

Breeding method for Clonal / Asexual propagated Crops

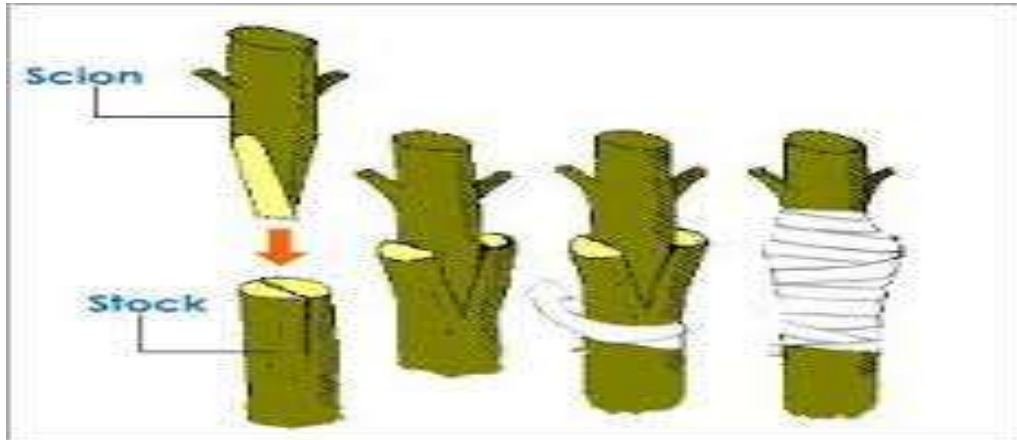
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Breeding method for Clonal / Asexual propagated Crops

- Asexual reproduction :- Multiplication of plants without the fusion of male and female gametes is known as asexual reproduction.
- Asexual reproduction can occur either
 1. By vegetative plant parts or
 2. By vegetative embryos which develop without sexual fusion.
- Asexual reproduction is of two types :-
 1. Vegetative reproduction.
 2. Apomixis
- Vegetative Reproduction :- Vegetative reproduction refers to multiplication of plants by means of various vegetative plant parts.
- Vegetative reproduction is again of two types :-
 1. Natural vegetative reproduction
 2. Artificial vegetative reproduction
- Natural vegetative reproduction :- In nature, multiplication of certain plants occurs by underground stems, subaerial stems, root and bulbils.
- **Underground stems:-** The underground modifications of stem generally serve as strong organs and contain many buds. These buds develop into shoots and produce plant after rooting.
 - ✓ Rhizome : Turmeric, Ginger
 - ✓ Tuber : Potato
 - ✓ Corm : Arvi, Bunda
 - ✓ Bulb : Garlic, Onion
- **Sub-aerial Stems:-** These modifications include runner, stolon, sucker etc.. Sub-aerial stems are used for the propagation of mint (*Mentha sp.*), date palm, strawberry, banana etc..
- **Bulbils:**
 - ✓ Bulbils are modified forms of flowers that develop into plants directly without formation of seeds.
 - ✓ These are vegetative bodies as their development does not involve fertilization and seed formation.
 - ✓ They develop into plants when fall on the ground. Bulbils are found in garlic, lily etc..
- **Leaves:**
 - ✓ This is not very common and It is seen in plants such as *Bryophyllum*.
 - ✓ It has fleshy leaves and adventitious buds are present at the margins of the leaves.
 - ✓ These buds fall off and grow into new plants.
- Artificial vegetative reproduction :- Multiplication of plants by vegetative parts through artificial method is known as artificial vegetative reproduction.

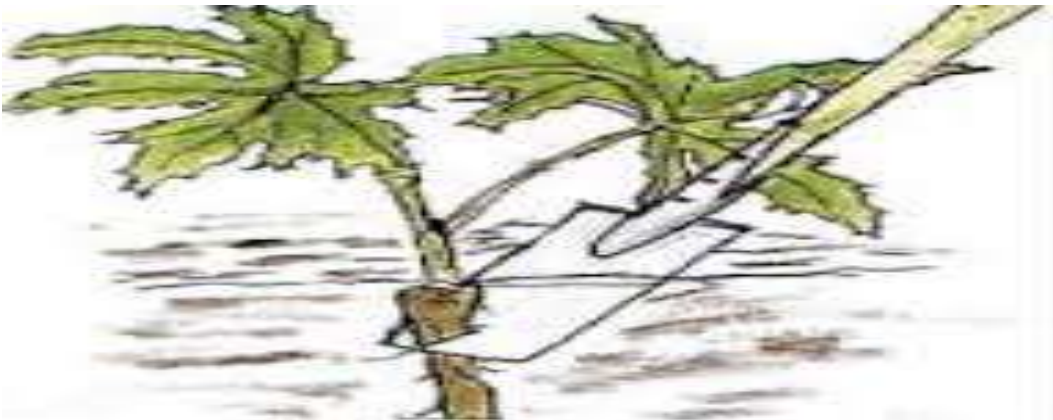
- ✓ **Stem cuttings:** Sugarcane (*Saccharum sp.*), Grapes (*Vitis vinifera*), Roses, etc.
- ✓ **Root cutting:** Sweet potato, Citrus, Lemon, etc.
- ✓ Layering, grafting are used in fruit and ornamental crops.

