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
 - 1. Vegetative propagation
 - Natural vegetative propagation
 - Artificial vegetative propagation
 - 2. Micropropagation

By evolving new varieties of plants with desired characteristics

- 1. 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
 Slow, uncertain and less economical method. 	 Quicker, more certain and less expensive method.
 Seeds are viable and strong enough to face the environmental changes. 	Seeds are less viable and less strong.
 Seedless plants cannot be reproduced by this method. 	 Seedless plants can be reproduced by this method.
• Parental characteristics are not retained and get mixed up.	Genetic characteristics are retained.
New varieties are possible.	No new varieties can be produced.
Overcrowding does not take place due to dispersal of fruits and seeds.	 Overcrowding occurs as there is no dispersal of fruits and seeds.

• Natural Vegetative Propagation

PROPAGULES	DESCRIPTION	EXAMPLES
Rhizome	Underground, horizontal, branching stem.	Ginger, turmeric etc.
Stem tuber	Swollen tip of underground, lateral stem.	Potato, artichoke etc.
Corm	 Short, vertical, underground stem, swollen with reserved food. 	Crocus, gladiolus etc.
Bulb	Underground, lateral branches.Their ends turn up and produce buds.	Mint, pear, banana etc.
Runners	 Grow rapidly along the ground, producing buds and adventitious roots at intervals. These become separate plants. 	Strawberry, creeping grass, <i>Desmodium</i> etc.
Offsets	 Short stout runners terminated by a single bud. 	Houseleek (<i>Pistia</i>), <i>Eichhornia</i> etc.

Stolon	• 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.	Blackberry, fern etc.
Root tubers	 Swollen fibrous roots, each capable of developing into a new plant. 	Dahlia, sweet potato etc.
Leaf buds	Bud detaches and grows into a new plant.	Dahlia, sweet potato etc.
Bulbils	Detachable buds	Yam <i>etc.</i>

• Artificial Vegetative Propagation

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

- **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.
 a. Intraspecific hybridisation: Hybridisation between two varieties of the same species.
 b. 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

