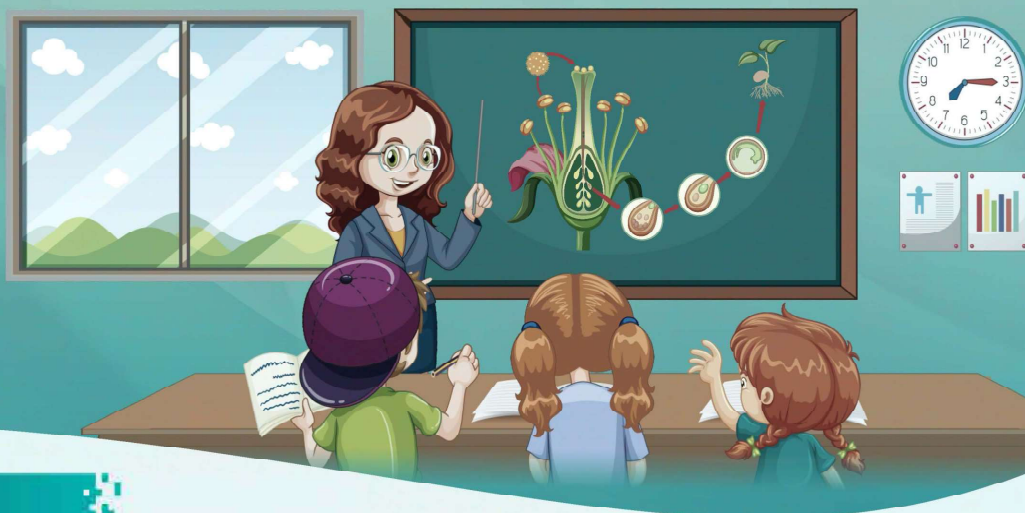
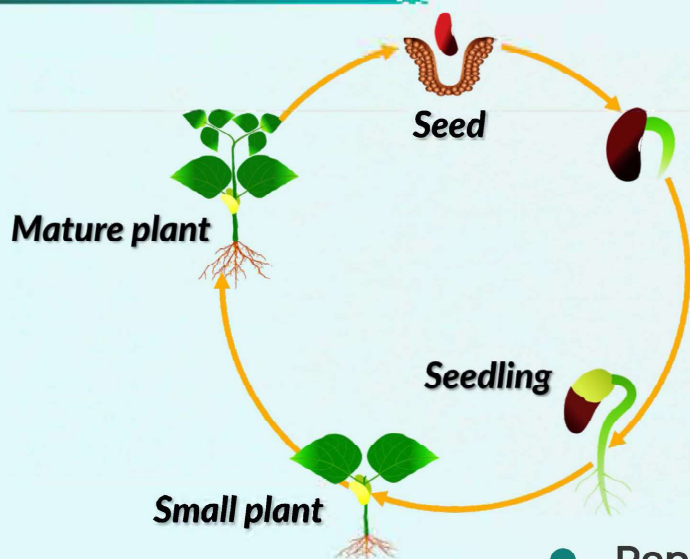


REPRODUCTION IN PLANTS



KEY POINTS

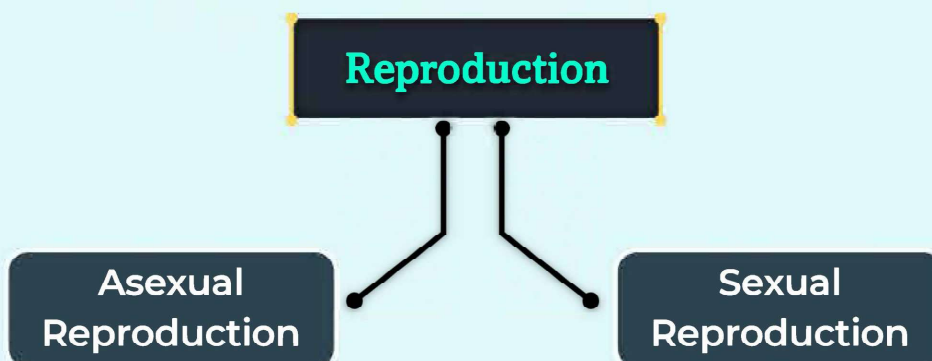
Introduction



"The process of producing young ones from their parents is known as reproduction."

