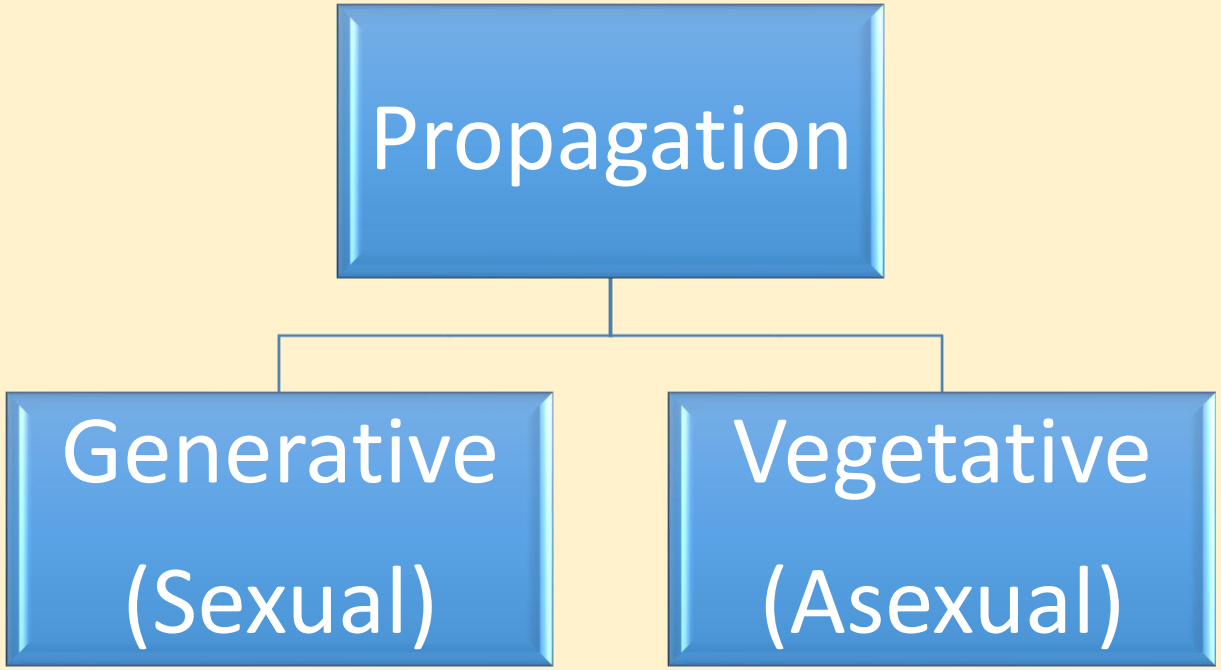
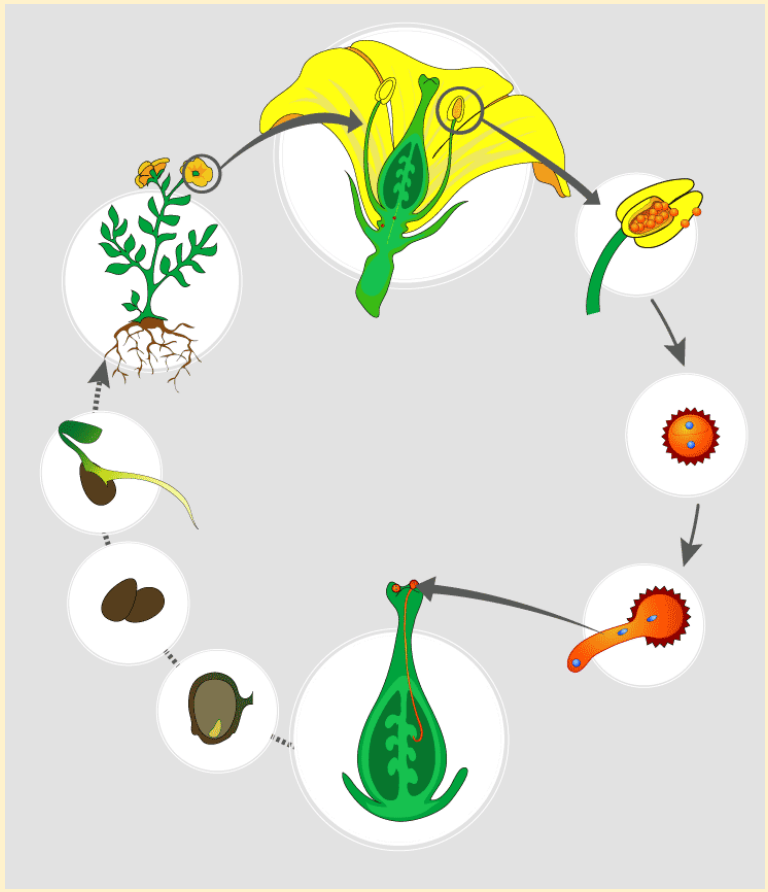
Propagation in Horticultural Plants

