



To produce its kind is a characteristic of all living organisms. You have already learnt this in Class VI. The production of new individuals from their parents is known as **reproduction**. But, how do plants reproduce? There are different modes of reproduction in plants which we shall learn in this chapter.

12.1 MODES OF REPRODUCTION

In Class VI you learnt about different parts of a flowering plant. Try to list the various parts of a plant and write the functions of each. Most plants have roots, stems and leaves. These are called the **vegetative parts** of a plant. After a certain period of growth, most plants bear flowers. You may have seen the mango trees flowering in spring. It is these flowers that give rise to juicy mango fruit we enjoy in summer. We eat the fruits and usually discard the seeds. Seeds germinate and form new plants. So, what is the function of flowers in plants? The flowers perform the function of reproduction in plants. Flowers are the **reproductive parts** of a plant. A flower may have either the male part or the female part or both male and female parts.

There are several ways by which plants produce their offspring. These are categorised into two types: (i) asexual, and (ii) sexual reproduction. In **asexual**

reproduction plants can give rise to new plants without seeds, whereas in **sexual reproduction**, new plants are obtained from seeds.

Asexual reproduction



Prahelika thought that new plants always grow from seeds. But, she has never seen the seeds of sugarcane, potato and rose. She wants to know how these plants reproduce.

In a sexual reproduction new plants are obtained without production of seeds or spores.

Vegetative propagation

It is a type of asexual reproduction in which new plants are produced from roots, stems, leaves and buds. Since reproduction is through the vegetative parts of the plant, it is known as **vegetative propagation**.

Activity 12.1

Cut a branch of rose or *champa* with a node. This piece of branch is termed a **cutting**. Bury the cutting in the soil. A node is a part of the stem/branch at which a leaf arises (Fig. 12.1). Water the

cutting every day and observe its growth. Observe and record the number of days taken for roots to come out and new leaves to arise. Try the same activity by growing money plant in a jar of water and record your observations.

You must have seen flower buds developing into flowers. Apart from flower

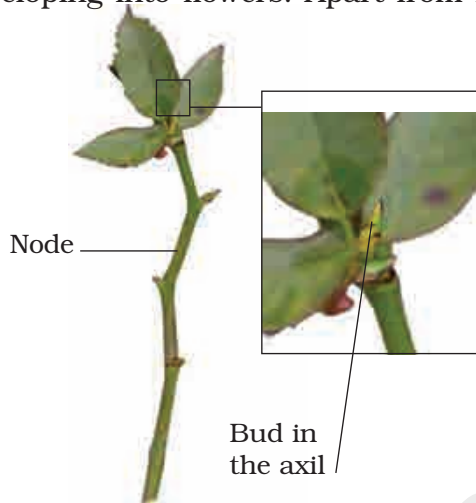


Fig. 12.1 Stem-cutting of rose

buds, there are buds in the axil (point of attachment of the leaf at the node) of leaves which develop into shoots. These buds are called vegetative buds (Fig. 12.2). A bud consists of a short stem around which immature overlapping leaves are folded. The vegetative buds can also give rise to new plants.

Activity 12.2

Take a fresh potato. Observe the scars on it with the help of a magnifying glass. You may find bud(s) in them. These scars are also called "**eyes**". Cut a few pieces of a potato, each with an eye and bury them in the soil. Water the pieces regularly for

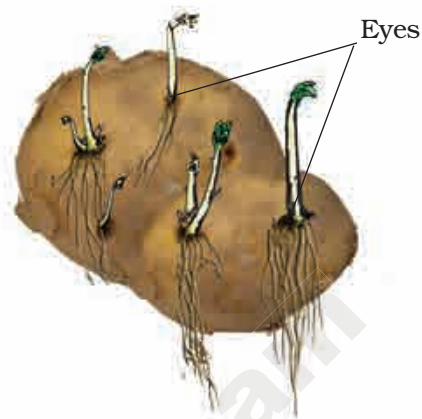


Fig. 12.2 Potato plant sprouting from an 'eye'

a few days and observe their progress. What do you find?

Likewise you can also grow ginger (Fig. 12.3) or turmeric.



Fig. 12.3 Ginger with new plants sprouting from it

Bryophyllum (sprout leaf plant) has buds in the margins of leaves (Fig. 12.4). If a leaf of this plant falls on a moist soil, each bud can give rise to a new plant.