- **STEM CUTTING**



- ✓ Stem cutting from healthy, disease- free plants, preferably from the upper part of the plants.
- ✓ Cutting should generally consist of the current or past season’s growth.
- ✓ Remove any flowers and flower buds when preparing cutting.

- **ROOT CUTTINGS**



- ✓ Root cutting is one of the most reliable and economical ways.
- ✓ Large fleshy root, the thicker the better.
- ✓ The best way to keep track of “up” and “down” is to make a flat cut on top “up” side, and a slanted cut on “down” or bottom side.
- ✓ Water the plants to settle the roots back into soil properly.

- **LEAF CUTTINGS**

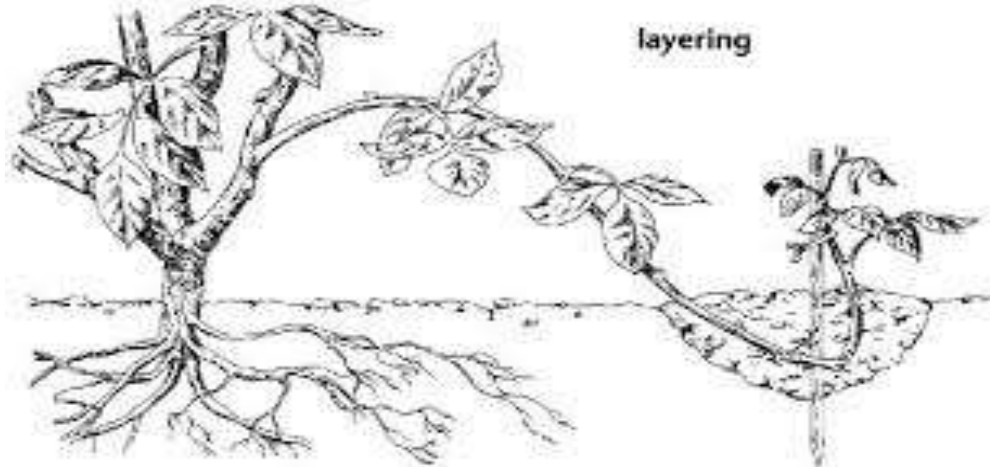


- ✓ Leaf cuttings are prepared from leaves with or without their stalk (petioles).
- ✓ Leaf section cutting can be used for propagating plants.
- ✓ Leaf cutting consist of a single leaf attached to a piece of 1 to ½ inch stem.
- ✓ The dominant bud, located where the leaf stalk joins the stem will give rise to a new shoot and braches.

- **LAYERING**

- ✓ **Layering** is a means of plant propagation in which a portion of an aerial stem grows roots while still attached to the parent plant and then detaches as an independent plant.
- ✓ Layering has evolved as a common means of vegetative propagation of numerous species in natural environments.
- ✓ Layering is also utilized by horticulturists to propagate desirable plants.
- ✓ Natural layering typically occurs when a branch touches the ground, whereupon it produces adventitious root.
- ✓ There are two types of layering
 1. Ground layering
 2. Air layering

- **GROUND LAYERING**



- ✓ Ground layering or mound layering is the typical propagation technique.
- ✓ The original plants are set in the ground with the stem nearly horizontal, which forces side buds to grow upward.
- ✓ After these are started, the original stem is buried up to some distance from the tip.
- ✓ At the end of the growing season, the side branches will have rooted, and can be separated while the plant is dormant.
- ✓ Some of these will be used for grafting roots stock.