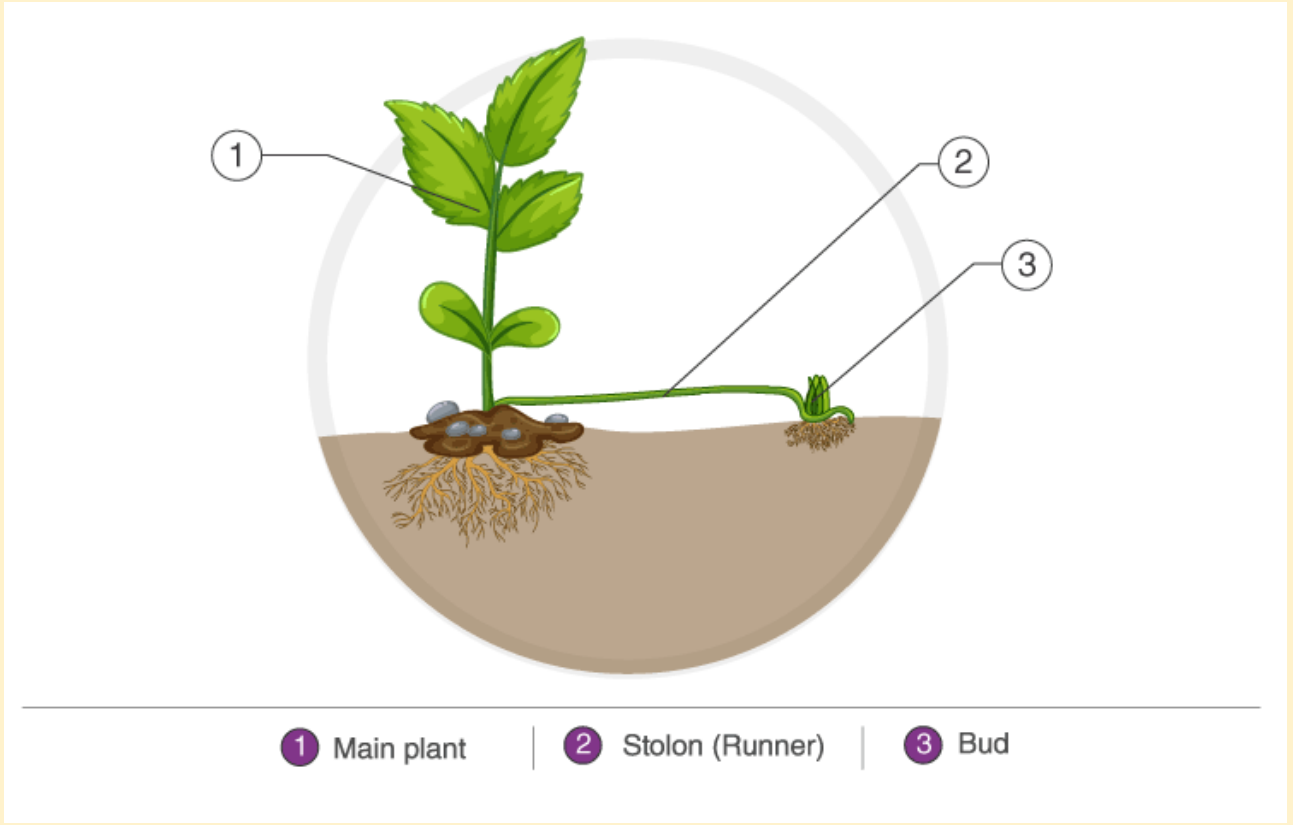
Propagation is necessary to continue commercial production with desired or demaned cultivars in horticultural growing.



Plant propagation is the process of creating new plants.

There are two general types of propagation: sexual and asexual.