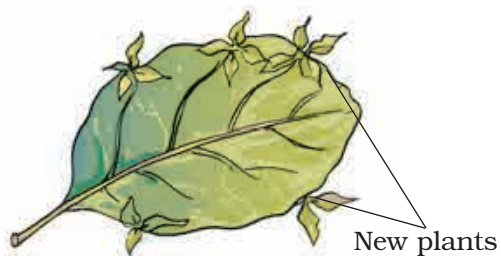


Fig. 12.4 Leaf of *Bryophyllum* with buds in the margin

The roots of some plants can also give rise to new plants. Sweet potato and dahlia are examples.

Plants such as cacti produce new plants when their parts get detached from the main plant body. Each detached part can grow into a new plant.



Plants produced by vegetative propagation take less time to grow and bear flowers and fruits earlier than those produced from seeds. The new plants are exact copies of the parent plant, as they are produced from a single parent.

Later in this chapter you will learn that plants produced by sexual reproduction have characters of both the parents. Plants produce seeds as a result of sexual reproduction.

Budding

You have already learnt about the tiny organisms like yeast can be seen only under a microscope. These grow and

multiply every few hours if sufficient nutrients are made available to them. Remember that yeast is a single-celled organism. Let us see how they reproduce?

Activity 12.3

(To be demonstrated by the teacher)

Take a piece of yeast cake or yeast powder from a bakery or a chemist shop. Take a pinch of yeast and place it in a container with some water. Add a spoonful of sugar and shake to dissolve it. Keep it in the warm part of a room. After an hour, put a drop of this liquid on a glass slide and observe under a microscope. What do you observe? You may see the formation of new yeast cells (Fig. 12.5).

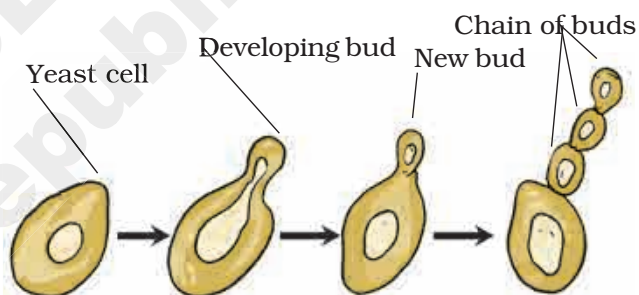


Fig. 12.5 Reproduction in yeast by budding

The small bulb-like projection coming out from the yeast cell is called a **bud**. The bud gradually grows and gets detached from the parent cell and forms a new yeast cell. The new yeast cell grows, matures and produces more yeast cells. Sometimes, another bud arises from the bud forming a chain of buds. If this process continues, a large number of yeast cells are produced in a short time.

Fragmentation

You might have seen slimy green patches in ponds, or in other stagnant water bodies. These are the algae. When water and nutrients are available algae grow and multiply rapidly by fragmentation. An alga breaks up into two or more fragments. These fragments or pieces grow into new individuals (Fig. 12.6). This process continues and they cover a large area in a short period of time.

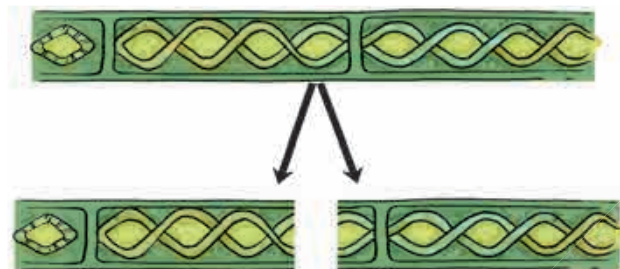


Fig. 12.6 Fragmentation in *Spirogyra* (an alga)

Spore formation

In Chapter 1 you learnt that the fungi on a bread piece grow from spores which are present in the air. Repeat Activity 1.2. Observe the spores in the cotton-like

