Seed Plants

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Objectives

- Identify the characteristics of seed plants.
- Explain the structures and functions of roots, stems, and leaves.
- Describe the main characteristics and importance of gymnosperms and angiosperms.
- Compare similarities and differences between monocots and dicots.

Characteristics of seed plants

- They have leaves, stems, roots, and vascular tissue.
- They produce seed. The seed contains an embryo and stored food.
- Seed plants are most familiar to you.

Leaves

Most of the photosynthesis occur in leaves.

Waxy cuticle – Coats the epidermis

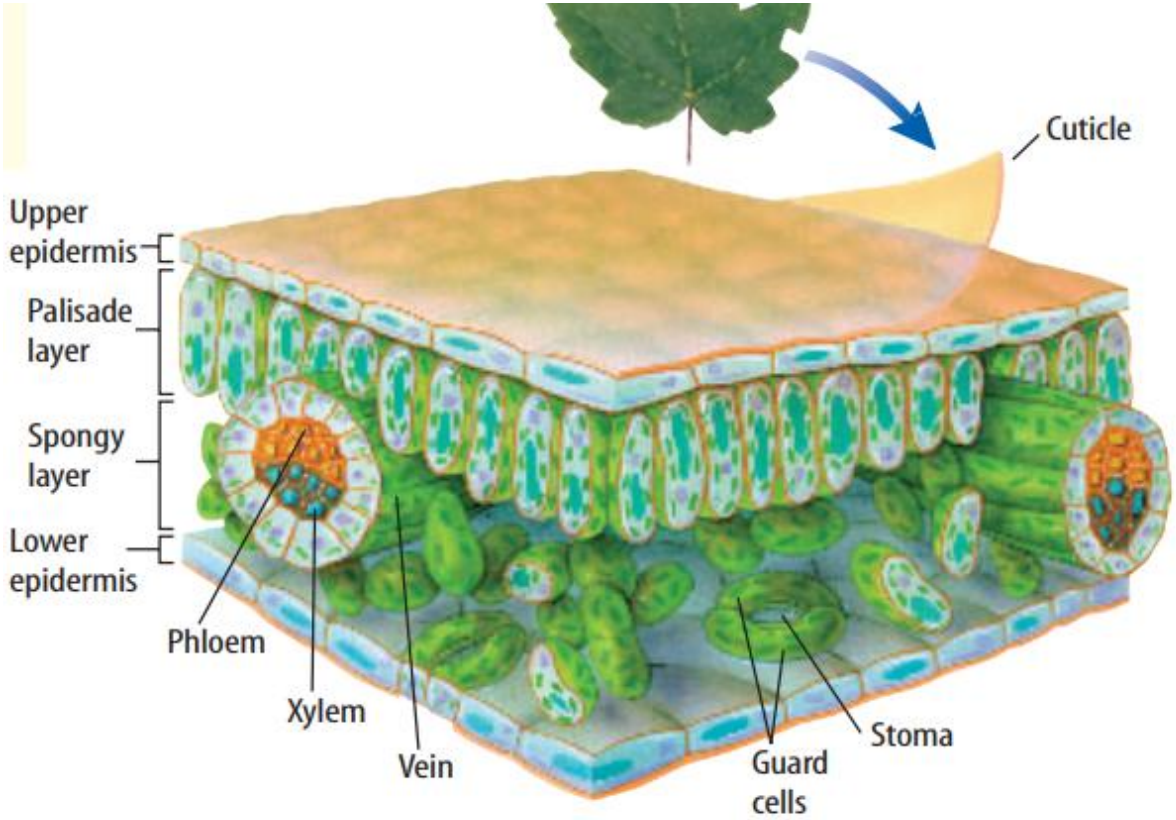
Epidermis – Upper and Lower

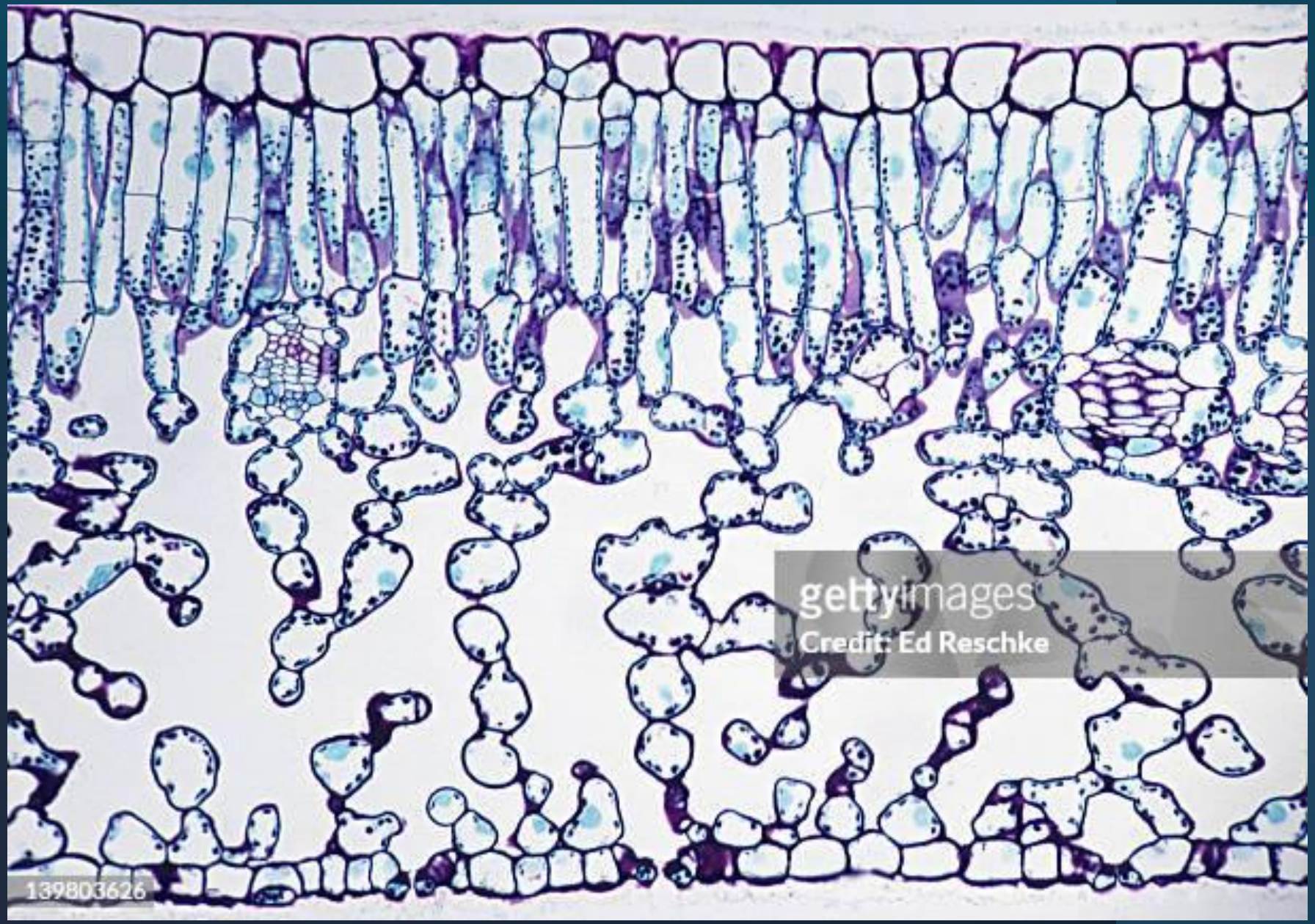
Palisade layer – it consists of closely packed, long, narrow cells that usually contain many chloroplasts