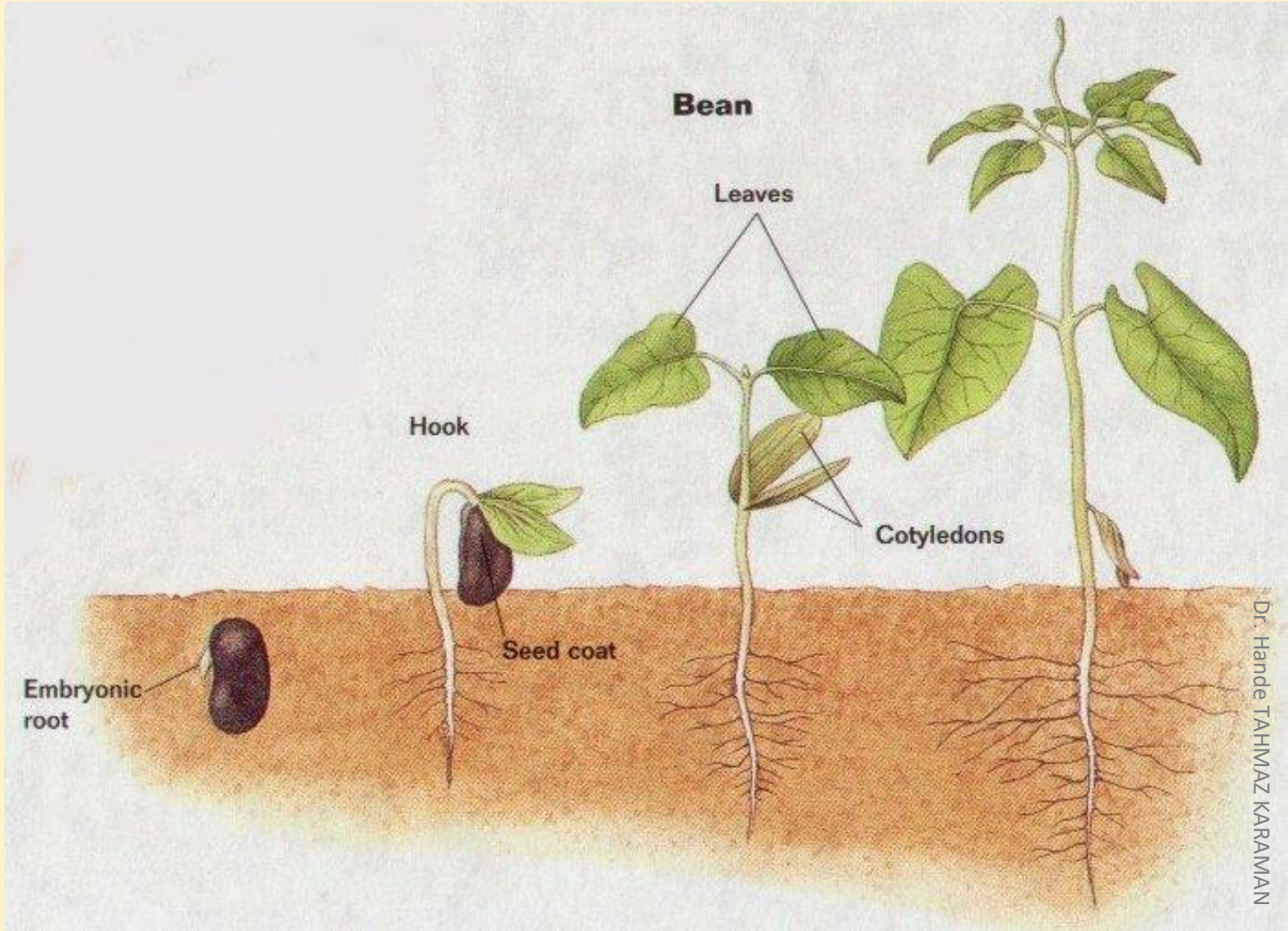


Sexual propagation

Sexual propagation is the reproduction of plants by seeds. The genetic material of two parents is combined by pollination and fertilization to create offspring that are different from each parent.

There are several advantages of sexual propagation:

•It may be quicker and more economical than asexual propagation.
•It may result in new cultivars and vigorous hybrids.
•For some plants, it may be the only means of propagation.
•It provides a way to avoid transmission of particular diseases, such as viruses.
•It maintains genetic variation, which increases the potential for plants to adapt to environmental pressures.