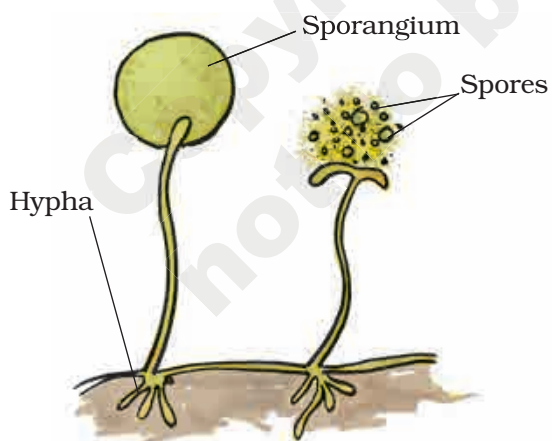


Fig. 12.7 Reproduction through spore formation in fungus

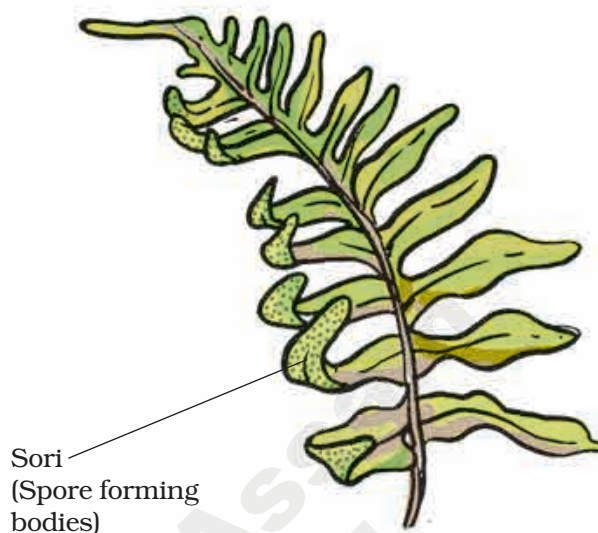


Fig. 12.8 Reproduction through spore formation in fern

mesh on the bread. When spores are released they keep floating in the air. As they are very light they can cover long distances.

The spores are asexual reproductive bodies. Each spore is covered by a hard protective coat to withstand unfavourable conditions such as high temperature and low humidity. So they can survive for a long time. Under favourable conditions, a spore germinates and develops into a new individual. Plants such as moss and ferns (Fig. 12.8) also reproduce by means of spores.

12.2 SEXUAL REPRODUCTION

You have learnt earlier the structure of a flower. You know that the flowers are the reproductive parts of a plant. The **stamens** are the male reproductive part and the **pistil** is the female reproductive part (Fig. 12.9).

Activity 12.4

Take a mustard/china rose/petunia flower and separate its reproductive parts. Study the various parts of a stamen and pistil.

The flowers which contain either only the pistil or only the stamens are called **unisexual flowers**. The flowers which contain both stamens and pistil are called **bisexual flowers**. Corn, papaya and cucumber produce unisexual flowers, whereas mustard, rose and petunia have bisexual flowers. Both the male and the

female unisexual flowers may be present in the same plant or in different plants.

Could you identify the anther and the filament of a stamen? [Fig. 12.9 (a)]. Anther contains pollen grains which produce **male gametes**. A pistil consists of stigma, style and ovary. The ovary contains one or more ovules. The **female gamete** or the **egg** is formed in an ovule [Fig. 12.9 (b)]. In sexual reproduction a male and a female gamete fuse to form a **zygote**.

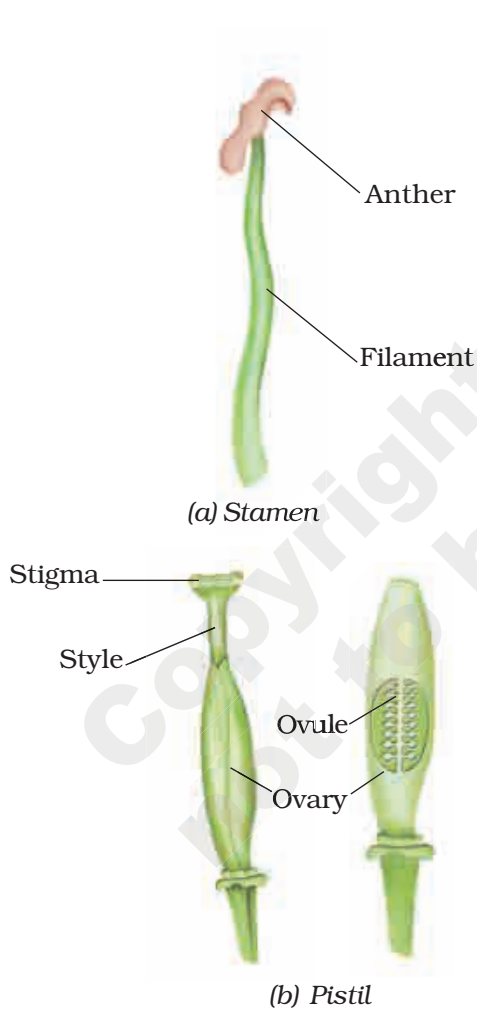
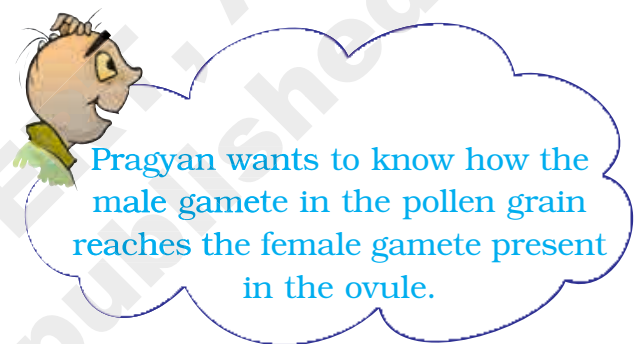