Spongy layer – loosely arranged cells separated by air spaces

Stomata – Small openings for gas exchange; CO_2 in, O_2 out

Guard Cells – Open and close stomata

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Stems

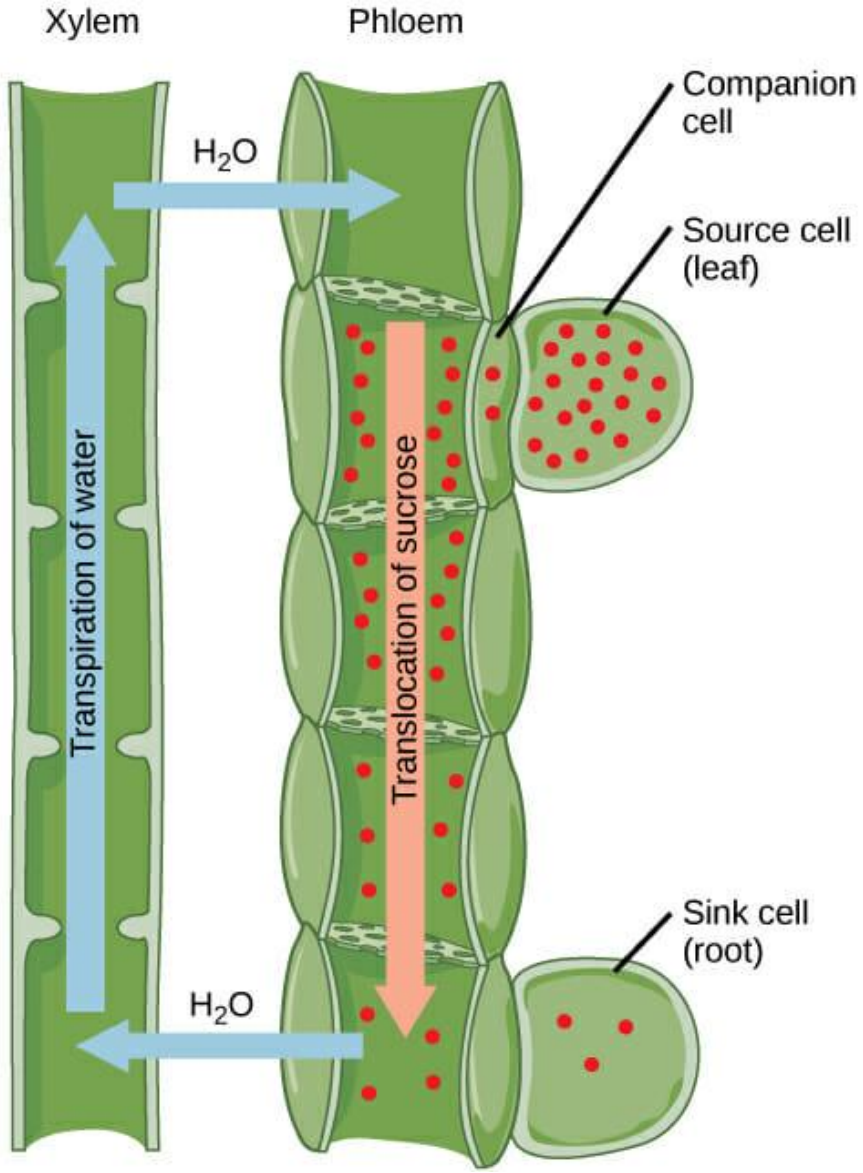
- Usually are located above ground and support the branches, leaves, and reproductive structures.
- Leaves <- Vascular Tissue -> Roots
- Plant stems are either herbaceous or woody.
- **Herbaceous** – usually soft and green like tulips.
- **Woody** – usually rigid and hard like trees.