- Reproduction is one of the most important properties of living organisms.
- All living organisms reproduce to produce young ones of their own kind.

Modes of reproduction in plants



1. Sexual reproduction

- Sexual reproduction is characterized by the fusion of two cells (gametes) usually coming from two parents. New plants are produced from seeds.
- Flowers produce seeds which are formed by the fusion of a male gamete with a female gamete.
- We sow these seeds and grow more plants of the same type. This is the most common method of growing new plants. This type of reproduction is called sexual reproduction.



UNISEXUAL

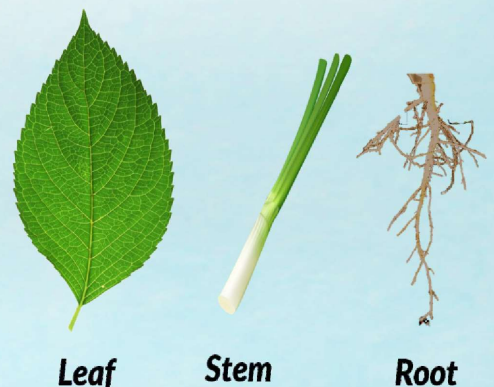
- Organism producing single gametes.
- In plants male and female parts present in different flower.

BISEXUAL

- Organism producing both types of gametes.
- In plants male and female parts present in the same flower.

2. Asexual reproduction

- This type of reproduction, which takes place without seeds, is called asexual reproduction.
- These plants give rise to new plants from a part of stem, root or leaf. These parts of the plant are called vegetative parts.



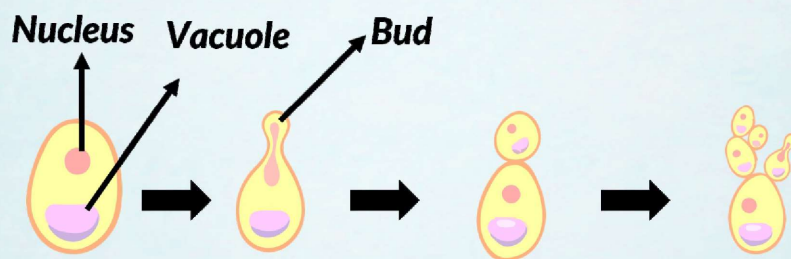
- Does not involve the union of gametes,.
- Single parent is involved.
- Offspring are genetically identical to their parents.



New individual is produced from a single parent.

