



Ministry of high Education
and Scientific Research
Southern technical university
Technical Institute / Al-
shatrah

الحقيبه التعليميه لماده
المشاتل / اول نباتي

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First modular unit

الوحده النمطيه الاولى

**The nursery – Nurseries importance - Types of nurseries -
Selection of the nursery site- Preparation and planning - Nursery
Supplements**

For Students of First Stage

(Over View) النظره الشامله
(Over View) النظره الشامله

أ - (Target Population) لفته المستهدفه

Students of First Stage / Plant Production department / Technical

Institut /Al-shatrah

طلبة المرحلة اولى قسم الانتاج النباتي

ب - (Rationale) الوحده مبررات

ليعرف الطالب اسس ومبادئ انشاء المشاتل.

ت - (Central Idea) الفكره المركزيه

- سيكون الطالب ملما بمعرفة
1- انواع المشاتل ،تخطيط المشتل واعداده
2-تقوية الطالب باللغه الانكليزيه

ث - (Objectives) اهداف الوحدة

سيكون الطاب بعد هذه المرحله قادرا على :

1- يعرف اهمية المشاتل وفوائدها.

- 2-يغرف انواع المشاتل
3- يغرف كيفية اختيار موقع المشتل
4-يعرف كيفية تهيئة وتخطيط المشتل والمستلزمات المطلوبه

الاختبار القبلي (Pre - Test) :

Q: Circle the correct answer:

- 1- nursery is a place where plants are propagated and grown until they reach the right size for outplanting.
- 2- The nursery is a permanent place for seedling.
- 3- When Selection of the nursery site, the site should be close to city as possible.
- 4- It should be Make the leveling of entire area of the nursery site .
- 5- Seeds and cuttings may plant on rows.
- 6- According to the kind of seedlings, Nurseries divide to Comercial and Small nurseries.

Note : Check the answers in key answer page7

The text

عرض الوحدة النمطية
عرض الوحدة النمطية

Nurseries

The nursery is a certain area of land for raising different seedlings of plants preliminary to transplanting in permanent place. Also nursery is a place where plants are propagated and grown until they reach the right size for outplanting. The nursery should be situated in a sheltered place where light, air, and water supply are plentiful .

Selection of the nursery site :

When Selection of The nursery site The following points should be taken into consideration :

- 1- Source of water should be near of the nursery site and available throughout the year.
- 2- The soil should preferably be light loam and well drained and high quantity of organic matter.
- 3- The site should be close to city as possible for purchasing nursery equipments.
- 4- It should be on a good road or connected by main road and preferably be near of the orchards.
- 5-The location is away from the places infested with insects or sources of fungal and bacterial diseases

Planning of nursery

- 1- Make the leveling of entire area of the nursery site .
- 2- Fences and windbreaks are built to keep animals away and protect seedlings from strong winds.

- 3- Usually, 40% of the total nursery area is allotted for infrastructure and facilities, including pathways, road networks, buildings, and sheds. The remaining 60% is for the nursery beds.
- 4- Road network is wide enough for vehicles to transport planting materials.
- 5- Identify areas establishment buildings that include greenhouses, plastic house and lathhouse, also cooling rooms , garages and stores
- 6- Divide the field into small pieces in which proving markers to know places where cultivated plants mediated a broad ways allow the passage of tractors and motor vehicles for the transport of plants and fertilizers, as well as control materials and perform easily agricultural operations.
- 7- Allocation of a place for the collection, dissemination and dried of seeds .
- 8- Identify sources of water and how to get it. also working docks Inside lathhouse and the establishment irrigation supplies in different ways
- 9- Make the beds of convenient sizes limiting the convenient roads. Usualy seed-beds or cuttings-beds are 1m wide with about 0.6 meter pathway between them.
- 10-Raising of plants in pots is widely practiced. Under normal conditions, pot culture needs shading for which greenhouse or lathhouse is a necessity. Also seeds and cuttings may plant on rows.
- 11-Allocation of places for growing mothers plants.
- 12-Sterilize the soil and tools before planting in the nursery.
- 13-Allot a store for basic nursery supplies like : equipment and tools, Fertilizers, Pesticides, Containers, plastic, wires, , etc.

Types of Nurseries

a- According to the number of plants:

- 1- Comercial nurseries : Nurseries have a big area and produce a large number of plants for sell.
- 2- Small nurseries : Nurseries have a small area and produce a limiting number of plants .

b- According to the kind of seedlings :

- 1- General nurseries : Nurseries for producing and breeding the

whole of plants (fruit seedlings, ornamental plants , vegetable and forest seedlings).

- 2- Horticulture nurseries : Nurseries for producing and breeding of the different fruit, vegetable and ornamental plants seedlings.
- 3- Forest nurseries : Nurseries for producing and breeding of the forest seedlings only.

c- According to the attribution :

- 1- Private nurseries :
- 2- Governmental nurseries :

Post text

Give your answer by (True) or (False)

- 1- The nursery is the permanent place for seedlings.
- 2- The nursery site should be close to city as possible.
- 3- Usualy Seedbeds or cuttings-beds are 1m wide with about 0.6 meter pathway between them.
- 4- Fences and windbreaks are built to limit the nursery.
- 5- According to the attribution, the nursery divide to general and nurseries and horticulture.
- 6- Usually, 70% of the total nursery area is allotted for infrastructure and facilities.
- 7- Sterilize the soil and tools after planting in the nursery.
- 8- windbreaks are established to keep animals away.

Note : Check the answers in key answer as in the following

key answer

Pre text

Q1: 1, 3, 4, 5

Post text

1. f
2. c
3. c
4. f
5. f
6. f
7. f
8. f

Reference

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Second modular unit

الوحده النمطيه الثانيه

Nursery installations - The greenhouse, plastichouse, Laethhouse, tunnels and - Equipment of propagation in the nursery.