• AIR LAYERING



- ✓ In air layering (or **Marcotting**), the target region is wounded, or a strip of bark is removed.
- ✓ Rooting hormone is often applied to encourage the wounded region to grow roots.
- ✓ When sufficient roots have grown from the wound, the stem from the parent plant is removed and planted.
- ✓ It can take the layer from a few weeks to one or more growing seasons to

- produce sufficient roots.
- ✓ E.g.: Air layering of *Limonium dendroides*

- **GRAFTING**

- ✓ Grafting or Graf tage is a horticultural technique where by tissue from one plant are inserted into those another.
- ✓ The technique is most commonly used asexually propagation of commercially grown plants.
- ✓ Eg:- mango tree(Malgoa)
- ✓ Some common method of grafting are
 1. Splice or whip grafting
 2. Whip and tongue grafting
 3. Approach grafting

- **1. SPLICE OR WHIP GRAFTING**

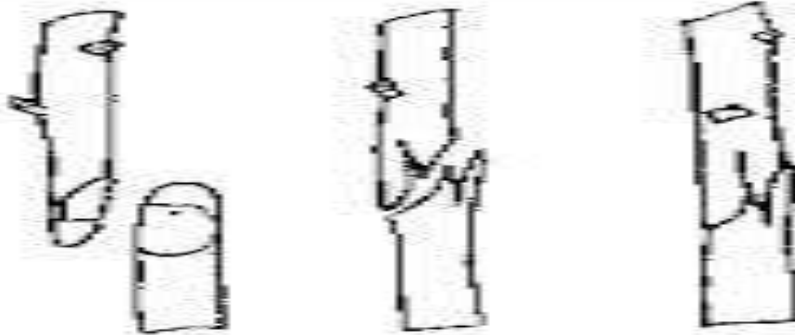


FIGURE 2

- ✓ It is a very simple popular and easy to perform method of grafting for small materials .
- ✓ It is usually done when the sap has started to rise before the bud break.

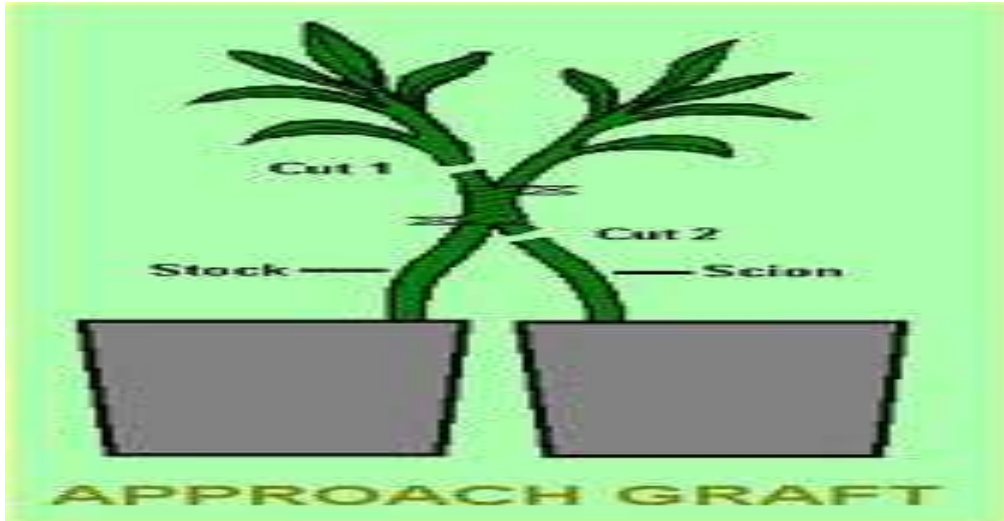
- **2. WHIP AND TONGUE GRAFTING**



- ✓ It is similar to splice grafting except that a tongue is added to the cut surface to

- ✓ provide better fitting and rigidity.
- ✓ It has the highest rate of success as it offers the most cambium contact between the two species
- ✓ E.g.: Common in fruit trees like- Bramley Apple

3. APPROACH GRAFTING



- ✓ Approach grafting or inarching is used to join together plant that are otherwise difficult to join.
 - ✓ It is used in pleaching.
 - ✓ The graft can be successfully accomplished any time of year.
 - ✓ Eg:- Mango- Malgoa, Guava.
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- **Significance :-** Vegetative reproduction has several advantages
 - ✓ It leads to continuity of same genotype with great precision, because all the progeny have similar genotype and phenotype.
 - ✓ Useful in obtain large number of genetically identical individuals.
 - ✓ Promising genotype can be maintained.
 - ✓ It makes use of desirable bud mutations. Mutants can be directly released as varieties.

References (if any)

1. Wikipedia

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