Plant Responses and Adaptations

Video

Plant Hormones

- **Hormone** - a chemical substance that is produced in one part of an organism & affects another part of the same individual

Control a plant's:
- patterns of growth & development
- plant's responses to environmental conditions

Hormones tell plants:

- When to **drop their leaves**.
- When to start **new growth**.
- When to cause **fruit to ripen**.
- When to cause **flowers to bloom**.
- When to cause **seeds to sprout**.

Leaf Drop

Tree Budding

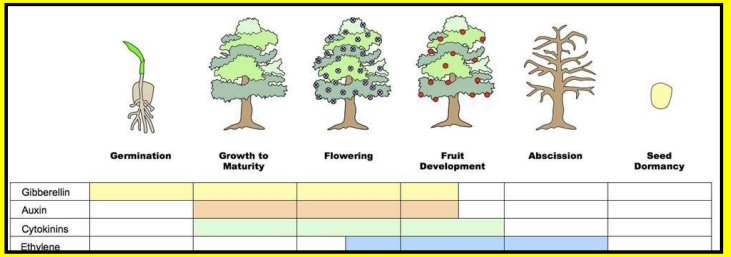
Fruit Ripening

Cactus Blooming

Sprouting Corn Seeds

Plant Hormones

- **Target cell** - the portion of an organism affected by a particular hormone



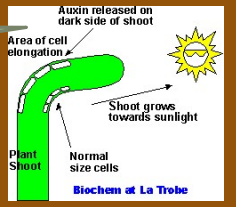
4 Types of Plant Hormones

1. Auxin
2. Cytokinin
3. Gibberellin
4. Ethylene

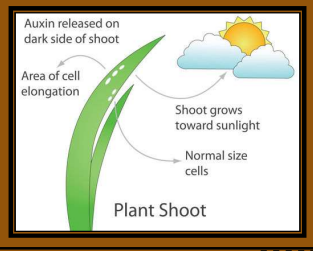
4 Types of Plant Hormones

1. Auxins

- Auxins – hormone that regulate cell growth and cell elongation

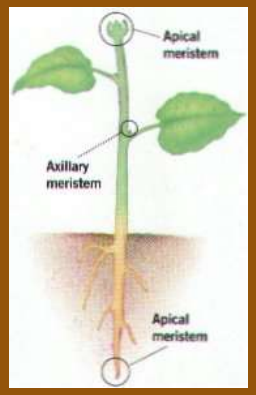


- Contribute to
  - phototropism
  - gravitropism



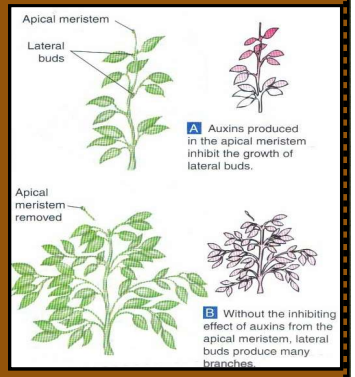
Auxins

- Apical meristem
  - Location where auxins are produced
    - stems & roots



Auxins

Apical dominance –
- the closer a bud is to the stem's tip, the more it is inhibited, because auxins move out from the apical meristem



Lateral bud –
- a meristematic area on the side of a stem that gives rise to side branches

Auxins

Auxin-like Weed Killers

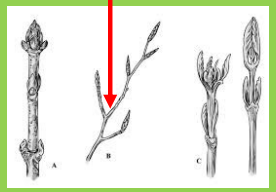
- Herbicides - compounds that are toxic to plants, many contain high concentrations of auxins since auxins inhibit growth

Weeds killed with herbicide

4 Types of Plant Hormones

2.Cytokinins

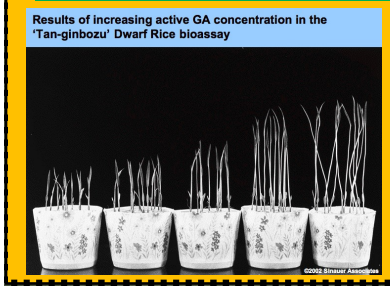
- Cytokinins - plant hormones that are produced in growing roots & in developing fruits & seeds
- They stimulate growth of lateral buds, & cause dormant seeds to sprout



4 Types of Plant Hormones

3. Gibberellins

- Gibberellin - a growth-promoting substance
- Gibberellins produce dramatic increases in size, particularly in stems & fruit

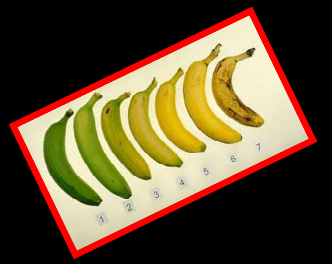


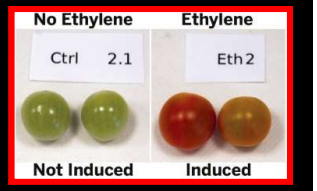
4 Types of Plant Hormones

4. Ethylene

- Ethylene – a natural gas that stimulates fruit to ripen
- Fruit tissues release small amounts of the hormone ethylene in response to auxin.

