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Center for Smart Agriculture

Organic Farming



Module 6: Plant propagation

Session 1: Plant propagation and method of propagation.



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- Plant propagation -reproduction of a plant

There are Two Method of Propagation:

1. Sexual Propagation 2. Asexual Propagation

- generative propagation or sexual reproduction (seeds) :lettuce, curly endive, pepper, eggplants, tomato, beans, etc.
- vegetative propagation (asexual reproduction) through vegetative parts of the plant:



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Eg. potato tubers, sweet potato roots, bulbs in onion and garlic, cuttings in artichoke, stolons in strawberry, “spiders” or roots in asparagus, etc.

- Seeds and plant material used should be free of pathogens and weeds, and obtained from safe sources.



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Vegetative Propagation

Using plant cuttings to reproduce plants from existing plants.



DIYNatural.com

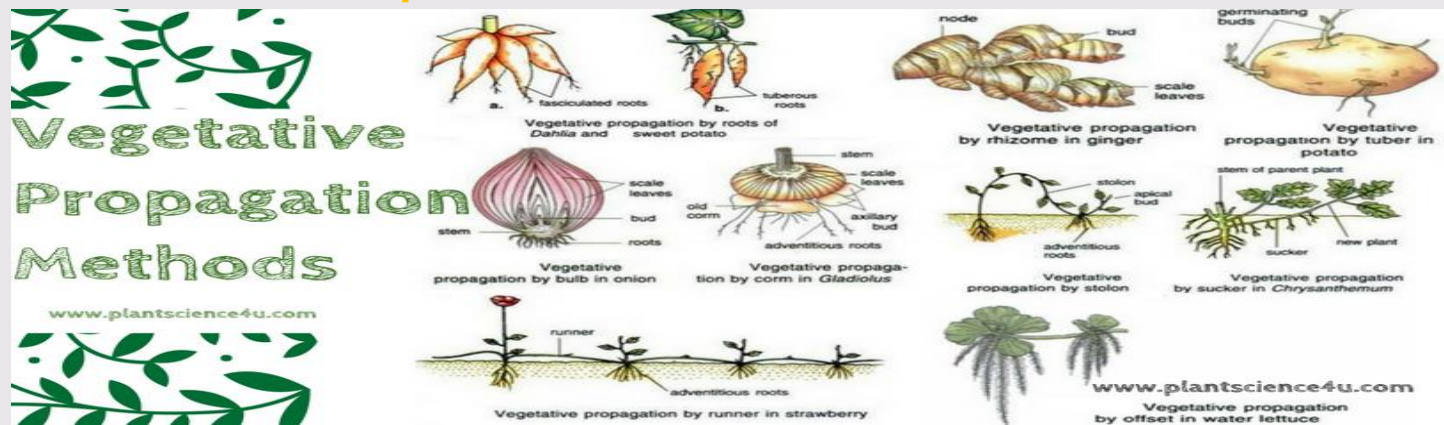


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Vegetative propagation

- Is based on the ability of plants to regenerate from its parts and tissues (adventitious or dormant buds)
- Adventitious buds originate fresh from the callus tissues around wounds
- Dormant buds are already there and proper stimulation make them grow (found in the leaf axils and are embedded in the bark-bud traces)
- If the physiological balance got upset (injury, cutting, fire, disease etc.) both type of buds got stimulated to produce shoots





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- Vegetative propagation ensures the production of exact copies of plants selected for superior characters
- Single stock can provide large number of plants- potentially useful for replicating clonal material and for the multiplication of the stock
- Genetic uniformity-similar growth and form-provide opportunity to harness and exploit genetic variation directly.
- If the trees are not producing seeds or if the seeds are not viable VP methods are quite useful
- Easier and cheaper-take less time to develop



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Sexual propagation

- Based on seeds
- Seed consists of an embryo, stored food tissues (endosperm and cotyledons) surrounded by protective seed covering
- Embryo consists of an axis with growing points at each end (radicle and plumule) and one or more cotyledons attached to the axis.
- storage tissue can be cotyledons , endosperms or perisperms.