Roots

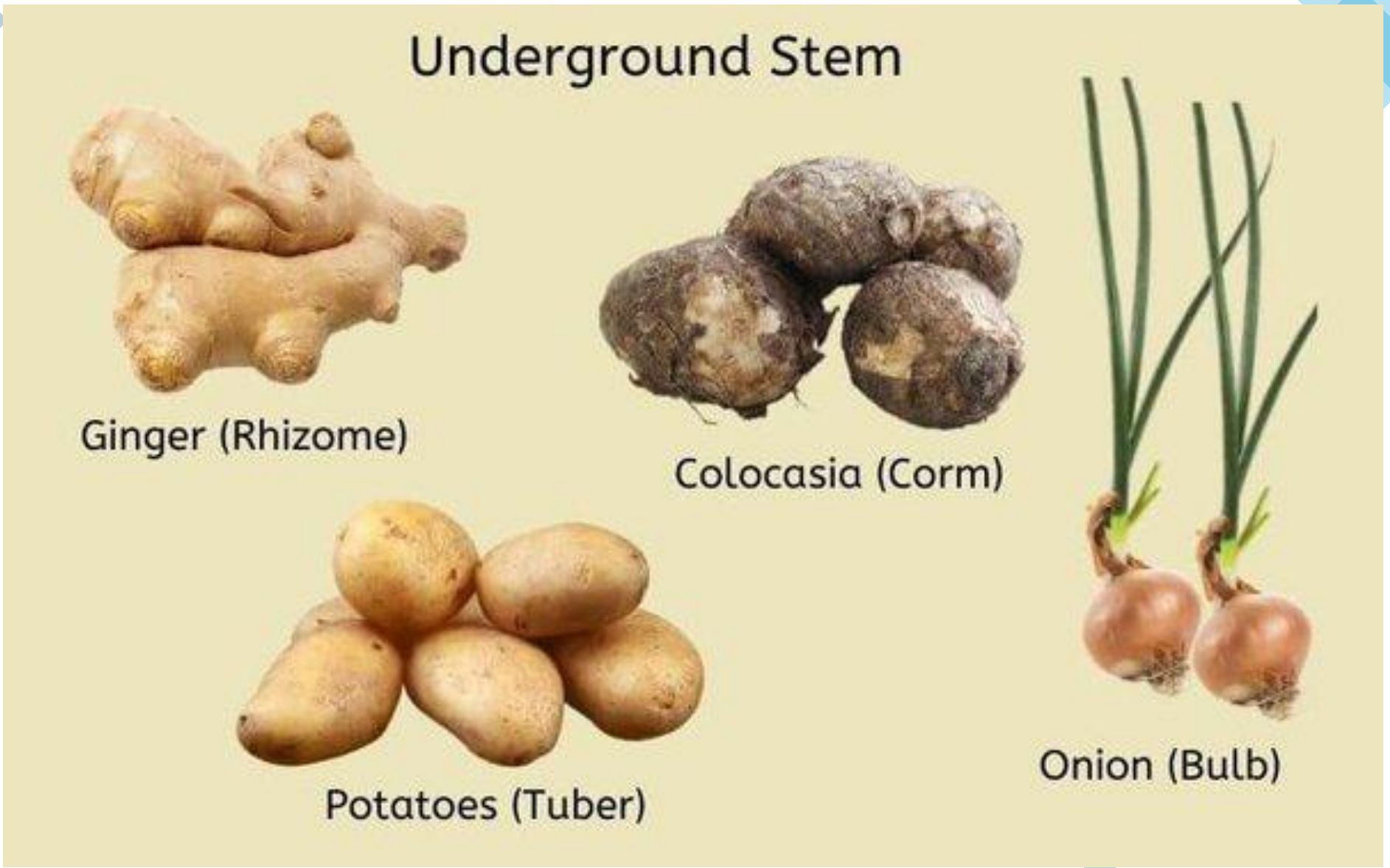
- Roots absorb water.
- Anchor the plant to the ground.
- Roots can store food – carrots.
- Roots can store water – plants that grow in dry areas

Vascular Tissue

- **Xylem** – made up of hollow, tubular cells; transport **water** from roots throughout the plants.
- **Phloem** – made up of tubular cells; transport **nutrients** from where it is made to other parts of the plant where it is used or **stored**.
- **Cambium** – produces most of the new xylem and phloem; increases the thickness of stems and roots.



Plants that store food in stem.



Plants that store food roots.

Carrot

Radish

Turnip

Sweet Potato

Dahlia

Plants that
store food
in leaves.

Gymnosperms

- The oldest trees alive. A **bristlecone pine tree** in the White Mountains of eastern California is estimated to be **4 900 years old**.
- They are vascular plants; and their seed are not **protected by fruit**.
- Gymnosperm comes from Greek and means “**naked seed**”.
- They **do not have flower**.
- Leaves of most of them are needlelike or scalelike.
- Many are called evergreen.