Generative Propagation

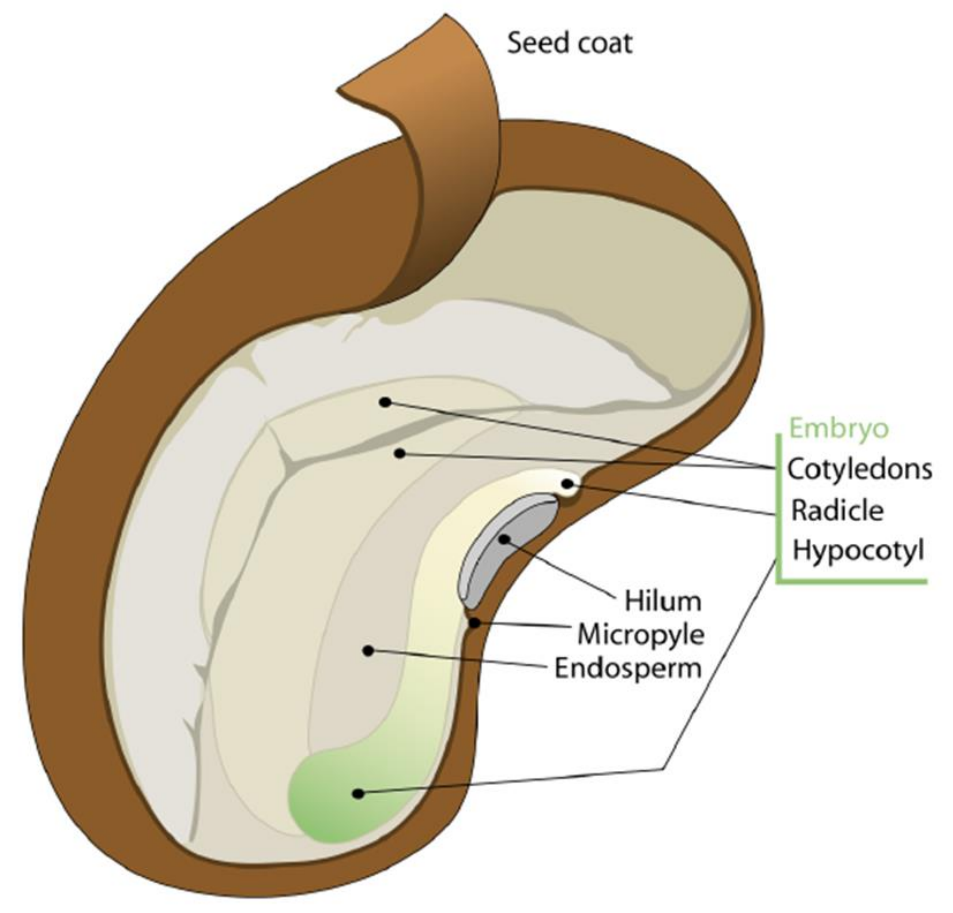
- Production material is seed (Embryo)
- Embryo= 2n chromosomes (n: mother, n: father).
- It means that the new individual or young plant occur after germination of seed may resemble the mother or the father, or both.
- If the chromosomes in the mother and father are homozygous, the individual formed (young plant) from them is very likely to be similar to one or the other.
- On the other hand, heterozygous individuals with very different characteristics from the mother and father and who do not have the important characteristics of the mother and father for breeding occur.

- In this situation;
- Individuals with very different growth strength, size, growth pattern and resistance to environmental conditions may occur after germination.
- In this case, the newly formed individuals (young plants) are not valuable in terms of horticultural production.

We are using seed propagation or these reasons:

