

Ch. 22 Plant Reproduction & Response

Section 22.4 Asexual Reproduction

I. Plants can reproduce asexually with stems, leaves, or roots.

- A. **Asexual** reproduction allows a plant to make copies of itself.
- B. **Regeneration** is one type of asexual reproduction.
1. plants grow a new individual from **fragment of parent**
 2. occurs when piece of a stem, leaf, or root **falls off** parent plant



C. **Vegetative reproduction** is another type of asexual reproduction.

1. **stems, leaves, or roots attached to parent** plant produce new individuals
2. specific adaptations include
 - a. **stolons** - **stems** that grow **horizontally** along the ground, also called runners. Ex: **strawberries**
 - b. **rhizomes** - horizontal **underground** stems, buds grow from joints in stem. Ex: **Iris**



- c. **tubers** - **underground** modified **stem used for storage**.
Ex. buds grow from "eyes" of **potato**
- d. **bulbs** - **underground stems** used for storage, surrounded by modified "**papery skin**" leaves. Ex. **tulips**, daffodils, onions



II. Humans can produce plants with desirable traits using vegetative structures.

1. **Vegetative propagation** takes advantage of plants' ability to reproduce asexually.
2. Humans use one plant with **desirable traits** to produce many individuals.
 - a. **cutting** of leaves or stems may grow new roots
 - b. **grafting** joins the parts of two plants together to form a **hybrid** plant



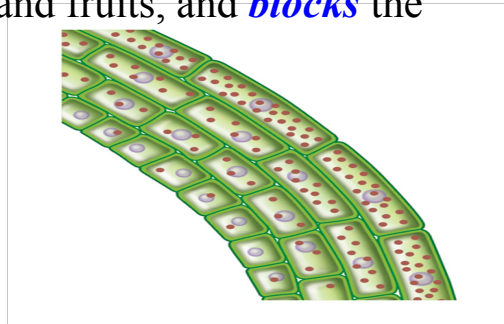
Section 22.5 Plant Hormones and Responses

I. Plant Hormones

As a seed sprouts, the seedling's shoot grows up and its roots grow down. **Hormones, *chemical messengers***, control most of these events.

A. Auxin causes stem *elongation*.

1. Auxin is produced at *the apical meristems*, tips of the stem and roots, causing cell walls to become more *flexible*.
2. Auxin also stimulates *root* development, *prevents* dropping of leaves, flowers, and fruits, and *blocks* the growth of buds along a stem.



B. Gibberellin promotes growth.

1. Gibberellin occurs *naturally* in plants. It was named for a fungus called *Gibberella*.
2. Gibberellin greatly *increases* stem growth, flower formation and the sprouting of seeds.

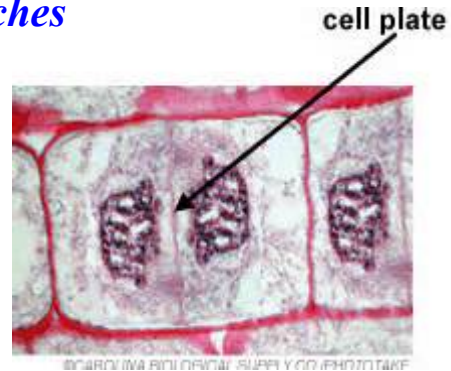
Without



With

C. Cytokinins stimulate cell division.

1. cytokinin is a hormone produced in the root *meristems*.
2. stimulates the production of proteins needed for *cytokinesis*, in cell division.
3. produced in *growing* roots, seeds, and fruits
4. involved in growth of *side branches*

**D. Ethylene stimulates fruit ripening.**

1. Ethylene promotes the *ripening* of fruit and the dropping of leaves and flowers, by weakening *cell walls*, causing them to become soft.
2. Simple *gaseous* compound of carbon and hydrogen, produced by the *fruit* itself and also by leaves and stems.
3. Ethylene is produced *naturally* in plants but is used *commercially* today to ripen bananas, honeydew melons and mangoes. (These plants are harvested while still green.)

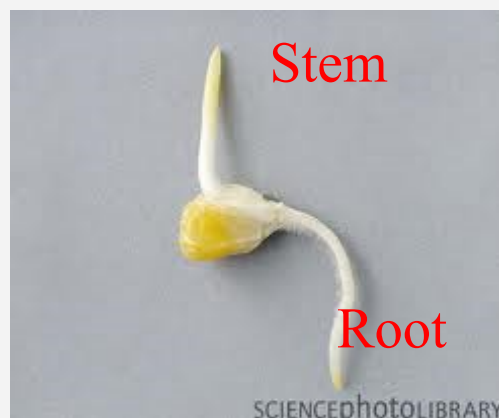


II. Plant responses

1. Plant response to external stimuli called *tropisms*.

- Positive tropism if plant grows *toward* stimulus.
- Negative tropism if plant grows *away* stimulus.
- **Types:**
 - *Photo*tropism = plant grows toward *light*. An uneven amount of auxin produced on one side of plant to help in elongation “leaning” toward light needed for photosynthesis.

- *Gravi*tropism = plant response to *gravity*. Roots grow downward with gravity; stems display negative gravitropism by growing upward.



- **Thigmotropism** = growth response to **touch**. Tendrils of vine touching a fence during growth and coiling around it. Growth cannot be reversed until another touch stimulus occurs.



2. Rapid responses in plants

- **Nastic movement** is the **nondependent** response of a plant to a moving stimulus.

Ex: water pressure release in Venus flytrap or mimosa leaflets.



B. Photoperiodism

- The response of flowering plants to daily daylight or darkness conditions is called **photoperiodism**.
- The length of darkness is what controls **flowering**.
- Each plant species has specific daylight - darkness conditions that will make flowering start, known as the **critical period**.

***Short**-day plant - flowers when the # of daylight hours is shorter than that of its critical period.

(Flower late summer)

Ex: strawberries, pansies



- **Long**-day plant - flowers when # of daylight hours is longer than that of its critical period.

(Flower in summer)

Ex: carnations, potatoes, wheat.



- **Day-neutral** plant - flowers over a range in the # of daylight hours. Ex: roses, cotton, many tropical plants.



- **Intermediate**-day plant - will not flower if the days are longer or shorter than its critical period.
Ex: sugarcane, several grasses.



- Photoperiodism is a physiological **adaptation** of all flowering plants that ensures the production of flowers at a time when there is an abundant population of **pollinators**.



- 1 To what stimuli is this plant responding?
- 2 Can this growth pattern be altered? Explain.