Gymnosperm

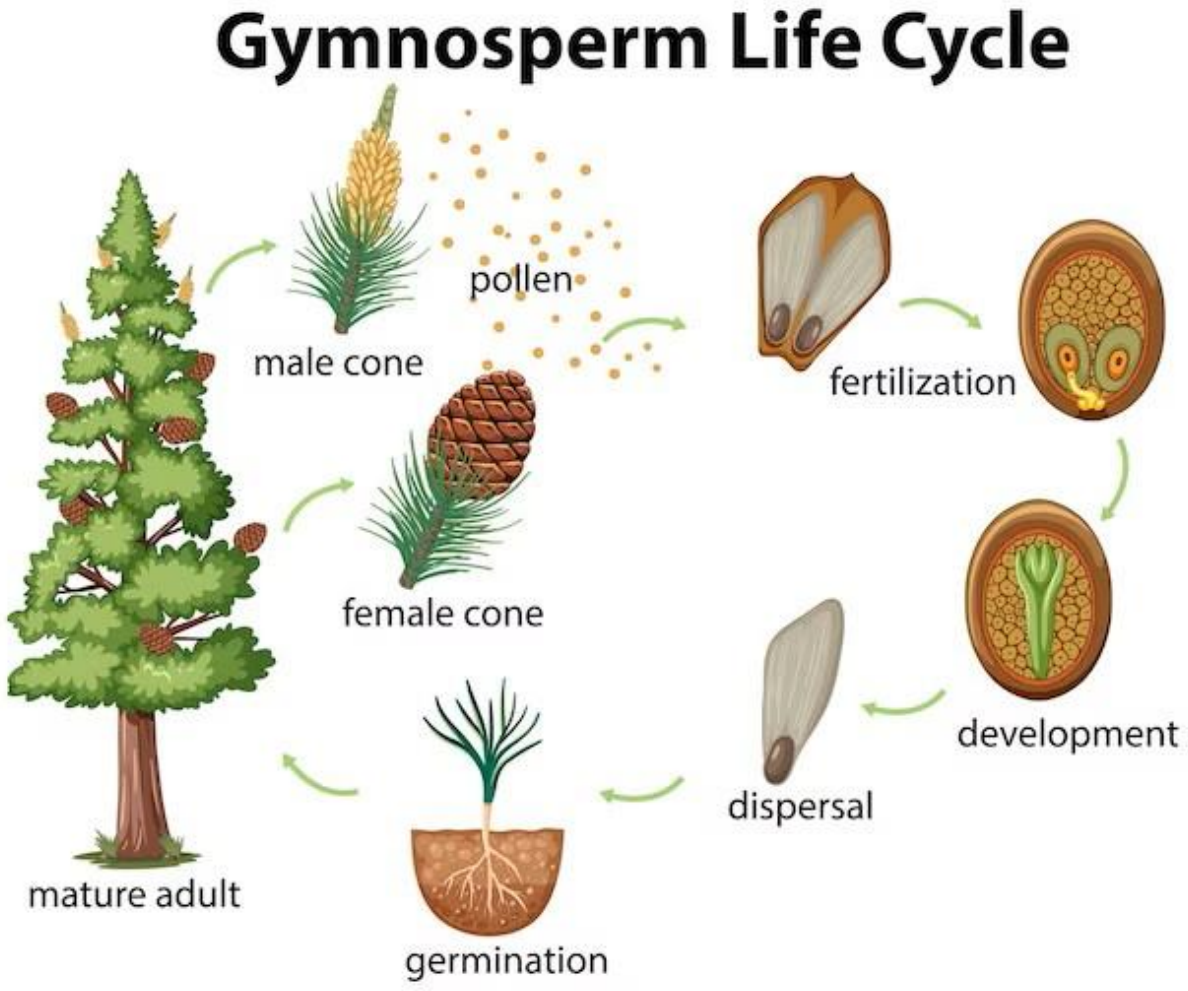
Four divisions of gymnosperms:

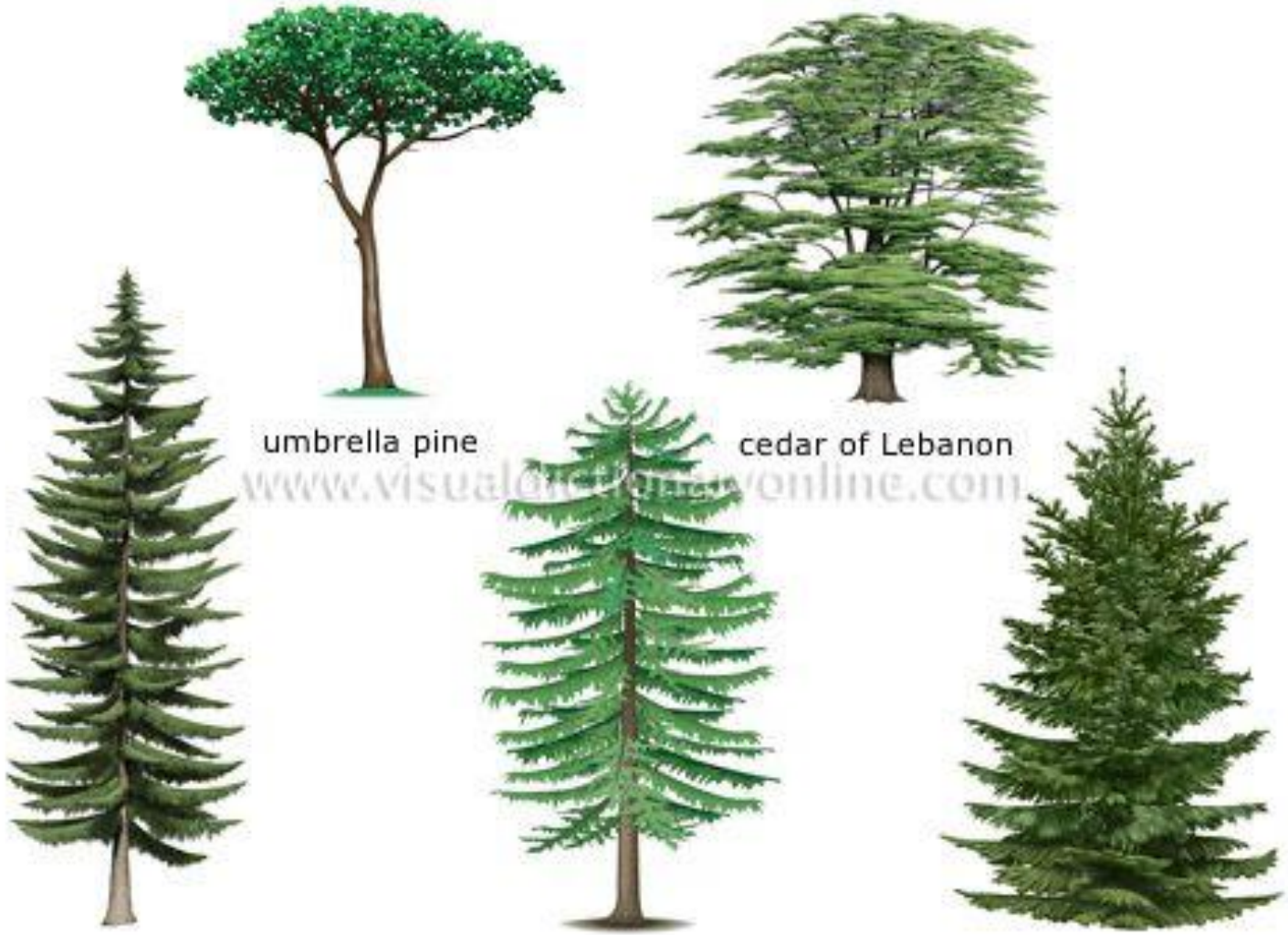
1. **Conifers**
2. **Cycads**
3. **Ginkgoes**
4. **Gnetophytes**