**Propagation Media – Prperties of
Medium – Proportions of mixtures in media.**

النظرة الشاملة (Over View): النظرة الشاملة

أ - (Target Population) الفئة المستهدفة

Students of First Stage / Plant Production department / Technical Institut / Al-shatrah
طلبة المرحلة الاولى نباتي

لاهميه منشات الاكثار صممت هذه الوحدة

ب - (Rationale) المبررات

ت - (Central Ideas) الفكرة المركزية

اولا: لغرض التعرف على منشات التكاثر

ثانيا: التعرف على الاوساط الزراعيه

ث - Objectives الاهداف:-

سيكون الطالب قادرا على

1- الغرض الاساسي من المنشات

2- مواصفات هذه المنشات

3- اهمية الاوساط الزراعيه .

(Pre - Test) الاختبار القبلي

Q1 : Give your answer by (True) or (False)

- 1- A miniature greenhouse is known as a cold frame.
- 2- A greenhouse is a structure with one type of covering materials.
- 3- many vegetables and flowers are grown in greenhouses in late winter and early spring.
- 4- lath house reduce the environment effects on growth of plants .
- 5- A lath house is a place for raising seedlings, rooted cuttings.

Note : Check the answers in key answer page 12

The text

عرض الوحدة النمطية

Installations of Nursery

A **greenhouse** (also called a **glasshouse**) is a building where plants are grown. These structures range in size from small sheds to very large buildings. A miniature greenhouse is known as a **cold frame**. A greenhouse is a structure with different types of covering materials, such as a glass or plastic roof and walls . it heats up because incoming visible solar radiation (for which the glass is transparent) from the sun is absorbed by plants, soil, and other things inside the building.

Greenhouses protect crops from too much heat or cold, shield plants from dust storms and blizzards, and help to keep out pests. Light and temperature are under controlling. Because greenhouses allow certain crops to be grown

throughout the year, greenhouses are increasingly important in the food supply to countries.

Greenhouses can be divided into glass greenhouses and plastic greenhouses. Plastics mostly used are [PEfilm](#) and multiwall sheet in [PC](#) or [PMMA](#). Commercial glass greenhouses are often high tech production facilities for vegetables or flowers. The glass greenhouses may be automatically controlled by a computer.

One of the largest greenhouse complexes in the world is in Almeria, Spain, where greenhouses cover almost 50,000 acres (200 km²). Sometimes called **the [sea of plastics](#)**.

Greenhouses are often used for growing [ornamentales plants](#), [vegetables](#), [fruits](#), and [tobacco](#) plants.

many vegetables and flowers are grown in greenhouses in late winter and early spring, and then transplanted outside as the weather warms.

Low tunnels are an inexpensive, effective way for gardeners to extend the growing season, keep pests off crops, and improve growing conditions by providing a relatively sheltered environment.

A **high tunnel** is a tall commercial or industrial-sized [greenhouse](#). These are used in [commercial agriculture](#) applications to maintain a more reliable and uniform temperature and humidity and to protect plants from variables such as wind.

lath house : A structure covered with narrow wooden slats that let air and light through the roof and sides while screening plants from the hot sun and dry winds and it will modify the environment in which they are growing by offering protection from hot, drying summer winds, reducing the intensity of the sunlight, dust storms lowering temperatures, rains and by maintaining a higher humidity. A lath house is a place for raising seedlings, rooted cuttings, and young plants prior to setting them out in the garden. Properly used,

Equipment and Tools of propagation in the nursery

The tools can be divided into:

A - Equipment collect seeds: including : pruning Scissors, Seed

collection bucket , Scissors Branches long arm, Stairs, Gloves.

B - Tools planting seeds: the right amount of sheet metal (such as oil cans, obesity and milk) , plastic basins, Clay pots, plastic pots, wooden boxes, plastic boxes, Plastic sacs.

C - ground service tools: Almenkerh, Alhqrν, Karak, comb.

D- Budding and Grafting Tools: Prunning Scissors, Budding knife, cleaver. Budding Tape, Grafting wax, sew, hammer.

E- Equipment of watering: plate, rubber tubes, manual sprinkler.

F- The tools of control to insect pests and diseases: Herbicides , insecticides , fogging machine.

G - General Tools: Paper bags, screws, front-wheel rickshaw, pollyethylene sacs.

Post text

Give your answer by (True) or (False

- 1- Greenhouses can be divided into glass greenhouses and plastic greenhouses.
- 2- Equipment collect seeds: including : pruning Scissors, Seed collection bucket.
- 3- reducing the intensity of the sunlight, dust storms lowering temperatures, rains and by lath house.
- 4- A high tunnels does not used in commercial agriculture applications.
- 5- One of the largest greenhouse complexes in the world is in Almeria, Spain, 50,000 acres.
- 6- A greenhouse is a building where plants are grown.
- 7- Greenhouses are not important in the food supply to countries.
- 8- Plastics mostly used are PEfilm and multiwall sheet in PC or PMMA.

0.key answer:

Pre text

1. c
2. f
3. c
4. c
5. c

Post text

1. c
2. c
3. c
4. f
5. c
6. c
7. f
8. c

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الوحده النمطيه الثالثه Third modular unit

Propagation Media – Properties of Medium – Proportions of mixtures in media.
Sanitation and Sterilization of Propagation Media – Heat treatment (steam) –
Fumigation chemicals.

النظرة الشاملة (Over View)

أ - (Target Population)

Students of First Stage / Plant Production department / Technical Institut / Al-shatrah

ب - (Rationale)
لاهمية الاوساط الزراعيه صممت هذه الوحده

ت - (Central Ideas)

اولا: التعرف على مختلف الاوساط

ثانيا : التعرف على طرق تعقيم التربيه

ث-Objectives-:

سيكون الطالب قادرا على
1- يعرف مختلف الاوساط
2- يعرف طرق التعقيم

الاختبار القبلي (Pre - Test)

Q1 : Give your answer by
(True) or (False)

- 1- Mixture soil preferably contain 70% sand, 20% Silt, 10% mud.
- 2- Peat moss : Its color is brown formed from remains of algae after analysation..
- 3- The color of Perlite is brown, Its origin from swamps.
- 4- Sterilization by hot water at 80 – 90 C.
- 5- For Chemical Sterilization Basamid used as 50 – 70 g/m² .

