

# Vegetative Propagation and Micropropagation

- There are two principles to improve the quality and quantity of products.

## By growing the desired variety of plants in large numbers

- Vegetative propagation
  - Natural vegetative propagation
  - Artificial vegetative propagation
- Micropropagation

## By evolving new varieties of plants with desired characteristics

- Hybridisation
  - Cross pollination
  - Somatic cell hybridisation

- Vegetative propagation** or **vegetative reproduction** is a form of asexual reproduction in which a relatively large, differentiated part of the plant's body gets detached from the parent plant and develops into an independent plant.

## Differences between Sexual Reproduction and Vegetative Propagation

SEXUAL REPRODUCTION	VEGETATIVE PROPAGATION
<ul style="list-style-type: none"> <li>Slow, uncertain and less economical method.</li> </ul>	<ul style="list-style-type: none"> <li>Quicker, more certain and less expensive method.</li> </ul>
<ul style="list-style-type: none"> <li>Seeds are viable and strong enough to face the environmental changes.</li> </ul>	<ul style="list-style-type: none"> <li>Seeds are less viable and less strong.</li> </ul>
<ul style="list-style-type: none"> <li>Seedless plants cannot be reproduced by this method.</li> </ul>	<ul style="list-style-type: none"> <li>Seedless plants can be reproduced by this method.</li> </ul>
<ul style="list-style-type: none"> <li>Parental characteristics are not retained and get mixed up.</li> </ul>	<ul style="list-style-type: none"> <li>Genetic characteristics are retained.</li> </ul>
<ul style="list-style-type: none"> <li>New varieties are possible.</li> </ul>	<ul style="list-style-type: none"> <li>No new varieties can be produced.</li> </ul>
<ul style="list-style-type: none"> <li>Overcrowding does not take place due to dispersal of fruits and seeds.</li> </ul>	<ul style="list-style-type: none"> <li>Overcrowding occurs as there is no dispersal of fruits and seeds.</li> </ul>

## Natural Vegetative Propagation

PROPAGULES	DESCRIPTION	EXAMPLES
Rhizome	<ul style="list-style-type: none"> <li>Underground, horizontal, branching stem.</li> </ul>	Ginger, turmeric etc.
Stem tuber	<ul style="list-style-type: none"> <li>Swollen tip of underground, lateral stem.</li> </ul>	Potato, artichoke etc.
Corm	<ul style="list-style-type: none"> <li>Short, vertical, underground stem, swollen with reserved food.</li> </ul>	Crocus, gladiolus etc.
Bulb	<ul style="list-style-type: none"> <li>Underground, lateral branches.</li> <li>Their ends turn up and produce buds.</li> </ul>	Mint, pear, banana etc.
Runners	<ul style="list-style-type: none"> <li>Grow rapidly along the ground, producing buds and adventitious roots at intervals. These become separate plants.</li> </ul>	Strawberry, creeping grass, <i>Desmodium</i> etc.
Offsets	<ul style="list-style-type: none"> <li>Short stout runners terminated by a single bud.</li> </ul>	Houseleek ( <i>Pistia</i> ), <i>Eichhornia</i> etc.

Stolon	<ul style="list-style-type: none"> <li>When a weak stem falls over and touches the ground, its tip swells. It develops adventitious roots and the further growth is continued by a lateral bud.</li> </ul>	Blackberry, fern etc.
Root tubers	<ul style="list-style-type: none"> <li>Swollen fibrous roots, each capable of developing into a new plant.</li> </ul>	<i>Dahlia</i> , sweet potato etc.
Leaf buds	<ul style="list-style-type: none"> <li>Bud detaches and grows into a new plant.</li> </ul>	<i>Dahlia</i> , sweet potato etc.
Bulbils	<ul style="list-style-type: none"> <li>Detachable buds</li> </ul>	Yam etc.

- Artificial Vegetative Propagation**

METHOD	EXAMPLES
<p><b>Cutting</b> is removing a portion of the stem and fixing it into the soil to allow the growth of roots and shoots.</p>	<p>Stem cutting: Rose, <i>Bougainvillea</i>, etc.            Root cutting: Lemon, tamarind etc.</p>
<p><b>Grafting</b> is joining a part (stem or bud) of a living plant to another, causing it to grow as a part of another plant.</p> <p><b>Types of grafting</b>            Approach grafting            Cleft grafting            Tongue grafting/whip grafting            Bud grafting</p>	<p>Sapota, mango, guava, apple, orange, peach, rose etc.</p>
<p><b>Layering</b> is a method in which a branch of the plant is covered with some material and supplied with water to produce roots.</p> <p><b>Types of layering</b>            Air/aerial layering            Ground/mound layering</p>	<p><i>Hibiscus</i>, jasmine, rose, <i>Bougainvillea</i> etc.</p>

- Micropropagation** is the technique of production of new plants from cells or tiny pieces of plant tissues that are removed from the growing tips of a plant and put into a suitable growth medium called the culture solution to produce callus, which gets differentiated into a plantlet.
- Hybridisation** is mixing up of the characters of two parents in the new offspring.
  - Intraspecific hybridisation:** Hybridisation between two varieties of the same species.
  - Interspecific hybridisation:** Hybridisation between two different species.
- Cross pollination** is the transfer of pollen grains from the anther of a flower of one plant to the stigma of a flower of another plant of the same species.
- Emasculation** is the method of removing anthers to prevent self-pollination.
- Somatic cell hybridisation** involves the fusion of somatic or body cells from two different varieties of a species or even from two different species.
- Biotechnology** is the use of microorganisms or living cells in industry and technology to manufacture various types of foods, drugs, medicines and chemicals as well as to breakdown the wastes.

- Biotechnology is practised in two ways.
  - a. By making use of natural microorganisms:** Natural microorganisms are used for the manufacture of many food items, such as cheese, curd or yogurt, vinegar, cake, bread, *idli*, *dosa* etc. These are produced by the action of microorganisms based on the principle of fermentation.
  - b. By using genetically engineered microorganisms:** Genetically engineered microorganisms are used for the large-scale production of useful products such as insulin etc. or in gene therapy.
- **Applications of Biotechnology**

Production of cheese	Production of yoghurt	Production of alcoholic beverages	Production of vinegar
Production of vitamins	Production of enzymes	Genetic engineering	Transgenic organisms
Proteomics	Forensics	Biochips	Biosensors