Fig. 12.9 Reproductive parts



Pollination

Generally pollen grains have a tough protective coat which prevents them from drying up. Since pollen grains are light, they can be carried by wind or water.

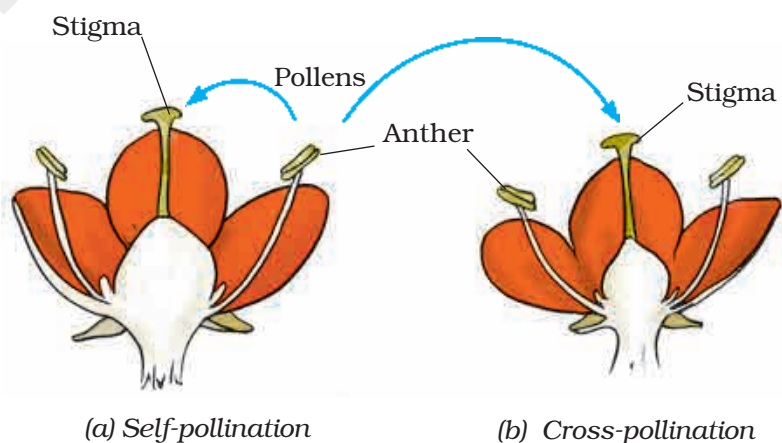


Fig. 12.10 Pollination in flower



Pragyan wants to know why flowers are generally so colourful and fragrant. Is it to attract insects?

Insects visit flowers and carry away pollen on their bodies. Some of the pollen lands on the stigma of a flower of the same kind. The transfer of pollen from the anther to the stigma of a flower is called **pollination**. If the pollen lands on the stigma of the same flower it is called **self-pollination**. When the pollen of a flower lands on the stigma of another flower of the same plant, or that of a different plant of the same kind, it is called **cross-pollination** [Fig. 12.10 (a) and (b)].

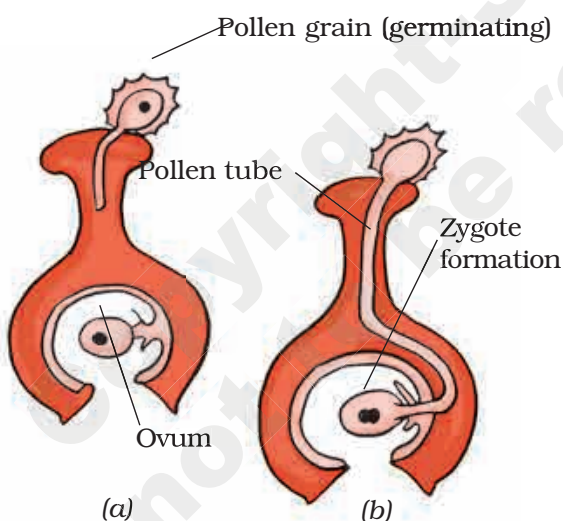


Fig. 12.11 Fertilisation (Zygote formation)

Fertilisation

The cell which results after **fusion** of the gametes is called a **zygote**. The process of fusion of male and female gametes (to