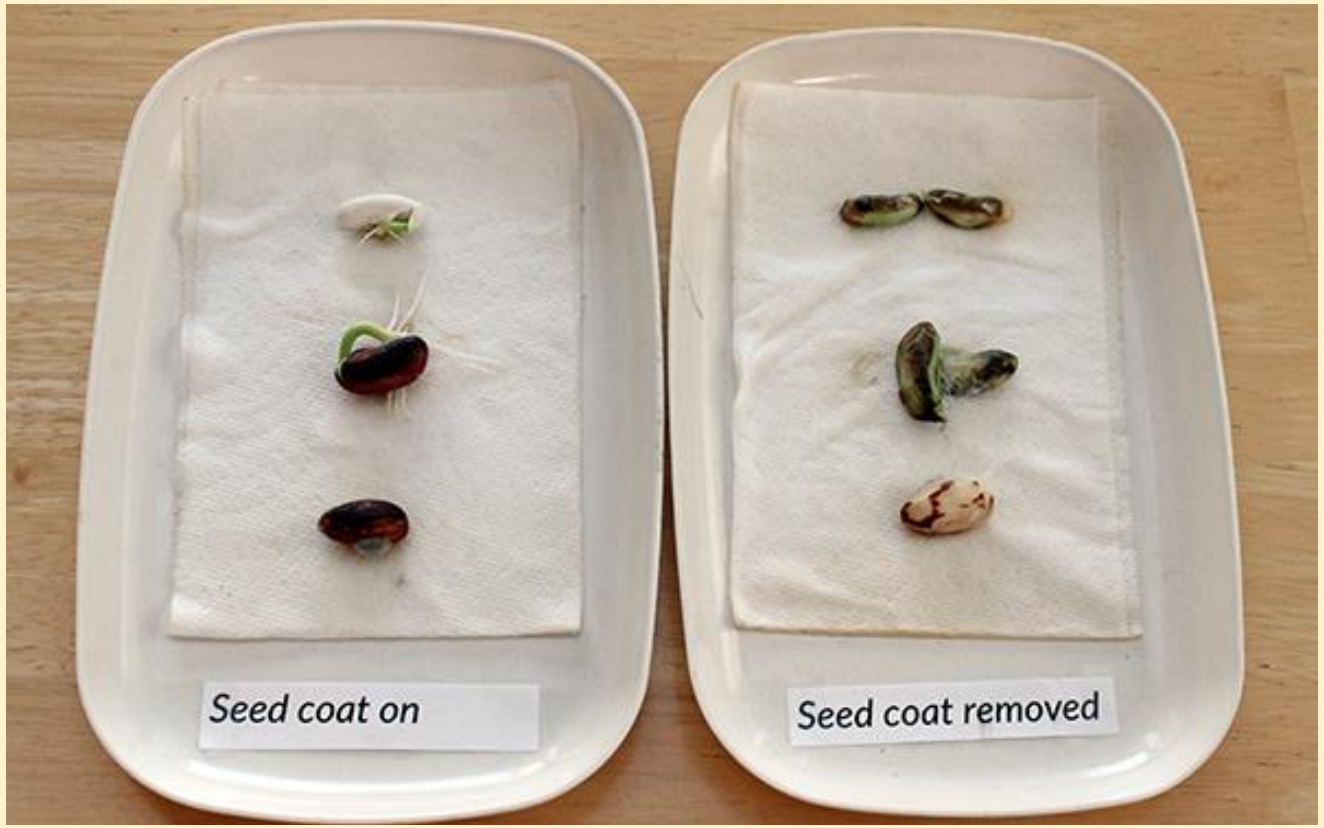
- For rootstock production in fruit growing
- For propagation of some vegetable species that cannot be propagated by other vegetative propagation methods (onion, potatoes, garlic, artichokes etc.).
- In breeding studies
- For propagation of some fruit species in which apomixes is common such as in citrus species.

