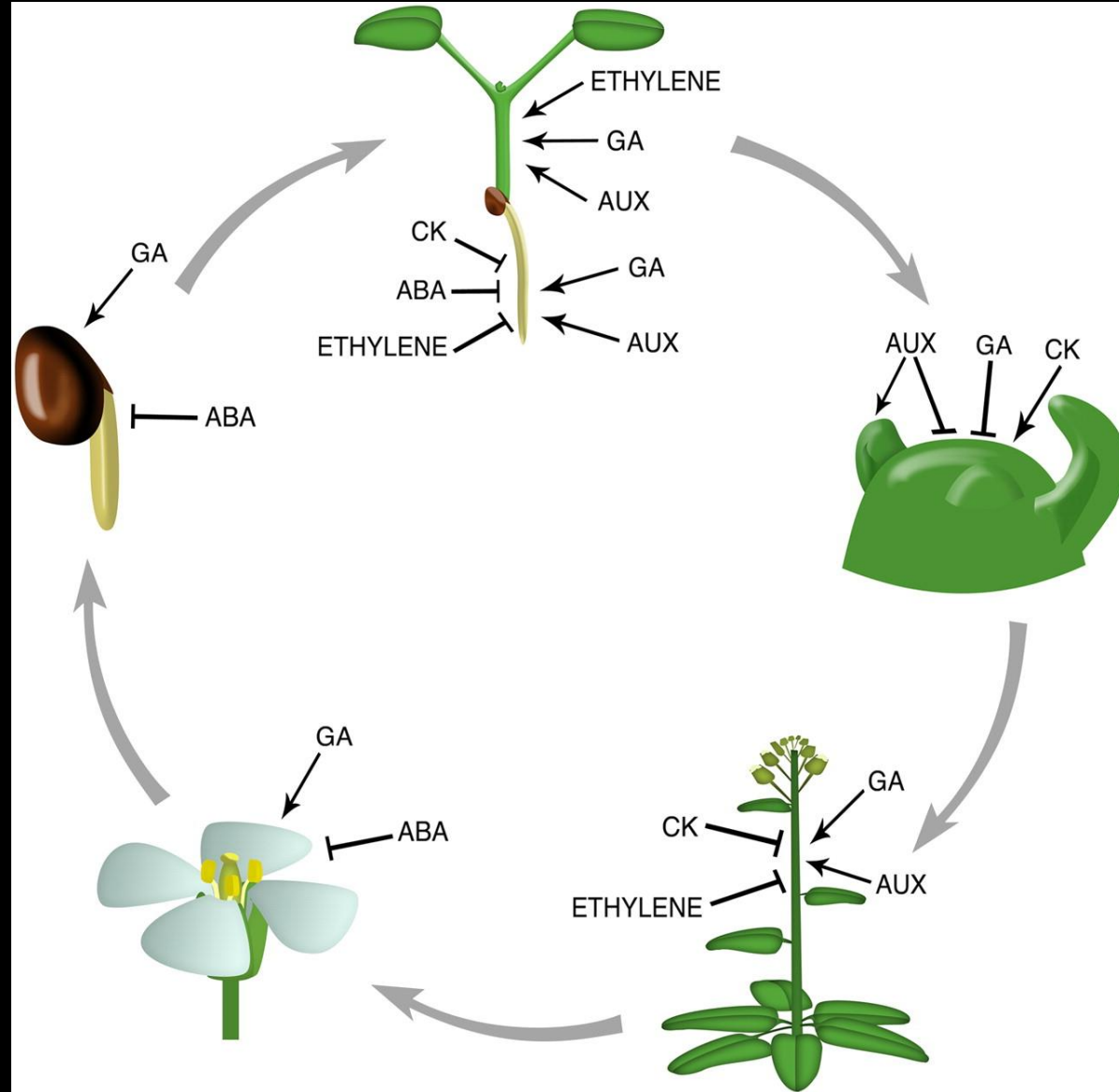


Fig. 17.17. Mobilization of food reserves in germinating barley grain.





GA₃ sprays applied to carrot plants at different growth stages stimulated leaf growth and inhibited root growth. Stem elongation was promoted by GA₃, in particular at higher temperatures. Plants bolting after GA₃ application deviated mostly from normal bolters by the formation of a short thickened stem, but started flowering only occasionally. GA₃ applied at a lower, vernalizing temperature (10°C) inhibited flowering.