

Plant Reproduction and Growth

Matthew Williams • Biology • May 9, 2026

Plant Reproduction and Growth

Flowering plants reproduce sexually using flowers, and disperse their offspring as seeds enclosed in fruits.

Seed Structure (Dicotyledonous)

A seed contains a plant embryo and food stores, protected by a seed coat.

Part	Function
Testa	tough outer coat; protects embryo from drying out and physical damage
Micropyle	small pore in testa; allows water uptake at germination
Hilum	scar where seed was attached to the pod
Cotyledons (seed leaves)	store food (starch, oils, proteins) for the germinating seedling
Radicle	embryonic root; grows downward (positive geotropism)
Plumule	embryonic shoot; grows upward (negative geotropism)

Labelled diagram of a dicotyledonous seed showing testa, micropyle, hilum, cotyledons, radicle, and plumule

Germination

Germination is the resumption of growth by the embryo after a period of dormancy.

Conditions required:

- **Water** — rehydrates the embryo; activates enzymes that break down food stores; needed for cell expansion
- **Oxygen** — for aerobic respiration to supply energy for growth

- **Warmth (suitable temperature)** — enzymes work at their optimum rate; most seeds germinate between 10–30°C

Light is not required for germination itself (seeds germinate underground in darkness), though it is needed once the seedling has emerged.

During germination: starch and oils in cotyledons are converted to glucose 'used in respiration and for building new cells 'radicle emerges first, anchoring the plant, then plumule grows upward.

Flower Structure

Flowers are the reproductive organs of flowering plants. Parts and their functions:

Part	Function
Sepals	protect the flower bud before it opens
Petals	attract insect pollinators (usually coloured and scented)
Stamens (filament + anther)	male part; anther produces pollen grains (contain male gametes)
Carpels (stigma + style + ovary)	female part; ovary contains ovules (contain female gametes)
Nectary	produces nectar to attract insects
Receptacle	supports all floral parts

Insect-pollinated vs Wind-pollinated Flowers

Feature	Insect-pollinated	Wind-pollinated
Petals	large, colourful, scented	small, dull, no scent
Pollen	sticky, spiky (catches on insect)	smooth, light (carried by wind)
Stamens	inside flower; held firmly	long, hanging outside flower
Stigma	sticky; inside flower	feathery; hanging outside to catch pollen
Nectar	yes	no
Pollen quantity	smaller amounts needed	huge quantities produced
Example	hibiscus, bougainvillea	grass, corn

Pollination and Fertilisation

Pollination is the transfer of pollen from the anther of one flower to the stigma of the same or another flower of the same species. It is carried out by insects or wind.

Type	Description	Advantage
Self-pollination	pollen transferred from anther to stigma of the same flower or another flower on the same plant	ensures seed production without a partner; useful in isolated plants
Cross-pollination	pollen transferred between flowers of different plants of the same species	promotes genetic variation in offspring; generally produces healthier plants

Fertilisation is the fusion of male and female gametes. After a pollen grain lands on the stigma, a pollen tube grows down through the style into the ovary, and the male gamete travels down the tube to fuse with the female gamete in the ovule.

Remember

Pollination ≠ fertilisation. Pollination is just the transfer of pollen. Fertilisation is the actual joining of gametes, which happens later inside the ovary.

Fruit and Seed Dispersal

After fertilisation, the ovary wall develops into a fruit and the ovule becomes a seed. Dispersal moves seeds away from the parent plant, reducing competition.

Dispersal method	Adaptations	Examples
Wind	light; wings; parachute hairs	dandelion (parachute), maple (wing)
Animal (external)	hooks or sticky coating to attach to fur	burdock, tick trefoil
Animal (internal, eaten)	fleshy, nutritious fruit; tough seed coat	mango, tomato, cherry
Water	buoyant; waterproof	coconut
Explosive	pod dries and twists, flinging seeds	sandbox tree, impatiens

PRACTICE — PLANT REPRODUCTION AND GROWTH**Germination**

Resumption of growth by a seed embryo after dormancy; requires water, oxygen, and warmth.

Cotyledons

Seed leaves that store food (starch, oils, proteins) for the germinating seedling.

Radicle

The embryonic root; first part to emerge during germination; grows downward.

Plumule

The embryonic shoot; grows upward after the radicle has anchored the plant.

Pollination

Transfer of pollen from anther to stigma; carried out by insects or wind.

Self-pollination

Transfer of pollen from anther to stigma of the same plant; ensures reproduction without a partner.

Cross-pollination

Transfer of pollen between flowers of different plants; promotes genetic variation.

Fertilisation (plants)

Fusion of male gamete (from pollen tube) with female gamete in the ovule.

Dispersal

Movement of seeds or fruits away from the parent plant; reduces competition for resources.