Methods of Asexual Reproduction

Budding

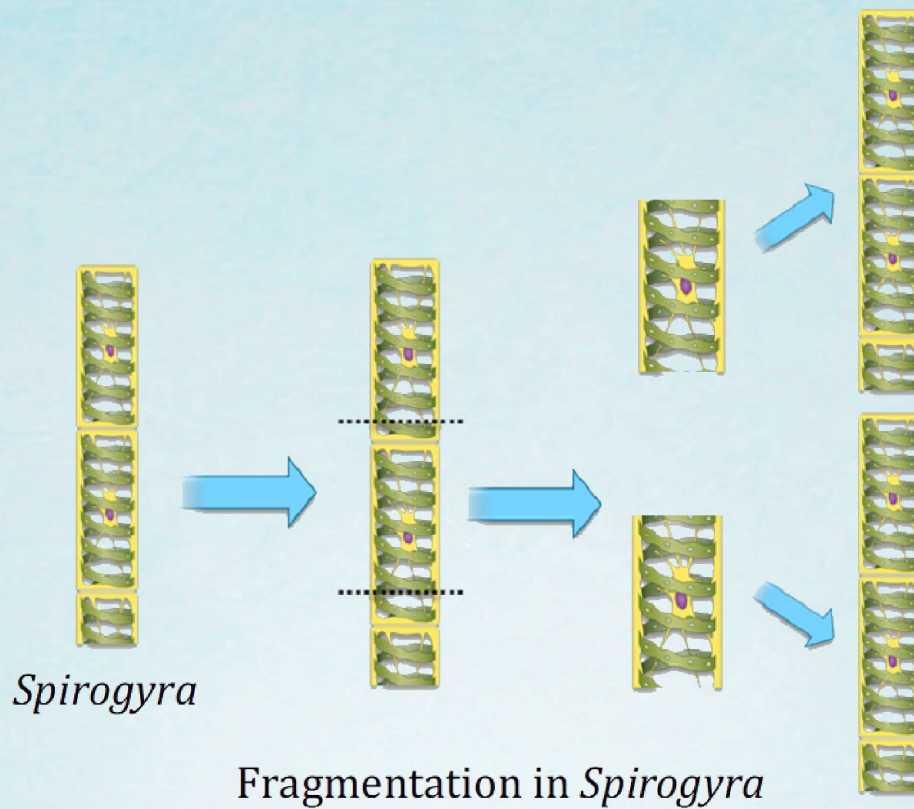


- Asexual mode of reproduction in which a small outgrowth (bud) appears on the body of the organism.
- Budding is commonly observed in yeast. A bulb-like projection, called the bud, is formed on the body.
- The nucleus of the body divides into two.
- Then, one of the two nuclei passes into the bud. The bud detaches itself from the parent body.
- It grows to full size and becomes a new individual.

E.g. *Yeast*

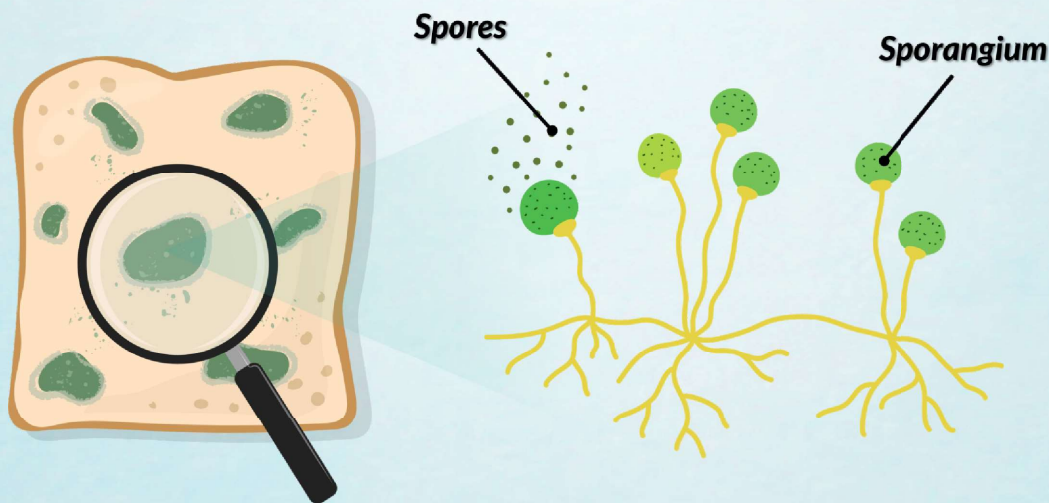
Fragmentation

- In some filamentous organisms such as *Spirogyra* (an algae), the filaments break up into two or more fragments. Each fragment or piece grows into a new individual.



Spore formation

- In non flowering plants like fungi (Mucor), bacteria, ferns or mosses.



- Spores are very small in size.
- Spores have thick walls which helps the spores to survive in adverse conditions in environment, like high temperature, scarcity of water and lack of food.
- The spore give rise to new organisms under favourable conditions.

Vegetative Propagation

- This is an asexual method of reproduction in plants where vegetative parts namely the root, stem, leaf or buds give rise to new plants.