Note : Check the answers in key answer page 16

The text

عرض الوحدة النمطية
عرض الوحدة النمطية

Types of agricultural media

- 1- Mixture soil** : For containers preferably contain 70% sand, 20% Silt, 10% mud.
- 2- Sand** : River sands used to fill the pots, wooden boxes, polyethylene sac wich used to plant the seeds or seedlings.
- 3- Peat moss** : Its color is brown formed from remains of algae after analysation. Ability of conserving water is high. Contain 1%N.
- 4- Sphagnum moss** : Light, Formed from swamps acid plants. Ability of conserving water is high. The absorption of water equal 10-20 times from its weight.

5-Vermiculite : One of Mica salts, light, extend with the heat.

Absorbe mach quantity of water.

6- Perlite : Its color is white to gray , from volcanic origin.

7- Leaf mold : Used leaves of some wood trees like oak. Mix layers of leaves with other layers of soil.

Sanitation and Sterilization of Propagation Media

Soil sterilization

1- **sterilization by Steam** : is a [farming](#) technique that [sterilizes soil](#) with [steam](#) in open fields or greenhouses and lath houses. Pests of plant cultures such as weeds, bacteria, [nematodes](#) , fungi and viruses are killed through induced hot steam which causes their cell structure to physically degenerate at mor than 120 C for 30-60 minutes under pressure.

2- Solar sterilization

3-Sterilization by hot water : soil irrigated by hot water at (120 – 150 C). Stay water until cooling, then drain it. After 3 weeks use the soil

3- **Chemical Sterilization (Fumigation chemicals)** : Using some Chemical substances like :

1-Methyl bromide : Used as 50 – 100 g/m² . You can planting after 48 hours from soil treatment.

2- Vapam : Used as 1 – 2 g/m² soil.

3- Basamid : Used as 50 – 70 g/m² .

In the case of **Vapam** and **Basamid** It must waiting 3 weeks at least after treatment to use the soil .Spray thes chemical substances by Special machines.

The addition of manure to soil must be befor Sterilization as 10-13 m²/greenhouse (400 m²). It must ploughing the soil to aeration and Get rid of the effects of toxic substances.

Surface Steaming : Several methods for surface steaming are in use

amongst which are: area sheet steaming, the steaming hood, the steaming harrow, the steaming plough and vacuum steaming with drainage pipes or mobile pipe systems.

Post text

Give your answer by (True) or (False)

- 1- Methyl bromide used as 50 – 100 g/m² ,and can planting after 48 hours from soil treatment.
- 2- Peat moss formed from volcanic origin .
- 3- The addition of manure to soil must be after Sterilization.
- 4- By Chemical Sterilization using some Chemical substances like Vapam and Basamid.
- 5- Soil sterilization by steam in open fields or greenhouses and lath houses.
- 6- Perlite formed from remains of algae after analysation.
- 7- The absorption of water of Sphagnum moss is high equal 10-20 times from its weight.
- 8- Vermiculite is one of mica salts, light, extend with the heat.

key answer:

Pre text

- 1- c
- 2- c
- 3- f
- 4- f
- 5- c

Post text

1. c
2. f
3. f
4. c
5. c
6. f
7. c
8. c

Fourth modular unit

الوحده
النمطيه الرابعه

Propagation of plants – Sexual Propagation - Advantages of Sexual

**Propagation. Pollination – Fertilization – Seed maturation – Seed Storage
– Seed viability – Requirements of germination .**

(Pre - Test) الاختبار القبلي

Circle the correct answer:

- 1- By Sexual method the Plants propagate by seeds produced from pollination and fertilization.
- 2- Seedling trees are generally long-lived, bear more heavily and more hardy.
- 3- Seedlings are cheaper and easy to perform.
- 4-The seedling trees are uniform in their growth.
- 5- Stratification is accomplished by storing seeds in alternate layers with moist sand and subjecting them to warm temperature.

Note : Check the answers in key answer as in page 21

The text

عرض الوحدة النمطية
عرض الوحدة النمطية

Propagation of Plants

The Plants are normally propagated by two methods:

1- Sexual method

2-Asexual method (Asexual Propagation) (Vegetative Propagation)

Sexual method (Sexual Propagation) (Sexual Reproduction)

By Sexual method the Plants propagate by seeds produced from pollination and fertilization and such Plants are known as seedlings.

Advantages of Sexual method :

- 1- Seedling trees are generally long-lived, bear more heavily and more hardy.
- 2- Propagation from the seed is the only way of reproduction where the methods of vegetative Propagation is not possible .
- 3- In-breeding, for the new varieties, the hybrids are first raised from seeds.
- 4- Seeds like those of some Citrus species and some mango varieties are capable to give more than one seedling from one seed .
- 5- The root-stocks which the fruit varieties are budded or grafted

are usually obtained by sexual Propagation.

6- Seedlings are cheaper and easy to perform.

Disadvantages :

1-The seedling trees are not uniform in their growth , yielding capacity and fruit quality as compared to the grafted trees

2.They take more time to bear the crop as compared to the grafted plants.

3-seedling trees become large for economic management, the cost of harvesting , pruning and spraying is more as compared to the grafted trees .

Propagation by seed :

Certain plants of fruit trees , ornamental plants, forest plants and

vegetative crops are usually Propagated by seeds. This method being the easiest and cheapest. In certain fruit like some citrus species and mango the seeds are

polyembryonic, one of these seedlings is of sexual origin and the rest are produced vegetatively from the cells of nucellus are called apogamic seedlings. The apogamic seedlings are identical to the parent in growth and production .

After seed extraction from fruits, the seeds are washed and dried in shade for about two or three days. Some seeds like seeds of citrus, papaya, mango should be sown within a week of their extraction. while the seeds of apple, cherry, peach, pear, plum, etc., do not germinate directly, they require a certain period of rest before they would germinate. They should be stratified before

actual sowing.

Stratification : is accomplished by storing seeds in alternate layers with moist sand and subjecting them to cold temperature.

The seeds of some fruits like Jujube is slow in germination unless treated with acid. Seeds of guava should be soaked in water two weeks before sowing . Placing the seeds in boiling water for 5 minutes has been found to reduce the time required for germination.

The young seedlings in seed-beds are usually subject to "damping off" disease.

Pollination : Is the transfer of pollen grain from the anther of a flower to the stigma of the same flower or of another flower.