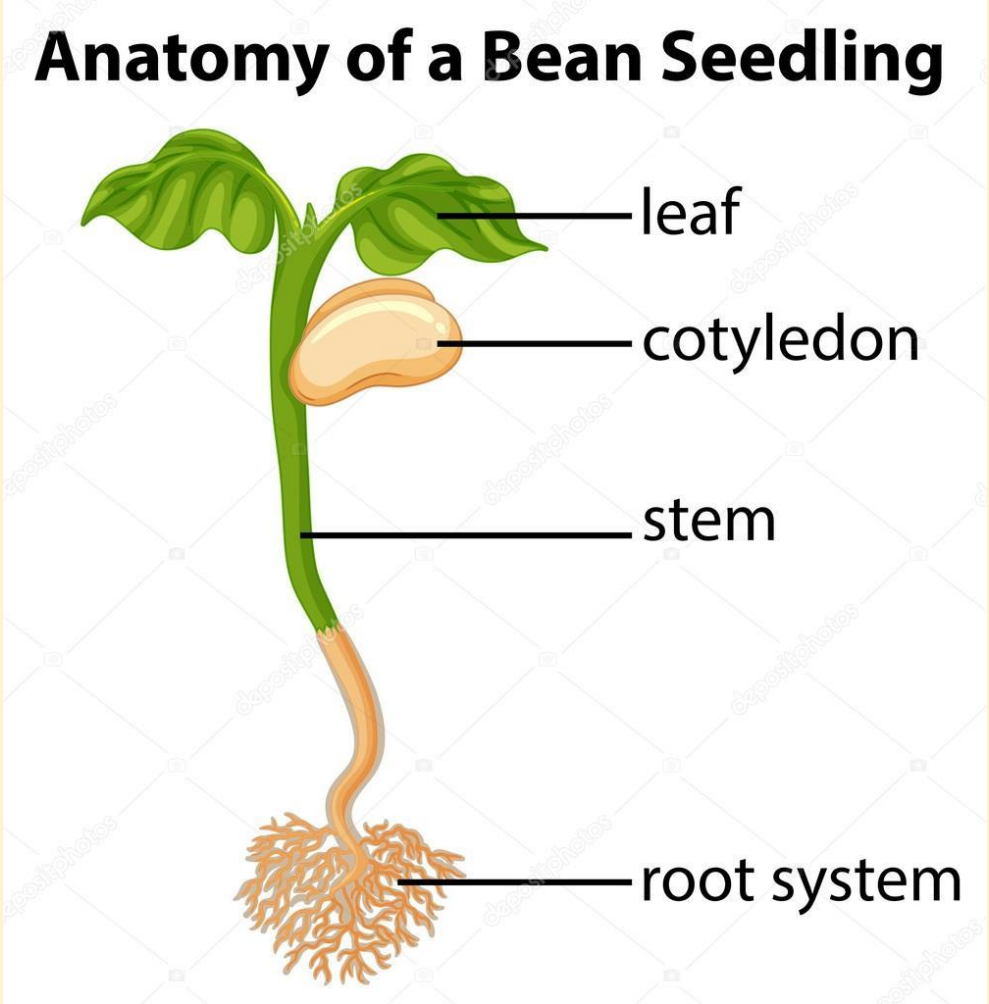
The structure of the seed



Most seeds are composed of three major parts: embryo, endosperm (food storage) tissue, and a seed coat (protective tissue).

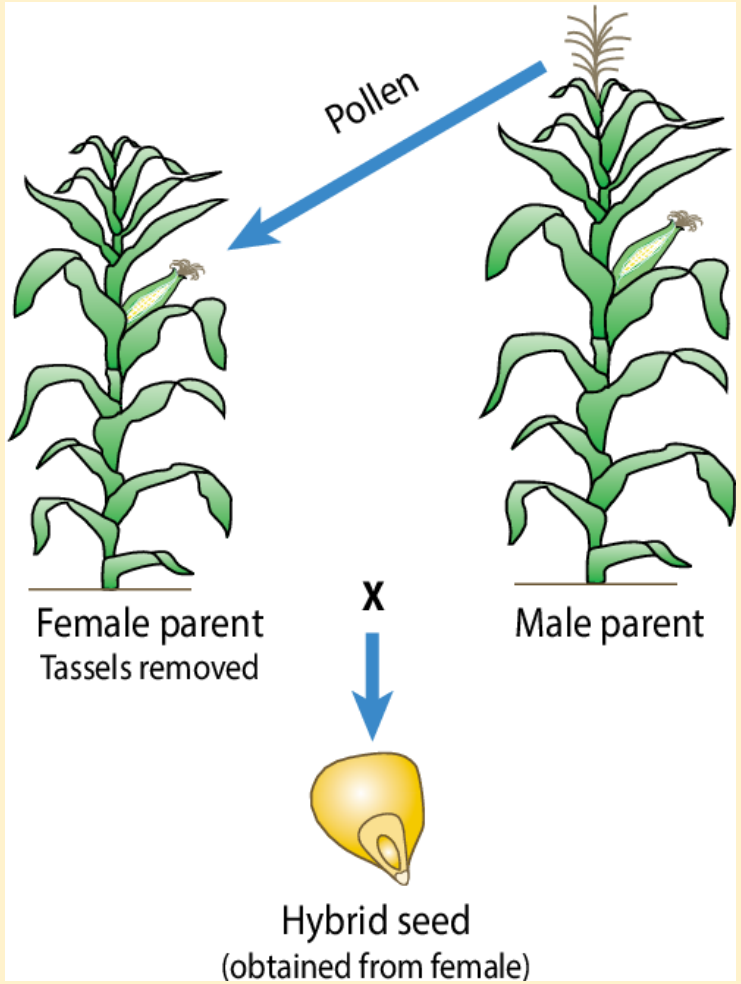
The embryo is a miniature plant in a resting (dormant) state. Most seeds contain a built-in food supply called the endosperm. The protective outer covering of a seed is called the seed coat. It protects seeds from mechanical injury and from diseases and insects. Also, the seed coat usually prevents water from entering the seed until time to germinate. The seed coat in many cases allows seeds to be stored for extended periods. The seed leaves, cotyledons, differ in shape from the true leaves. Monocots (such as corn) produce only one cotyledon; dicots (like beans) produce two cotyledons. Some gymnosperms, like pines, have many cotyledons.