(a) Vegetative propagation by roots :

- Swollen roots when planted in soil, the buds present on the roots grow into new plants.

E.g. *Sweet Potato, Dahila & asparagus.*



Dahlia

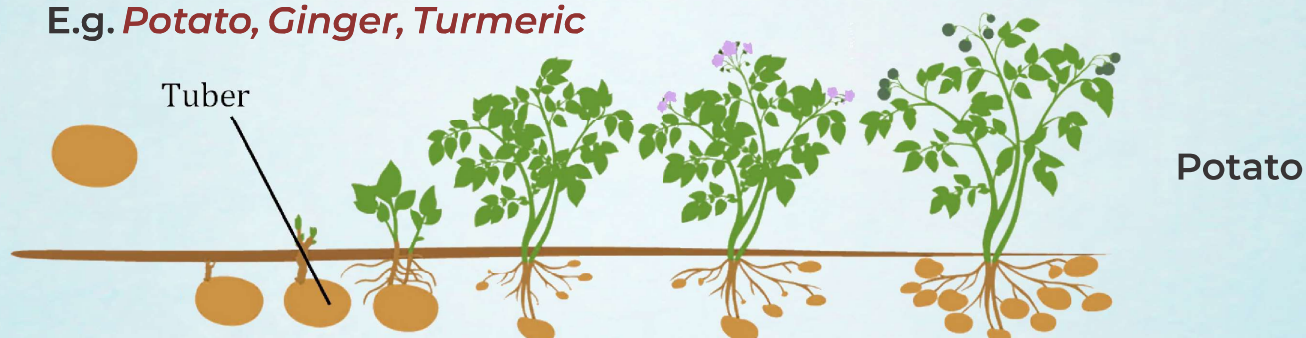


Sweet potato

(b) Vegetative propagation by stems :

- Plants multiply by stems.
- An underground swollen stem (tuber) which contains stored food material.
- The eyes (scars) on the potato tuber sprout (germinate) give rise to a new plant.

E.g. *Potato, Ginger, Turmeric*



(c) Vegetative propagation by leaves :

- Plantlets develop from the margins of intact leaves.
- These plantlets on being detached, develop into independent plants.

E.g. *Bryophyllum*



Bryophyllum

Advantages of vegetative reproduction

- It is an easier, rapid and less expensive method of propagation. Plants can be grown in much less time.
- Seedless plants can be raised.
- Plants produced by this method are identical copies of the parent plant and show no variations.
- Plants like banana, sugarcane, sweet potato, rose and jasmine do not produce viable seeds. Such plants can be easily grown by this method.



A node is a part of the stem/ branch at which a leaf arises.

Artificial methods of vegetative propagation :

Cutting

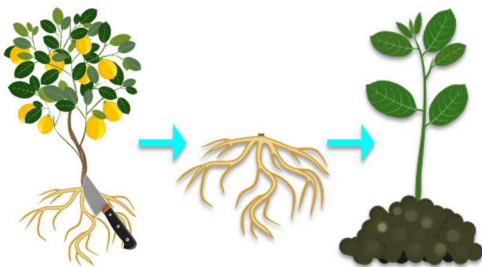
Artificial method of vegetative propagation in which short lengths of plant stem or root are used for growing new plants.

Cutting

Root cutting

In certain plants, Root cuttings when put in damp soil give rise to roots and shoots & form new plants.

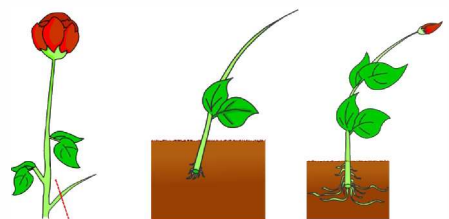
E.g. Lemon, Tamarind.



Stem cutting

Cuttings are short length of the plant which, when removed and placed in soil, with suitable conditions, develop roots and leaves and grow into independent plants.