Probably you are most familiar with the division **Coniferophyta, the conifers**.

Pines, firs, spruces, redwoods, and junipers belong to this division.

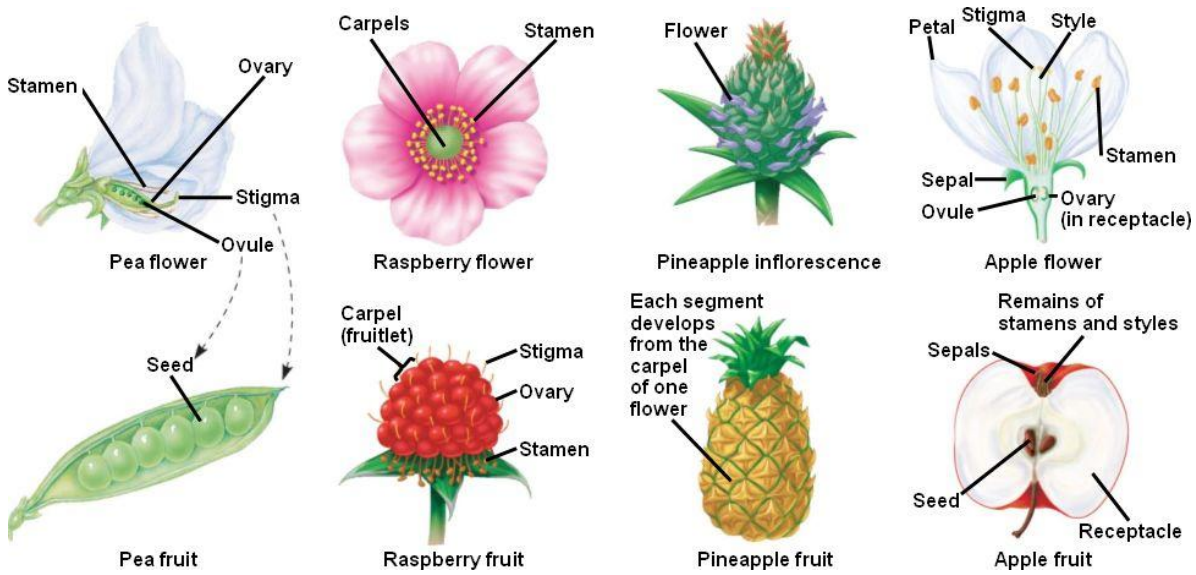
All conifers produce two types of cones- male and female.




umbrella pine
cedar of Lebanon
spruce
larch
+ fir

Angiosperm

- They have **flowers** and produce **fruits** with one or more seeds.
- Flower -> Fruits -> Seeds
- More than half of the known plant species belong to this division.