Self-Pollination : Is the transfer of pollen grain from an anther to the stigma of pistil of the same flower or by different flowers of the same plant, or by flowers of different plants of the same variety .

Pollinator : An animal that moves pollen from the anthers to the stigmas of flowers, thus effecting pollination. like bees , butterflies, hummingbirds , moths, some flies , some wasps , and nectar feeding bats.

Cross-pollination : The transfer of pollen from the anther of the flower of one plant to the flowers of a different plant.

Double Fertilization: One of generative nucleus in pollen, fuses with the egg cell , producing the zygote (embryo) of the seed .The other generative nucleus fuses with the two polar nucleus, to produce the endosperm.

Storage of Seeds : The seeds generally lose viability when allowed to dry. If the seeds are to be stored for several months, they should be dried quickly after being washed and then mixed with charcoal packed in wooden box and kept in dry cool place (3-13°C) .

The seed consist of three parts : The **outer seed coat**, which protects the seed, and mostly **endosperm** which provides food and nutrients to the embryo, and **the embryo** itself.

The embryo consist of : radicle, plumule and cotyledon.

The seed coat is surrounded the seed except micropyl hole.

Germination : Germination is the process in which a plant emerges from a seed and begins growth.

For seed germination it is essential that the seed be subjected to a favorable supply of moisture. During germination the embryo, and the endosperm if present, swell and push the seed coat off.

Some seeds have impervious seed coats, are unable to take up sufficient water for germination without special treatments. The seed contains relatively large quantities of stored food, in such insoluble forms as starch, fat, and protein. In order for these materials to be used by the seed, they must be transformed into soluble compounds. Certain specific enzymes, produced within the cells carry on this process of digestion which renders the stored foods available. Then, there is a movement of food, from the storage cells to the growing parts of the germinating seed, which are principally the growing points of the radicle and the plumule.

. **Seedlings** : The germination is considered as complete when the seed coat is broken and the radicle and plumule pass outward from the seed, from which time the young plant is regarded as a seedling.

Requirements for Germination: In order for seed to germinate they must have proper conditions of :

1. **Moisture** : The amount of moisture required for germination is usually that completely saturate and soften the seeds.
2. **Temperature** : Temperature has an effect on germination by its influence on the rate of water intake and the speed of the metabolic processes within the seed. Seeds of fruit trees and ornamental plants will germinate under a wide range of temperature.
3. **Light** : Seeds can be classified into four groups based upon the

influence of light on germination :

- a- Light is absolutely essential for the germination of some seeds
Like seeds of *Viscum album*.
- b- The germination of some seeds is hastened by light, but light is not very necessary for the germination like certain varieties of lettuce .
- c- Other seeds have their germination inhibited by light like certain species of wild onions and Lilies which germinate best in total darkness.
- d- Seeds are indifferent to light and germinate equally well in light or darkness like seeds of most horticultural crops such as cabbage, beans, peas, pecan, peach, blackberry.

4.Oxygen : The seed embryo requires oxygen for respiration and the initiation of growth. The embryo needs grand energy for the germination and for its organs to penetrate the coat seed and soil. This energy is obtained by respiration as following equation.
$$\text{Sugar} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O} + \text{Energy}$$

key answer:

Pre text :1,2

**Ministry of high Education and Scientific Research
Technical Institute / Al-shatrah**

Fifth modular unit

الوحده النمطيه الخامسه

Seed Dormancy – Methods of breaking dormancy - Methods of seeds sowing - Methods of transplanting to permanent place - Methods of seeds sowing.

(Pre - Test) الاختبار القبلي

Give your answer by (True) or (False)

- 1- viability of seeds is seeds capability to the germination, when conditions of germination to be available.
- 2- Vigor of parent plant is on of internal factors to seed dormancy.
- 3- In Jiffy-disc and Fiber peat : cabbage, tomato, cucumber, lettuce.
- 4- Alcoholic production extract from *Juniperus communis*
- 5- Perfume, drug, medicine extract from *Pinus brutia*.

Note : Check the answers in key answer page 25

The text

عرض الوحدة النمطية

viability of seeds : Seeds capability to the germination, when conditions of germination to be available.

Besides of environment factors, Seeds viability being influenced largely by these internal factors :

- 1- Vigor of parent plant.
- 2- Age of seed.
- 3- Storage of seed.
- 4- Size of seed.

Methodes of sowing of seeds:

1. In containers or pots: like seeds of Eucalyptus, Casuarinas, carnation
2. In wooden boxes: like seeds of tomato, Citrus, Carnation
3. In seed-beds: like seeds of citrus, Eucalyptus, Casuarinas, Calistemon
4. In polyethylen sacs: like seeds of Melia, Dodonea, Neruim
5. In pits in the permanent place :apricot, Peach, Pistacia, Juglans
6. In Jiffy-disc and Fiber peat : cabbage, tomato, cucumber, lettuce
7. On rows : apricot, Peach, Pistacia, Juglans

Methods of transplanting to permanent place

- 1- Transplanting with mass of mud : This method used in ever green plants, at the end of February and Mars like Citrus , olive .
- 2- Transplanting without mass of mud This method used in deciduous plants, as apricot, peac at January and February .

Seed dormancy :

Seed dormancy is defined as a state in which seeds could not germinate even under environmental conditions normally favorable for germination. Often seed dormancy is divided into two major categories : exogenous and endogenous

Exogenous dormancy : It is caused by conditions outside the embryo and often consist of three subgroups:

- 1- **Physical dormancy** : Which occurs when seed coat is impermeable to water or the exchange of gases. Legumes are typical examples of physically dormant seeds; they have low moisture content and are prevented from imbibing water by the seed coat. Chipping or cracking of the seed coat or any other coverings allows water intake.
- 2- **Mechanical dormancy** : Occurs when seed coats or other coverings are too hard to allow the embryo to expand during germination

3- Chemical dormancy : Includes growth regulators etc, that are present in the coverings around the embryo. They may be leached out of the tissues by washing or soaking the seed, or deactivated by other means.

Endogenous dormancy : is caused by conditions within the embryo itself, and often consist of three subgroups : physiological dormancy, morphological dormancy and combined dormancy, each of these groups may also have subgroups.