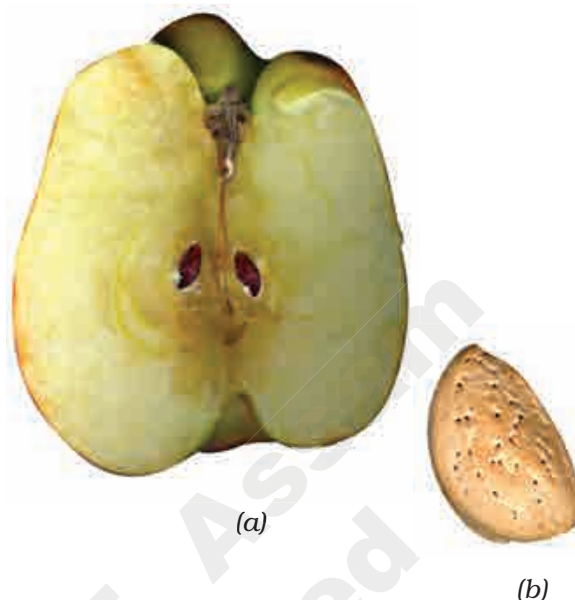


Fig. 12.12 (a) Section of an apple, (b) Almond form a zygote) is called **fertilisation** (Fig. 12.11). The zygote develops into an **embryo**.

12.3 FRUITS AND SEED FORMATION

After fertilisation, the ovary grows into a fruit and other parts of the flower fall off. The fruit is the ripened ovary. The seeds develop from the ovules. The seed contains an embryo enclosed in a protective seed coat.

Some fruits are fleshy and juicy such as mango, apple and orange. Some fruits are hard like almonds and walnuts [Fig. 12.12 (a) and (b)].

12.4 SEED DISPERSAL

In nature same kind of plants grow at different places. This happens because **seeds are dispersed to different places**. Sometimes after a walk through a forest or a field or a park, you may have found seeds or fruits sticking to your clothes.

Did you try to observe how these seeds were clinging to your clothes?

What do you think will happen if all seeds of a plant were to fall at the same place and grow there? There would be severe competition for sunlight, water, minerals and space. As a result the seeds would not grow into healthy plants. Plants benefit by seed dispersal. It prevents competition between the plant and its own seedlings for sunlight, water and minerals. It also enables the plants to invade new habitats for wider distribution.

Seeds and fruits of plants are carried away by wind, water and animals. Winged seeds such as those of drumstick and maple [Fig. 12.13 (a) and (b)], light seeds

of grasses or hairy seeds of aak (*Madar*) and hairy fruit of sunflower [Fig. 12.14 (a), (b)], get blown off with the wind to far away places. Some seeds are dispersed by water. These fruits or seeds usually develop floating ability in the form of spongy or fibrous outer coat as in coconut. Some seeds are dispersed by animals, especially spiny seeds with hooks which get attached to the bodies of animals and are carried to distant places. Examples are *Xanthium* (Fig. 12.15) and *Urena*.

Some seeds are dispersed when the fruits burst with sudden jerks. The seeds are scattered far from the parent plant. This happens in the case of castor and balsam.

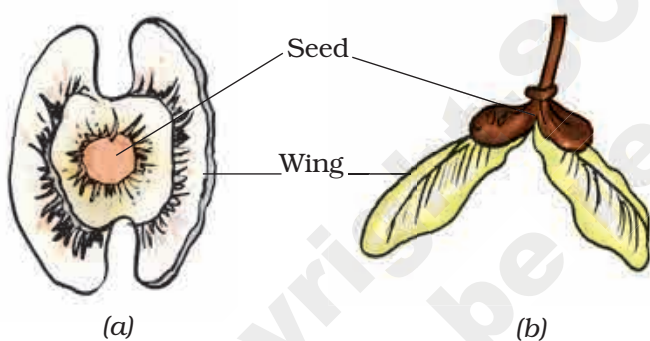


Fig. 12.13 Seeds of (a) drumstick and (b) maple

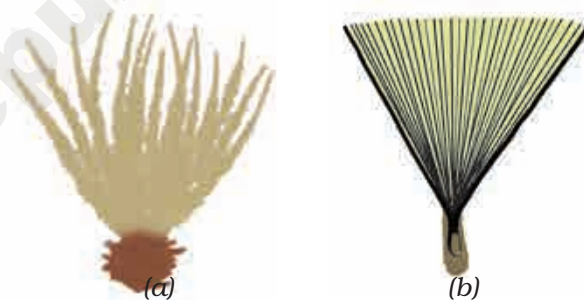


Fig. 12.14 (a) The hairy fruit of sunflower and (b) hairy seed of madar (aak)



Fig. 12.15 *Xanthium*

Keywords

Asexual reproduction	Hypha	Sexual reproduction
Budding	Ovule	Spore
Embryo	Pollen grain	Sporangium
Fertilisation	Pollen tube	Vegetative propagation
Fragmentation	Pollination	Zygote
Gametes	Seed dispersal	