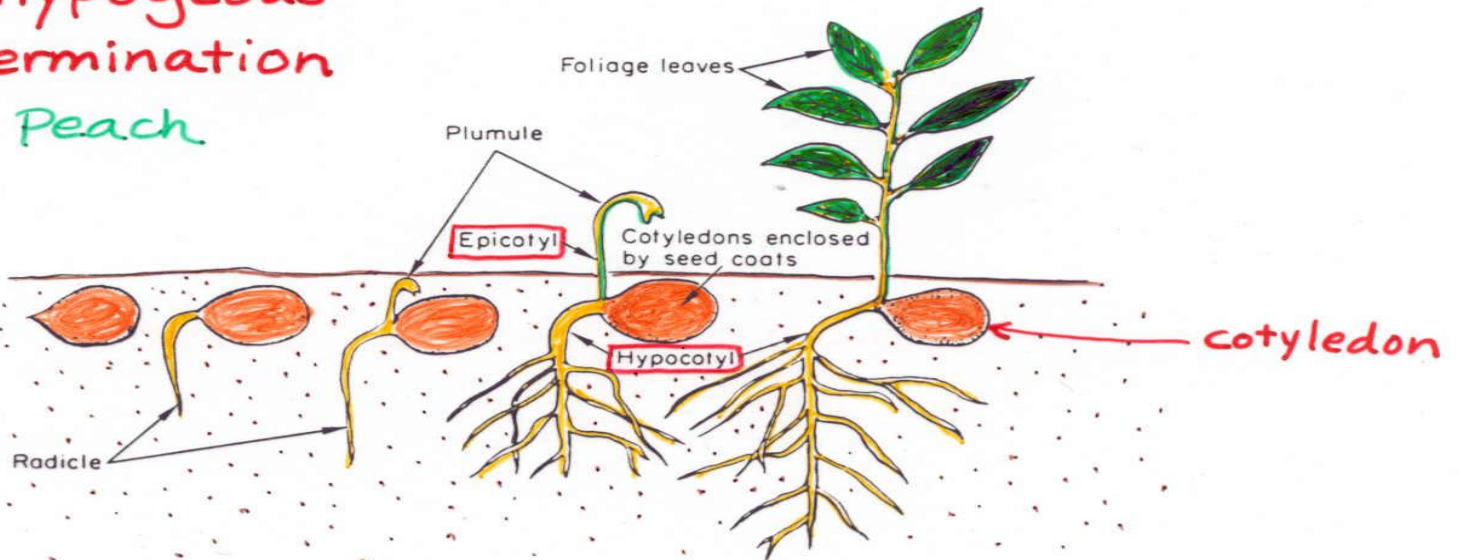




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Hypogeous Germination Peach





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Seeding or Sowing

- Seeds are sown in nursery beds either broadcast or in drills, or it is dibbled.
- Very small seed is mixed with 1 or 2 times its volume of fine soil, clean sand, or wood ash before sowing
- very commonly broadcast rather thickly over the entire surface of the seed bed – covered with a thin layer of fine soil, clean sand, wood ash or leaf mould.
- the seeds are sown in beds, polythene bags, or in any other containers.
- common methods- dibbling or drilling.



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- the seeds can be covered with soil-thickness varies with size and type of seed. seed beds should be surrounded by stone planks, brick walling, or wire netting- for protection against mice.
- larger seeds are sown deeper- advisable to sow too shallow.
- thumb rule: cover the seed as deep as the smallest diameter of the seed. in light soils the sowing is made deeper as compared to heavy soils.



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- the quantity of seed needed per bed :

- $W = \frac{A \times D}{P \times N} \times 100,$

where, W- weight of seed required in grams

A- Area of bed in sq.m.

D- Number of plants required per sq.m.

P- Plant % of seeds

N- number of seeds per gram.



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Time of sowing:

- the aim is to produce planting stock of desired size at the time of planting season.
- depends on many factors such as seed ripening, stage of dormancy if any, rate of growth of species in the locality and size of plants required at the time of planting.





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Sowing in Polypots or containers:

- one or two seeds are sown in one container.
- after germination only one healthy seedling /bag is retained.
- the bags should be watered one day before sowing and afterwards regularly until the germination comes.
- polybags should be perforated to allow the water to drain away.



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Plant containers

- Brick containers-made of unbaked bricks, 1:1:1-clay, FYM, sand
- Broad at the base (15x15cm) and narrowed towards the top(10x10cm) and height- 25-30 cm
- Small hole having 2cm diameter, and 8cm depth is made in the centre of the top of the brick
- *Used: for species which cannot resist shock of transplanting, use of containers prolong the capacity to withstand the dry period ,very much necessary for poor sites/soils*



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- Dona containers- leaves of FICUS, Bauhinia, Palas etc.
- Baskets- bamboo strips, or Tamarix cuttings
- Earthen pots- with or without bottom
- Tubes- tieing 2 halves-made from bamboos, metals, plastic papers, or plastics

Polythene bags- cheap, convenient, keep, handle and transport



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- Simple plastic glass:
- Corrugated walled plastic containers
 - book type of root trainer-small plants-
 - not good for tall plants
 - a) it is easy to handle and ease of transport
 - b) small volume of soil mixture is required for filling
 - c) weeding, shifting and other operations are easy



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PROPOGATING STRUCTURES

1. Green house
 - Structure covered with glass for protection against adverse climatic conditions.
 - Plants are grown or cuttings are rooted in it.
 - Conservation of heat is essential in green house.