1- Physiological dormancy

Physiological dormancy prevents embryo growth and seed germination until chemical changes occur. These chemicals include inhibitors (Absciscic acid) that often retard embryo growth. Physiological dormancy is indicated when an increase in germination rate occurs after using of gibberellic acid (GA3) or when up to 3 months of cold (0-10°C) or 15°C stratification in Physiological dormancy is broken when inhibiting chemicals are broken down or are no longer produced by the seed; often by a period of cool moist conditions, normally below (+4C) 39F, such as many species in *Ranunculaceae* and *Paeonia*

2- Morphological dormancy

Immature embryos - some plants release their seeds before the tissues of the embryos have fully differentiated, and the seeds ripen after they take water in soil, germination can be delayed from a few weeks to a few months.

3- Combined dormancy

Seeds have both morphological and physiological dormancy.

key answer:

Pre text

- 1- f
- 2- f
- 3- f
- 4- c
- 5- f

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الراوي وعادل وعلي الدوري المشاتل وتكثير النباتات دار الكتب للطباعة والنشر جامعة الموصل وزارة التعليم الطبعه 2

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Sixth modular unit

الوحده النمطيه السادسه

**Asexual Propagation (vegetative propagation) –
Advantages of Asexual Propagation - Disadvantages of
Asexual method - Methods of vegetative propagation**

(Pre - Test) الاختبار القبلي

Give your answer by (True) or (False)

- 1- Asexual propagation is increasing the numbers of plants through the use of any part of the plant except seed.
- 2- In asexual propagation the plants have identical characteristics as their parents.
- 3- In Some species or varieties, fruits are seedless like apple.
- 4- The vegetatively Propagated plants are uniforme in growth, yield
- 5- In vegetative Propagation, it is possible to regulate the tree size, fruit quality

Note : Check the answers in key answer page 28

The text

عرض الوحدة النمطية

Asexual Propagation (vegetative propagation)

multiplication or increase the numbers of plants through the use of any part of the plant can reproduce by which except seed. In case of asexual Propagation of Plants, a vegetative part of Plant, such as leaf, stem or root is placed in such an environment that it develops into a new plant. The new plant possesses all characteristics of the parent. and when place a part of plant called a **scion** on other plant known as **stocks**, the plants, raised, are called **grafted** or **budded plants**

Advantages of Asexual method :

- 1-The plants have identical characteristics as their parents.
- 2-The vegetatively Propagated plants are uniform in growth, yield and fruit quality.
- 3- Uniformity in fruit quality in the trees raised vegetatively makes harvesting and marketing easy.
- 4- In Some species or varieties, fruits are seedless like Banana, Pineapple, lemon, some varieties of grape, Guava, etc.
- 5-Vegetatively Propagated fruit trees come into bearing earlier than the seedling trees.
- 6- Some fruit varieties are susceptible to certain diseases. By budding or grafting, those varieties can be grown without pest or disease incidence. For example, European grapes are susceptible to the pest Phylloxera. By budding or grafting European grapes onto American grape rootstocks, this danger can be avoided.
- 7- It is possible to adapt such varieties to unfavourable soil and climatic conditions by grafting them upon suitable rootstocks. For example, in very cold regions, apples are successfully grown on Russian stock or crab apple and, similarly, oranges do well on trifoliolate orange stock in sub-tropical regions.
- 8- In vegetative Propagation, it is possible to regulate the tree size, fruit quality, precocity, etc by using different rootstocks , Like Golden Delicious apple tree on Malling XVI rootstock may be two to three times bigger than the same variety grafted on Malling IX . Similarly Pear tree can be dwarfed on Quince A or C rootstocks. Dwarf trees in some cases have certain advantages like early bearing, better fruit quality and more trees per hectare.

Disadvantages of Asexual method :

1. The vegetatively Propagated plants particularly the budded and grafted plants are not generally so vigorous and long-lived as the seedling trees .
2. New varieties can't be evolved by the vegetatively Propagated

Methods of propoagation

- 1- By Cuttings**
- 2- layering**
- 3- Suckers**
- 4- Bulbs and Corms**
- 5- Rhizomes**
- 6- Offsets**
- 7- Budding and Grafting**

key answer:

Pre text

- 1- c
- 2- f
- 3- c
- 4- f
- 5- f

**Ministry of high Education and Scientific Research
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Seventh modula الوحدة النمطية السابعه

propagation by cuttings –Types of cuttings – Sorts of stem cuttings
- Origin of roots in hardwood cuttings – factors influencing root formation.

(Pre - Test) الاختبار القبلي

Give your answer by true or false ?

- 1- Cuttings can be made from root, leaf or Stem Parts of plant.
- 2- apple, cherry, kaki, pear can propagate by root cuttings.
- 3- Stem Cuttings divide to three types.
- 4- Begonia, Pepromia and bryophyllum propagated by stem Cuttings.
- 5- Cuttings of deciduous plants are taken during the summer season and planted in late summer.

Note : Check the answers in key answer page 31

The text

عرض الوحدة النمطية
عرض الوحدة النمطية

Propagation by Cuttings :

Cuttings can be made from root, leaf or Stem Parts of plant.

a- Root

Cuttings : cut pieces of roots about 10 to 25cm. long which are usually planted in horizontal position in sand or soil .Guava, apple, cherry, kaki, pear, pican, plum, blackberry can be Propagated by root cuttings.

b- Leaf Cuttings :Many plants with thick leaves can be propagated by leaf Cuttings like *Sanseveria*, *Pepromia*, *bryophyllum*, *Begonia*.

c- Stem Cuttings : Divided to three types (sorts):

1. Herbaceous Cuttings : These are made from herbaceous plants, such as those frequently grown in greenhouse they require special attention with regard to temperature and moisture to prevent

wilting. Like geranium, coleus, petunia, chrysanthemum, tomato, sweet potato.

- 2. Softwood Cuttings :** Stem Cuttings of trees or shrubs that are made of current season shoots, they are made 10 -15 cm. long from parts below the terminal with some leaves. These cuttings are planted in greenhouse such as blueberry, *Jasminum*, *Myrtus*.
- 3. Hardwood Cuttings :** These are made from a wide variety of plants including deciduous types, conifers, and broad-leaved evergreens. Cuttings of deciduous plants are taken during the dormant season and planted in late winter. Deciduous cuttings made from 15-25 cm. Many species of plants may be propagated by hardwood cuttings in the nursery row like Grape, fig, rose, *Ligustrum*, Citron, Lemon.

