

MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END THEORY EXAMINATION
B.Sc. (Hons.) Horticulture

Semester : II (New) Term : II Academic year: 2021-22
Course No. : H/FS-122 Title : Plant propagation and nursery management
Credits : 2 (1+1)
Day and Date: Time (hrs): 2 hrs. Total Marks: 40

- Note**
1. Solve ANY EIGHT questions from SECTION 'A'
 2. All questions from SECTION 'B' are compulsory
 3. All questions carry equal marks.
 4. Draw neat diagrams wherever necessary

SECTION 'A'

Q 1. What is plant propagation? Enlist the methods of plant propagation and write advantages and disadvantages of asexual propagation.

Ans: Definition- Plant propagation means the production of seedlings/plants through seeds or any vegetative part of the plant, viz., stem, leaf, root, corm, bulb, rhizome, sucker etc.

Methods of propagation- 1) Sexual propagation 2) Asexual propagation

Advantages of asexual propagation:

Four points of advantages and two points of disadvantages.

1. Asexually propagated plants are true to type to their mother plants.
2. Asexually propagated plants have short juvenile phase and bear flowers and fruits in the early age (3-4 years) than seedling plants.
3. Vegetative propagated plants are smaller in stature and hence management operations like spraying, pruning and harvesting etc. become easy.
4. Plants in which seed setting does not take place (e.g. pineapple and banana), asexual propagation serves as a substitute for sexual propagation.
5. Using asexual methods, desirable characters of a mother plant can be perpetuated/ multiplied easily.
6. It is possible to convert a non-productive local variety into productive improved variety by using asexual methods.

Disadvantages of asexual propagation:

1. Asexual propagated plants have shorter life-span.
2. Asexual propagation restricts diversity.
3. Sometimes asexual propagation disseminates diseases e.g. Tristeza virus in citrus.
4. Technical skill is required.

Q.2. What is seed dormancy? Describe in brief treatments used for breaking seed dormancy.

Ans: Definition- Inability of a viable seed to germinate under favourable conditions such as, temperature, water, light, oxygen, humidity etc.

Methods of breaking seed dormancy: (Explanation with suitable examples)

I. Scarification - i. Mechanical ii. Acid (Chemical) iii. Hot water scarification

II. Stratification - i. Outdoor stratification ii. Refrigerated stratification

Q 3. Enlist different methods of grafting. Describe in detail about 'stone grafting' with example.

Ans: Methods of grafting:

Soft wood grafting, Crown grafting, Bridge grafting, Veneer grafting, Approach grafting, Stone (Epicotyl) grafting.

Stone grafting- Mango. Age of root stock and scion. Explanation with figure.

Q. 4. Describe various structures used for plant propagation.

Ans: Glasshouse, shade net house, mist house, humidifiers, polyhouse, hot beds, cold frames etc.

Q. 5. What is sexual propagation. Describe in brief its advantages and disadvantages.

Ans: Definition- Refers to multiplication of plants by seeds.

Advantages of sexual propagation:

1. Simple and easy method, Seedling plants are long lived,
2. Plants have greater tolerance to adverse soil and climatic conditions and diseases.
3. Seed propagation makes feasible to propagate plants like papaya and coconut in which asexual means of propagation is not common.
4. Hybrids can only be developed by sexual means.
5. Seed is the source for production of rootstocks for asexual propagation.
6. Seeds, if stored properly can be kept for longer duration /period for future use.

Disadvantages of sexual propagation:

1. Seedling plants are not true to type to the mother plants
2. Seedling plants have long juvenile phase (6-10 years) and hence flowering and fruiting commences very late.
3. Sexually raised plants are generally tall and spreading type and thus are cumbersome for carrying out various management practices like pruning, spraying, harvesting etc.
4. Seeds of many fruits are to be sown immediately after extraction from the fruits as they lose their viability very soon e.g. cashew nut, jamun, jackfruit, citrus, mango and papaya.
5. Seedling plants usually produce fruits inferior quality.

Q 6. Define apomixis. Describe various types of apomixis and its significance in horticulture.

Ans: Apomixis- Development of a embryo without fertilization directly from egg cell or nucellus is called as a apomixis.