What you have learnt

- All organisms multiply or reproduce their own kind.
- In plants there are two modes of reproduction, asexual and sexual.
- There are several methods of asexual reproduction such as fragmentation, budding, spore formation and vegetative propagation.
- Sexual reproduction involves the fusion of male and female gametes.
- In vegetative propagation new plants are produced from different vegetative parts such as leaves, stems and roots.
- Flower is the reproductive part of a plant.
- A flower may be unisexual with either the male or the female reproductive parts.
- A bisexual flower has both the male and the female reproductive parts.
- The male gametes are found inside the pollen grains and female gametes are found in the ovule.
- Pollination is the process of transfer of pollen grains from the anther of one flower to the stigma of the same or another flower.
- Pollination is of two types, self-pollination and cross-pollination. In self-pollination, pollen grains are transferred from the anther to the stigma of the same flower. In cross-pollination, pollen grains are transferred from the anther of one flower to the stigma of another flower of the same kind.
- Pollination takes place in plants with the help of wind, water and insects.
- The fusion of male and female gametes is called fertilisation.
- Fertilised egg is called zygote. Zygote develops into an embryo.
- Fruit is the mature ovary whereas ovule develops into a seed, which contains the developing embryo.
- Seed dispersal is aided by wind, water and animals.
- Seed dispersal helps the plants to (i) prevent overcrowding, (ii) avoid competition for sunlight, water and minerals and (iii) invade new habitats.

Exercises

1. Fill in the blanks:

- (a) Production of new individuals from the vegetative part of parent is _____ called _____.
- (b) A flower may have either male or female reproductive parts. Such _____ a flower is called _____.
- (c) The transfer of pollen grains from the anther to the stigma of the _____ same or of another flower of the same kind is known as _____.
- (d) The fusion of male and female gametes is termed as _____.
- (e) Seed dispersal takes place by means of _____, _____ and _____.

- 2. Describe the different methods of asexual reproduction. Give examples.
- 3. Explain what you understand by sexual reproduction.
- 4. State the main difference between asexual and sexual reproduction.
- 5. Sketch the reproductive parts of a flower.
- 6. Explain the difference between self-pollination and cross-pollination.
- 7. How does the process of fertilisation take place in flowers?
- 8. Describe the various ways by which seeds are dispersed.
- 9. Match items in Column I with those in Column II:

Column I

- (a) Bud
- (b) Eyes
- (c) Fragmentation
- (d) Wings
- (e) Spores

Column II

- (i) Maple
- (ii) *Spirogyra*
- (iii) Yeast
- (iv) Bread mould
- (v) Potato
- (vi) Rose

10. Tick (✓) the correct answer:

- (a) The reproductive part of a plant is the
 - (i) leaf (ii) stem (iii) root (iv) flower
- (b) The process of fusion of the male and the female gametes is called
 - (i) fertilisation (ii) pollination
 - (iii) reproduction (iv) seed formation

- (c) Mature ovary forms the
 (i) seed (ii) stamen
 (iii) pistil (iv) fruit
- (d) A spore producing plant is
 (i) rose (ii) bread mould
 (iii) potato (iv) ginger
- (e) *Bryophyllum* can reproduce by its
 (i) stem (ii) leaves
 (iii) roots (iv) flower

Extended Learning-Activities and Projects

1. Make your own cactus garden by collecting pieces cut from different kinds of cacti. Grow the variety in one single flat container or in separate pots.
2. Visit a fruit market and collect as many local fruits as possible. If many fruits are not available, you can collect tomatoes and cucumbers (these are fruits, though we use them as vegetables). Make drawings of the different fruits. Split the fruits and examine the seeds within. Look for any special characteristics in the fruits and their seeds. If possible visit the website:
www.saps.plantsci.cam.ac.uk/fscfruit/dispersal.pdf
 You can visit a library also to learn about this

3. Think of ten different fruit-bearing plants. Remember that many vegetables are also fruits of the plants. Discuss with your teacher, parents, farmers, fruit growers and agricultural experts (if available nearby) and find out the manner of their dispersal. Present your data in the form of a table as shown below:
4. Suppose there is one member of a particular kind of organism in a culture

S. No.	Name of fruit-bearing plant	Agent through which seeds are dispersed	Part of or seed which helps in dispersal
1.			
2.			
3.			

dish, which doubles itself in one hour through asexual reproduction. Work out the number of members of that kind of organism which will be present in the culture dish after ten hours. Such a colony of individuals arising from one parent is called a "clone".

You can read more on the following website:

www.edumedia-sciences.com/a437_l2-blog-call.html