Origin of Roots in Hardwood Cuttings:

The adventitious roots of hardwood cuttings may arise in the cambium layer.

Factors Influencing Root Formation

- 1- Media :** Any medium used in the propagation bed should be easily worked to facilitate planting of the cuttings, and particularly the removal of the cuttings with little damage to roots, and it should be retentive of moisture, well drained and free from fungi and bacteria which will attack cuttings.
- 2- Temperature :** Control of temperature is very important factor in the rooting of cuttings. High temperature is favorable for the rooting of some species, stimulates a high rate of transpiration particularly for herbaceous and softwood cuttings, and the humidity is maintained. In the case of hardwood cuttings, planted in the bed in winter or early spring, the primary consideration is to induce root activity before shoot growth occurs. For this reason it is desirable to provide bottom heat, so that the bed temperature is 5 to 10 °C. warmer than the surrounding air, by electric heating or heating pipes, placed under the bed. Soil temperature of 18 to 25°C give satisfactory

results with many plants.

- 3- **Humidity** : A high degree of humidity should be maintained in the bed cuttings in order to prevent drying and death of the cuttings before they have opportunity to root.
- 4- **Growth regulators** : Certain growth regulators or hormones have been used to stimulate plant growth especially root formation in cuttings. The most widely used of these are Indole Acetic Acid (IAA), Indole Butyric Acid (IBA), Naphthalene Acetic Acid (NAA), Hormodin.

key answer:

Pre text

- 1 - c
- 2 - c
- 3 - c
- 4 - f
- 5 - f

Eighth modular unit

الوحده النمطيه الثامنه

Scientific visit to one of the Governmental nurseries

Ningth modular unit

الوحده النمطيه التاسعه

Auxins - Kinds of Auxins - Auxin used methods in the stem cuttings - Bulbs- Forms of bulbs – Suckers - Plants propagated by suckers.

(Pre - Test) الاختبار القبلي

Give your answer by (True) or (False)

- 1- Auxins are substances often used to promote initiation of adventitious roots
- 2- Auxins can also be used to promote uniform flowering, fruit set and to prevent premature fruit drop.
- 3- In quick dip method soaking the bases of the cuttings in auxin solution with certain concentration for many hours .
- 4- Suckers arise from the adventitious buds on the roots or under ground parts of stems of some trees.
- 5- Gladulus and Crocus return to Root tubers, While Dahlia and Begonia are from corms.

Note : Check the answers in key answer as in page 34

The text

عرض الوحدة النمطية

Auxins

Auxins are substances often used to promote initiation of adventitious roots and used in the commercial propagation of plants to root stem cuttings. They can also be used to promote uniform flowering, to promote fruit set, and to prevent premature fruit drop. Like : Natural auxin Indole-3-acetic acid (IAA).

Synthetic auxin : Indole Butyric Acid (IBA), Naphthalene acetic acid (NAA), 2,4-dichlorophenoxyacetic acid (2,4-D).

Several methods of introducing the auxins in the cuttings have been used.

a. Quick dip method : To soak the bases of the cuttings in auxin solution with certain concentration for many seconds .

b. prolonged soaking methods : To soak the bases of the cuttings in dilute solution of auxin (5-100ppm.) for 24 h.

c. Powder method : To put the end of wet cuttings in powder of Auxin (ceradix or IBA), then planted in bed.

Callus formation : Callus formation at the basal end of the cutting was considered to be a vital factor in the rooting of hardwood cuttings. Callused cuttings respond more readily to chemicals used to aid in root formation than those not callused.

Propagation by Bulbs

A bulb is a modified short stem in which the central axis is vertical surrounded with fleshy leaves. The central axis has a terminal growing point and axillary buds. Most bulbs are subterranean. Some of them are above the ground.

Forms of the bulbs : divid to :

1- true bulbs : like onion, Tulip, Narcissus, Hyacinth.

2- Corms : like Gladiolus, Crocus, Frezia Anemon.

3- Rhizomes : like Canna, Iris, Asparagus, Lily of the Valley.

4- Tubers : two kinds

a- Stem tubers : like Potato, Artichoke,

b- Root tubers : like Sweetpotato, Dahlia, Gloxinia, Begonia.

It can propagate some bulbs by division and take the growing bulbs to plant them in early spring. like Amaryllis, Polyanthus, Agapanthus.

Some bulbs prefer humid media like Canna, Crinum, Strelitzia, Hemerocallis.

Propagation by Suckers

Suckers arise from the adventitious buds on the roots or under ground parts of stems of some trees. If soil is mounded up around the base of these shoots, they will develop good root systems in time and can be successfully transplanted. like Punica, Guava, olive, apple .

key answer:

Pre text

- 1- c
- 2- c
- 3- c
- 4- f
- 5- c

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Tenth modular unit

الوحده النمطيه
العاشره

Layering - Methods of Layering – Sorts of ground Layering- Air Layering . Offsets – Runners (stolons) – Rhizomes. .

The text

عرض الوحدة النمطية
عرض الوحدة النمطية

Propagation by Layering

a. Ground Layering:

1- Simple Layering :

Layering is made by bending the branches to the ground and covering the portion just below 3-6 inches of soil in early spring. The tip of the shoot is left exposed, to form leaves as new plant. Many species of plants can be grown from simple layering like Punica, fig, apple, olive, grape, blackberry.

2- Compound Layering :

Long shoots that are alternately covered some points. The roots will form at each node where they are covered and develop new shoots from buds at nodes that are not covered. They are made in late winter and early spring and separated after one or two full seasons in order to develop a strong root system. Compound Layering is adapted to the propagation of the Muscadine grape and Philodendron.

3- Mound (tool) Layering :

This method is especially favorable for the rooting of apple, plum and quince rootstock. Pruning the plants hardly and buried till 5cm appear. before growth starts, then many new shoots arise from the base during the following season.

b- Air Layering (marcottage)

A ring of bark about 3cm long, is removed below the bud from the portion of the selected shoots. It is covered with peat-moss and wraps with a piece of plastic to keep the moisture. The plants are propagated by this method like *Ficus elastica*, pomegranate, lime, pummelo, *Bougainvillea*.