Plant	Approximate Time to Sow Before Last Frost (weeks)	Time Seeds Take to Germinate (days)	Temperature (°F)	Light/Dark Requirement
Ageratum	8	5–10	70	Light
Alyssum	8	5–10	70	Either
Aster	6	5–10	70	Either
Balsam	6	5–10	70	Either
Begonia	12 or more	10–15	70	Light
Broccoli	8	5–10	70	Either
Browallia	12 or more	15–20	70	Light
Cabbage	8	5–10	70	Either
Cauliflower	8	5–10	70	Either
Celosia	8	5–10	70	Either
Centaurea	6	5–10	65	Dark
Coleus	8	5–10	65	Light
Cosmos	4 or less	5–10	70	Either
Cucumber	4 or less	5–10	85	Either
Dahlia	8	5–10	70	Either

To obtain vigorous plants from seeds, start with high-quality seeds from a reliable source. Select cultivars that provide the desired size, color, and growth habit. Choose cultivars adapted to your area. Many vegetable and flower cultivars are hybrids that may cost more than open-pollinated types, but they usually have more vigor, more uniformity, and better growth than nonhybrids.



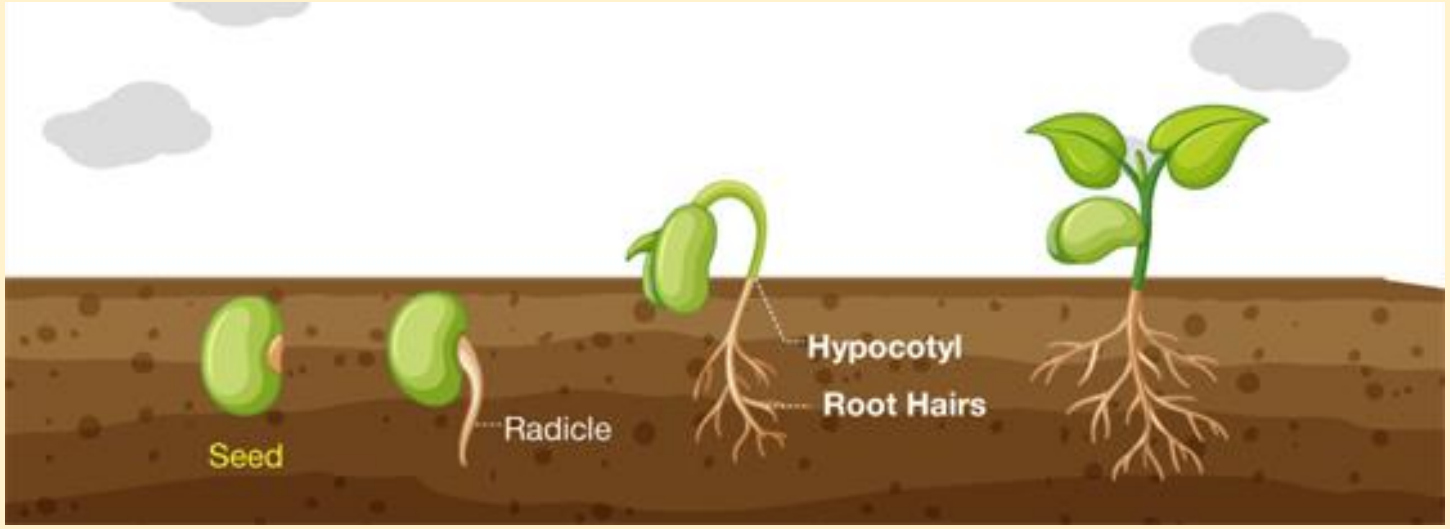
Purchase only enough seed for one year because the likelihood of germination decreases with age. The seed packet label usually indicates essential information about the cultivar or species, such as the year in which the seeds were packaged, the germination percentage, and whether the seeds have received any chemical treatment.