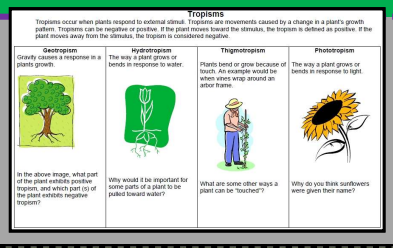
Ex.) Tomatoes picked before they are ripe will be exposed to ethylene later to turn a ripe-tomato red.





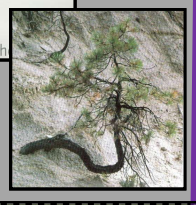
Tropisms

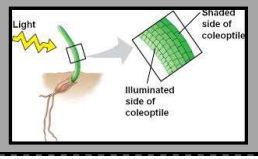
- Tropisms - the responses of plants to external stimuli
- 3 types
  - Gravitropism (aka. Geotropism)
  - Phototropism
  - Thigmotropism
- External stimuli include gravity, light, & touch



Tropisms

Gravitropism	Phototropism
○ The response of a plant to gravity ○ Also known as Geotropism	○ The response of a plant to a light source





Tropisms

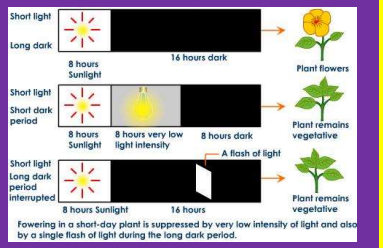
- Thigmotropism - the response of a plant to touch

What type of tropism is shown in these pictures?

Photoperiodism

- Photoperiodism - a plant's response to light & dark
- Responsible for the timing of seasonal activities such as flowering & growth

Phytochrome - a plant pigment that is responsible for photoperiodism (absorbs red light)



Photoperiodism

- Short-day plants - plants that flower when the days are short
  - Ex.) Poinsettias
  - Ex.)chrysanthemums

- Long-day plants - plants that flower when the days are long

Ex.) Spinach

Ex.) Irises

Winter Dormancy

- Dormancy - the period when an organism's growth & activity decrease or stop

Cold weather approaches:

- deciduous plants turn off photosynthetic pathways
- transport materials from leaves to roots
- seal leaves off from the rest of the plant

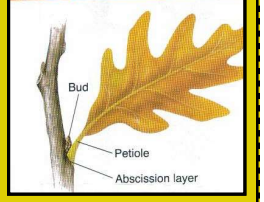

Poison Ivy

Winter Dormancy

Leaf Abscission

- Abscission layer - layer of cells at the petiole seals the leaf off from the plant's vascular system
  - Before long, the leaf falls to the ground, a sign that the tree is fully prepared for winter

abscisic *acid (hormone)*



Video

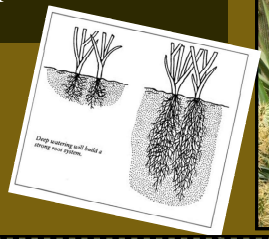
1. Aquatic Plants

- To take in sufficient oxygen, many aquatic plants have tissues with large air-filled spaces through which oxygen can diffuse

Water Lillies

2. Desert Plants

- Xerophytes - plants that live in the desert
- Plant adaptations include extensive roots, reduced leaves, & thick stems that can store water



3. Nutritional Specialists

- Plants that have specialized features for obtaining nutrients.
  - Carnivorous plants (digest insects)
  - Parasites grow into tissues of their host plant & extract water & nutrients, causing harm to host

Video

Venus Fly Trap

Pitcher plant

mistletoe

The Rat-Eating Pitcher Plant (Nepenthes attenboroughii)

- One of the largest carnivorous plant in the world. Though it has not been seen to eat rats, one specimen was observed to digest a shrew.
- measured more than 1.5 litres in volume.
- The plant was discovered on Mount Victoria in the Philippines in June 2007 and was named after Sir David Attenborough.

4. Epiphytes

- **Epiphytes** - plants that grow on top of other plants
  - Mainly found in tropical rain forest

Ex. Spanish moss, bromeliads

Chemical Defenses

- Many plants defend themselves against insect attack by manufacturing compounds that have powerful effects on animals

Poison ivy produces *urushiol* to protect the plant from herbivores. In humans this chemical produces an allergic skin rash, known as urushiol-induced contact dermatitis.

OVERVIEW

Plants move toward light

Fruits grow in girth

Plants grow in response to gravity

Regulates plant growth

Gas that ripens fruits

Plants respond to touch

Increase lateral buds growth

- Hormones (know functions):
  1. Auxin
  2. Cytokinin
  3. Gibberellin
  4. Ethylene
- Tropisms
  5. Phototropism
  6. Gravitropism
  7. Thigmotropism

Extra videos

Plant adaptations in Rainforest