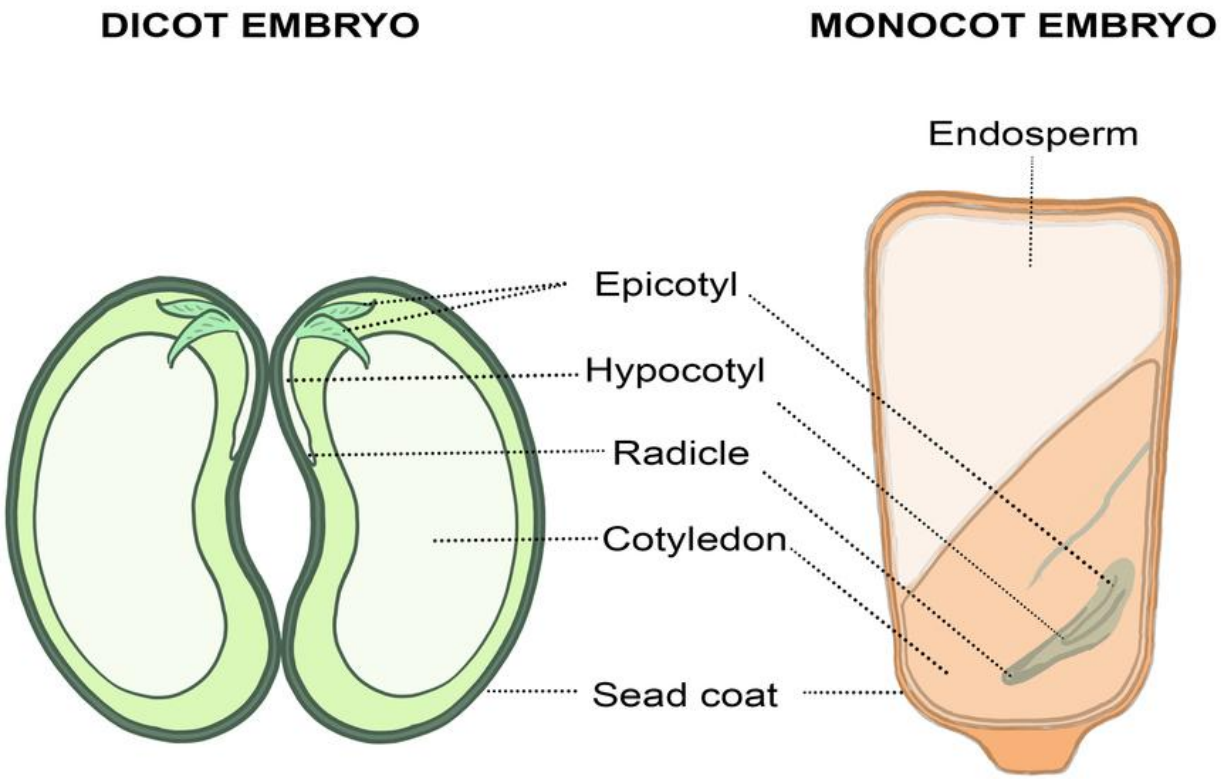


Flowers

- They vary in size, shape, and color.
- From 0.1 mm long to 9 kg in weight.
- Flower -> Fruit -> Seeds
- Some fruits are juicy and sweet, and some not.
- The fruit of the vanilla orchid, as shown to the right, contains seeds and is dry

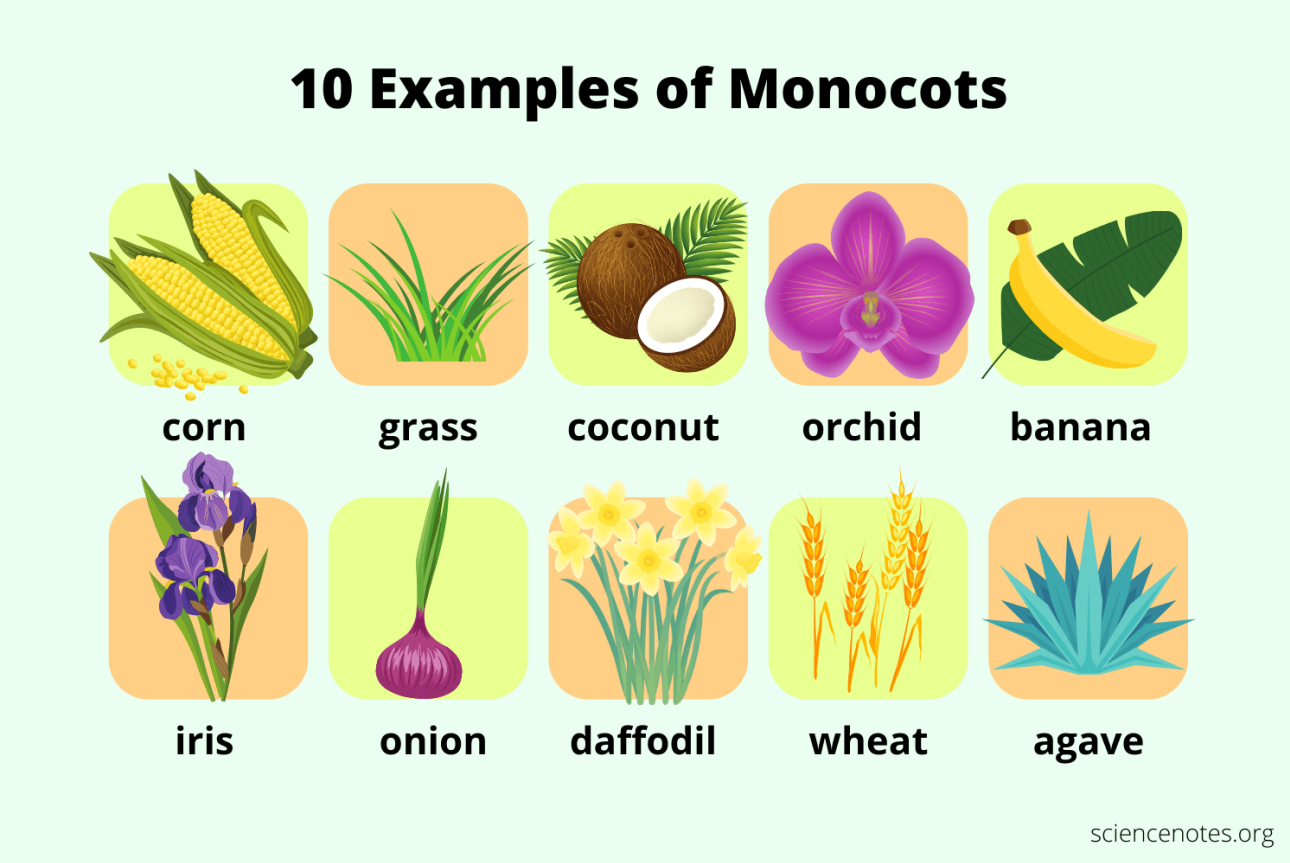
Monocots and Dicots

- Angiosperms are divided into two groups:
- The monocots (monocotyledon) and the dicots (dicotyledon).
- A cotyledon is part of a seed often used for food storage.
- **Monocots** have **one cotyledon** inside their seeds and **dicots** have **two cotyledon**.