Types of Apomixis –

- i. Recurrent
2. Non-recurrent
3. Adventitious
4. vegetative

Significance of Apomixis -

1. Apomixis produces new hybrid breeds in lesser time.
2. Hybrid varieties of seeds having better yield and quality can be produced.
3. Disease-free plants can be obtained
4. It transfers all the characters to the progeny.
5. Manifold yield of crops

Q. 7. Write short notes (Any Two)

Ans: a. **Shield budding-** For shield budding, one year old rootstock seedlings of 25 - 35 cm height and 2 - 2.5 cm thickness is selected.

- "T" shaped cut is made on the selected portion of the stock with the help of a sharp budding knife. The incision should be given through the bark not the wood.
- The two flaps of bark are loosened with the help of budding knife.
- This shield piece containing a bud is inserted in the "T" cut made on stock and is tied with a polythene strip but the bud should be expose.
- The selected bud of desired cultivar is inserted 15 - 20 cm above the ground level.
- When bud healing process is over, the bud may attain a height of 15 - 20cm, the remaining portion of the stock is cut to about 10 - 15cm above the bud.
- This method is carried out in citrus, rose and apple, pear, peach, plum, apricot, cherry, are propagated by this method
(draw diagram)

b. **Chimera-** Mutation occurring in single cell is called as chimera.

Different types are Periclinal, mericlinal, sectorial and graft chimera.

c. Effects of hardening -

1. Improves the quality.
2. Plant resists the loss of water
3. It increases the presence of dry matter in plant.
4. Decrease the transpiration per unit area of leaf
5. Decrease the rate of growth of plant
6. Plant can withstand better against unfavorable weather condition

Q. 8. Define plant growth regulators and give its use in plant propagation with example.

Ans: Plant growth regulators (PGR) are defined as organic compounds, other than nutrients, that affect the physiological processes of growth and development in plants when applied in low concentration.

Use in PGR in plant propagation:

1. Easy to rooting of cutting
2. Seed germination
3. Breaking dormancy
4. Induce bud emergence

Q. 9 Define micropropagation. Write its advantages and disadvantages.

Ans: Micropropagation refers to the production of plants from very small plant parts, tissues or cells, grown aseptically in a test tube or containers under controlled nutritional, environmental and aseptic conditions.

Advantages of micropropagation:

1. Production of large propagating material in shorter time
2. Production of disease-free plants
3. Clonal propagation of parental stock for hybrid seed production
4. Year-around nursery production
5. Useful in propagation of dioecious plants
6. Breeding cycle is reduced

Disadvantages of micropropagation:

1. Expensive and sophisticated facilities, trained personnel and specialized techniques are required
2. High cost of production results from expensive facilities and high labour inputs
3. Contamination or insect infestation can cause high losses in a short time
4. Higher level of somatic variation
5. Poor establishment of the plantlets in the field

Q.10 Explain the criteria for selection and maintenance of mother tree in plant propagation.

Ans: Criteria for selection

1. **Creation of budwood bank**- Improved high yielding and commercial trees
2. **Selection of varieties** - Identification and listing of cultivars, regular yields of high quality fruits, disease and pest resistant
3. **Indexing of viral diseases** - Trees should be indexed for virus and then categorized accordingly.

Maintenance of mother tree

1. Identified mother trees are used to develop progeny in large number near to the nursery site at 2x2 m distance.
2. The trees are properly labeled and used for scion wood.
3. Progeny trees are heavily pruned to produce scion wood in bulk.
4. Adequate plant protection measures are also adopted to keep these progeny free from the insect/pests and diseases.
5. Old trees of selected varieties can also be pruned severely to develop forced shoots to be used as scion source in the orchard site.

SECTION 'B'

Q 11. Define the following

- Ans:
- a) **Corm**- It is a specialized organ with presence of nodes and internodes.
 - b) **Stock-scion relationships** - different aspect of rootstocks will influence the performance of a scion cultivar or *vice versa* is known as stock-scion relationship.
 - c) **Polyembryony**-Presence of more than one embryo in a seed.
 - d) **Rootstock**- Lower portion of a graft is called as a rootstock.

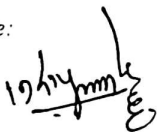
Q. 12 Match the following

Ans,

'A'		'B'
1. Air layering	→	b. Pomegranate
2. Bulb	→	c. Tuberose
3. Corms	→	d. Gladiolus
4. Shield budding	→	a. Sweet orange

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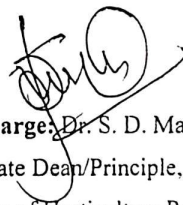
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