E.g. Rose, Moneyplant, Sugarcane



Sexual reproduction

- Sexual reproduction occurs in plants as well as animals. It is the most common method of reproduction.

Steps involved

Step 1

Formation of gametes

- Male gamete
- Female gamete

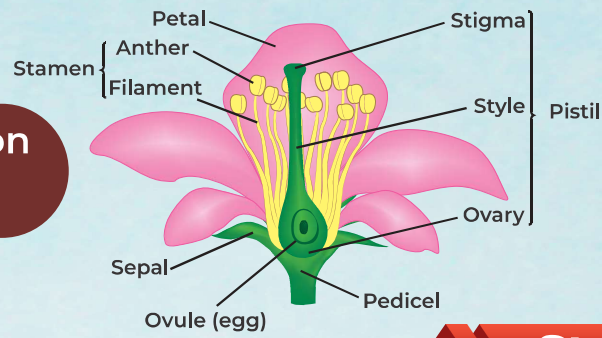
Step 2

Fusion of gametes to form zygote (Fertilization)

Step 3

Development of zygote to new individual

Sexual reproduction in flowering Plant

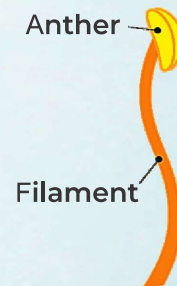


1 Sepals

- The outermost whorl consist of sepals.
- Sepals are green and leaf like structure at the base flower.
- Sepals protect flower during its development and support the flower when flower blooms.

Stamen 3

- The third whorl of flower consists of stamen which consists of an anther and a filament.
- An anther is a swollen structure present on the tip of the filament.
- The anther produces a powdery substance called the pollen grains.
- Pollen grains contain the male sex cell or male gamete.

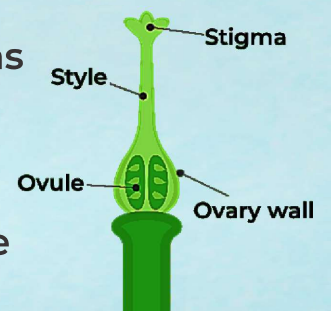


2 Petals

- The second whorl consists of petals.
- These are colourful structures that surround the inner parts of flower.
- Its function is to attract the pollinators.

Pistil 4

- It is a single elongated structure in the centre of the flower.
- Consists of a basal swollen portion called the ovary which continues into a long style and ends in to knob-like part, the stigma.
- The ovary contains many ovules. The female sex cell or gamete (egg) is present inside the ovule.



Types of flowers

Bisexual Flower

In many plants, the male and the female parts are present in the same flower.

e.g., *Rose, Mustard, Petunia.*

Unisexual Flower

In some, the male and the female parts are present on different flowers.