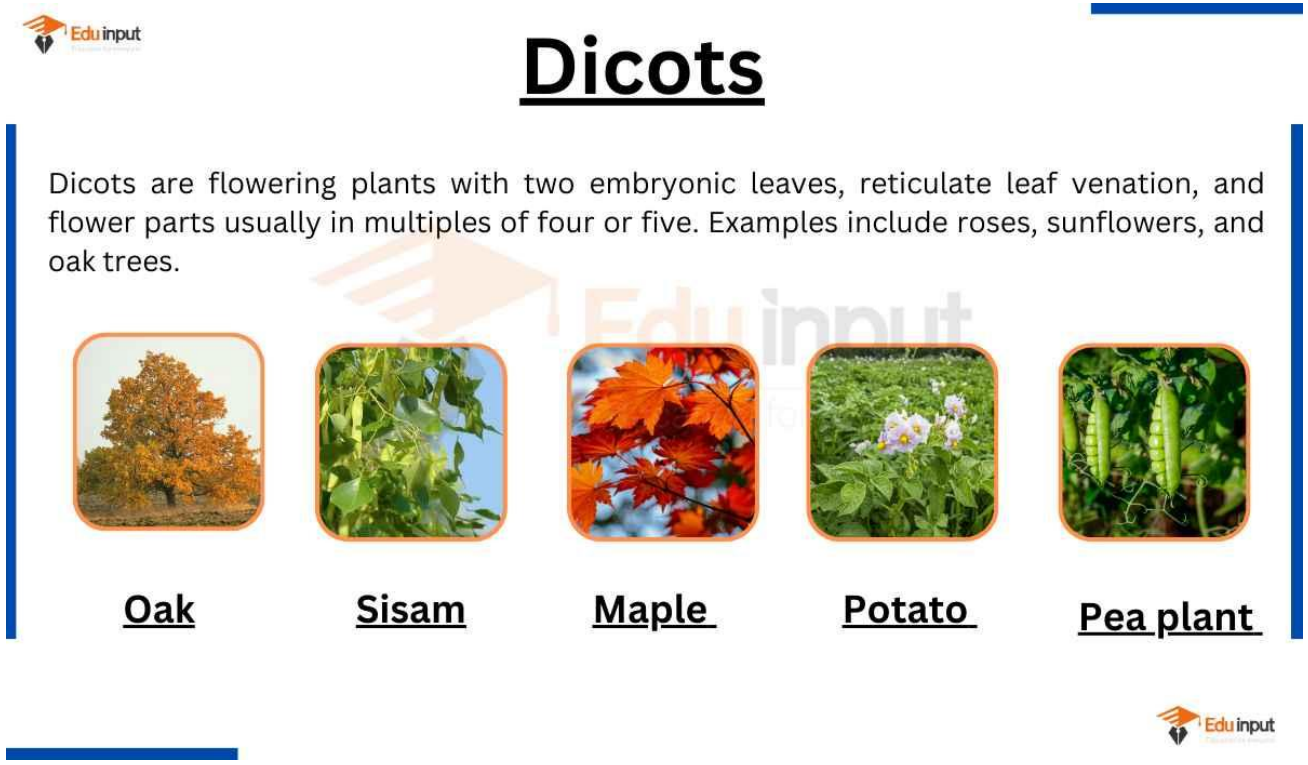
Monocots

- Many important foods come from monocots, including **corn, rice, wheat, and barley**. If you eat **bananas, pineapple, or dates**, you are eating fruit from monocots. **Lilies and orchids** also are monocots.



Dicots

• Dicots also produce familiar foods such as **peanuts, green beans, peas, apples, and oranges**. You might have rested in the shade of a dicot tree. Most shade trees, such as **maple, oak, and elm**, are dicots.



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Monocot vs Dicot

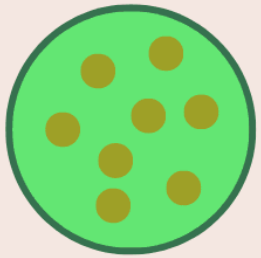
Monocots and dicots are the two broad groups of flowering plants.

