

CONCEPT MAP

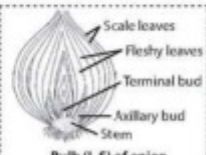
VEGETATIVE PROPAGATION IN PLANTS

Vegetative propagation is the regeneration of new plants from vegetative parts of parent plant. It includes all those processes of propagation in which a part of the plant body is separated from the parent plant and gives rise to a new individual without any obvious changes in the protoplast. All the plants developed by vegetative propagation are genetically identical to their parent plants.

NATURAL METHODS

Propagation by Stem

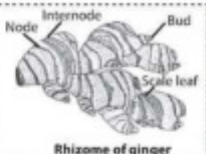
Bulb
Short and thickened underground stem axis represented by a slightly conical disc with fleshy leaves surrounding a terminal bud at the centre of disc. Onion, tulip, garlic, etc., commonly propagate by bulb.



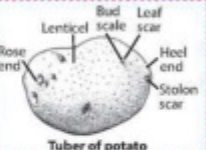
Corm
Condensed form of rhizome which grows vertically down. Internodes are usually reduced and one or more axillary buds are present in the axil of scale leaves. Colocasia, Gladiolus, Crocus, etc., propagate through corm.



Rhizome
They are thick, prostrate and branched stems which grow horizontally. Distinct nodes and internodes are present. Nodes bear small scale leaves with buds. Ginger, turmeric, Canna, etc., propagate by means of rhizomes.



Tuber
It is an underground stem modification for reserve food accumulation. Eyes or axillary buds are present on the surface which give rise to new plantlets. Potato, Caladium, etc., commonly propagate by tuber.



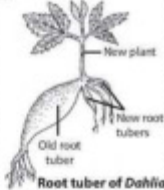
Propagation by Leaf

Foliar buds are produced on leaf margins of many plants which can grow into new plants. When such leaves fall on the ground the buds germinate and give rise to new plants, e.g., Bryophyllum, Kalanchoe, etc.



Propagation by Root

Tap roots of some plants develop adventitious buds to form new plants, e.g., Dolbergia. In some plants like sweet potato and Dahlia, root tubers develop adventitious buds which develop into new plant.



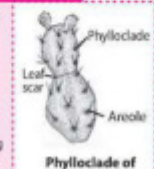
Propagation by Bulbil

In *Globba bulbifera*, some flowers in the lower part of the inflorescence are modified into small multicellular structures, called **bulbils**. They fall on the ground and grow into new plants. In American aloe, (*Agave sisalana*), reproductive buds (bulbils) often take the place of many flowers on the inflorescence axis. Bulbils are also produced in the leaf axil of wild yam (*Dioscorea bulbifera*) and *Lilium bulbiferum*.



Aerial stem

Phylloclades are fleshy, green, flattened or cylindrical stem branches. Each segment of stem can form a new plant on breaking off, e.g., Opuntia.



Subaerial stem

Some subaerial stem modifications also take part in vegetative propagation. **Runner** is a slender creeping stem with long internodes. Nodes bear axillary buds, scale leaves and adventitious roots. Runners break off and grow into individual plants, e.g., Ovals, Cymodon, etc. **Stolons** are arched horizontal branches which develop into new plants where they touch the ground, e.g., strawberry. **Offset** is a short runner that is one internode long, generally found in aquatic plants, e.g., Eichhornia. **Suckers** are slender subaerial branches which develop from base of aerial shoot. Initially they grow horizontally but soon grow obliquely upwards forming a leafy shoot, e.g., mint.

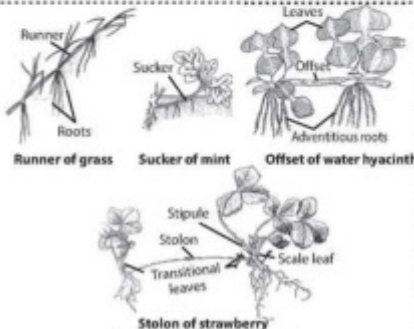


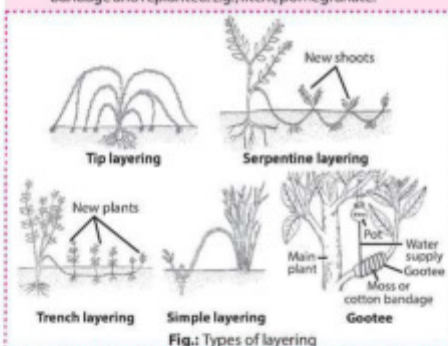
Fig.: Types of subaerial stem

ARTIFICIAL METHODS

Layering

It is the method of inducing root formation in stem while it is still attached to the parent plant. It is of following types:

- Tip layering**: In this method, tip portion of the shoot is bent and buried in the soil. E.g., black raspberry.
- Serpentine layering**: In this method, long slender shoot is bent and laid to the ground, covered with soil at short regular intervals so as to form many plants. E.g., Clematis.
- Trench layering**: In this method, long shoot is placed in trench leaving the apical portion exposed. Roots are produced at each node on the lower side and shoot emerges on the upper side. E.g., walnut, mulberry.
- Simple layering**: In this method, rooting is induced on a soft stem. It is defoliated and a small injury is made on it. After that it is pegged in the soil to develop adventitious roots. Later on, the layer is separated and planted. E.g., jasmine, grapevine.
- Air layering or gootee**: In this method, rooting is induced in aerial hard branches. The stem is girdled and covered with moist moss or cotton. Water is added to it along with small quantity of root promoting hormones. After 2-3 months roots appear and shoot is then cut below the cotton bandage and replanted. E.g., litchi, pomegranate.



Cutting

Any part of the plant (stem, root or leaf) that produces roots when put into the soil and gives rise to a new plant is called cutting. It can be done in following ways:

- Root cutting**: The pieces of roots are used to artificially propagate new plants, e.g., lemon, orange, etc.
- Stem cutting**: 20-30 cm long stem cuttings are used to propagate both herbaceous and woody plants. Their lower ends are dipped in root promoting hormones for several minutes before planting, e.g., rose.
- Leaf cutting**: In this technique, leaf is transversely cut into two or three parts and leaf cuttings are vertically planted in soil, e.g., *Sansevieria*.

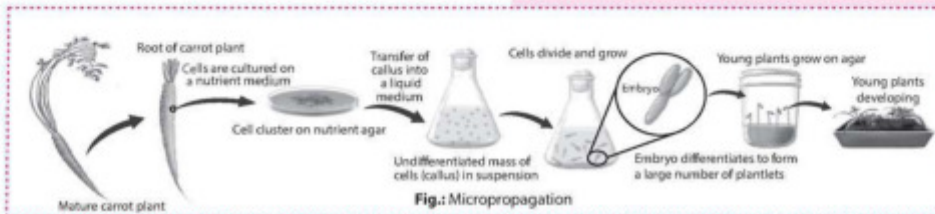


Fig.: Micropropagation

Grafting

Grafting is the technique of joining together parts of two different plants in such a manner that they unite and later develop as a composite plant. Various techniques of grafting are as follows:

- Tongue grafting**: Oblique cut is given to both stock and scion (of same diameter) and they are tied together.
- Crown grafting**: Stock has larger diameter than scion. Many slits are formed on the sides of stock and scions are inserted into them and bandaged.
- Wedge grafting**: V-shaped notch is given to stock and wedge like cut is given to scion (both of same diameter).
- Side grafting**: V-shaped notch is given to stock at one side and scion is inserted in it. Stock has larger diameter than scion.
- Approach grafting**: Two independently growing plants are brought together. Their shoots are given cuts at the same level and united.
- Bud grafting**: In bud grafting, scion consists of a single bud accompanied with a portion of living tissue. It is inserted into a T-shaped incision on the stock treated with grafting wax and bandaged, e.g., apple, peach.

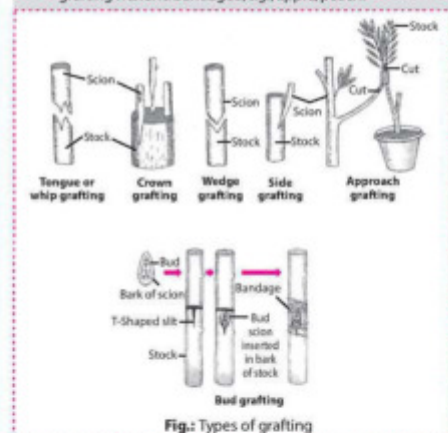


Fig.: Types of grafting

Micropropagation

The technique of propagating plants by culturing cells, tissues and organs is known as micropropagation. It is popularly known as **tissue culture**. Methods of micropropagation are callus culture, suspension culture, embryo culture, anther culture, protoplast culture, etc. Laboratory culturing ultimately results in formation of large number of plantlets, e.g., orchids, Carnation, etc.