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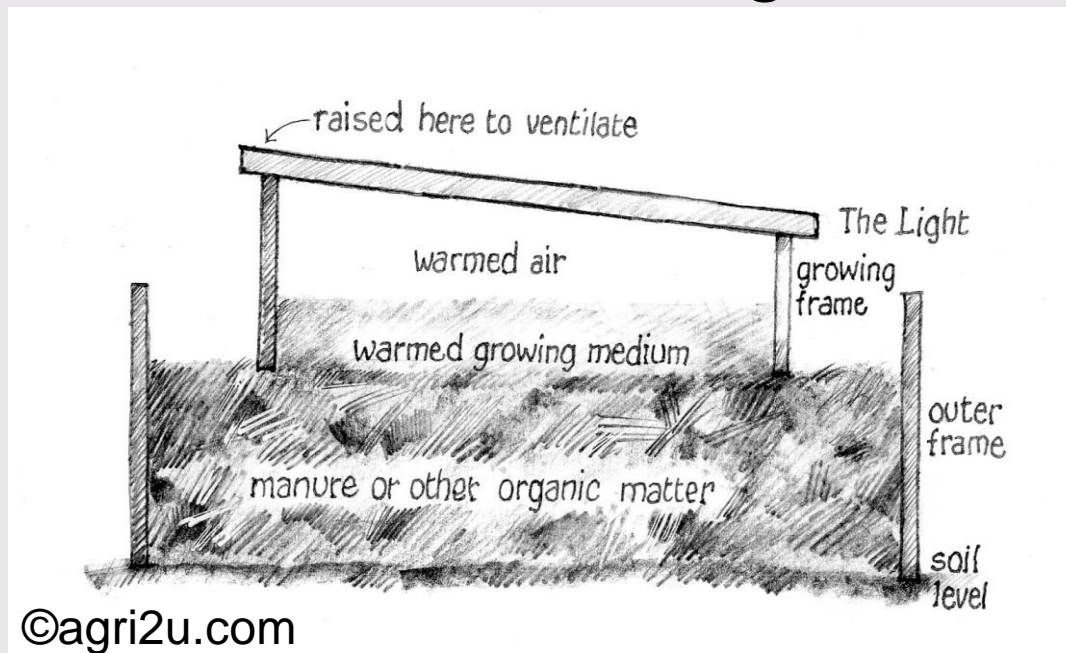




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- Hot bed
- Small fixed structure having three Components namely frame, cover and heating unit.
- Used for growing small tender seedlings and rooting of cuttings.
- Cover is made of glass or transparent





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- Cold frame
- Small and movable structure of glass which encloses a ground bed.
- Used for hardening or conditioning of rooted cutting and young seedling before transferring them out.



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- Lath house

- Structure made for providing shade and thereby protecting the young tender seedlings or rooted cuttings.

- Loss of moisture from and soil surface is greatly reduced.
- Net house
- Used for growing shade loving plants, orchids, cactus and also for raising seedlings.
- Inside atmosphere remain cool in summer and warm during winter.



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REQUIREMENTS OF GROWING MEDIA

- Firm enough to hold the seeds.
- Porous enough to facilitate air drainage.
- Free from contamination
- Preferably neutral in action
- Should not denature upon pasteurization or steam treatment.



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GROWING MEDIA

o Compost-Decomposed and rotten material of farm waste.

❖ Useful material for growing seeds and cuttings.

❖ Preferably be used after sterilization

Soil- Most common, easily available cheap material, light soils are preferred

❖ Light soils preferred for uprooting of seedlings.

❖ Seeds of fruit plants are raised in heavy soils





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- o Sand- Mostly used for nutritional experiments to eliminate the biasness.
- ❖ Mix with organic materials while using for seeds and cuttings.
- o Sphagnum moss-Grass plant grown as lithophyte in swampy areas
- ❖ Good water holding capacity. 10-20 times more water to its weight.
- ❖ Used as a rooting medium in air layering
- ❖ Contains some specific fungicides which prevents damping off of seedlings.



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- Perlite- Grey white siliceous material obtained after heating of crude ore.
- ❖ Holds 3-4 times its weight of water.
- ❖ Neutral in reaction with PH of 6-8 and does not contain mineral nutrients.
- ❖ In combination with peat moss it is a popular medium medium for cutting





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THANK YOU