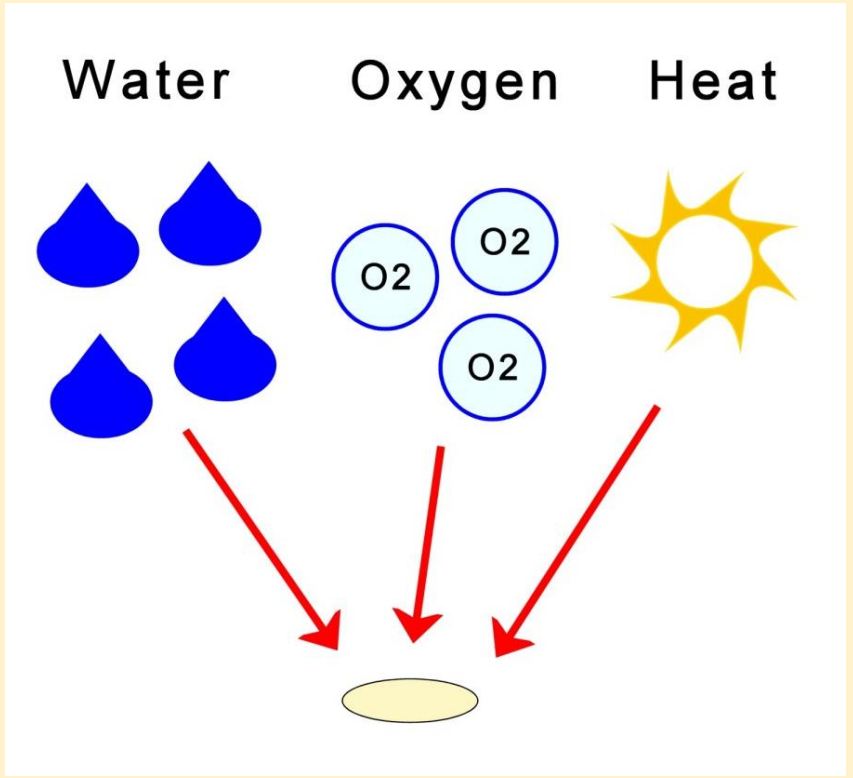
If seeds are obtained well ahead of the actual sowing date (or are surplus seeds), store them in a cool, dry place. Laminated or foil packages help ensure dry storage. Paper packets are best kept in tightly sealed containers and maintained around 40°F in low humidity. A good storage location would be an airtight jar in the refrigerator. Gardeners can save money and cultivate a rewarding hobby by saving seeds from plants in their own gardens. Seeds that have been produced through insect, animal or wind, or other natural pollination methods are known as open-pollinated. Open-pollination can increase biodiversity, and plants may display different characteristics than the parent plants. This is especially true when saving seed from hybrids.

Germination

Germination is the resumption of active embryo growth after a dormant period. Three conditions must be satisfied for a seed to germinate:

The seed must be viable; that is, the embryo must be alive and capable of germination.
Internal conditions of the seed must be favorable for germination; that is, any physical, chemical, or physiological barriers to germination must have disappeared or must have been removed by the propagator.
The seed must be subjected to appropriate environmental conditions, including water (moisture), proper temperature, oxygen, and, for some species, light.





The first step in germination is absorption of water. An adequate, continuous supply of moisture is important to ensure germination. Once germination has begun, a dry period can kill the embryo.

Light can stimulate or inhibit seed germination of some species. Plants that require light for germination include ageratum, begonia, browallia, impatiens, lettuce, and petunia. Other plants germinate best in the dark. These include calendula, centaurea, phlox, and verbena. Some plants germinate in either light or dark. Seed catalogs and seed packets often list germination and cultural information for particular plants. When sowing light-requiring seeds, sow them on the soil surface. Supplemental light can be provided by fluorescent fixtures suspended 6 to 12 inches above the soil surface for 16 hours a day.

Respiration in dormant seeds is low, but they do require some oxygen. Respiration rate increases during germination. The medium in which the seeds are sown should be loose and well aerated. If the oxygen supply during germination is limited or reduced, germination can be severely retarded or inhibited.

Temperature affects the germination percentage and the rate (speed) of germination. Some seeds germinate over a wide range of temperatures; others have a narrow range. Many species have minimum, maximum, and optimum temperatures at which they germinate. For example, tomato seeds have a minimum germination of 50°F, a maximum of 95°F, and an optimum germination temperature of 80°F. When germination temperatures are listed, they are usually optimum temperatures. For most plants, 65 to 75°F is best.