Propagation by Rhizomes:

A Rhizome is a stem growing in a horizontal direction slightly below the surface of the soil, containing nodes and internodes. Propagation in spring such as, permoda grass, *Iris germanica*.

Stolons :

Stems which grow horizontally above-ground or below ground arise from an axillary bud near the base of the plant form new plants at the nodes. Stolons are often called runners. Like strawberry, ranunculus, spider plant, Bermuda grass.

Offsets :

Is a side branch get out near the ground surface around trunk containing the roots . it can separate these parts and planting them as independant plants .like some species of bulbs such as tulip or lily. Also the Date palm , Banana and Ananas propagated by this method.

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Eleventh modular unit

الوحده النمطيه الحاديه عشر

**Vegetative propagation by Budding – Purposes for Budding –
Factors Influencing the success of Budding- Budding Methods.**

(Pre - Test) الاختبار القبلي
(Pre - Test) الاختبار القبلي

Circle the correct answer :

- 1- One of the purposes of budding and grafting is maintain of vegetative strains.
- 2- Its possible to budding of different varieties on one tree.

- 3- The T- Budding is the most popular methods of budding..
- 4- Its possible to overcome unfavorable condition.
- 5- T- Budding and chip budding are from Types of Budding.
- 6- **Note : Check the answers in key answer as in** page 38

7- The text

عرض الوحدة النمطية
عرض الوحدة النمطية

Budding and Grafting

The Important (purposes) of Budding and Grafting

- 1- Maintain of vegetative strains
- 2- Overcome on unfavorable condition
- 3- Using double grafting to overcome on incompetability of scion and rootstock.
- 4- Changing the unwanted variety to desired variety.
- 5- Hastened the mature of trees.
- 6- To study the virus diseases.
- 7- Budding of different varieties on one tree.

Budding : A single bud of plant used as a scion and inserted inside the bark of the root-stock. It is widely practised in citrus, jujube and deciduous fruit trees.

Types of Budding

1- T- Budding

2- Chip Budding

The T- Budding is the most popular methods of budding. It is used for propagating plants, such as roses, peaches, apples, Citrus.

key answer:

Pre text

- 1- c
- 2- c

3- c

4- c

5- f

Ministry of high Education and Scientific Research
Technical Institute / Al-shatrah

Twelfth modular unit الوحدة النمطية الثانيه عشر

Grafting - Purposes for Grafting- Grafting Methods – Whipe Grafting , Splice G. , Side G. , Side tongue G. , Cleft G. , Wedge G. , Bridge Grafting

(Pre - Test) الاختبار القبلي

Circle the correct answer :

- 1- The impact of the rootstock in the shape of the tree and its growth
- 2- Effect of rootstock in the transmission of diseases .
- 3-The impact of the rootstock on in the fruit properties..
- 4- Its impact on rootstock grown streingth.
- 5-Scion impact on the resistance of the rootstock cooler

Note : Check the answers in key answer as in page 41

The text

عرض الوحدة النمطية عرض الوحدة النمطية

Grafting : A shoot or a branch (cutting) used as a scion and inserted or joined with the root-stock. for example pear, Morus, Fig, Oak .

Methods of Grafting :

- 1- Whip Grafting
- 2- Tongue Grafting
- 3- Cleft Grafting
- 4- Side Grafting
- 5- Bark Grafting
- 6- Bridge Grafting
- 7- Double Grafting

The effects of rootstocks on scions : The rootstock affect on scion in the following forms :

- 1- The impact of the rootstock in the shape of the tree and its growth .
- 2- Increase the resistance of scion to cold .
- 3- Effect of rootstock in the transmission of diseases.
- 4- The impact of the rootstock in the buds open.
- 5- The impact of the rootstock in the early yield.
- 6- The impact of the rootstock on the fruit properties.
- 7- The impact of the rootstock on trees resistance to some diseases.

effects of scion on rootstocks :

The affect of scion on rootstock in the following forms :

- 1- Its impact on rootstock grown strength.
- 2- Its impact on the resistance of the rootstock cooler.
- 3- Its impact on deepening the roots of rootstock in the soil.

key answer:

Pre text

- 1- c
- 2- c
- 3- f
- 4- c
- 5- c

Thirteenth modular unit

الوحده النمطيه
الثالثه عشر

Propagation Via Tissue culture – advantages of Tissue culture - Tissue culture laboratory - preparation chamber - Sterilization - Growyh room .

(Pre - Test) الاختبار القبلي

Circle the correct answer :

- 1- Plant Tissue Culture refers to the technique of growing plant cells, tissues or other plant parts in a nutrient medium .
- 2- Production of very large numbers of plants using Plant Tissue culture.
- 3- Production throughout the year because of control over

environmental conditio

- 4- sterilization processes and culture of the plant parts take place in growth room
- 5- Some advantages of tissue culture to maintain the genetic properties of propagated plants.

●Note : Check the answers in key answer page 43

The text

عرض الوحدة النمطية
عرض الوحدة النمطية

Plant tissue culture :

Plant Tissue Culture refers to the technique of growing plant cells, tissues, organs, seeds or other plant parts in a sterile environment on a nutrient medium , often to produce [clones](#) of a plant.

Different techniques in plant tissue culture may offer certain advantages including:

- 1- Production of very large numbers of plants using a small portion of the mother plant.
- 2- Production throughout the year because of control over environmental conditions.
- 3- Maintain the genetic properties of propagated plants.
- 4- Vegetative propagation of plants that are difficult to propagate by other methods.

- 5- Economy in the space allocated to the propagation.
- 6- Genetics and plant improvement.
- 7- Production of plants free of viral diseases.
- 8- Study of various plant diseases .
- 9- Obtainment to secondary materials

Plant tissue culture relies on the fact that many plant cells have the ability to regenerate a whole plant (totipotency). Single cell, plant cells without cell walls (protoplasts), pieces of leaves, roots, can often be used to generate a new plant on culture media given the required nutrients and plant hormones.