e.g., *Papaya, Corn and Cucumber.*

Pollination in Flowering Plants

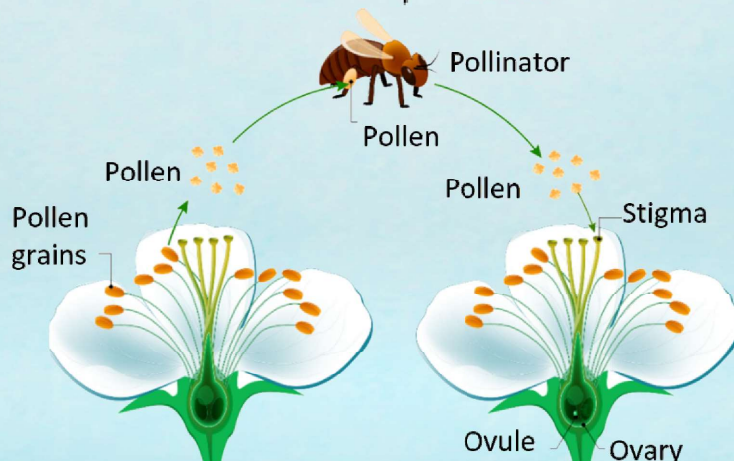
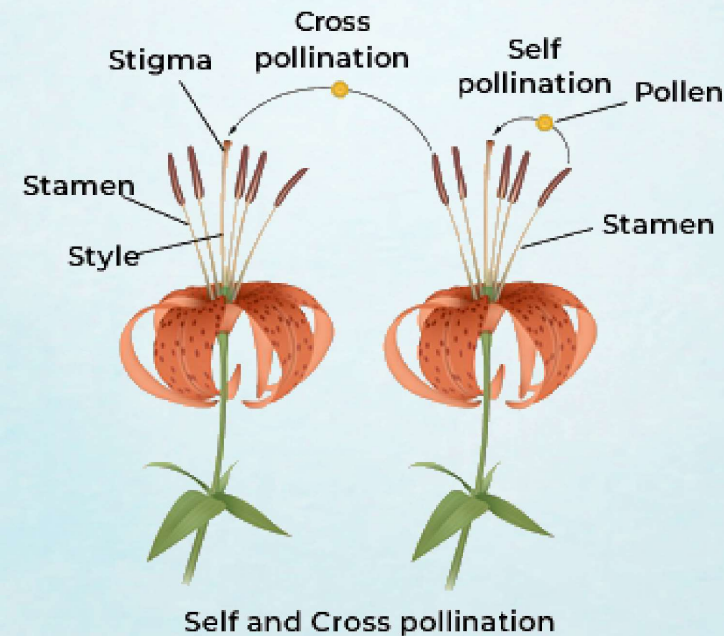
- Process in which pollen grains are transferred from the anther to the stigma.

Self-pollination :

Within the same flower or between flowers of the same plant.

Cross pollination :

Between flowers from different plants of the same species.



Agencies of pollination

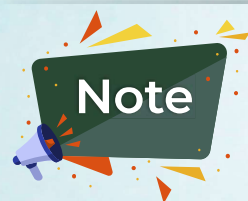
Abiotic Agencies

Includes the non-living things like water, wind and air.

Biotic Agencies

Includes living things like many butterflies, bees and moths.

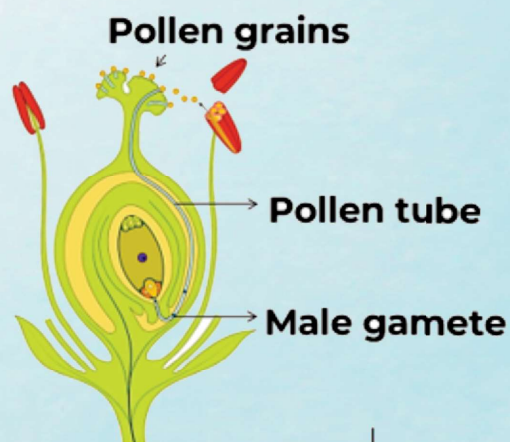
- When an insect visits a flower, the deposited pollen grains now get dusted on the stigma of the second flower, thus bringing about the transfer of pollen grains from the anther to the stigma (pollination).
- Pollen grains of all flowers are not carried by insects. In some cases, they are carried by wind (wind pollination). In case of water plants, pollen grains are carried by water (water pollination).



Some birds such as sunbird and humming bird which have small, narrow beaks pollinate flowers. Mammals such as bats and rodents also pollinate flowers.

Fertilization in flowering plants

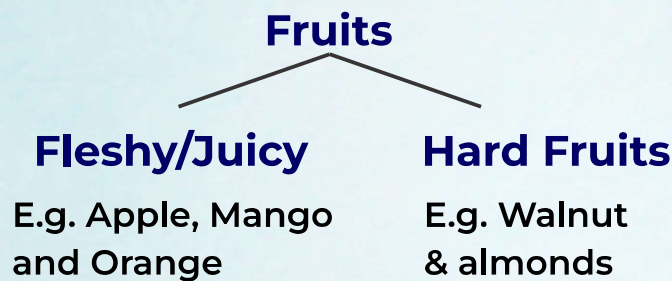
- Fertilization is a step between pollination and seed formation. The fusion of the male gamete with the female gamete is called fertilization. During fertilization, the following events take place:
 - The pollen grains germinate on the stigma and pollen tubes develop. The pollen tubes move downwards into the style. These tubes are the carriers of male gametes.
 - One pollen tube finally enters the ovule where female gamete is located. Female gamete or egg cell is present inside the ovule.
 - Finally the male gamete fuses with the female gamete. This completes the process of fertilization. The fusion product or the cell formed as a result of fusion of the two gametes is called zygote. The zygote soon develops into an embryo (baby plant).