MONOCOTS

1 cotyledon

fibrous roots

parallel leaf veins



scattered stem vascular bundles

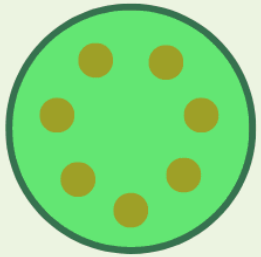
flower parts in threes

DICOTS

2 cotyledons

tap root

net leaf veins

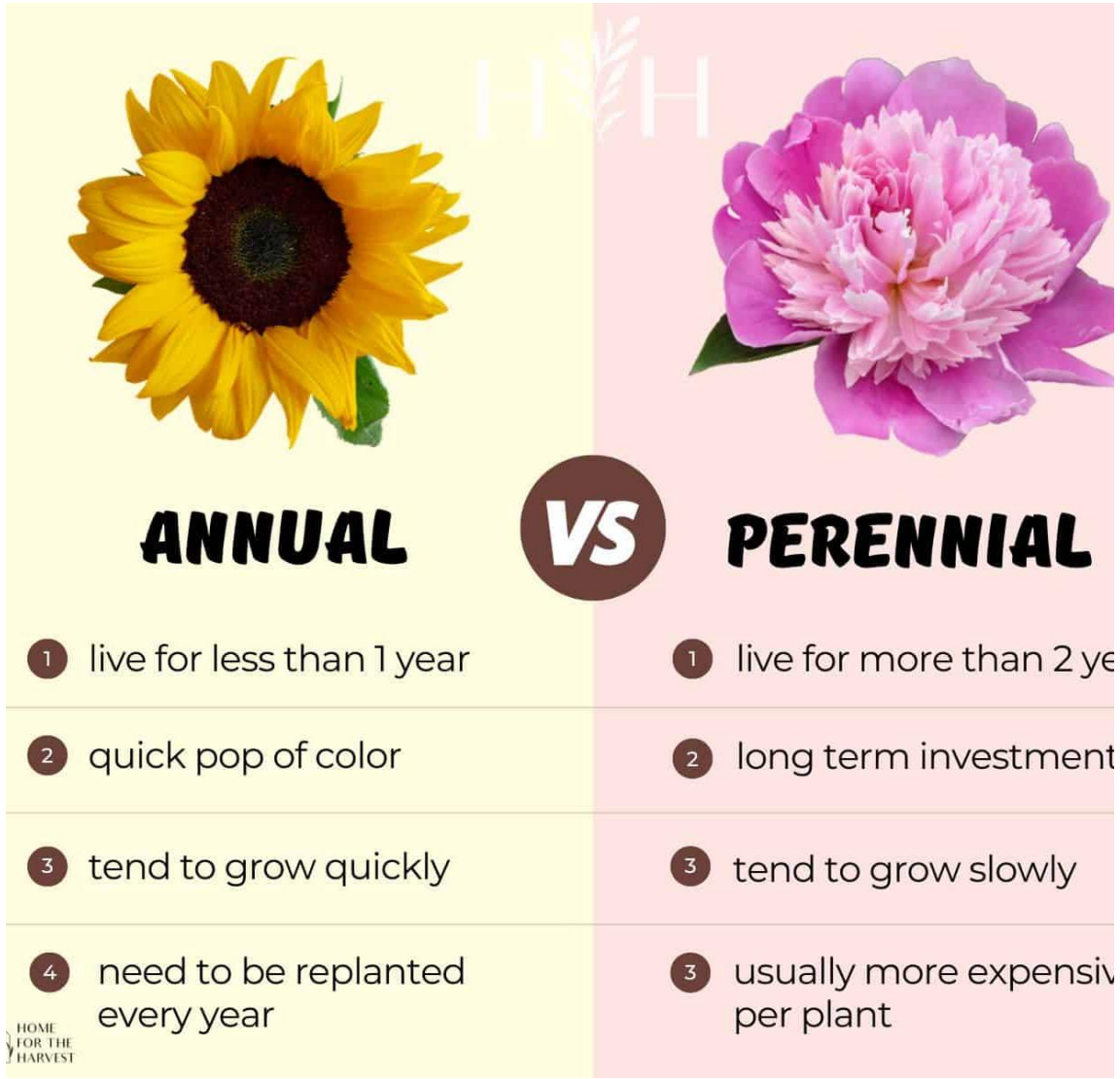


vascular bundles form ring

flower parts in fours or fives

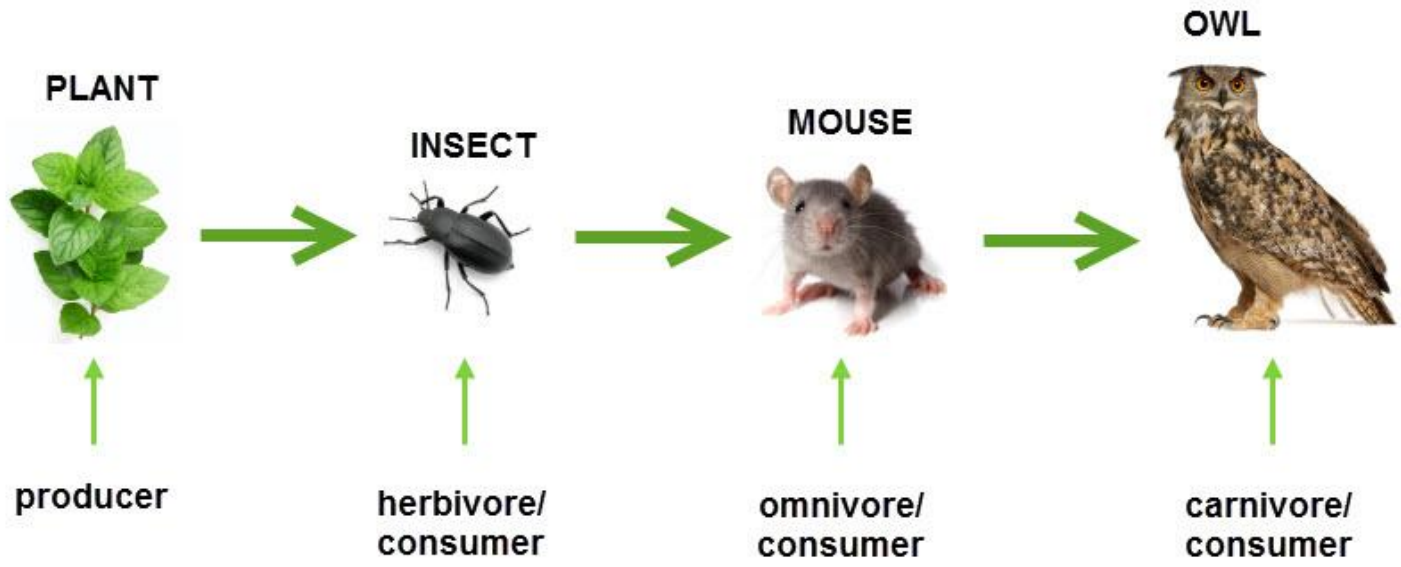
Life cycle of angiosperms

- Annual plants – if a plant's life cycle is completed within one year
- Biennial plants – if a plant's life cycle is completed within two years
- Perennials – if a plant's life cycle is completed in more than two years



Importance of seed plants

- Paper is made from wood.
- Clothing is made from cotton.
- Bread, fruits, potato chips – all come from seed plant.
- Milk, hamburgers, and hot dogs all come from animals that eat seed plants.



• Conifers are the most economically important gymnosperms. Most wood used for construction and for paper production comes from conifers. **Resin**, a **waxy substance** secreted by conifers, is used to make chemicals found in **soap**, **paint**, **varnish**, and some **medicines**. The most economically important plants on Earth are the angiosperms. They form the basis of the diets of most animals. Angiosperms were the first plants that humans grew. They included grains, such as barley and wheat, and legumes, such as peas and lentils. Angiosperms are also the source of many of the fibers used in clothing. Besides cotton, linen fabrics come from plant fibers

Table 1 Some Products of Seed Plants

From Gymnosperms		From Angiosperms	
lumber, paper, soap, varnish, paints, waxes, perfumes, edible pine nuts, medicines		foods, sugar, chocolate, cotton cloth, linen, rubber, vegetable oils, perfumes, medicines, cinnamon, flavorings, dyes, lumber