Tissue culture laboratory : contains :

- 1- preparation chamber :** contains work tables , Sinks, water taps, balances, chemicals, stock solutions, Frozen, a place of storage, a steam sterilization (Autoclave) , mixture / heater , stirrer/hot plate , pH-meter , test tubes , Bottles with wide craters, petry dishes, cotton , aluminum paper, etc.
- 2- Sterilization room :** Take place within this room all sterilization processes and culture of the plant parts.
- 3- Growth room :** This room use to for growth the plants after planting.

Sterilization:

In order to provide sterile conditions are sterilized all the equipment and tools used and sterilization the nutrient medium and part of plant and the place in which to conduct the process of agriculture.

key answer:

Pre text

1, 2, 3 , 5

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Fourteenth modular unit **الوحده النمطيه الرابعه عشر**

.room media preparation - Nutrient medium

**Techniques - Choice of explant - tissue culture medium –
Applications - Sterilization of explants - Micropropagation stages -
Establishment stage - Multiplication stage - Rooting stage -
Acclimatization stage .**

(Pre - Test) الاختبار القبلي
(Pre - Test) الاختبار القبلي

Give your answer by (True) or (False)

- 1- Forest conservation is the science that deals with the effect of vital and non vital factors.
- 2- vital factors include viruses, bacteria, fungi and others .
- 3- There is no mutual relationships between plants and animals.
- 4- Some animals feed on some neighborhoods harmful.

5- Physiological dependence are two forms of symbiosis and parasitism.

●Note : Check the answers in key answer page 47

The text

عرض الوحدة النمطية
عرض الوحدة النمطية

Techniques

Modern plant tissue culture is performed under aseptic conditions under filtered air. The tissue obtained from the plant to culture is called an explant, so surface sterilization of explants in chemical solutions (usually alcohol) . Explants are then usually placed on the surface of a solid culture medium, but are sometimes placed directly into a liquid medium.

Choice of explant

The tissue obtained from the plant to culture is called an explant., it can be grown from any part of the plant.

The most commonly used tissue explants are the meristematic ends of the plants like the stem tip, auxiliary bud tip and root tip. These tissues have high rates of cell division and either concentrate or produce required growth regulating substances including auxins and cytokinins.

tissue culture medium

Culture media used for *in vitro* cultivation of plant cells are composed of following basic components:

- 1- Complex Mixture of Salts: Essential elements, or mineral ions
- 2- Organic Supplement: vitamins and/or amino acids
- 3- Carbon Source: usually sugar sucrose
- 4- Gelling Agents (agar)
- 5- Plant Growth Regulators
- 6- Antibiotics

Applications

Plant tissue culture is used widely in plant science ; it also has a number of commercial applications. Applications include:

1. Micropropagation is widely used in [forestry](#) and in floriculture.
2. Micropropagation can also be used to [conserve](#) rare or [endangered](#) plant species.
- 3- A plant breeder may use tissue culture to screen cells rather than plants for advantageous characters, e.g. herbicide resistance/tolerance.

Micropropagation stages

1-Selection of explants

2-Establishment stage

3- Multiplication stage

4- Rooting stage

5- Acclimatization stage .

key answer:

Pre text

- 1- c
- 2- c
- 3- f
- 4- c 5-c

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Technical Institute / Al-shatrah**

Fifteenth modular unit

الوحده النمطيه الخامسه عشر

Pruning and Training - The objectives of Pruning . Plant Parts – Framework - Methods of Training

(Pre - Test) الاختبار القبلي
(Pre - Test) الاختبار القبلي

Give your answer by (True) or (Fals)

- 1- Pruning is removal of a part or parts of a woody plant for specific purpose.
- 2- Training is a pruning in the early years to building up of the initial framework of trees or shrubs.
- 3- The objectives of Pruning is to train the plant.
- 4- The typical shrub or tree has 2 main parts
- 5- There are 6 principal methods of training young pre-bearing fruit trees .

●Note : Check the answers in key answer page 55

The text

عرض الوحدة النمطية
عرض الوحدة النمطية

Pruning and Training

Pruning : It can be described as the removal of a part or parts of a woody plant for specific purpose.

The objectives of Pruning are :

- 1- To train the plant.
- 2- To maintain the plant health.
- 3- To obtain a balance between vegetative growth and flowers.
- 4- To improve the quality of flowers, fruits, foliage or stem.
- 5- To restrict growth.

Training : Pruning in the early years to building up of the initial framework of trees, shrubs, climbers for easier management in later years.

Plant Parts :

The typical shrub or tree has 4 main parts : A root system, trunk, framework, leaves, and flowers producing seeds.

Framework : Consists of a central trunk, branches, sub- branches. The branches serve several functions. They hold the plant erect, and they carry food and nutrients between leaves and roots.

Methods of Training

There are 4 principal methods of training young pre-bearing fruit trees :

1-The central leader : fitted for Juglans, pecan, and some tropical fruits. Usually do not remove the top of main stem. Select some branches on stem and shorted them as main branches. In the third and fourth year, the training of the side branches takes priority.

2- Modified-Leader : The modified-Leader system of training is the most used at the present time and has much to recommend. Selection of leader and main branches should be made in winter, and cut the top about 3 feet from the ground. This methods fitted for many species like apple, peach, plum, pear, apricot.

3- Open-Center : In this type of training, the all branches originate from small area on the main trunk after cut the stem about 2 feet from the ground (low-head).Open center allows full sun shine to reach each branch. Fitted for peach , fig , some of plum and apple.

4- Modern methods : Some species like pear and apple can trained

in espalier upon wires on form palmette, oblique or horizontal.

Post test

Give your answer by (True) or (Fals)

- 1- Open-Center is the modified-Leader system of training is the most used at the present time and has much to recommend.
- 2- In Modern methods all the branches originate from small area on the main trunk.
- 3- The central leader : fitted for Juglans, pecan, and some tropical fruits.
- 4- The objectives of Pruning is to obtain a balance between vegetative growth and flowers.
- 5- Training is a pruning in the early years to building up of the initial framework of trees or shrubs.

key answer:

Pre text

- 1- c
- 2- c
- 3- c
- 4- f
- 5- f

Pre text

- 1- f
- 2- f
- 3- c
- 4- c
- 5- c