Formation of fruit and seed

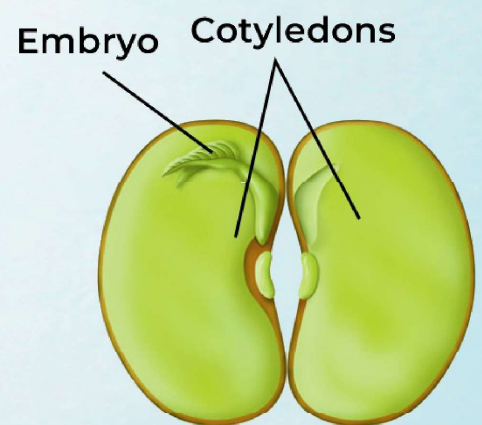
- The flower loses its bright colour.
- The sepals, petals and stamens fall off.
- The ovary increases in size and becomes the fruit. The fruit thus is the ripened ovary.
- The ovary wall becomes the fruit wall.
- Inside the ovary, the ovules develop to form the seeds.

The seeds develop from the ovules. The seed contains an embryo enclosed in a protective seed coat.



Functions of fruits

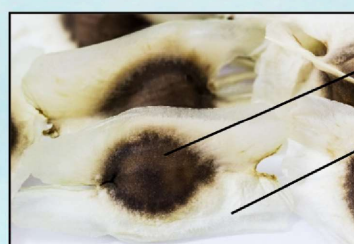
- The fruit wall gives protection to the seeds and therefore, to the embryo.
- The fruit is a store house of food material.
- The fruit helps in the dispersal of seeds.



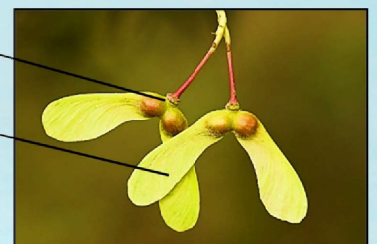
Structure of bean seed

Dispersal of seeds and fruits

- For a seed to give rise to a new plant, certain favourable conditions are necessary. A seed must fall on a suitable place where favourable conditions are present.
- The seeds of *Drumstick* and *Maple* have flat, wing-like light structures. Like *Madar*, these seeds are also dispersed by wind.



(a) Drumstick



(b) Maple



(a) Gokhru



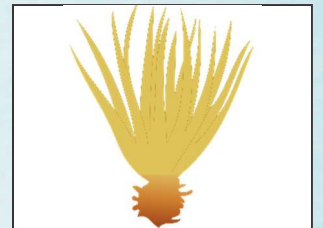
(b) Xanthium

- In *urena* and *xanthium*, the fruits are thorny and stick to our clothes as we pass by them.
- Thus, animals as well as human beings help in dispersal.

- In some cases like light seeds of grasses or hairy seeds of aak (Madar) and hairy fruit of sunflower are carried to far-off places by wind.



(a) Hairy seed of Madar (Aak)



(b) Hairy fruit of Sunflower



Fibrous fruit of coconut dispersed by water

- In case of coconut which is grown on the sea shore, the fruit is large and fibrous. It falls in water, and being fibrous it floats in water. It is thus carried away from the parent plant by water currents.

Seed dispersal help the plants to :

- Prevent overcrowding.
- Avoid competition for water, minerals and sunlight.
- Spread to new habitats.